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Regulatory

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*PPR*

**NORTHERN STATES POWER COMPANY**

MINNEAPOLIS, MINNESOTA 55401



March 1, 1977



Mr J G Keppler, Director, Region III  
Office of Inspection & Enforcement  
U S Nuclear Regulatory Commission  
799 Roosevelt Road  
Glen Ellyn, IL 60137

Dear Mr Keppler:

MONTICELLO NUCLEAR GENERATING PLANT  
Docket No. 50-263 License No. DPR-22

Effluent and Waste Disposal Semiannual Report  
July 1 - December 31, 1976

In accordance with the Monticello Technical Specifications, Appendix A to Operating License DPR-22, we are submitting two copies of the Effluent and Waste Disposal Semiannual Report covering the period July 1, 1976 through December 31, 1976.

Yours very truly,

*L. O. Mayer*

L O Mayer, PE  
Manager, Nuclear Support Services

LOM/DMM/deb

cc: DIR, IE, USNRC (25)  
DIR, MIPC, USNRC (2)  
MPCA  
Attn: J W Ferman  
G Charnoff

Attachment

2153

9211250341 761231  
PDR ADOCK 05000263  
R PDR

MONTICELLO NUCLEAR GENERATING PLANT  
NORTHERN STATES POWER COMPANY

PERIOD: JUL - DEC 1976  
LICENSE NO. DPR-22

EFFLUENT AND WASTE DISPOSAL SEMIANNUAL REPORT

SUPPLEMENTAL INFORMATION

w/ITR 3-1-77

1. REGULATORY LIMITS - QTRLY LEVELS REQUIRING REPORT TO NRC

A. NOBLE GASES:

$$50*(QTV*NBARV+QTS*NBARS) = 1 \text{ AND}$$

$$25*(QTV*MBARV+QTS*MBARS) = 1$$

QTV = NOBLE GAS RELEASE RATE FROM BLDG VENTS(CI/SEC)  
QTS = NOBLE GAS RELEASE RATE FROM PLANT STACK(CI/SEC)  
NBARV = VENT AVG GAMMA AIR DOSE FACTOR(REM/YR PER CI/SEC)  
NBARS = STACK AVG GAMMA AIR DOSE FACTOR(REM/YR PER CI/SEC)  
MBARV = VENT AVG BETA AIR DOSE FACTOR(REM/YR PER CI/SEC)  
MBARS = STACK AVG BETA AIR DOSE FACTOR(REM/YR PER CI/SEC)

B. IODINES AND PARTICULATES:

$$50*(3.7E05*QV+2.5E04*QS) = 1$$

QV = BUILDING VENT RELEASE RATE OF IODINES AND PARTICULATES  
WITH HALF-LIVES GREATER THAN 8 DAYS (CI/SEC)

QS = PLANT STACK RELEASE RATE OF IODINES AND PARTICULATES  
WITH HALF-LIVES GREATER THAN 8 DAYS (CI/SEC)

C. LIQUID EFFLUENTS:

CONCENTRATION - 10CFR20, APP B, TABLE II, COL 2,  
AND NOTES THERETO

TOTAL QUANTITY - 2.5 CI/QUARTER

2. AVERAGE DOSE FACTORS FOR NOBLE GASES  
(REM/YEAR PER CI/SEC):

	VENT RELEASES		STACK RELEASES	
	1ST QTR	2ND QTR	1ST QTR	2ND QTR
KBAR (BODY GAMMA)	5.98E 00	6.02E 00	1.56E 00	1.58E 00
LBAR (SKIN BETA)	4.50E 01	4.45E 01	1.64E 00	1.62E 00
MBAR (AIR BETA)	4.76E 01	4.71E 01	1.74E 00	1.72E 00
NBAR (AIR GAMMA)	6.31E 00	6.36E 00	1.62E 00	1.65E 00

3. AVERAGE ENERGY:

(NOT APPLICABLE)

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SUPPLEMENTAL INFORMATION (CONTINUED)

4. MEASUREMENTS AND APPROXIMATIONS OF TOTAL RADIOACTIVITY:

A. NOBLE GASES:

CONTINUOUS GROSS ACTIVITY MONITORS IN REACTOR BUILDING VENT AND PLANT STACK EXHAUST STREAMS. WEEKLY ISOTOPIC ANALYSIS OF AIR EJECTOR STREAM AND GAS DECAY STORAGE TANK CONTENTS PRIOR TO RELEASE.

B. IODINES IN GASEOUS EFFLUENT:

CONTINUOUS MONITORING WITH CHARCOAL CARTRIDGES IN REACTOR BUILDING VENT AND PLANT STACK EXHAUST STREAMS WITH WEEKLY REMOVAL FOR ANALYSIS.

C. PARTICULATES IN GASEOUS EFFLUENT:

CONTINUOUS MONITORING WITH PARTICULATE FILTERS IN REACTOR BUILDING VENT AND PLANT STACK EXHAUST STREAMS WITH WEEKLY REMOVAL FOR ANALYSIS.

D. LIQUID EFFLUENTS:

TANK SAMPLE ANALYZED PRIOR TO RELEASE WITH CONTINUOUS MONITORING OF GROSS ACTIVITY DURING RELEASE.

5. BATCH RELEASES:

A. LIQUID:

1. NUMBER OF BATCH RELEASES	0	
2. TOTAL TIME PERIOD FOR BATCH RELEASES	NA	MIN
3. MAXIMUM TIME PERIOD FOR A BATCH RELEASE	NA	MIN
4. AVERAGE TIME PERIOD FOR A BATCH RELEASE	NA	MIN
5. MINIMUM TIME PERIOD FOR A BATCH RELEASE	NA	MIN
6. AVERAGE RIVER FLOW DURING RELEASES	NA	CF/SEC

B. GASEOUS:

1. NUMBER OF BATCH RELEASES	0	
2. TOTAL TIME PERIOD FOR BATCH RELEASES	NA	MIN
3. MAXIMUM TIME PERIOD FOR A BATCH RELEASE	NA	MIN
4. AVERAGE TIME PERIOD FOR A BATCH RELEASE	NA	MIN
5. MINIMUM TIME PERIOD FOR A BATCH RELEASE	NA	MIN

6. ABNORMAL RELEASES:

A. LIQUID:

1. NUMBER OF RELEASES	0	
2. TOTAL ACTIVITY RELEASED	0.0	CI

B. GASEOUS:

1. NUMBER OF RELEASES	0	
2. TOTAL ACTIVITY RELEASED	0.0	CI

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TABLE 1A GASEOUS EFFLUENTS - SUMMATION OF ALL RELEASES

	UNITS	1ST QTR	2ND QTR	PCNT EST ERROR
-----				
A. NOBLE GASES:				
1. TOTAL RELEASE:				
A. ELEVATED RELEASE	CI	2.05E 03	1.50E 03	
B. BUILDING VENT RELEASE	CI	7.94E 02	8.51E 02	
C. TOTAL	CI	2.84E 03	2.35E 03	5.00E 01
2. AVERAGE RELEASE RATE:				
A. ELEVATED RELEASE	UCI/SEC	2.58E 02	1.88E 02	
B. BUILDING VENT RELEASE	UCI/SEC	9.99E 01	1.07E 02	
C. TOTAL	UCI/SEC	3.57E 02	2.95E 02	5.00E 01
3. PERCENT TECH SPEC QTRLY REPORTING LEVEL		1.30E 01	1.34E 01	
B. IODINES:				
1. TOTAL I-131:				
A. ELEVATED RELEASE	CI	1.32E-02	2.29E-02	
B. BUILDING VENT RELEASE	CI	1.16E-02	1.70E-02	
C. TOTAL	CI	2.48E-02	3.99E-02	5.00E 01
2. AVERAGE I-131 RELEASE RATE:				
A. ELEVATED RELEASE	UCI/SEC	1.66E-03	2.88E-03	
B. BUILDING VENT RELEASE	UCI/SEC	1.45E-03	2.14E-03	
C. TOTAL	UCI/SEC	3.12E-03	5.02E-03	5.00E 01
C. LONG LIVED PARTICULATES AND GROSS ALPHA RELEASES:				
1. TOTAL PARTICULATES:				
A. ELEVATED RELEASE	CI	3.86E-03	4.89E-03	
B. BUILDING VENT RELEASE	CI	3.53E-03	1.75E-02	
C. TOTAL	CI	7.38E-03	2.24E-02	5.00E 01
2. AVERAGE RELEASE RATE:				
A. ELEVATED RELEASE	UCI/SEC	4.85E-04	6.15E-04	
B. BUILDING VENT RELEASE	UCI/SEC	4.44E-04	2.21E-03	
C. TOTAL	UCI/SEC	9.29E-04	2.82E-03	5.00E 01
3. PERCENT TECH SPEC QTRLY REPORTING LEVEL FOR LONG LIVED IODINES & PARTICULATES		3.78E 00	8.48E 00	

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TABLE 1A GASEOUS EFFLUENTS - SUMMATION OF ALL RELEASES (CONTINUED)

	UNITS	1ST QTR	2ND QTR	PCNT EST ERROR
	-----	-----	-----	-----
4. GROSS ALPHA RADIOACTIVITY:				
A. ELEVATED RELEASE	CI	7.31E-07	9.12E-07	
B. BUILDING VENT RELEASE	CI	1.03E-05	2.41E-05	
C. TOTAL	CI	1.10E-05	2.50E-05	1.00E 02
D. TRITIUM:				
1. TOTAL RELEASE:				
A. ELEVATED RELEASE	CI	2.35E 00	4.70E 00	
B. BUILDING VENT RELEASE	CI	9.46E 00	3.37E 01	
C. TOTAL	CI	1.18E 01	3.84E 01	5.00E 01
2. AVERAGE RELEASE RATE:				
A. ELEVATED RELEASE	UCI/SEC	2.95E-01	5.92E-01	
B. BUILDING VENT RELEASE	UCI/SEC	1.19E 00	4.24E 00	
C. TOTAL	UCI/SEC	1.49E 00	4.83E 00	5.00E 01

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TABLE 1B GASEOUS EFFLUENTS - ELEVATED RELEASE

NUCLIDES RELEASED	UNITS	CONTINUOUS MODE		BATCH MODE	
		1ST QTR	2ND QTR	1ST QTR	2ND QTR
1. NOBLE GASES:					
XE133	CI	1.79E 02	1.23E 02	0.0	0.0
XE135	CI	3.67E 01	3.11E 01	0.0	0.0
KR85M	CI	3.72E 00	2.72E 00	0.0	0.0
KR88	CI	1.28E 01	9.05E 00	0.0	0.0
KR87	CI	2.54E 01	1.80E 01	0.0	0.0
XE138	CI	5.74E 02	4.39E 02	0.0	0.0
KR90	CI	1.61E 01	1.15E 01	0.0	0.0
XE139	CI	4.79E 01	3.42E 01	0.0	0.0
KR89	CI	4.77E 02	3.43E 02	0.0	0.0
XE137	CI	6.24E 02	4.48E 02	0.0	0.0
XE135M	CI	3.71E 01	2.69E 01	0.0	0.0
KR83M	CI	5.12E 00	3.86E 00	0.0	0.0
XE133M	CI	5.42E-01	4.58E-01	0.0	0.0
XE131M	CI	1.50E 00	1.34E 00	0.0	0.0
KR85	CI	6.72E 00	5.97E 00	0.0	0.0
TOTAL FOR PERIOD	CI	2.05E 03	1.50E 03	0.0	0.0
2. IODINES:					
I-131	CI	1.32E-02	2.29E-02	0.0	0.0
I-133	CI	3.16E-02	5.19E-02	0.0	0.0
I-135	CI	<4.15E-03	<2.24E-02	0.0	0.0
TOTAL FOR PERIOD	CI	4.86E-02	9.68E-02	0.0	0.0
TOTAL (WITH MDA VALUES)	CI	<4.89E-02	<9.71E-02	0.0	0.0

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TABLE 1B GASEOUS EFFLUENTS - ELEVATED RELEASE (CONTINUED)

NUCLIDES RELEASED	UNITS	CONTINUOUS MODE		BATCH MODE	
		1ST QTR	2ND QTR	1ST QTR	2ND QTR
3. PARTICULATES:					
ND147	CI	<7.50E-06	<6.55E-06	0.0	0.0
CE144	CI	<3.46E-05	<6.00E-05	0.0	0.0
CE141	CI	<6.99E-06	<1.07E-05	0.0	0.0
BA140	CI	3.11E-03	3.92E-03	0.0	0.0
CS137	CI	6.36E-05	1.38E-04	0.0	0.0
CS136	CI	<6.29E-06	<6.30E-06	0.0	0.0
CS134	CI	<1.98E-05	<2.33E-05	0.0	0.0
SB126	CI	<4.10E-06	<4.16E-06	0.0	0.0
SB124	CI	<6.29E-06	<5.48E-06	0.0	0.0
RU103	CI	<7.73E-06	<7.06E-06	0.0	0.0
ZR95	CI	<6.19E-06	<6.08E-06	0.0	0.0
NB95	CI	<3.10E-06	<3.36E-06	0.0	0.0
SR90	CI	2.00E-05	1.36E-05	0.0	0.0
SR89	CI	6.10E-04	7.36E-04	0.0	0.0
ZN65	CI	<8.50E-06	<8.50E-06	0.0	0.0
CO60	CI	<8.31E-06	<5.07E-06	0.0	0.0
Fe59	CI	<7.95E-06	<7.97E-06	0.0	0.0
CO58	CI	<4.61E-06	<4.63E-06	0.0	0.0
CO57	CI	<1.58E-06	<1.49E-06	0.0	0.0
MN54	CI	<3.06E-06	<3.05E-06	0.0	0.0
CR51	CI	<2.67E-05	<2.86E-05	0.0	0.0
TOTAL FOR PERIOD	CI	3.86E-03	4.89E-03	0.0	0.0
TOTAL (WITH MDA VALUES)	CI	<3.97E-03	<5.00E-03	0.0	0.0

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## EFFLUENT AND WASTE DISPOSAL SEMIANNUAL REPORT

TABLE 1C GASEOUS EFFLUENTS - BUILDING VENT RELEASE

NUCLIDES RELEASED	UNITS	CONTINUOUS MODE		BATCH MODE	
		1ST QTR	2ND QTR	1ST QTR	2ND QTR
1. NOBLE GASES:					
XE133	CI	6.46E-01	6.41E-01	0.0	0.0
XE135	CI	1.58E 01	1.92E 01	0.0	0.0
KR85M	CI	1.59E 00	1.68E 00	0.0	0.0
KR88	CI	5.47E 00	5.69E 00	0.0	0.0
KR87	CI	1.09E 01	1.11E 01	0.0	0.0
XE138	CI	2.45E 02	2.72E 02	0.0	0.0
KR90	CI	6.85E 00	7.16E 00	0.0	0.0
XE139	CI	2.04E 01	2.13E 01	0.0	0.0
KR89	CI	2.03E 02	2.14E 02	0.0	0.0
XE137	CI	2.66E 02	2.80E 02	0.0	0.0
XE135M	CI	1.58E 01	1.68E 01	0.0	0.0
KR83M	CI	2.20E 00	2.40E 00	0.0	0.0
XE133M	CI	4.25E-02	5.08E-02	0.0	0.0
XE131M	CI	1.54E-03	1.88E-03	0.0	0.0
KR85	CI	2.97E-03	2.53E-03	0.0	0.0
TOTAL FOR PERIOD	CI	7.94E 02	8.51E 02	0.0	0.0
2. IODINES:					
I-131	CI	1.16E-02	1.70E-02	0.0	0.0
I-133	CI	7.49E-02	2.03E-01	0.0	0.0
I-135	CI	<1.91E-02	<1.19E-01	0.0	0.0
TOTAL FOR PERIOD	CI	1.01E-01	3.35E-01	0.0	0.0
TOTAL (WITH MDA VALUES)	CI	<1.06E-01	<3.39E-01	0.0	0.0



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TABLE 1C GASEOUS EFFLUENTS - BUILDING VENT RELEASES (CONTINUED)

NUCLIDES RELEASED	UNITS	CONTINUOUS MODE		BATCH MODE	
		1ST QTR	2ND QTR	1ST QTR	2ND QTR
3. PARTICULATES:					
ND147	CI	<7.51E-05	<1.06E-04	0.0	0.0
CE144	CI	<1.12E-04	<1.54E-04	0.0	0.0
CE141	CI	<2.89E-05	<3.95E-05	0.0	0.0
BA140	CI	2.54E-03	1.17E-02	0.0	0.0
CS137	CI	4.16E-04	4.97E-04	0.0	0.0
CS136	CI	<4.28E-05	<1.81E-04	0.0	0.0
CS134	CI	<1.40E-04	<1.40E-04	0.0	0.0
SB126	CI	<2.77E-05	<3.82E-05	0.0	0.0
SB124	CI	<5.62E-05	<4.21E-05	0.0	0.0
RU103	CI	<1.01E-04	<4.22E-04	0.0	0.0
ZR95	CI	<4.08E-05	<5.46E-05	0.0	0.0
NB95	CI	<3.10E-05	<1.71E-04	0.0	0.0
SR90	CI	4.22E-05	1.38E-05	0.0	0.0
SR89	CI	1.94E-04	2.91E-04	0.0	0.0
ZN65	CI	<5.81E-05	<1.30E-03	0.0	0.0
CO60	CI	<1.49E-04	<7.99E-04	0.0	0.0
FE59	CI	<4.92E-05	<6.70E-05	0.0	0.0
CO58	CI	<2.53E-05	<3.66E-05	0.0	0.0
CO57	CI	<1.46E-05	<1.90E-05	0.0	0.0
MN54	CI	<2.18E-05	<5.89E-05	0.0	0.0
CR51	CI	<1.80E-04	<2.39E-03	0.0	0.0
TOTAL FOR PERIOD	CI	3.53E-03	1.75E-02	0.0	0.0
TOTAL (WITH MDA VALUES)	CI	<4.34E-03	<1.65E-02	0.0	0.0

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EFFLUENT AND WASTE DISPOSAL SEMIANNUAL REPORT

TABLE 2A LIQUID EFFLUENTS - SUMMATION OF ALL RELEASES

	UNITS	1ST QTR	2ND QTR	PCNT EST ERROR
	-----	-----	-----	-----
<b>A. FISSION AND ACTIVATION PRODUCTS:</b>				
1. TOTAL RELEASE (EXCEPT H-3, GASES, AND ALPHA)	CI	0.0	0.0	0.0
2. AVG DILUTED CONCENTRATION	UCI/ML	0.0	0.0	
3. PERCENT OF QUARTERLY LIMIT		0.0	0.0	
<b>B. TRITIUM:</b>				
1. TOTAL RELEASE	CI	0.0	0.0	0.0
2. AVG DILUTED CONCENTRATION	UCI/ML	0.0	0.0	
3. PERCENT OF QUARTERLY LIMIT		NA	NA	
<b>C. DISSOLVED AND ENTRAINED GASES:</b>				
1. TOTAL RELEASE	CI	0.0	0.0	0.0
2. AVG DILUTED CONCENTRATION	UCI/ML	0.0	0.0	
3. PERCENT OF QUARTERLY LIMIT		NA	NA	
<b>D. GROSS ALPHA RADIOACTIVITY:</b>				
1. TOTAL RELEASE	CI	0.0	0.0	0.0
<b>E. VOLUME OF WASTE RELEASED</b>				
	LITERS	0.0	0.0	0.0
<b>F. VOLUME OF DILUTION WATER USED</b>				
	LITERS	0.0	0.0	0.0

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TABLE 2B LIQUID EFFLUENTS

NUCLIDES RELEASED	UNITS	CONTINUOUS MODE		BATCH MODE	
		1ST QTR	2ND QTR	1ST QTR	2ND QTR
NONE					

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## EFFLUENT AND WASTE DISPOSAL SEMIANNUAL REPORT

TABLE 3 SOLID WASTE AND IRRADIATED FUEL SHIPMENTS

## A. SOLID WASTE SHIPPED OFFSITE FOR BURIAL OR DISPOSAL:

## 1. TYPE OF WASTE:

	UNITS	TOTAL	PCNT EST ERROR
	-----	-----	-----
A. SPENT RESINS, FILTER SLUDGES, EVAPORATOR BOTTOMS, ECT.	CU METER CI	5.70E 01 1.46E 03	5.00E 01
B. DRY COMPRESSIBLE WASTE, CONTAMINATED EQUIP, ECT.	CU METER CI	4.23E 03 1.90E 00	5.00E 01
C. IRRADIATED COMPONENTS, CONTROL RODS, ECT.	CU METER CI	0.0 0.0	0.0
D. OTHER (DESCRIBED BELOW):  NONE			

## 2. ESTIMATE OF MAJOR NUCLIDE COMPOSITION BY TYPE OF WASTE:

TYPE	NUCLIDE	PERCENT
----	-----	-----
A	CS137	3.90E 01
	CS134	2.50E 01
	CO60	2.00E 01
B	CS137	3.90E 01
	CS134	2.50E 01
	CO60	2.00E 01

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TABLE 3 SOLID WASTE AND IRRADIATED FUEL SHIPMENTS (CONTINUED)

A. SOLID WASTE DISPOSITION:

NUMBER OF SHIPMENTS	MODE	DESTINATION
12	TRUCK	NUC ENG CO., SHEFFIELD, ILLINOIS
3	TRUCK	CHEM NUC INC., BARNWELL, SC

B. IRRADIATED FUEL SHIPMENTS:

NUMBER OF SHIPMENTS	MODE	DESTINATION
NONE		

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NOTES:

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1. RELEASE OF INDIVIDUAL NOBLE GAS ISOTOPES FROM THE PLANT STACK WAS DETERMINED USING AN ISOTOPIC ANALYSIS AT THE STEAM JET AIR EJECTOR. XE133, XE135, KR85M, KR88, KR87, AND XE138 WERE MEASURED AND USED TO CHARACTERIZE THE MODE OF GAS RELEASE FROM THE FUEL. OTHER SIGNIFICANT NOBLE GASES WERE DETERMINED USING KNOWN RATIOS, THE MEASURED TOTAL OFFGAS HOLDUP SYSTEM DELAY TIME, AND THE KNOWN FRACTION OF THE OFFGAS STREAM RELEASED VIA THE GLAND EXHAUSTER.

2. AN ISOTOPIC ANALYSIS FOR NOBLE GASES IS NORMALLY NOT POSSIBLE AT THE BUILDING VENTS. THEREFORE, FOR VENT RELEASES, THE ISOTOPIC MIXTURE IS ASSUMED TO BE EQUAL TO THE MIXTURE DETERMINED AT THE SJAE.

3. TOTAL RELEASES REPORTED IN TABLES 1A AND 2A DO NOT INCLUDE NUCLIDES WHICH WERE BELOW MINIMUM DETECTABLE ACTIVITY (MDA). MDA VALUES ARE INCLUDED IN TABLES 1B, 1C, AND 2B. COMPARISONS OF RELEASES TO APPLICABLE LIMITS DO NOT INCLUDE NUCLIDES WHICH WERE BELOW MDA. MAXIMUM ALLOWED MDA VALUES ARE ESTABLISHED IN THE TECHNICAL SPECIFICATIONS.

4. INFORMATION REQUIRED BY REGULATORY GUIDE 1.21 WHICH IS NOT APPLICABLE TO THE MONTICELLO PLANT IS INDICATED BY 'NA'.