

EFFLUENT SEMIANNUAL REPORT

06-JUL-92 THROUGH 03-JAN-93

SUPPLEMENTAL INFORMATION

Facility: Prairie Island Nuclear Generating Plant

Licensee: Northern States Power Company

License Numbers: DPR-42 & DPR-60

A. Regulatory Limits

1. Liquid Effluents:

- a. The dose or dose commitment to an individual from radioactive materials in liquid effluents released from the site shall be limited to:

for the quarter	3.0 mrem to the total body 10.0 mrem to any organ
-----------------	------------------------------------------------------

for the year	6.0 mrem to the total body 20.0 mrem to any organ
--------------	------------------------------------------------------

2. Gaseous Effluents:

- a. The dose rate due to radioactive materials released in gaseous effluents from the site shall be limited to:

noble gases	≤500 mrem/year total body ≤3000 mrem/year skin
-------------	---------------------------------------------------

I-131, H-3, LLP	≤1500 mrem/year to any organ
-----------------	------------------------------

- b. The dose due to radioactive gaseous effluents shall be limited to:

noble gases	≤10 mrad/quarter gamma ≤20 mrad/quarter beta ≤20 mrad/year gamma ≤40 mrad/year beta
-------------	----------------------------------------------------------------------------------------------

I-131, H-3, LLP	≤15 mrem/quarter to any organ ≤30 mrem/year to any organ
-----------------	-------------------------------------------------------------

B. Maximum Permissible Concentration

1. Fission and activation gases in gaseous releases:  
10 CFR 20, Appendix B, Table 2, Column 1
2. Iodine and particulates with halflives greater than 8 days in gaseous releases:  
10 CFR 20, Appendix B, Table 2, Column 1
3. Liquid effluents for radionuclides other than dissolved or entrained gases:  
10 CFR 20, Appendix B, Table 2, Column 2
4. Liquid effluent dissolved and entrained gases:  
2.0E-04 uCi/ml Total Activity

C. Average Energy

Not applicable to Prairie Island regulatory limits.

D. Measurements and approximations of total activity

1. Fission and activation gases in gaseous releases:	Total Nuclide	GeLi GeLi	±25%
2. Iodines in gaseous releases:	Total Nuclide	GeLi GeLi	±25%
3. Particulates in gaseous releases:	Total Nuclide	GeLi GeLi	±25%
4. Liquid effluents	Total Nuclide	GeLi GeLi	±25%

E. Manual Revisions

1. Offsite Dose Calculations Manual latest Revision number: 12  
Revision date : 17-JUN-92
2. Process Control Program Manual latest Revision number: 4  
Revision date : 23-APR-91

## 1.0 BATCH RELEASES (LIQUID)

- 1.1 NUMBER OF BATCH RELEASES
- 1.2 TOTAL TIME PERIOD (HRS)
- 1.3 MAXIMUM TIME PERIOD (HRS)
- 1.4 AVERAGE TIME PERIOD (HRS)
- 1.5 MINIMUM TIME PERIOD (HRS)
- 1.6 AVERAGE MISSISSIPPI RIVER FLOW (CFS)

QTR: 03	QTR: 04
5.00E+01	1.03E+02
2.24E+02	1.91E+02
7.53E+00	4.62E+00
4.48E+00	1.86E+00
2.83E+00	1.20E+00
1.95E+04	5.76E+04

## 2.0 BATCH RELEASES (GASEOUS)

- 2.1 NUMBER OF BATCH RELEASES
- 2.2 TOTAL TIME PERIOD (HRS)
- 2.3 MAXIMUM TIME PERIOD (HRS)
- 2.4 AVERAGE TIME PERIOD (HRS)
- 2.5 MINIMUM TIME PERIOD (HRS)

QTR: 03	QTR: 04
6.00E+00	1.30E+01
1.42E+01	2.98E+01
8.00E+00	8.10E+00
1.33E+00	2.29E+00
2.50E-01	2.50E-01

## 3.0 ABNORMAL RELEASES (LIQUID)

- 3.1 NUMBER OF RELEASES
- 3.2 TOTAL ACTIVITY RELEASED (CI)
- 3.3 TOTAL TRITIUM RELEASED (CI)

QTR: 03	QTR: 04
0.00E+00	1.00E+00
0.00E+00	3.70E-03
0.00E+00	2.96E-02

## 4.0 ABNORMAL RELEASES (GASEOUS)

- 4.1 NUMBER OF RELEASES
- 4.2 TOTAL ACTIVITY RELEASED (CI)

QTR: 03	QTR: 04
0.00E+00	0.00E+00
0.00E+00	0.00E+00

TABLE 1A  
GASEOUS EFFLUENTS - SUMMATION OF ALL RELEASES

	QTR: 03	QTR: 04
5.0 FISSION AND ACTIVATION GASES		
5.1 TOTAL RELEASE (CI)	1.73E+01	3.52E+00
5.2 AVERAGE RELEASE RATE (UCI/SEC)	2.20E+00	4.48E-01
5.3 GAMMA DOSE (MRAD)	7.46E-03	2.05E-03
5.4 BETA DOSE (MRAD)	2.39E-02	1.16E-02
5.5 PERCENT OF GAMMA TECH SPEC (%)	7.46E-02	2.05E-02
5.6 PERCENT OF BETA TECH SPEC (%)	1.20E-01	5.80E-02
6.0 IODINES		
6.1 TOTAL I-131 (CI)	1.48E-05	1.72E-04
6.2 AVERAGE RELEASE RATE (UCI/SEC)	1.88E-06	2.19E-05
7.0 PARTICULATES		
7.1 TOTAL RELEASE (CI)	3.71E-06	3.72E-05
7.2 AVERAGE RELEASE RATE (UCI/SEC)	4.72E-07	4.73E-06
8.0 TRITIUM		
8.1 TOTAL RELEASE (CI)	1.59E+01	9.80E+00
8.2 AVERAGE RELEASE RATE (UCI/SEC)	2.02E+00	1.25E+00
9.0 TOTAL IODINE, PARTICULATE AND TRITIUM (UCI/SEC)	2.02E+00	1.25E+00
10.0 DOSE (MREM)	3.39E-02	1.50E-02
11.0 PERCENT OF TECH SPEC (%)	2.26E-01	1.00E-01
12.0 GROSS ALPHA (CI)	0.00E+00	5.39E-06

TABLE 1C  
GASEOUS EFFLUENTS - GROUND LEVEL RELEASES

## 13.0 FISSION AND ACTIVATION GASES

NUCLIDE	UNITS	CONTINUOUS MODE		BATCH MODE	
		QTR: 03	QTR: 04	QTR: 03	QTR: 04
KR-85	CI			2.74E-01	7.90E-01
XE-131M	CI				2.41E-02
XE-133	CI	1.61E+01	1.85E+00	6.58E-01	8.10E-01
XE-133M	CI	1.67E-01			5.66E-04
XE-135	CI	1.58E-01	4.15E-02	1.43E-04	2.06E-05
XE-135M	CI			5.72E-04	
TOTAL	CI	1.64E+01	1.90E+00	9.33E-01	1.62E+00

## 14.0 IODINES

NUCLIDE	UNITS	CONTINUOUS MODE		BATCH MODE	
		QTR: 03	QTR: 04	QTR: 03	QTR: 04
I-131	CI	1.07E-05	1.65E-04	4.08E-06	7.11E-06
I-132	CI			5.73E-10	
I-133	CI			2.97E-06	1.02E-07
I-134	CI			5.29E-10	
I-135	CI			4.87E-07	
TOTAL	CI	1.07E-05	1.65E-04	7.54E-06	7.21E-06

TABLE 1C  
GASEOUS EFFLUENTS - GROUND LEVEL RELEASES

## 15.0 PARTICULATES

NUCLIDE	UNITS	CONTINUOUS MODE		BATCH MODE	
		QTR: 03	QTR: 04	QTR: 03	QTR: 04
AG-110M	CI		7.01E-07		
CO-58	CI		3.36E-06		5.61E-06
CO-60	CI				1.67E-06
CS-134	CI			1.88E-06	8.83E-06
CS-136	CI			2.35E-07	
CS-137	CI			1.56E-06	7.68E-06
MN-54	CI			3.80E-08	
NA-24	CI			2.81E-10	
NB-97	CI				1.51E-07
NB-95	CI				5.47E-06
SR-89	CI			5.10E-08	
TE-132	CI				3.61E-07
ZR-95	CI				3.36E-06
TOTAL	CI	0.00E+00	4.06E-06	3.71E-06	3.31E-05

TABLE 2A  
LIQUID EFFLUENTS - SUMMATION OF ALL RELEASES

	QTR: 03	QTR: 04
16.0 VOLUME OF WASTE PRIOR TO DILUTION (LITERS)	2.77E+07	3.09E+08
17.0 VOLUME OF DILUTION WATER (LITERS)	2.66E+11	9.35E+10
18.0 FISSION AND ACTIVATION PRODUCTS		
18.1 TOTAL RELEASE W/O H-3, RADGAS, ALPHA (CI)	1.11E-01	5.79E-01
18.2 AVERAGE DILUTED CONCENTRATION (UCI/ML)	4.17E-10	6.17E-09
19.0 TRITIUM		
19.1 TOTAL RELEASE (CI)	2.10E+02	3.93E+01
19.2 AVERAGE DILUTED CONCENTRATION (UCI/ML)	7.90E-07	4.19E-07
20.0 DISSOLVED AND ENTRAINED GASES		
20.1 TOTAL RELEASE (CI)	2.39E-02	2.20E-02
20.2 AVERAGE DILUTED CONCENTRATION (UCI/ML)	8.99E-11	2.35E-10
21.0 GROSS ALPHA (CI)	0.00E+00	0.00E+00
22.0 TOTAL TRITIUM, FISSION AND ACTIVATION PRODUCTS (UCI/ML)	7.90E-07	4.25E-07
23.0 TOTAL BODY DOSE (MREM)	8.12E-04	4.19E-03
24.0 CRITICAL ORGAN		
24.1 DOSE (MREM)	8.12E-04	4.19E-03
24.2 ORGAN	TTL BODY	TTL BODY
25.0 PERCENT OF TOTAL BODY TECH SPEC LIMIT (%)	2.71E-02	1.37E-01
26.0 PERCENT OF CRITICAL ORGAN TECH SPEC LIMIT (%)	2.71E-02	1.37E-01

TABLE 2A  
LIQUID EFFLUENTS - SUMMATION OF ALL RELEASES

## 27.0 INDIVIDUAL LIQUID EFFLUENT

NUCLIDE	UNITS	CONTINUOUS MODE		BATCH MODE	
		QTR: 03	QTR: 04	QTR: 03	QTR: 04
AG-108M	CI				2.66E-06
AG-110M	CI		1.15E-04	2.17E-02	1.34E-02
BE-7	CI			4.26E-04	5.75E-05
CO-57	CI			5.29E-05	1.59E-05
CO-58	CI		5.93E-05	1.83E-02	5.43E-02
CO-60	CI			7.21E-03	9.82E-03
CR-51	CI			1.95E-03	1.39E-02
CS-134	CI		3.40E-05		3.06E-04
CS-137	CI		2.78E-05	5.84E-05	4.21E-04
CU-64	CI				8.17E-04
FE-55	CI		1.88E-01	5.19E-02	2.18E-01
FE-59	CI			1.34E-03	6.04E-03
I-131	CI		5.56E-06	8.19E-05	3.03E-03
I-133	CI				6.91E-06
LA-140	CI			1.00E-04	3.44E-04
MN-54	CI			7.29E-04	1.61E-03
MO-99	CI			1.58E-05	1.37E-05
NA-24	CI				8.06E-07
NB-95	CI				3.29E-04
NB-97	CI			7.93E-06	5.25E-06
RH-105	CI			2.20E-05	
RU-103	CI				3.17E-06
SB-122	CI			2.08E-05	3.60E-03
SB-124	CI			1.09E-03	3.59E-02



TABLE 2A  
LIQUID EFFLUENTS - SUMMATION OF ALL RELEASES

## 27.0 INDIVIDUAL LIQUID EFFLUENT (CONTINUED)

SB-125	CI			4.46E-03	2.63E-02
SB-126	CI				1.29E-04
SC-47	CI			6.67E-05	5.06E-04
SN-113	CI			1.36E-03	1.61E-03
SR-92	CI			7.56E-06	1.66E-05
TC-99M	CI			2.12E-05	1.45E-05
TE-132	CI				7.88E-06
W-187	CI			1.76E-05	3.31E-05
Y-93	CI				1.66E-05
ZN-65	CI				3.69E-05
ZR-95	CI			2.03E-04	5.64E-04
ZR-97	CI				4.75E-06
TOTAL	CI	0.00E+00	1.88E-01	1.11E-01	3.91E-01

## 28.0 DISSOLVED AND ENTRAINED GASES

NUCLIDE	UNITS	CONTINUOUS MODE		BATCH MODE	
		QTR: 03	QTR: 04	QTR: 03	QTR: 04
KR-85M	CI			3.18E-06	
XE-133	CI		2.75E-05	2.39E-02	2.15E-02
XE-133M	CI				1.32E-05
XE-135	CI			4.40E-06	4.77E-04
XE-135M	CI				1.94E-05
TOTAL	CI	0.00E+00	2.75E-05	2.39E-02	2.20E-02

Subject: Northern States Power, Prairie Island Liquid Effluent Release  
Abnormal Release during 4th Quarter 1992.

On Dec 6, 1992 two liquid waste tanks were placed on recirculation for release. One of the tanks were sampled and processed for release prior to the second tank. The release authorization papers and operations procedures became mixed up and the tank that was not yet sampled and authorized was released. The mistake was realized later in the day when the sample and release authorization papers were being prepared for the second tank to be released. Follow-up samples were taken and compared to projected and actual observed radiation monitor readings. The two tanks were very similar in concentration and it was determined that the original pre-release dose calculations were reasonably accurate. The tank was released at a rate that was 0.22% of the maximum release rate limit based on MPCs as per the ODCM.

Operations and Effluent Release procedures have been altered to prevent re-occurrence. This event has been investigated and the corrective actions determined adequate. Further information concerning this event can be found in Prairie Island LER for Unit #1 92-16.

PRAIRIE ISLAND NUCLEAR GENERATING PLANT  
 NORTHERN STATES POWER

Period: 7-1-92 to 12-31-92  
 License No. DPR-42

SOLID RADIOACTIVE WASTE DISPOSAL SEMI-ANNUAL REPORT

Table 1: Solid Waste and Irradiated Fuel Shipments

1. Solid Waste Total Volumes and Total Curie Quantities:

Type of Waste	Units	Totals	Container Disposal Volumes (List)
A. <u>Resins</u>	ft <sup>3</sup>	366.6	183.3cf
	Ci (+/-25%)	2.71E+01	
B. <u>Dry-Compacted</u>	ft <sup>3</sup>	982.6	7.5cf
	Ci (+/-25%)	7.23E-01	11.0cf
C. <u>Non-Compacted</u>	ft <sup>3</sup>	16.8	96cf
	Ci (+/-25%)	6.82E-02	
D. <u>Filter Media</u>	ft <sup>3</sup>		
	Ci		
S. <u>Spent Fuel</u>	ft <sup>3</sup>		
	Ci		

PRAIRIE ISLAND NUCLEAR GENERATING PLANT  
NORTHERN STATES POWER

License No. DPR-42

SOLID RADIOACTIVE WASTE DISPOSAL SEMI-ANNUAL REPORT

Table 1: Solid Waste and Irradiated Fuel Shipments (Continued)

2. Principal Radionuclide Composition by Type of Waste:

[illegible]

\* = Inferred - Not Measured on Site

IBM

PRAIRIE ISLAND NUCLEAR GENERATING PLANT  
NORTHERN STATES POWER

Period: 7-1-92 to 12-31-92  
License No. DPR-42

SOLID RADIOACTIVE WASTE DISPOSAL SEMI-ANNUAL REPORT

Table 1: Solid Waste and Irradiated Fuel Shipments (Continued)

2. Principal Radionuclide Composition by Type of Waste  
(Continuation):

\* = Inferred - Not Measured on Site

IBM

PRAIRIE ISLAND NUCLEAR GENERATING PLANT  
NORTHERN STATES POWER

Period: 7-1-92 to 12-31-92  
License No. DPR-42

SOLID RADIOACTIVE WASTE DISPOSAL SEMI-ANNUAL REPORT

Table 1: Solid Waste and Irradiated Fuel Shipments (Continued)

3. Solid Waste Disposition:

<u>Number of Shipments</u>	<u>Mode</u>	<u>Destination</u>
4	Truck	Richland
1	Truck	Quadrex

4. Irradiated Fuel Shipments:

<u>Number of Shipments</u>	<u>Mode</u>	<u>Destination</u>
0		

PRAIRIE ISLAND NUCLEAR GENERATING PLANT  
NORTHERN STATES POWER

Period: 7-1-92 to 12-31-92  
License No. DPR-42

# SOLID RADIOACTIVE WASTE DISPOSAL SEMI-ANNUAL REPORT

Table 1: Solid Waste and Irradiated Fuel Shipments (Continued)

5. Shipping Container and Solidification Method:

[illegible]

CONTAINER CODES: L = LSA  
(Shipment Type) A = Type A  
B = Type B  
Q = Highway Route Controlled Quantity

SOLIDIFICATION CODES: C = Cement

TYPES OF WASTE:    A = Resins  
                          B = Dry Compacted  
                          C = Non-Compacted  
                          D = Filter Media  
                          S = Spent Fuel

NORTHERN STATES POWER COMPANY

PRAIRIE ISLAND NUCLEAR GENERATING PLANT  
OFF-SITE RADIATION DOSE ASSESSMENT FOR

January 1- December 31, 1992

An assessment of radiation dose due to release from the Prairie Island Nuclear Generating Plant during 1992 was performed in accordance with the Technical Specifications. Computed doses were well below the 40 CFR Part 190 Standards and 10 CFR Part 50 Appendix I Guidelines.

Off-site dose calculation formulas and meteorological data from the Off-site Dose Calculation Manual were used in making this assessment. Source terms were obtained from the two Effluent and Waste Disposal Semiannual Reports prepared for NRC review during the year of 1992.

Off-site Doses from Gaseous Release

Computed doses due to gaseous releases are reported in Table 1. Critical receptor location and pathways for organ doses are reported in Table 2. Doses, both whole body and organ, are a small percentage of Appendix I Guidelines.

Off-site Doses from Liquid Release

Computed doses due to liquid releases are reported in Table 1. Receptor information is reported in Table 2. Both whole body dose and organ dose are a small percentage of Appendix I Guidelines.

Doses to Individuals Due to Activities Inside the Site Boundary

Occasionally sportsmen enter the Prairie Island site for recreational activities. These individuals are not expected to spend more than a few hours per year within the site boundary. Commercial and recreational river traffic exists through this area.

For purposes of estimating the dose due to recreational and river water transportation activities within the site boundary, it is assumed that the limiting dose within the site boundary would be received by an individual who spends a total of seven days per year on the river just off shore from the main plant buildings (ESE at 0.2 miles). Whole body and inhalation organ doses were calculated for this location and occupancy time. These doses were reported in Table 1.



#### Doses to Most Exposed Member of the General Public from Reactor Releases and Other Uranium Fuel Cycle Sources

There are no other uranium fuel facilities in the vicinity of the Prairie Island site. The only other artificial source of exposure to the general public in addition to the plant effluent releases is from direct radiation of the reactors. This direct radiation from pressurized water reactors has been shown to be negligible. An array of TLD monitoring stations around the perimeter of the site boundary has consistently indicated that plant operation in the past years has no effect on ambient gamma radiation.

Therefore, the most exposed member of the general public will not receive an annual radiation dose from reactor effluent releases and all other fuel cycle activities in excess of the sum of the liquid and gaseous whole body and organ doses reported in Table 1 for the site boundary and critical receptor, respectively. These doses are well below 40 CFR Part 190 standards of 25 mrem to the whole body, 75 mrem to the thyroid, and 25 mrem to any other organ.

#### Radiation Environmental Monitoring Program Sampling Deviations

There were no milk or vegetable sampling deviations during this reporting period.

TABLE 1

## OFF-SITE RADIATION DOSE ASSESSMENT - PRAIRIE ISLAND

PERIOD: JANUARY 1 through DECEMBER 31, 199210 CFR Part 50 Appendix I  
Guidelines per 2-units site per yearGaseous Releases

Maximum Site Boundary Gamma Air Dose (mrad)	9.37E-03	20
Maximum Site Boundary Beta Air Dose (mrad)	3.00E-02	40
Maximum Off-site Dose to Any Organ (mrem)* Total	1.14E-01	30
Offshore Location (mrem)		
Whole Body	5.40E-03	10
Organ	5.60E-03	30

Liquid Releases

Maximum Off-site Dose Whole Body (mrem)	7.00E-03	6
Maximum Off-site Dose Organ, Total	7.00E-03	20

\* Long-lived Particulates, I-131, and H-3

TABLE 2

OFF-SITE RADIATION DOSE ASSESSMENT - PRAIRIE ISLAND  
SUPPLEMENTAL INFORMATION

PERIOD: JANUARY 1 through DECEMBER 31, 1992

Gaseous Releases

Maximum Site Boundary  
Dose Location  
(from Building vents)

Sector	WNW
Distance (miles)	0.4

Offshore Location  
Within Site Boundary

Sector	ESE
Distance (miles)	0.2

Maximum Off-site  
Dose Location

Sector	SSE
Distance (miles)	0.6
Pathways	Plume, Ground, Inhalation, Vegetables

Age Group	Child
Organ	Thyroid

Liquid Releases

Maximum Off-site Dose  
Location Downstream  
Pathways  
Organ

Fish
Whole Body