

EFFLUENT AND WASTE DISPOSAL SEMI-ANNUAL REPORT

July THROUGH December, 1982

SUPPLEMENTAL INFORMATION

Facility - Prairie Island Nuclear Generating PlantLicensee - Northern States Power Company License Nos. - DPR-42 & DPR-601. Regulatory Limits

Action is required if the rate of release of radioactive materials, when averaged over a three-month period, is such that these quantities, if continued at the same release rate for a year, would exceed twice the design objectives. Design objectives are:

- a. Fission and activation gases (and all other radioactive isotopes except halogen and particulate isotopes with half-lives greater than 8 days) in gaseous releases:

$$\sum_i \frac{Q_i}{MPC_i} \leq 1300 \text{ m}^3/\text{sec}$$

- b. Iodines and particulates with half-lives greater than 8 days in gaseous releases:

$$\sum_i \frac{Q_i}{MPC_i} \leq 67 \text{ m}^3/\text{sec}$$

- c. Liquid Effluents:

1. Annual total quantity of radioactive material in liquid waste, excluding tritium and dissolved gases, of 5 Ci per unit.
2. Annual average concentration of radioactive material in liquid waste, prior to dilution in the Mississippi River, excluding tritium and dissolved gases, of $2 \times 10^{-8} \mu\text{Ci/ml}$.
3. Annual average concentration of tritium in liquid waste, prior to dilution in the Mississippi River, of $5 \times 10^{-6} \mu\text{Ci/ml}$.

2. Maximum Permissible Concentrations

- a. Fission and activation gases (and all other radioactive isotopes except halogen and particulate isotopes with half-lives greater than 8 days) in gaseous releases:

10 CFR 20, Appendix B, Table 2, Column 1

2. Maximum Permissible Concentrations

- b. Iodine and particulates with half-lives greater than 8 days in gaseous releases:

10 CFR 20, Appendix B, Table 2, Column 1

- c. Liquid Effluents:

10 CFR 20, Appendix B, Table 2, Column 2

3. Average Energy

Not applicable to Prairie Island Regulatory Limits.

4. Measurements and Approximations of Total Radioactivity

a. Fission and activation gases in gaseous releases:	Total Nuclide	Geli Geli
b. Iodines in gaseous releases	Total Nuclide	Geli Geli
c. Particulates in gaseous releases:	Total Nuclide	Geli Geli
d. Liquid Effluents:	Total Nuclide	Gross Beta Gamma Geli

BATCH RELEASES

- a. Liquid
Number of Batch Releases
Total Time Period for a Batch Release (hr)
Maximum Time for a Batch Release (hr)
Average Time for a Batch Release (hr)
Minimum Time for a Batch Release (hr)
Ave Mississippi flow during Quarter (CFS)

QTR 3	QTR 4
48	83
68.1	121
1.75	2.25
1.42	1.46
1.33	0.78
12049	23932

- b. Gaseous
Number of Batch Releases
Total Time Period for Batch Releases (hr)
Maximum Time for a Batch Release (hr)
Average Time for a Batch Release (hr)
Minimum Time for a Batch Release (hr)

QTR 3	QTR 4
2	4
16.7	31.4
14.7	15.0
8.35	7.86
2.00	1.00

ABNORMAL RELEASES

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- a. Liquid
Number of Releases
Total Activity Released (Ci)
Total Tritium Released (Ci)

QIR 3	QIR 4
0	0
0	0
0	0

- b. Gaseous
Number of Releases
Total Activity Releases (Ci)

QIR 3	QIR 3
1	0
1.3E01	0
NA	NA

TABLE 1A

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EFFLUENT AND WASTE DISPOSAL SEMIANNUAL REPORT
GASEOUS EFFLUENTS - SUMMATION OF ALL RELEASES

	UNIT	QTR <u>3</u>	QTR <u>4</u>	EST TOTAL ERROR %
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A. Fission and Activation Gases

Total Release	Ci	1.2E02	2.1E02	
Average Release Rate	µCi/sec	1.5E01	2.7E01	

B. Short Lived Particulate (+1/2 < 8 days)

Total Release	Ci	7.9E-07	0.0E00	
Average Release Rate	µCi/sec	1.0E-07	0.0E00	

C. Tritium

Total Release	Ci	4.3E01	2.9E01	
Average Release Rate	µCi/sec	5.4E00	3.7E00	

Total A & B & C	µCi/sec	2.0E01	3.1E01	
% of Design Objective	%	7.4E00	1.1E01	

D. Iodines

Total I131	Ci	2.2E-03	1.3E-03	
Average Release Rate	µCi/sec	2.8E-04	1.7E-04	

E. Long Lived Particulates (+1/2 > 8 days)

Total Release	Ci	1.3E-06	4.3E-05	
Average Release Rate	µCi/sec	1.7E-07	5.5E-06	

Total D & E	µCi/sec	2.8E-04	1.8E-04	
% of Design Objective	%	3.7E00	2.4E00	

F. Gross Alpha

Total Release	Ci	0.0E00	0.0E00	
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TABLE 1B
EFFLUENT AND WASTE DISPOSAL SEMIANNUAL REPORT
GASEOUS EFFLUENTS

CONTINUOUS MODE

BATCH MODE

NUCLIDE	UNIT	QTR <u>3</u>	QTR <u>4</u>	QTR <u>3</u>	QTR <u>4</u>
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1. Fission and Activation Gases

Kr85	Ci	2.8E-01	4.3E00	2.2E-01	7.6E-01
Kr85m	Ci	2.9E-01	1.8E-01		
Kr87	Ci	8.5E-02	7.4E-02		
Kr88	Ci		2.3E-01		
Xel33	Ci	1.2E02	2.0E02	8.3E-03	1.7E00
Xel35	Ci	9.9E-01	3.5E00	3.9E-07	2.5E-03
Xel35m	Ci	3.1E-02	1.8E-02		
Xel38	Ci	4.7E-02			
Xel31m	Ci		2.2E00	3.2E-03	5.6E-02
Ar41	Ci	1.2E-02	9.6E-03	1.2E-03	6.4E-03
Xel33m	Ci	3.9E-01	1.3E00		3.1E-04
Total	Ci	1.2E02	2.1E02	2.3E-01	2.5E00

2. Iodines

I131	Ci	2.2E-03	1.3E-03		
I133	Ci	2.9E-04	1.5E-04		
I135	Ci				
Total	Ci	2.5E-03	1.5E-03		

CONTINUOUS MODE

BATCH MODE

NUCLIDE	UNIT	QTR <u>3</u>	QTR <u>4</u>	QTR <u>3</u>	QTR <u>4</u>
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3. Particulates

Sr89	Ci				
Sr90	Ci				
Cs134	Ci				
Cs137	Ci		3.1E-07		
Ba-La140	Ci				
Co58	Ci	1.3E-06			
Co60	Ci				
Cd109	Ci				4.3E-05
Sb124	Ci				
Na24	Ci				
Co57	Ci				
Ce144	Ci				
Zr-Nb95	Ci				
Rb88	Ci				

TABLE 1B
EFFLUENT AND WASTE DISPOSAL SEMIANNUAL REPORT
GASEOUS EFFLUENTS

3. Particulates

Sr85	Cl	None			
Mn54	Cl				
Cs138	Cl				
Y88	Cl				

TABLE 2A

EFFLUENT AND WASTE DISPOSAL SEMI-ANNUAL REPORT
LIQUID EFFLUENTS - SUMMATION OF ALL RELEASES

UNIT	QTR <u>3</u>	QTR <u>4</u>	TOTAL ERROR %
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A. Fission and Activation Products

Total Release W/O H-3, Rad Gas, Alpha	Ci	3.4E-04	1.7E-03	
Average Diluted Concentration	µCi/ml	1.6E-12	2.8E-11	
% of T. S. Annual Curie Design Objective	%	3.4E-03	1.7E-02	

B. Tritium

Total Release	Ci	1.6E02	1.5E02	
Average Diluted Concentration *	µCi/ml	7.6E-07	2.5E-06	
% of T. S. Annual Design Objective Conc *	%	15.2	50.0	

C. Dissolved and Entrained Gases

Total Release	Ci	1.0E-01	2.2E-02	
Average Diluted Concentration *	µCi/ml	4.8E-10	3.7E-10	

D. Gross Alpha

Total Release	Ci	4.5E-08	2.0E-06	
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E. Volume of Waste (Prior to Dilution)

liters	5.6E07	3.2E07	
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F. Volume of Dilution Water *

liters	2.1E11	6.0E10	
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* Flow through Truttman's slough was terminated during this reporting period due to change in circ water discharge path. The volume of dilution water is calculated from cooling tower blowdown flow.

TABLE 2A
EFFLUENT AND WASTE DISPOSAL SEMIANNUAL REPORT
LIQUID EFFLUENTS - SUMMATION OF ALL RELEASES

Continuous Mode				Batch Mode	
NUCLIDE	UNIT	QTR <u>3</u>	QTR <u>4</u>	QTR <u>3</u>	QTR <u>4</u>
Sr89	Ci				
Sr90	Ci				
Cs134	Ci				
Cs137	Ci				
Il31	Ci	9.1E-07			4.8E-06
Co58	Ci	9.9E-06		2.3E-04	1.0E-05
Co60	Ci	6.1E-06		7.9E-06	1.8E-05
Fe59	Ci				
Zn65	Ci				
Mn54	Ci				
Cr51	Ci				
Zr-Nb95	Ci				
Mo99	Ci				
Ba-140	Ci				
Ag110m	Ci				
Na24	Ci				
W187	Ci				
Sb124	Ci				
Sr85	Ci				
Cs136	Ci				
Zr-Nb97	Ci				
Cd109	Ci				
Rb88	Ci				
Total	Ci	1.7E-05	0.0E00	2.4E-04	3.3E-05

Continuous Mode				Batch Mode	
NUCLIDE	UNIT	QTR <u>3</u>	QTR <u>4</u>	QTR <u>3</u>	QTR <u>4</u>
Xe133	Ci	2.1E-03	6.5E-05	9.6E-02	2.2E-02
Xe133m	Ci			8.0E-04	
Xe131m	Ci			9.0E-04	1.4E-04
Xe135	Ci			2.4E-04	3.7E-05
Kr85m	Ci				
Kr85	Ci				
Kr88	Ci				

TABLE 3

EFFLUENT AND WASTE DISPOSAL SEMIANNUAL REPORT

July through December 1982

Solid Waste and Irradiated Fuel Shipments

A. Solid waste shipped offsite for burial or disposal (not irradiated fuel)

1. Type of Waste	Unit	6 Month Period	Est. Total Error %
a. Spent Resins	ft ³ Ci	NONE	
b. Dry compressible waste, contaminated equipment, evaporator, bottoms, etc.	ft ³ Ci	645 33.94	± 15%
c. Irradiated components, control rods, etc.	ft ³ Ci	NONE	
d. Other (describe)	ft ³ Ci	NONE	

2. Estimate of major nuclide composition (by type of waste).

a.	NONE	%	
		%	
		%	
		%	
		%	
		%	
b.	Co58	1.0 %	± 10%
	Co60	86 %	± 10%
	Cs137	9.0 %	± 10%
	Cs134	2.0 %	± 10%
	Mn54	2.0 %	± 10%
c.		%	
		%	
d.		%	
		%	

3. Solid Waste Disposition

Number of Shipments

5

Mode of Transportation

Truck

DestinationU.S. Ecology, Richland,
Washington

B. Irradiated Fuel Shipments (disposition)

NONE

SOLID RADIOACTIVE WASTE SEMI-ANNUAL REPORT

July 1982 through December 1982

	<u>Volume (FT³)</u>	<u>Curie Quantity (measured)</u>	<u>Radionuclides (measured)</u>	<u>Percent Abundance</u>	<u>Container Type</u>	<u>Quantity</u>
Cemented Waste	577.5	31.541	a. C060 b. C058 c. CS137 d. Mn54 e. SB124 f. C057	74 24 1 0.4 0.3 0.3	DOT7A Type A 55 gal Drum	77
Compacted Trash	67.5	2.396	a. C060 b. C058 c. CS134 d. CS137 e. NB95 f. ZR95	65 20 5 4 3 3	DOT7A Type A 55 gal Drum	9
Dewatered Resin	0	0	a. None b. c. d. e. f.		None	0
Non-com- pacted Trash or other:	0	0	a. None b. c. d. e. f.		None	0

Total Volume 645 FT³

Total Curie Content 33.937

Prairie Island Nuclear Generating Plant
Change to Offsite Dose Calculation Manual (ODCM)
Table 5.1-1 Radiation Environmental Monitoring
Program, Sampling Locations

In accordance with the Prairie Island Technical Specifications Section 6.5 E Offsite Dose Calculation Manual (ODCM), a change to Table 5.1-1 Radiation Environmental Monitoring Program, Sampling Locations is submitted.

One of three farms located in different sectors required by the sampling program is located 2.5 miles at 39°/NE from the facility. The owner of the farm has decided to discontinue the dairy portion of his farming operation in favor of a less confining beef cattle operation. We have collected raw milk from this farm since May 28, 1970. Beginning with the October 1982 collection date, we have begun collecting raw milk from a farm located 2.6 miles at 60° ENE from the facility. This is the closest dairy farm to the farm being discontinued, and Figure 5.1-1, map showing sampling locations does not require a change as the two above sites are within the circle identifying the sampling location.

Instructions for Entering Rev. 3 to the Prairie Island ODCM

1. Remove ODCM cover page and pages v, vi, 5-1, and 5-2.
2. Replace ODCM cover page and pages v, vi, and 5-2 with Rev 3 pages. Replace page 5-1 with reprinted Rev 1 page (pages 5-1 and 5-2 are now printed on a single sheet).
3. Use ODCM page vi to page check you manual if desired.

PRAIRIE ISLAND NUCLEAR GENERATING PLANT

OFFSITE DOSE CALCULATION MANUAL

(ODCM)

REV. 3

DOCKET NO. 50-282 and 50-306

NORTHERN STATES POWER COMPANY
MINNEAPOLIS, MINNESOTA

OPERATIONS COMMITTEE FINAL REVIEW DATE: 2-14-83

REVIEWED BY: *D. K. Larimer*

DATE: 2-21-83

APPROVED BY: *D. A. Schulte*

DATE: 2-21-83

RECORD OF REVISIONS

<u>Revision No.</u>	<u>Date</u>	<u>Reason for Revision</u>
Original	June 7, 1979	-
1	April 15, 1980	Incorporation of NRC Staff comments and correction of miscellaneous errors
2	Aug 6, 1982	Incorporation of NRC Staff comments
3	Feb 21, 1983	Change in milk sampling location

LIST OF EFFECTIVE PAGES

<u>Page No.</u>	<u>Revision No.</u>	<u>Page No.</u>	<u>Revision No.</u>
Cover	3	3-11	2
i	2	3-12	0
ii	1	3-13	2
iii	0	3-14	2
iv	0	3-15	2
v	3	3-16	2
vi	3	3-17	0
1-1	1	3-18	1
2-1	2	3-19	0
2-2	2	3-20	2
2-3	2	3-21	2
2-4	1	3-22	2
2-5	1	3-23	2
2-6	1	3-24	2
2-7	2	3-25	2
2-7a	2	3-26	2
2-8	2	3-27	2
2-9	0	3-28	2
2-10	2	3-29	2
2-11	2	3-30	2
2-12	2	3-31	2
2-13	1	3-32	2
2-14	2	3-33	2
2-13	2	3-34	2
3-1	2	3-35	2
3-2	1	3-36	2
3-3	1	3-37	2
3-4	2	3-38	2
3-5	2	4-1	1
3-6	1	4-2	0
3-7	1	4-3	0
3-8	2	5-1	1
3-9	2	5-2	3
3-10	2	5-3	2
		5-4	1
		5-5	1
		5-6	2
		5-7	2
		5-8	1
		A-1 thru	0
		A-39	
		B-1 thru	0
		B-8	
		C-1 thru	2
		C-14	

5.0 RADIATION ENVIRONMENTAL MONITORING PROGRAM

5.1 Sampling

Table 5.1-1 and Figures 5.1-1 5.1-2, and 5.1-3 specify the current sampling locations based on the latest land use census.

If it is learned from an annual census that milk animals or gardens are present at a location which yields a calculated thyroid dose greater than those previously sampled, the new milk animal or garden locations resulting in higher calculated doses shall be added to the surveillance program as soon as practicable. Sample locations (except the control) having lower calculated doses may be dropped from the program at the end of the grazing or growing season (October 31) to keep the total number of sample locations constant.

5.2 Interlaboratory Comparison Program

Analyses shall be performed on radioactive samples supplied by the EPA crosscheck program. This program involves the analyses of samples provided by a control laboratory and comparison of results with those of the control laboratory as well as with other laboratories which receive portions of the same samples. Media used in this program (air, milk, water, etc.) shall be limited to those found in the radiation environmental monitoring program. The results of analyses performed as a part of the crosscheck program shall be included in the Annual Radiation Environmental Monitoring Report.

TABLE 5.1-1

FRAIRIE ISLAND NUCLEAR GENERATING PLANT
RADIATION ENVIRONMENTAL MONITORING PROGRAM
SAMPLING LOCATIONS

<u>Type of Sample</u>	<u>Code</u> *	<u>Collection Site</u>	<u>Location</u>
River Water	P-5 ^C	Upstream of Plant	0.6 mi @ 60°/ENE
River Water	P-6	Lock & Dam #3	1.6 mi @ 129°/SE
Drinking Water	P-11	City of Red Wing	7.1 mi @ 135°/SE
Well Water	P-25 ^C	Kinneman Farm	11.1 mi @ 331°/NNW
Well Water	P-6	Lock & Dam #3	1.6 mi @ 129°/SE
Well Water	P-8	Kinney Store	2.0 mi @ 280°/W
Well Water	P-9	Plant Well #2	0.3 mi @ 306°/NW
Sediment-River	P-5 ^C	Upstream of Plant	0.6 mi @ 60°/ENE
Sediment-River	P-6	Lock & Dam #3	1.6 mi @ 129°/SE
Sediment-Shoreline	P-12	Recreation Area	3.4 mi @ 116°/ESE
Periphyton or Macroinvertebrates	P-5 ^C	Upstream of Plant	0.6 mi @ 60°/ENE
	P-6	Lock & Dam #3	1.6 mi @ 129°/SE
Fish	P-5 ^C	Upstream of Plant	0.6 mi @ 60°/ENE
Fish	P-6	Lock & Dam #3	1.6 mi @ 129°/SE
Milk	P-25 ^C	Kinneman Farm	11.1 mi @ 331°/NNW
Milk	P-14	Gustafson Farm	2.2 mi @ 168°/SSE
Milk	P-16	Johnson Farm	2.6 mi @ 60°/ENE
Milk	P-17	Place Farm	3.5 mi @ 25°/NNE
Milk	P-18	Birk Farm	3.5 mi @ 181°/S

Northern States Power Company
Prairie Island Nuclear Generating Plant

Offsite Radiation Dose Assessment for January 1 - December 31, 1982

An assessment of radiation dose due to releases from the Prairie Island Nuclear Generating Plant during 1982 was performed in accordance with the Technical Specifications. Computed doses were well below the 40 CFR Part 190 and 10 CFR Part 50, Appendix I, standards and guidelines.

NRC Computer programs GASPAR and LADTAP were used in conjunction with meteorological parameters from the Offsite Dose Calculation Manual in making this assessment. Source terms were obtained from the two Effluent and Waste Disposal Semiannual Reports prepared for NRC review during the year.

Offsite Doses from Gaseous Releases

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

Offsite Doses from Liquid Releases

Computed doses due to liquid releases are reported in Table 1. Receptor information is reported in Table 2. Doses, both whole body and organ, are a small percentage of Appendix I guidelines.

Doses to Individuals Due to Activities Inside the Site Boundary

Occasional sportmen will 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 the area.

For purposes of estimating dose due to recreational and river 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 are reported in Table 1.

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

There are no uranium fuel cycle facilities in the vicinity of the Prairie Island site.

The only other source of exposure to the general public in addition to the plant gaseous and liquid effluents is from direct radiation. Pressurized water reactor direct radiation has been shown to be negligible. An array of TLD monitoring locations at the site boundary has consistently indicated that plant operation in recent years has had no effect on ambient gamma radiation.

Therefore, the most exposed member of the general public will not receive a radiation dose from reactor 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 within the 40 CFR Part 190 standards of 25 mrem to the whole body or any organ (except the thyroid) and 75 mrem to the thyroid every 12 months.

TABLE 1
OFFSITE RADIATION DOSE ASSESSMENT - PRAIRIE ISLAND
PERIOD: JANUARY 1 THROUGH DECEMBER 31, 1982

<u>Gaseous Releases</u>		<u>10 CFR Part 50 Appendix I Guideline per year</u>
Maximum Site Boundary Gamma Air Dose (mrad)	0.23	20
Maximum Site Boundary Beta Air Dose (mrad)	0.58	40
Maximum Offsite Dose to Any Organ* (mrem)		
Total	0.34	30
H-3 Dose	0.25	-
Offshore Location (mrem, 7 days/year)		
Whole Body	0.02	10
Organ	0.01	30
<u>Liquid Releases</u>		
Maximum Offsite Whole Body Dose (mrem)		
Total	0.00113	6
H-3 Dose	0.00112	-
Maximum Offsite Organ Dose (mrem)*		
Total	0.00114	20
H-3 Dose	0.00113	-

* Long lived particulates, I-131, and tritium.

TABLE 2

OFFSITE RADIATION DOSE ASSESSMENT
 SUPPLEMENTAL INFORMATION - PRAIRIE ISLAND

PERIOD: JANUARY 1 THROUGH DECEMBER 31, 1982

Gaseous Effluents

Maximum Site Boundary
 Dose Location
 (from building vents)

Sector	WNW
Distance (mi)	0.36

Offshore Location
 Within Site
 Boundary

Sector	ESE
Distance (mi)	0.2

Maximum Offsite
 Dose Location

Sector	WNW
Distance (mi)	0.7
Pathways	Ground, inhalation, vegetables

Age Group	Child
Organ	Thyroid

Liquid Effluents

Maximum Offsite
 Dose Location Downstream

Pathways	Fish
Age Group	Adult
Organ	Thyroid