

TRANSMITTAL MANIFEST

NORTHERN STATES POWER COMPANY

NUCLEAR GENERATION DEPARTMENT

PRAIRIE ISLAND NUCLEAR GENERATING PLANT

Effluent and Waste Disposal Semiannual Report  
for January through June 1993

MANIFEST DATE: August 27, 1993

USNRC	4	ANI Library	1
Regional Admin III		Fluor Daniels	2
NRR Project Manager		T Synder	
DCD		Corporate Library	
Resident Inspector		Shaw Pittman Potts & Trowbridge	1
J K Gilchrist	1	J Silberg	
D A Schuelke	1	Westinghouse Electric	3
P H Kamman	1	T J Kitchen	
PI Site General Mgr.	1	J A Usem	
ERAD Dept.		K C Hoskins	
Attn: Records Clerk	1	Safety Audit Committee	10
Communications Department		R O Anderson	
Attn: Tom Bushee	1	A B Cutter	
NRS File (4131116)	1	R L Hannen	
NSS File	1	F W Hartley	
MDH	1	W J Hill	
Attn: Kris Sanda		D D Lanning	
		D S Mendeley	
		M D Wadley	
		C R Steinhardt	
		Secretary	
		Manifest File	

EFFLUENT SEMIANNUAL REPORT

04-JAN-93 THROUGH 04-JUL-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
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- 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-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: 01	QTR: 02
3.40E+01	2.20E+01
5.40E+01	3.44E+01
2.12E+00	2.55E+00
1.59E+00	1.56E+00
1.28E+00	1.33E+00
1.04E+04	5.68E+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: 01	QTR: 02
1.60E+01	2.00E+00
7.84E+01	5.30E+00
4.88E+01	3.10E+00
3.05E+00	2.65E+00
1.20E-01	2.18E+00

## 3.0 ABNORMAL RELEASES (LIQUID)

3.1 NUMBER OF RELEASES

3.2 TOTAL ACTIVITY RELEASED (CI)

3.3 TOTAL TRITIUM RELEASED (CI)

QTR: 01	QTR: 02
0.00E+00	0.00E+00
0.00E+00	0.00E+00
0.00E+00	0.00E+00

## 4.0 ABNORMAL RELEASES (GASEOUS)

4.1 NUMBER OF RELEASES

4.2 TOTAL ACTIVITY RELEASED (CI)

QTR: 01	QTR: 02
0.00E+00	0.00E+00
0.00E+00	0.00E+00

TABLE 1A  
GASEOUS EFFLUENTS - SUMMATION OF ALL RELEASES

	QTR: 01	QTR: 02
5.0 FISSION AND ACTIVATION GASES		
5.1 TOTAL RELEASE (CI)	3.51E-01	3.02E-01
5.2 AVERAGE RELEASE RATE (UCI/SEC)	4.47E-02	3.84E-02
5.3 GAMMA DOSE (MRAD)	2.55E-05	2.47E-05
5.4 BETA DOSE (MRAD)	2.87E-03	2.46E-03
5.5 PERCENT OF GAMMA TECH SPEC (%)	2.55E-04	2.47E-04
5.6 PERCENT OF BETA TECH SPEC (%)	1.44E-02	1.23E-02
6.0 IODINES		
6.1 TOTAL I-131 (CI)	0.00E+00	0.00E+00
6.2 AVERAGE RELEASE RATE (UCI/SEC)	0.00E+00	0.00E+00
7.0 PARTICULATES		
7.1 TOTAL RELEASE (CI)	4.61E-05	1.33E-06
7.2 AVERAGE RELEASE RATE (UCI/SEC)	5.87E-06	1.69E-07
8.0 TRITIUM		
8.1 TOTAL RELEASE (CI)	2.21E+01	1.21E+01
8.2 AVERAGE RELEASE RATE (UCI/SEC)	2.81E+00	1.54E+00
9.0 TOTAL IODINE, PARTICULATE AND TRITIUM (UCI/SEC)	2.81E+00	1.54E+00
10.0 DOSE (MREM)	5.46E-02	2.23E-02
11.0 PERCENT OF TECH SPEC (%)	3.64E-01	1.49E-01
12.0 GROSS ALPHA (CI)	9.67E-09	5.24E-08

TABLE 1C  
GASEOUS EFFLUENTS - GROUND LEVEL RELEASES

## 13.0 FISSION AND ACTIVATION GASES

NUCLIDE	UNITS	CONTINUOUS MODE		BATCH MODE	
		QTR: 01	QTR: 02	QTR: 01	QTR: 02
KR-85	CI			3.52E-01	3.00E-01
XE-133	CI			1.31E-04	1.98E-03
XE-131M	CI				3.20E-06
XE-135	CI				2.85E-06
TOTAL	CI	0.00E+00	0.00E+00	3.52E-01	3.02E-01

## 14.0 IODINES

NUCLIDE	UNITS	CONTINUOUS MODE		BATCH MODE	
		QTR: 01	QTR: 02	QTR: 01	QTR: 02
TOTAL	CI	0.00E+00	0.00E+00	0.00E+00	0.00E+00

## 15.0 PARTICULATES

NUCLIDE	UNITS	CONTINUOUS MODE		BATCH MODE	
		QTR: 01	QTR: 02	QTR: 01	QTR: 02
BR-82	CI		1.02E-06		
CO-58	CI			3.98E-06	
CO-60	CI			9.24E-06	
CS-134	CI			1.16E-05	
CS-137	CI			1.63E-05	
MN-54	CI			4.70E-06	
NB-95	CI			3.03E-07	
SR-90	CI		3.09E-07		
TOTAL	CI	0.00E+00	1.33E-06	4.61E-05	0.00E+00

TABLE 2A  
LIQUID EFFLUENTS - SUMMATION OF ALL RELEASES

	QTR: 01	QTR: 02
16.0 VOLUME OF WASTE PRIOR TO DILUTION (LITERS)	3.12E+10	2.52E+10
17.0 VOLUME OF DILUTION WATER (LITERS)	1.36E+11	9.20E+10
18.0 FISSION AND ACTIVATION PRODUCTS		
18.1 TOTAL RELEASE W/O H-3, RADGAS, ALPHA (CI)	5.74E-02	3.06E-02
18.2 AVERAGE DILUTED CONCENTRATION (UCI/ML)	3.44E-10	2.62E-10
19.0 TRITIUM		
19.1 TOTAL RELEASE (CI)	5.16E+01	4.79E+01
19.2 AVERAGE DILUTED CONCENTRATION (UCI/ML)	3.09E-07	4.09E-07
20.0 DISSOLVED AND ENTRAINED GASES		
20.1 TOTAL RELEASE (CI)	6.13E-06	2.56E-06
20.2 AVERAGE DILUTED CONCENTRATION (UCI/ML)	3.67E-14	2.19E-14
21.0 GROSS ALPHA (CI)	0.00E+00	0.00E+00
22.0 TOTAL TRITIUM, FISSION AND ACTIVATION PRODUCTS (UCI/ML)	3.09E-07	4.09E-07
23.0 TOTAL BODY DOSE (MREM)	1.44E-02	5.34E-03
24.0 CRITICAL ORGAN		
24.1 DOSE (MREM)	1.44E-02	5.34E-03
24.2 ORGAN	TTL BODY	TTL BOBY
25.0 PERCENT OF TOTAL BODY TECH SPEC LIMIT (%)	4.80E-01	1.78E-01
26.0 PERCENT OF CRITICAL ORGAN TECH SPEC LIMIT (%)	4.80E-01	1.78E-01

TABLE 2A  
LIQUID EFFLUENTS - SUMMATION OF ALL RELEASES

## 27.0 INDIVIDUAL LIQUID EFFLUENT

NUCLIDE	UNITS	CONTINUOUS MODE		BATCH MODE	
		QTR: 01	QTR: 02	QTR: 01	QTR: 02
AG-110M	CI			1.90E-02	1.53E-03
CO-58	CI			1.37E-02	2.09E-03
CO-60	CI	5.17E-06		7.81E-03	2.01E-03
CR-51	CI			2.47E-03	5.71E-05
FE-59	CI			7.48E-04	2.69E-05
MN-54	CI			4.51E-04	5.08E-05
NB-95	CI			9.40E-04	9.40E-05
SB-124	CI			2.64E-03	5.41E-05
SB-125	CI			4.50E-03	4.96E-04
SN-113	CI			7.68E-04	1.21E-04
ZR-95	CI			6.85E-04	5.75E-05
CS-134	CI			1.48E-03	5.61E-04
CO-57	CI			1.90E-05	6.27E-06
CS-137	CI	1.77E-04		1.54E-03	5.99E-04
AG-108M	CI			5.43E-05	
BE-7	CI			3.38E-04	5.05E-04
ZN-65	CI			9.62E-06	7.11E-06
NB-97	CI	1.48E-05		2.82E-06	2.31E-06
SC-47	CI			1.11E-05	
NA-24	CI			5.56E-06	
FE-55	CI		1.65E-05	6.62E-06	2.23E-02
TOTAL	CI	1.97E-04	1.65E-05	5.72E-02	3.06E-02



TABLE 2A  
LIQUID EFFLUENTS - SUMMATION OF ALL RELEASES

## 28.0 DISSOLVED AND ENTRAINED GASES

		CONTINUOUS MODE		BATCH MODE	
NUCLIDE	UNITS	QTR: 01	QTR: 02	QTR: 01	QTR: 02
KR-85M	CI				2.56E-06
XE-133	CI			6.13E-06	
TOTAL	CI	0.00E+00	0.00E+00	6.13E-06	2.56E-06

PRAIRIE ISLAND NUCLEAR GENERATING PLANT  
 NORTHERN STATES POWER

Period: 1-1-93 to 7-1-93  
 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	6 MONTH PERIOD TOTALS (0.1 ) E00)	EST. TOTAL ERROR, % (0.00 E00)	CONTAINER DISPOSAL VOLUMES (LIST)
A. Resins	ft <sup>3</sup>	<u>2.72E+2</u>		<u>135.8</u>
	Ci	<u>2.83E+2</u>	<u>2.5E+1</u>	
B. Dry-Compacted	ft <sup>3</sup>			
	Ci			
C. Non-Compacted	ft <sup>3</sup>			
	Ci			
D. Filter Media	ft <sup>3</sup>			
	Ci			
S. Spent Fuel	ft <sup>3</sup>			
	Ci			

**NOTE:** The solid waste information provided in this report is the volume and activity of the low-level waste leaving the Prairie Island site. No allowance is made for off-site volume reduction prior to burial.

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## SOLID RADIOACTIVE WASTE DISPOSAL SEMI-ANNUAL REPORT

TABLE 1 SOLID WASTE AND IRRADIATED FUEL SHIPMENTS [continued]

## 2. Principal Radionuclide Composition by Type of Waste:

\* = Inferred - Not Measured on Site

## 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 (Continuation):

<sup>i</sup> = Inferred – Not Measured on Site

PRAIRIE ISLAND NUCLEAR GENERATING PLANT  
NORTHERN STATES POWER

Period: 1-1-93 to 7-1-93  
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**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>
2	TRUCK	BARNWELL

4. Irradiated Fuel Shipments:

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

PRAIRIE ISLAND NUCLEAR GENERATING PLANT  
NORTHERN STATES POWER

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**SOLID RADIOACTIVE WASTE DISPOSAL SEMI-ANNUAL REPORT**

**TABLE 1 SOLID WASTE AND IRRADIATED FUEL SHIPMENTS [continued]**

5. Shipping Container and Solidification Method:

No.	Disposal Volume (Ft <sup>3</sup> )	Activity (Ci)	Type of Waste	Container Code	Solidif. Code
<u>93-03</u>	<u>135.8</u>	<u>160</u>	<u>A</u>	<u>L</u>	<u>N/A</u>
<u>93-06</u>	<u>135.8</u>	<u>123</u>	<u>A</u>	<u>L</u>	<u>N/A</u>
_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____
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_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____
TOTALS <u>2</u>	<u>271.6</u>	<u>283</u>			

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

PRAIRIE ISLAND NUCLEAR GENERATING PLANT  
NORTHERN STATES POWER

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**SOLID RADIOACTIVE WASTE DISPOSAL SEMI-ANNUAL REPORT**

**TABLE 2 PROCESS CONTROL PROGRAM CHANGES**

TITLE: Process Control Program for Solidification/Dewatering of Radioactive  
Waste from Liquid Systems

Current Revision Number: 4 Effective Date: 5-23-91

**NOTE:**

If the effective date of the PCP is within the period covered by this report, then a description and justification of the changes to the PCP is required (T.S.6.7.A.4). Attach the sidelined pages to this report.

Changes/Justification:

Subject: Composite results compared to T.S. LLDs

It has been discovered that some of the Strontium 89 analysis results for the samples collected in 1989 through 1992 were reported as "Less Than" values but greater than the LLD values specified by the Prairie Island Technical Specifications Table TS.4.17-3 and TS.4.17-4. The Strontium 89 LLDs specified are  $5.0E-08$  uCi/ml for liquids and  $1.0E-11$  uCi/cc for airborne samples. Per discussions with NRC and per Technical Specifications this attachment is describing the reasons the LLDs were greater than T.S.

The analysis of airborne and liquid composite samples for Strontium 89 is conducted by an offsite laboratory. During the period involved, two separate offsite laboratories were involved in the composite analysis. Analysis of sampling procedures and discussions with the laboratory we are currently utilizing revealed that the discrepancies occurred due to the following reasons:

- 1) We ship the offsite laboratory half of the volume collected and composited during the previous quarter. The offsite lab then analyzes less than half of the amount they receive in order to maintain a sufficient volume to allow them to reanalyze if necessary. In the past we have procedurally collected a one liter sample to save for composite analysis with each release. If a release occurs from a specific release point only once during the quarter, the amount of sample analyzed was less than 250 mls.
- 2) We have specified to the offsite laboratory that all analysis results be decay corrected back to a specific date part way through the previous quarter. Strontium 89 has a 50 day half life, so any delay in the shipping, analysis or counting causes the calculated LLD value to be higher.

On one occasion, due to temporary restrictions of shipping radioactive materials over Indian reservation property, the entire quarters composite samples were held on site until the shipping restrictions were lifted. This caused the entire quarters liquid Sr-89 values to be higher than LLD due to decay correction.

- 3) Some airborne batch releases are Containment Post LOCA vents and the only particulate filter available for analysis is from a prerelease sample taken from containment prior to the release. Due to the small sample volume and possible long decay time, depending upon when the vent release occurred during the quarter, it can be difficult to meet the airborne T.S. LLD of  $1.0E-11$  for Sr-89.

The following steps have been taken to ensure that all Strontium 89 composite results will be analyzed in a manner that can accurately report LLD values less than those specified in our technical specifications:

- 1) Plant procedures have been modified to ensure that a minimum of 2 liters of sample be collected and available to ship to the offsite laboratory for analysis from every release point that was used during the quarter. During winter months, at least 1800 mls will be shipped to allow space in the bottle to prevent freezing from breaking the bottle.
- 2) The laboratory indicates that the specified LLD can be obtained if a minimum volume of 600 ml is used for the analysis. We are requesting that a sample volume of 800 to 1000 mls be used for the analysis.



- 3) The analysis request letter that accompanies the composite samples to the offsite laboratory will specify the required LLDs for the various samples types.
- 4) All containment vent and purge particulate samples will be counted for gross beta gamma. If the analysis indicates beta gamma activity the particulate filter will be shipped to the offsite laboratory before the decay correction would cause the LLD calculation to be greater than T.S.
- 5) The plant review and acceptance of laboratory results will be improved. The computer program that is used to input the composite results into our database will be revised to automatically check to insure that analysis results are less than the specified LLD values.

Included are attachments to the Semi-annual Effluent Release Reports that specify the release points and their respective "Less Than" activity values as reported by the offsite laboratory for the periods of Quarter 1 of 1989 through Quarter 4 of 1992. Only the release points with "Less Than" values that exceeded the LLD are included in the attachments. The Semi-annual Effluent Release Reports results remain unchanged since all original calculations were made with these release concentrations less than detectable. Based on plant experience and other analysis results of the involved release paths, we believe the activity was well less than the Tech. Spec. LLD values.