PRAIRIE ISLAND NUCLEAR GENERATING PLANT

CHANGES 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 (OCDM), a change to Figure 5.1-1 and Table 5.1-1 Radiation Environmental Monitoring Program, Sampling Location is submitted.

One of three dairy farms required by the sampling program is located 3.5 miles at 181°/S from the facility. The dairy farm owner has decided to move his operation to another location.

After consulting the Dispersion Parameters (D/Q) in the Offsite Dose Calculation Manual, the decision was made to sample raw milk from the Perry Christensen Farm located 3.7 miles at 88°/E of the plant, the next highest D/Q farm.

LIQUID RELEASE DILUTION FLOW

Setpoint calculations were originally based on a dilution flow of 4.52E5 GPM (1000 CFS). This method took credit for Sturgeon Lake dilution. This method is no longer correct since circulation discharge no longer is diluted into Sturgeon Lake prior to entering the main body of the Mississippi due to plant modifications. Minimum dilution flow of 67,300 GPM (150 CFS) yields conservative results.

Instructions for Entering Rev. 4 to the Prairie Island ODCM

1. Remove ODCM cover page and pages v, vi, 2.2, 2.5, 5.2 and 5.6.

2. Replace ODCM cover page and pages v, vi, 2.2, 2.5, 5.2 and 5.6 with Rev 4 pages. (Pages 2.2 and 2.3, 2.4 and 2.5, 5.5 and 5.6 are printed on a single sheet).

3. Use ODCM page vi to page check your manual if desired.

PRAIRIE ISLAND NUCLEAR GENERATING PLANT

OFFSITE DOSE CALCULATION MANUAL

(ODCM)

REV. 4

DOCKET NO. 50-282 and 50-306

NORTHERN STATES POWER COMPANY
MINNEAPOLIS, MINNESOTA

OPERATIONS COMMITTEE FINAL REVIEW DATE: 11-14-83

REVIEWED BY: J Sorensen DATE: 11/14/83

APPROVED BY: D.A. Schuelke DATE: 11-14-84

RECORD OF REVISIONS

Revision No.	Date	Reason for Revision
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
4	Nov. 14 1983	Change in milk sampling location and change in cooling tower blowdown

LIST OF EFFECTIVE PAGES

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

2.1.1.1 Determine the "mix" (radionuclides and composition) of the liquid effluent.

a. Determine the liquid source terms that are representative of the "mix" of the liquid effluent. Liquid source terms are the total curies of each isotope released during the previous month. Table 2.1-1 source terms may be used if there have been no liquid releases.

b. Determine S_i (the fraction of the total radioactivity in the liquid effluent comprised by radionuclide "i") for each individual radionuclide in the liquid effluent.

$$S_i = \frac{A_i}{\sum_i A_i} \qquad (2.1\text{-}1)$$

A_i = The radioactivity of radionuclide "i" in the liquid effluent

2.1.1.2 Determine C_t (the maximum acceptable total radioactivity concentration of all radionuclides in the liquid effluent prior to dilution (μCi/ml)).

$$C_t = \frac{F}{f \sum_i \frac{S_i}{MPC_i}} \qquad (2.1\text{-}2)$$

F = Dilution water flow rate (gpm)

= 67,300 gpm from cooling tower blowdown

f = The maximum attainable discharge flow rate prior to dilution (gpm)

= 60 gpm from the LDT tank pump(2)

= 100 gpm from the CVCS tank pump(2)

= 60 gpm from the SGBD tank pump(2)

MPC_i = The liquid effluent radioactivity concentration limit for radionuclide "i" (μCi/ml) from Table 2.1-1 or if not listed in Table 2.1-1, obtained from Reference 3.

2.1.1.3 Determine C_m (the maximum acceptable total radioactivity concentration of the radionuclides (minus tritium) in the liquid discharge prior to dilution (μCi/ml)).

$$C_m = C_t - (C_t S_H) \qquad (2.1\text{-}3)$$

SH = The fraction of the total radioactivity in the liquid effluent contributed by tritium and other radionuclides that do not emit gamma or X-ray radiation.

2.1.1.4 Determine C.R. (the calculated monitor count rate above background attributed to the radionuclides (ncpm)).

C.R. is obtained by using the applicable Effluent Monitor Efficiency Curve located in the Radiation Monitor Calibration file. C.R. is the count rate that corresponds to the "adjusted" total radioactivity concentration (C_m).

2.1.1.5 Determine HSP (the monitor high alarm setpoint above background (ncpm)).

$$HSP = T_m C.R. \qquad (2.1\text{-}4)$$

T_m = Fraction of the radioactivity from the site that may be released via each release point to ensure that the site boundary dose rate limit is not exceeded due to simultaneous releases from several release points.

= 0.90 for the Waste Effluent Liquid Monitor (R-18)

= 0.05 for the Steam Generator Blowdown Liquid Monitor - Unit 1 (1R-19)

= 0.05 for the Steam Generator Blowdown Liquid Monitor - Unit 2 (2R-19)

T_m values may be revised from the values given above. The summation of all the T_m values shall not be greater than unity.

2.1.1.6 The monitor high alarm setpoint above background (ncpm), shall be set at or below the HSP value.

2.1.2 Setpoint Based on Analysis of Liquid Prior to Discharge (Optional)

This method may be used in lieu of the method in Section 2.1.1 to determine the setpoints for the maximum acceptable discharge flow rate prior to dilution and to determine the associated high alarm setpoint based on this flow rate for the Waste Effluent Liquid Monitor (R-18), Steam Generator Blowdown Liquid Monitor - Unit 1 (1R-19), and Steam Generator Blowdown Liquid Monitor - Unit 2 (2R-19), during all operational conditions.

2.1.2.1 Determine f (the maximum acceptable discharge flow rate prior to dilution (gpm)).

$$f = \frac{0.8\ F\ T_m}{\sum_i \frac{C_i}{MPC_i}} \qquad (2.1\text{-}5)$$

F = Dilution water flow rate (gpm)

= 67,300 gpm from cooling tower blowdown.

C_i = Concentration of radionuclide "i" in the liquid effluent prior to dilution (μCi/ml) from analysis of the liquid effluent to be released.

MPC_i = The liquid effluent radioactivity concentration limit for radionuclide "i" (μCi/ml) from Table 2.1-1 or if not listed in Table 2.1-1 from Reference 3.

T_m = Fraction of the radioactivity from the site that may be released via each release point to ensure that the site boundary limit is not exceeded due to simultaneous releases from several release points. Refer to Section 2.1.1.5.

2.1.2.2 Determine the monitor setpoint based on the radionuclide mix of the liquid effluent.

a. Determine C.R. (the calculated monitor count rate above background attributed to the radionuclides (ncpm)).

C.R. is obtained by using the applicable Effluent Monitor Efficiency Curve located in the Radiation Monitor

TABLE 5.1-1

PRAIRIE ISLAND NUCLEAR GENERATING PLANT
RADIATION ENVIRONMENTAL MONITORING PROGRAM
SAMPLING LOCATIONS

Type of Sample	Code*	Collection Site	Location
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	Christensen Farm	3.7 mi @ 88°/E

TABLE 5.1-1 (continued)

PRAIRIE ISLAND NUCLEAR GENERATING PLANT
RADIATION ENVIRONMENTAL MONITORING PROGRAM
SAMPLING LOCATIONS

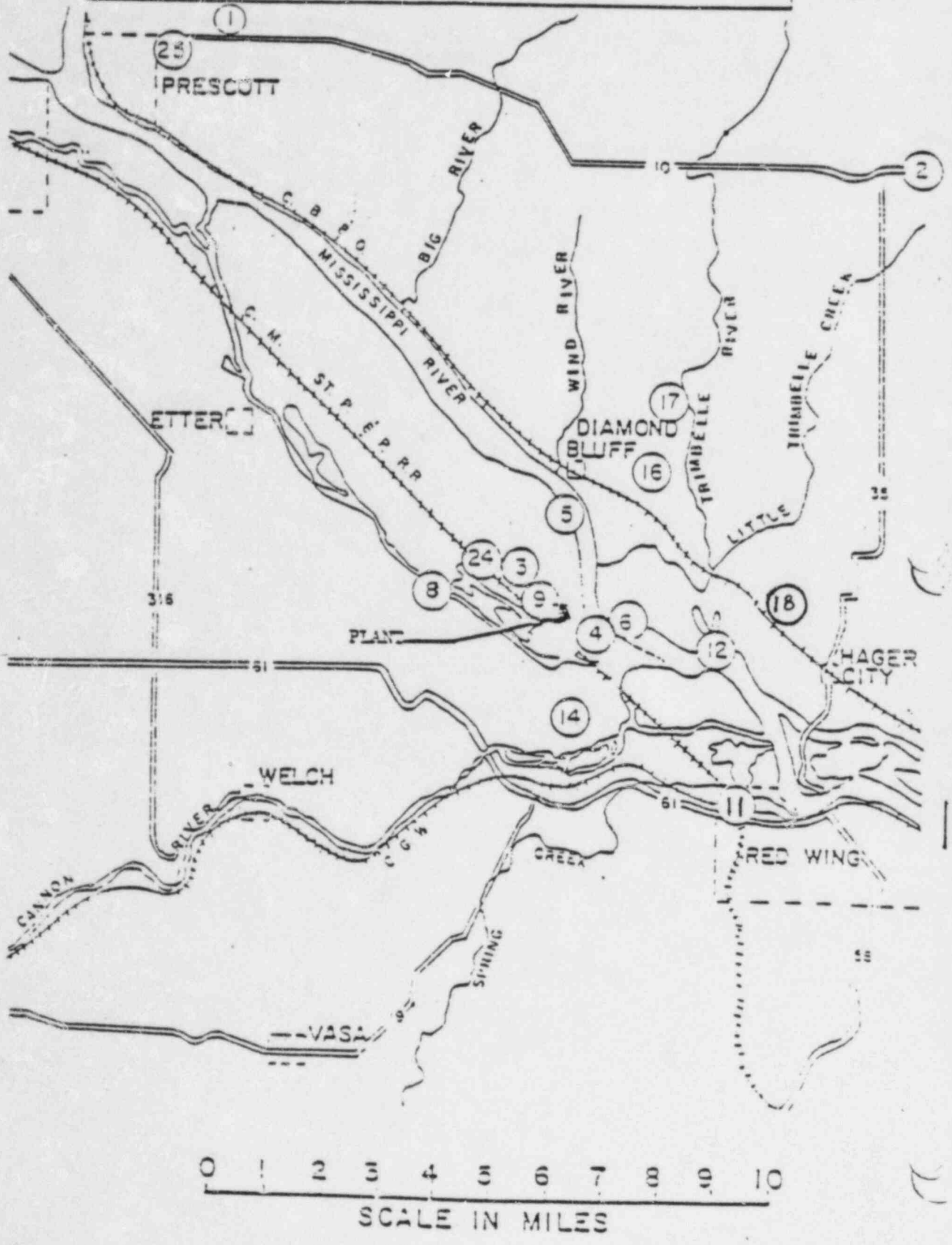
Type of Sample	Code*	Collection Site	Location
Direct Radiation(TLD)	P06S	Earl Flynn Farm	2.5 mi @ 299°/WNW
Direct Radiation(TLD)	P01C	Robert Kinneman Farm	11.1 mi @ 331°/NNW

* "C" denotes control location. All other locations are indicators.

The letters after numbered TLD's are as follows:

"A" denotes locations in the general area of the site boundary
"B" denotes locations about 4 to 5 miles distance from the plant
"S" denotes special interest locations.

FIGURE 5.1-1
PRAIRIE ISLAND NUCLEAR GENERATING PLANT
RADIATION ENVIRONMENTAL MONITORING PROGRAM



REV. 4