MONTICELLO NUCLEAR GENERATING PLANT

OFFSITE DOSE CALCULATIONAL MANUAL
(ODCM)

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1.0 INTRODUCTION

This Offsite Dose Calculation Manual (ODCM) provides the information and methodologies to be used by Monticello Nuclear Generating Plant (MNGP) to assure compliance with MNGP's operating technical specifications related to liquid and gaseous radiological effluents. They are intended to show compliance with 10 CFR 20, 10 CFR 50.36a, 10 CFR 50, Appendix A (GDC 60 & 64) and Appendix I, and 40 CFR 190.

This ODCM is based on "Radiological Effluent Technical Specifications for PWR's (NUREG-0472, Draft)," "Preparation of Radiological Effluent Technical Specifications for Nuclear Power Plants (NUREG-0133)," and other inputs from the Nuclear Regulatory Commission (USNRC). Specific plant procedures for implementation of this manual are provided elsewhere. These procedures will be utilized by the operating staff of MNGP to assure compliance with the technical specifications.

Also included in this manual is information related to the Radiological Environmental Monitoring Program (REMP) in the form of Figure 5.2-1 and Table 5.1-1. This figure and table designate specific sample types and locations currently used to satisfy the technical specification requirements for the REMP. They are subject to change based on the results of the periodic land use census.

This ODCM has been prepared as generically as possible in order to minimize the need for future revisions. Some changes to the ODCM will be needed in the future. Any such changes will be properly reviewed and approved as indicated in the Administrative Control Section, of the MNGP Technical Specifications.

2.0 LIQUID EFFLUENTS

2.1 Monitor Alarm Setpoint Determination

Monitor alarm setpoints will be determined in order to assure compliance with 10CFR20. The setpoints will indicate if the concentration of radionuclides in the liquid effluent released from the site to unrestricted areas exceeds the concentrations specified in 10CFR20, Appendix B, Table II, Column 2 for radionuclides other than dissolved or entrained noble gases. The setpoints will also assure that a concentration of 2×10^{-4} μCi/ml for dissolved or entrained noble gases is not exceeded.

2.1.1 Setpoint Based on Conservative Radionuclide Mix

The following method applies to liquid releases from the plant via the discharge canal when determining the high-high alarm setpoint for the Liquid Radwaste Effluent Monitor during all operational conditions. The radwaste discharge flowrate is assumed to be maintained relatively constant at or near the maximum design flowrate.

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 radioactivity levels of the radionuclides in the effluent from Table 2.1-1.

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 from Table 2.1-1.

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 flowrate (gpm) = 240,000 gpm from two circulating water pumps

f = The maximum acceptable discharge flowrate prior to dilution (gpm) = 50 gpm from the Liquid Radwaste pump[1]

MPC_i = The liquid effluent radioactivity concentration limit for radionuclide "i" (μCi/cc) from Table 2.1-1 .

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 (μ Ci/cc)).

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

S_H = The fraction of the total radioactivity in the liquid effluent comprised of 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 (ncps)).

$$C.R. = \frac{C_m}{E} \qquad (2.1\text{-}4)$$

E = The detection efficiency of the monitor (μCi/cc/cps) from Plant Chemistry Surveillance procedures.

2.1.1.5 The monitor high-high alarm setpoint above background (ncps) should be set at the C.R. value. Since only one tank can be released at a time, adjustment of this value is not necessary to compensate for releases from more than one source.

TABLE 2.1-1 LIQUID SOURCE TERMS

RADIONUCLIDE	RADIOACTIVITY * (3) (A_i)(Ci/Yr)	(2) MPC_i(μCi/ml)
Na-24	1.7 E-1	3E-5
Mn-56	2.7 E-1	1E-4
Co-60	2.0 E-2	3E-5
Cu-64	5.4 E-1	2E-4
Zn-69m	3.7 E-2	6E-5
Np-239	1.7 E-1	1E-4
Br-83	1.4 E-2	3E-6
Sr-89	2.8 E-3	3E-6
Sr-90	1.7 E-4	3E-7
Sr-91	6.4 E-2	5E-5
Sr-92	5.8 E-2	6E-5
Y-92	1.0 E-1	6E-5
Y-93	6.6 E-2	3E-5
Mo-99	5.0 E-2	4E-5
I-131	1.3 E-1	3E-7
I-132	1.3 E-1	8E-6
I-133	4.0 E-1	1E-6
I-134	6.4 E-2	2E-5
Cs-134	8.3 E-2	9E-6
I-135	2.5 E-1	4E-6
Cs-136	2.6 E-2	6E-5
Cs-137	1.2 E-1	2E-5
Cs-138	1.5 E-1	2E-4
Ba-140	1.1 E-2	2E-5
La-141	5.7 E-3	3E-6
Ce-144	5.3 E-3	1E-5
H-3	2.1E1	3E-3
Total	2.39E1	-

* These source terms were calculated in accordance with NUREG-0016 by using the USNRC "GALE" Code.

2.2 Compliance With 10 CFR 20

In order to show compliance with 10 CFR 20, the concentrations of radionuclides in liquid effluents will be determined and compared with maximum permissable concentrations (MPC) as defined in Appendix B, Table II of 10 CFR 20. Concentrations of radioactivity in effluents prior to dilution will be determined. Concentration in diluted effluent will be calculated using these results prior to each batch release, and following each batch release.

2.2.1 Batch Releases

2.2.1.1 Prerelease

The radioactivity content of each batch release will be determined prior to release. MNGP will show compliance with 10 CFR 20 in the following manner:

The concentration of the various radionuclides in the batch release prior to dilution, is divided by the minimum dilution flow to obtain the concentration at the unrestricted area. This calculation is shown in the following equation:

$$Conc_i = \frac{C_i \; R}{MDF} \qquad (2.2\text{-}1)$$

where

$Conc_i$ = concentration of radionuclide i at the unrestricted area, μCi/ml;

C_i = concentration of radionuclide i in the potential batch release, μCi/ml;

R = release rate of the batch, gpm;

MDF = minimum dilution flow, gpm.

The projected concentration in the unrestricted area is compared to the concentrations in Appendix B, Table II of 10 CFR 20. These concentrations are given in Table 2.1-1. Before a release may occur, equation 2.2-2 must be met for all isotopes. For the MNGP the MDF is 240,000 gpm. The maximum release rate is 50 gpm.

$$\sum_i \left[\frac{Conc_i}{MPC_i} \right] \leq 1 \qquad (2.2\text{-}2)$$

where

MCP_i = maximum concentration of radionuclide i from Reference 2, μCi/ml

2.3 Liquid Effluent Doses - Compliance with 10 CFR 50

Doses resulting from liquid effluents will be calculated monthly to show compliance with 10 CFR 50.[4] A cumulative summation of total body and organ doses for each calendar quarter and calendar year will be maintained as well as projected doses for the next month.

2.3.1 Determination of Liquid Effluent Dilution

To determine doses from liquid effluents the near field average dilution factor for the period of release must be calculated. This dilution factor must be calculated for each batch release. The dilution factor is determined by:

$$F_k = \frac{R_k}{X\ ADF_k} \qquad (2.3\text{-}1)$$

The value of X is the site specific value for the mixing effect of the MNGP discharge structure. This value is 1.0 for MNGP while operating in the once-through cooling mode. Although not expected to occur, if radioactive material is discharged while operating in the recycle mode, this value may be adjusted upward.

where

R_k = Release rate of the batch during time period k, gpm;

ADF_k = Actual dilution flow during the time period of release k, gpm.

2.3.2 Dose Calculations

The dose contribution from the release of liquid effluents will be calculated monthly. The dose contribution will be calculated using the following equation:

$$D = \sum_k \sum_i A_{i\tau}\ t_k\ C_{ik}\ F_k \qquad (2.3\text{-}2)$$

where:

D = the dose commitment to the total body or any organ, from the liquid effluents for the 31 day period, mrem;

C_{ik} = the average concentration of radionuclide, i, in undiluted liquid effluent for the release k, μCi/ml;

$A_{i\tau}$ = the site related ingestion dose commitment factor to the total body or any organ τ for each identified principal gamma and beta emitter, mrem/hr per μCi/ml;

F_k = the near field average dilution factor for C_{ik} during liquid effluent release k, as defined in Section 2.3.1;

t_k = The length of time for release k, hours

The dose factor $A_{i\tau}$ was calculated for an adult for each isotope using the following equation:

$$A_{i\tau} = 1.14 \times 10^5 \, (735\text{-}/D_w + 21BF_i) \; DF_{i\tau} \qquad (2.3\text{-}3)$$

where

$$1.14\text{x}10^5 = 10^6 \frac{\text{pCi}}{\mu\text{Ci}} \times 10^3 \frac{\text{ml}}{\text{l}} \times \frac{1 \text{ yr}}{8760 \text{ hr}};$$

730 = adult water consumption rate, l/yr;

D_w = dilution factor from the near field area to the potable water intake for adult water consumption;

21 = adult fish consumption, kg/yr;

BF_i = bioaccumulation factor for radionuclide i in fish from TableA-1 of Regulatory Guide 1.109 Rev. 1,[5] pCi/Kg per pCi/l;

$DF_{i\tau}$ = dose conversion factor for radionuclide i for adults for particular organ τ from Table E-11 of Regulatory Guide 1.109 Rev 1, mrem/pCi.

A table of $A_{i\tau}$ values for an adult at the MNGP are presented in Table 2.3-1. The far field dilution factor, D_w, for the MNGP is 7:1, for the nearest downstream water supply in St. Paul. This value was determined by assuming that effluents are completely mixed in 50 percent of the Mississippi River flow (7431 cfs at Anoka, Minnesota).

2.3.3 Cumulation of Doses

Doses calculated monthly will be summed for comparison with quarterly and annual limits. The monthly results should be added to the doses cumulated from the other months in the quarter of interest and in the year of interest. The following relationships should hold:

For the quarter,

$$D < 1.4 \text{ mrem total body} \quad (2.3\text{-}4)$$

$$D < 2.8 \text{ mrem any organ} \quad (2.3\text{-}5)$$

For the Calendar year,

$$D < 2.8 \text{ mrem total body} \quad (2.3\text{-}6)$$

$$D < 5.6 \text{ mrem any organ} \quad (2.3\text{-}7)$$

The limits on these four equations are those given in NUREG-0133 but have been adjusted to account for the expected annual dose from P-32 and Fe-55. This adjustment has been made because these radionuclides will not routinely be measured but could result in significant doses due to high bioaccumulation.

The quarterly limits given above represent one half of the annual design objective. If these quarterly or annual limits are exceeded, a special report should be submitted stating the reason and corrective action to be taken. This report will include results of analyses of Mississippi River water and an analysis of possible impacts through the drinking water pathway. If twice these limits are exceeded, a special report will be submitted showing compliance with 40 CFR 190.

2.3.4 Projection of Doses

Anticipated doses resulting from the release of liquid effluents will be projected monthly. If the sum of the accumulated doses to date for the quarter and the projected doses for the remainder of the quarter exceed 25 percent of Equation 2.3-6 or 2.3-7, additional components of the liquid radwaste treatment system will be used to process waste. The projected doses will be calculated using Equation 2.3-2. The dilution factor, F_k, will be calculated by replacing the term ADF_k in Equation 2.3-1 with the term MDF from Equation 2.2-1. The total source term utilized for the most recent dose calculation should be used for the projections unless information exists indicating that actual releases could differ significantly in the next month. In this case, the source term should be adjusted to reflect this information and the justification for the adjustment noted. This adjustment should account for any radwaste equipment which was operated during the previous month that could be out of service in the coming month.

REFERENCES FOR SECTION 2

(1) "NSP - Monticello Nuclear Generating Plant," Appendix I Analysis - Supplement No. 1 - Docket No. 50-263," Table 2.1-1.

(2) 10 CFR 20, Appendix B, Table II, Column 2.

(3) "NSP - Monticello Nuclear Generating Plant," Appendix I Analysis - Supplement No. 1 - Docket No. 50-263," Figure 2.1-2.

(4) 10 CFR 50, Appendix I.

(5) U.S. Nuclear Regulatory Commission, "Regulatory Guide 1.109 Calculation of Annual Doses to Man from Routine Releases of Reactor Effluents for the Purpose of Compliance with 10 CFR 50, Appendix I," Rev. 1, 1977.

TABLE 2.3-1

A_{it} VALUES FOR THE MONTICELLO NUCLEAR GENERATING PLANT

(MREM/HR PER μCI/ML)

NUCLIDE	BONE	LIVER	T.BODY	THYRTOD	KIDNEY	LUNG	GI-LLI
1H 3	0.00E-01	1.47E 00	1.47E 00	1.47E 00	1.47E 00	1.47E 00	1.47E 00
6C 14	3.13E 04	6.26E 03	6.26E 03	6.26E 03	6.26E 03	6.26E 03	6.26E 03
11NA 24	4.27E 02	4.27E 02	4.27E 02	4.27E 02	4.27E 02	4.27E 02	4.27E 02
15P 32	4.62E 07	2.87E 06	1.79E 06	0.00E-01	0.00E-01	0.00E-01	5.20E 06
24CR 51	0.00E-01	0.00E-01	1.31E 00	7.80E-01	2.38E-01	1.73E 00	3.28E 02
25MN 54	0.00E-01	4.43E 03	8.45E 02	0.00E-01	1.32E 03	0.00E-01	1.36E 04
25MN 56	0.00E-01	1.11E 02	1.98E 01	0.00E-01	1.42E 02	0.00E-01	3.56E 03
26FE 55	6.91E 02	4.77E 02	1.11E 02	0.00E-01	0.00E-01	2.66E 02	2.74E 02
26FE 59	1.09E 03	2.56E 03	9.83E 02	0.00E-01	0.00E-01	7.16E 02	8.54E 03
27CO 58	0.00E-01	9.80E 01	2.20E 02	0.00E-01	0.00E-01	0.00E-01	1.99E 03
27CO 60	0.00E-01	2.82E 02	6.21E 02	0.00E-01	0.00E-01	0.00E-01	5.29E 03
28NI 63	3.27E 04	2.26E 03	1.10E 03	0.00E-01	0.00E-01	0.00E-01	4.72E 02
28NI 65	1.33E 02	1.72E 01	7.87E 00	0.00E-01	0.00E-01	0.00E-01	4.37E 02
29CU 64	0.00E-01	1.10E 01	5.15E 00	0.00E-01	2.76E 01	0.00E-01	9.34E 02
30ZN 65	2.32E 04	7.39E 04	3.34E 04	0.00E-01	4.94E 04	0.00E-01	4.66E 04
30ZN 69	4.94E 01	9.46E 01	6.58E 00	0.00E-01	6.14E 01	0.00E-01	1.42E 01
35BR 83	0.00E-01	0.00E-01	4.09E 01	0.00E-01	0.00E-01	0.00E-01	5.89E 01
35BR 84	0.00E-01	0.00E-01	5.30E 01	0.00E-01	0.00E-01	0.00E-01	4.16E-04
35BR 85	0.00E-01	0.00E-01	2.18E 00	0.00E-01	0.00E-01	0.00E-01	1.02E-15
37RB 86	0.00E-01	1.01E 05	4.72E 04	0.00E-01	0.00E-01	0.00E-01	2.00E 04
37RB 88	0.00E-01	2.90E 02	1.54E 02	0.00E-01	0.00E-01	0.00E-01	4.01E-09
37RB 89	0.00E-01	1.92E 02	1.35E 02	0.00E-01	0.00E-01	0.00E-01	1.12E-11
38SR 89	2.58E 04	0.00E-01	7.40E 02	0.00E-01	0.00E-01	0.00E-01	4.14E 03
38SR 90	6.35E 05	0.00E-01	1.56E 05	0.00E-01	0.00E-01	0.00E-01	1.83E 04
38SR 91	4.75E 02	0.00E-01	1.92E 01	0.00E-01	0.00E-01	0.00E-01	2.26E 03
38SR 92	1.80E 02	0.00E-01	7.78E 00	0.00E-01	0.00E-01	0.00E-01	3.57E 03
39Y 90	6.90E-01	0.00E-01	1.85E-02	0.00E-01	0.00E-01	0.00E-01	7.32E 03
39Y 91M	6.52E-03	0.00E-01	2.53E-04	0.00E-01	0.00E-01	0.00E-01	1.92E-02
39Y 91	1.01E 01	0.00E-01	2.70E-01	0.00E-01	0.00E-01	0.00E-01	5.57E 03
39Y 92	6.06E-02	0.00E-01	1.77E-03	0.00E-01	0.00E-01	0.00E-01	1.06E 03
39Y 93	1.92E-01	0.00E-01	5.31E-03	0.00E-01	0.00E-01	0.00E-01	6.10E 03
40ZR 95	6.02E-01	1.93E-01	1.31E-01	0.00E-01	3.03E-01	0.00E-01	6.11E 02
40ZR 97	3.32E-02	6.71E-03	3.07E-03	0.00E-01	1.01E-02	0.00E-01	2.08E 03
41NB 95	4.47E 02	2.49E 02	1.34E 02	0.00E-01	2.46E 02	0.00E-01	1.51E 06
42MO 99	0.00E-01	1.54E 02	2.94E 01	0.00E-01	3.50E 02	0.00E-01	3.58E 02
43TC 99M	1.18E-02	3.34E-02	4.25E-01	0.00E-01	5.07E-01	1.63E-02	1.97E 01
43TC101	1.21E-02	1.75E-02	1.72E-01	0.00E-01	3.15E-01	8.94E-03	5.26E-14
44RU103	6.63E 00	0.00E-01	2.86E 00	0.00E-01	2.53E 01	0.00E-01	7.74E 02
44RU105	5.52E-01	0.00E-01	2.18E-01	0.00E-01	7.13E 00	0.00E-01	3.38E 02
44RU106	9.85E 01	0.00E-01	1.25E 01	0.00E-01	1.90E 02	0.00E-01	6.38E 03
47AG110M	2.78E 00	2.57E 00	1.53E 00	0.00E-01	5.06E 00	0.00E-01	1.05E 03
52TE125M	2.60E 03	9.41E 02	3.48E 02	7.81E 02	1.06E 04	0.00E-01	1.04E 04
52TE127M	6.56E 03	2.35E 03	8.00E 02	1.68E 03	2.67E 04	0.00E-01	2.20E 04
52TE127	1.07E 02	3.83E 01	2.31E 01	7.90E 01	4.34E 02	0.00E-01	8.42E 03
52TE129M	1.11E 04	4.16E 03	1.76E 03	3.83E 03	4.65E 04	0.00E-01	5.61E 04
52TE129	3.04E 01	1.14E 01	7.42E 00	2.34E 01	1.23E 02	0.00E-01	2.30E 01

TABLE 2.3-1(Cont.)

A_{iT} VALUES FOR THE MONTICELLO NUCLEAR GENERATING PLANT

(MREM/HR PER μCI/ML)

NUCLIDE	BONE	LIVER	T.BODY	THYRIOD	KIDNEY	LUNG	GI-LLI
52TE131M	1.68E 03	8.20E 02	6.83E 02	1.30E 03	8.31E 03	0.00E-01	8.14E 04
52TE131	1.91E 01	7.98E 00	6.03E 00	1.57E 01	8.37E 01	0.00E-01	2.70E 00
52TE132	2.44E 03	1.58E 03	1.48E 03	1.75E 03	1.52E 04	0.00E-01	7.47E 04
53I 130	3.61E 01	1.07E 02	4.21E 01	9.03E 03	1.66E 02	0.00E-01	9.18E 01
53I 131	1.99E 02	2.84E 02	1.63E 02	9.32E 04	4.38E 02	0.00E-01	7.50E 01
53I 132	9.70E 00	2.60E 01	9.08E 00	9.08E 02	4.13E 01	0.00E-01	4.88E 00
53I 133	6.79E 01	1.18E 02	3.60E 01	1.74E 04	2.06E 02	0.00E-01	1.06E 02
53I 134	5.07E 00	1.38E 01	4.92E 00	2.39E 02	2.19E 01	0.00E-01	1.20E-02
53I 135	2.12E 01	5.54E 01	2.05E 01	3.66E 03	8.89E 01	0.00E-01	6.26E 01
55CS134	2.99E 05	7.10E 05	5.81E 05	0.00E-01	2.30E 05	7.63E 04	1.24E 04
55CS136	3.12E 04	1.23E 05	8.88E 04	0.00E-01	6.36E 04	9.41E 03	1.40E 04
55CS137	3.83E 05	5.23E 05	3.43E 05	0.00E-01	1.78E 05	5.90E 04	1.01E 04
55CS138	2.65E 02	5.23E 02	2.59E 02	0.00E-01	3.84E 02	3.80E 01	2.23E-03
56BA139	2.08E 00	1.48E-03	6.10E-02	0.00E-01	1.39E-03	8.41E-04	3.69E 00
56BA140	4.36E 02	5.47E-01	2.85E 01	0.00E-01	1.86E-01	3.13E-01	8.97E 02
56BA141	1.01E 00	7.64E-04	3.41E-02	0.00E-01	7.10E-04	4.34E-04	4.77E-10
56BA142	4.57E-01	4.70E-04	2.88E-02	0.00E-01	3.97E-04	2.66E-04	6.44E-19
57LA140	1.79E-01	9.04E-02	2.39E-02	0.00E-01	0.00E-01	0.00E-01	6.64E 03
57LA142	9.18E-03	4.18E-03	1.04E-03	0.00E-01	0.00E-01	0.00E-01	3.05E 01
58CE141	1.34E-01	9.04E-02	1.03E-02	0.00E-01	4.20E-02	0.00E-01	3.46E 02
58CE143	2.36E-02	1.74E 01	1.93E-03	0.00E-01	7.67E-03	0.00E-01	6.51E 02
58CE144	6.97E 00	2.91E 00	3.74E-01	0.00E-01	1.73E 00	0.00E-01	2.36E 03
59PR143	6.60E-01	2.65E-01	3.27E-02	0.00E-01	1.53E-01	0.00E-01	2.89E 03
59PR144	2.16E-03	8.97E-04	1.10E-04	0.00E-01	5.06E-04	0.00E-01	3.11E-10
60ND147	4.51E-01	5.22E-01	3.12E-02	0.00E-01	3.05E-01	0.00E-01	2.50E 03
74W 187	2.97E 02	2.48E 02	8.68E 01	0.00E-01	0.00E-01	0.00E-01	8.13E 04
93NP239	4.26E-02	4.19E-03	2.31E-03	0.00E-01	1.31E-02	0.00E-01	8.60E 02

3.0 GASEOUS EFFLUENTS

3.1 Monitor Alarm Setpoint Determination

3.1.1 Effluent Monitors

Monitor alarm setpoints will be determined in order to assure compliance with 10CFR20. The setpoints will indicate if the dose rate in the unrestricted areas due to noble gas radionuclides in the gaseous effluent released from the site exceeds 500 mrem/year to the whole body or exceeds 3000 mrem/year to the skin. The unrestricted area boundary is defined in the MNGP Technical Specifications.

If more than one source term applies at a release point, calculate the setpoint for each source term and use the lowest setpoint obtained.

3.1.1.1 Setpoint Based on Conservative Mix (Mixed Mode Releases)

The following method applies to continuous gaseous releases via the Reactor Building Vent when determining the high-high alarm setpoint for the Reactor Building Noble Gas Monitor which initiates isolation of Reactor Building Vent releases.

a. Determine the "mix" (noble gas radionuclides and composition) of the gaseous effluent.

(1) Determine the gaseous source terms that are representative of the "mix" of the gaseous effluent. Gaseous source terms are the radioactivity of the noble gas radionuclides in the effluent from Table 3.1-1.

(2) Determine S_i (the fraction of the total radioactivity in the gaseous effluent comprised by noble gas radionuclide "i") for each individual noble gas radionuclide in the gaseous effluent.

$$S_i = \frac{A_i}{\sum_i A_i} \qquad (3.1\text{-}1)$$

A_i = The radioactivity of noble gas radionuclide "i" in the gaseous effluent from Table 3.1-1.

b. Determine Q_t (the maximum acceptable total release rate of all noble gas radionuclides in the gaseous effluent (μCi/sec)) based upon the whole body exposure limit.

$$Q_t = \frac{500}{(X/Q)_v \sum_i K_i S_i} \qquad (3.1\text{-}2)$$

$(X/Q)_v$ = The highest calculated annual average relative concentration of effluents released via the Reactor Building Vent for any area at or beyond the unrestricted area boundary for all sectors (sec/m^3) from Appendix A, Table A-3. = 4.08 E-6 sec/m^3 (SSE, 0.43 miles)

K_i = The total whole body dose factor due to gamma emissions from noble gas radionuclide "i" (mrem/year/μCi/m^3) from Table 3.1-2.

c. Determine Q_t based upon the skin exposure limit.

$$Q_t = \frac{3000}{(X/Q)_v \sum_i (L_i + 1.1\, M_i)\, S_i} \qquad (3.1\text{-}3)$$

$L_i + 1.1\, M_i$ = The total skin dose factor due to emissions from noble gas radionuclide "i" (mrem/year/μCi/m^3) from Table 3.1-2.

d. Determine C_t (the maximum acceptable total radioactivity concentration of all noble gas radionuclides in the gaseous effluent (μCi/cc)).

$$C_t = \frac{2.12\ E\text{-}3\ Q_t}{F} \qquad (3.1\text{-}4)$$

NOTE: Use the <u>lower</u> of the Q_t values obtained in Sections 3.1.1.1b and 3.1.1.1c.

F = The maximum acceptable effluent flow-rate at the point of release (cfm) = 175,000 cfm[1]

2.12 E-3 = Unit conversion factor to convert μCi/sec/cfm to μCi/cc.

e. Determine C.R. (the calculated monitor count rate above background attributed to the noble gas radionuclides (ncps)).

$$C.R. = \frac{C_t}{E} \qquad (3.1\text{-}5)$$

E = The detection efficiency of the monitor for noble gas radionuclides (μCi/cc/cps) from Plant Chemistry Surveillance Procedures.

f. Determine HHSP (the monitor high-high alarm setpoint above background (ncps)).

$$HHSP = 0.50\ C.R. \qquad (3.1\text{-}6)$$

0.50 = Fraction of the total radioactivity from the site via the monitored release point to ensure that the site boundary limit is not exceeded due to simultaneous releases from several release points.

3.1.1.2 Setpoint Based on Conservative Mix (Elevated Releases)

The following method applies to gaseous releases via the Stack when determining the high-high alarm setpoint for the Stack Gas Monitor for all possible release modes.

These modes are:

- Continuous release via turbine gland seal
- Continuous release via the gaseous radwaste holdup system
- Batch release via the mechanical vacuum pump
- Batch release via drywell purging

a. Determine the "mix" (noble gases and composition) of the gaseous effluent.

(1) Determine the gaseous source terms that are representative of the "mix" of the gaseous effluent. Gaseous source terms are the radioactivity of the noble gases radionuclides in the effluent from Table 3.1-1, or a representative analysis of the gaseous effluent.

(2) Determine S_i (the fraction of the total radioactivity in the gaseous effluent comprised by noble gas radionuclide "i") for each individual noble gas radionuclide in the gaseous effluent.

$$S_i = \frac{A_i}{\sum_i A_i} \qquad (3.1\text{-}7)$$

A_i = The radioactivity of noble gas radionuclide "i" in the gaseous effluent from Table 3.1-1, or a representative analysis of the gaseous effluent.

b. Determine Q_t (the maximum acceptable total release rate of all noble gas radionuclides in the gaseous effluent (μCi/sec)) based upon the whole body exposure limit.

$$Q_t = \frac{500}{\sum_i V_i \quad S_i} \qquad (3.1\text{-}8)$$

NOTE: For short term batch releases (equal to or less than 500 hrs/year) via the mechanical vacuum pump and via drywell purging, substitute v_i for V_i in Equation 3.1-8.

V_i = The constant for long term releases (greater than 500 hrs/year) for noble gas radionuclide "i" accounting for the gamma radiation from the elevated finite plume (mrem/year/μCi/sec) from Table 3.1-2.

v_i = The constant for short term releases (equal to or less than 500 hrs/year) for noble gas radionuclide "i" accounting for the gamma radiation from the elevated finite plume (mrem/year/μCi/sec) from Table 3.1-2.

c. Determine Q_t based upon the skin exposure limit.

$$Q_t = \frac{3000}{\sum_i (L_i (\chi/Q)_s + 1.1\ B_i)\ S_i} \qquad (3.1\text{-}9)$$

NOTE: For short term batch releases (equal to or less than 500 hrs/year) via the mechanical vacuum pump and via drywell purging, use short term $(\chi/q)_s$ value and substitute b_i for B_i in Equation 3.1-9.

$L_i(\chi/Q)_s + 1.1\ B_i$ = The total skin dose constant for long term releases (greater than 500 hrs/year) due to emissions from noble gas radionuclide "i" (mrem/year/μCi/sec) from Table 3.1-2.

$L_i\ (\chi/q)_s + 1.1\ b_i$ = The total skin dose constant for short term releases (equal to or less than 500 hrs/year) due to emissions from noble gas radionuclide "i" (mrem/year/μCi/sec) from Table 3.1-2.

d. Determine C_t (the maximum acceptable total radioactivity concentration of all noble gas radionuclides in the gaseous effluent (μCi/cc)).

$$C_t = \frac{2.12\ E\text{-}3\ Q_t}{F} \qquad (3.1.\text{-}10)$$

NOTE: Use the <u>lower</u> of the Q_t values obtained in Sections 3.1.1.2b. and 3.1.1.2c.

F = The maximum acceptable effluent flowrate at the point of release (cfm) = 5000 cfm

2.12 E-3 = Unit conversion factor to convert μCi/sec/cfm to μCi/cc.

e. Determine C.R. (the calculated monitor count rate above background attributed to the noble gas radionuclides (ncps)).

$$C.R. = \frac{C_t}{E} \qquad (3.1.\text{-}11)$$

E = The detection efficiency of the monitor for the source term noble gas radionuclides (μCi/cc/cps) from Plant Chemistry Surveillance procedures.

f. Determine HHSP (the monitor high-high alarm setpoint above background (ncps)).

$$HHSP = 0.50\ CR \qquad (3.1\text{-}12)$$

0.50 = Fraction of the total radioactivity from the site via the monitored release point to ensure that the site boundary limit is not exceeded due to simultaneous releases from several release points.

3.1.2 Accident Monitors

The gross radioactivity in noble gases removed from the main condensor by means of steam jet air ejectors as measured prior to entering the treatment, adsorption, and delay systems shall be limited by an alarm setpoint for the Off Gas Monitor.

This procedure determines the monitor alarm setpoint that indicates if the potential total body accident dose to an individual at the unrestricted area (exclusion area) boundary due to noble gas radionuclides in the gaseous effluent released from the site exceeds a small fraction of the limits specified in 10CFR100 in the event this effluent, including the radioactivity accumulated in the treatment system, is inadvertently discharged directly to the environment without treatment. Offgas flow is automatically terminated when this setpoint is reached.

3.1.2.1 Determine C_t (the maximum acceptable total radioactivity concentration of all noble gas radionuclides in the gaseous effluent (μCi/cc))

$$C_t = \frac{2.12\ E\text{-}3\ Q_t}{f} \qquad (3.1\text{-}17)$$

Q_t = The maximum acceptable total release rate of all noble gas radionuclides in the gaseous effluent (μCi/sec) Q_t = 3.25 E7 μCi/sec

f = The maximum acceptable effluent flowrate at the point of release (cfm) = 85.5 cfm

3.1.2.2 Determine C.R. (the calculated monitor reading above background attributed to the noble gas radionuclides (mR/hr)).

$$C.R. = \frac{C_t}{E} \qquad (3.1\text{-}18)$$

E = The detection efficiency of the monitor for noble gas radionuclides represented in main condensor offgas (μCi/cc/mR/hr) from Plant Chemistry Surveillance procedures.

3.1.2.3 The monitor high-high alarm setpoint above background (mR/hr) should be set at or below the C.R. value.

TABLE 3.1-1 GASEOUS SOURCE TERMS [3]

RADIONUCLIDE	REACTOR BLDG VENT (A_i) (Ci/Yr)	GLAND SEAL (A_i)(Ci/Yr)	MECH. VAC. PUMP (A_i) (Ci/Yr)	GASEOUS RADWASTE (A_i) (Ci/Yr)	DRYWELL VENTING (A_i) (Ci/Yr)
Kr-83m	-	2.3E1	-	-	-
Kr-85m	7.1E1	4.1E1	-	-	3.0E0
Kr-85	-	-	-	1.3E2	-
Kr-87	1.33E2	1.4E2	-	-	3.0E0
Kr-88	2.33E2	1.4E2	-	-	3.0E0
Kr-89	-	6.0E2	-	-	-
Kr-90	-	-	-	-	-
Xe-131m	-	-	-	4.5E1	-
Xe-133m	-	2.0E0	-	2.7E1	-
Xe-133	3.26E2	5.6E1	2.3E3	8.9E3	6.6E1
Xe-135m	6.96E2	1.7E1	-	-	4.6E1
Xe-135	7.09E2	1.5E2	3.5E2	-	3.4E1
Xe-137	-	7.3E2	-	-	-
Xe-138	1.41E3	5.6E2	-	-	7.0E0
Xe-139	-	-	-	-	-
Ar-41	-	-	-	-	2.5E1
Total	3.58E3	2.46E3	2.65E3	9.10E3	1.62E2

"-" Indicates that the release is less than 1 Ci/yr.

TABLE 3.1-2 DOSE FACTORS AND CONSTANTS

RADIONUCLIDE	TOTAL WHOLE BODY DOSE FACTOR (K_i)(mrem/yr/uCi/m^3)	TOTAL SKIN DOSE FACTOR (L_i+1.1M) (mrem/yr/uCi/m^3)	TOTAL BODY DOSE CONSTANT FOR LONG TERM RELEASES (V_i) (mrem/yr/uCi/sec)
Kr-83m	7.56E-2	2.12E1	2.61E-9
Kr-85m	1.17E3	2.81E3	1.39E-4
Kr-85	1.61E1	1.36E3	2.10E-6
Kr-87	5.92E3	1.65E4	6.33E-4
Kr-88	1.47E4	1.91E4	1.66E-3
Kr-89	1.66E4	2.91E4	1.12E-3
Xe-131m	9.15E1	6.48E2	3.31E-5
Xe-133m	2.51E2	1.35E3	2.51E-5
Xe-133	2.94E2	6.94E2	2.61E-5
Xe-135m	3.12E3	4.41E3	3.34E-4
Xe-135	1.81E3	3.97E3	2.24E-4
Xe-137	1.42E3	1.39E4	9.99E-5
Xe-138	8.83E3	1.43E4	9.90E-4
Ar-41	8.84E3	1.29E4	1.20E-3

RADIONUCLIDE	TOTAL BODY DOSE CONSTANT FOR SHORT TERM RELEASES (v_i) (mrem/yr/uCi/sec)	TOTAL SKIN DOSE CONSTANT FOR LONG TERM RELEASES ($L_i(\chi/q)_s$ +1.1B_i)* (mrem/yr/uCi/sec)	TOTAL SKIN DOSE CONSTANT FOR SHORT TERM RELEASES (L_i $(\chi/q)_s$ + 1.1 b_i)* (mrem/yr/uCi/sec)
Kr-83m	2.99E-9	4.15E-7	4.75E-7
Kr-85m	1.59E-4	3.90E-4	7.07E-4
Kr-85	2.40E-6	1.52E-4	4.14E-4
Kr-87	7.25E-4	2.13E-3	4.18E-3
Kr-88	1.90E-3	3.00E-3	3.86E-3
Kr-89	1.28E-3	2.97E-3	5.20E-3
Xe-131m	3.79E-5	1.10E-4	2.11E-4
Xe-133m	2.87E-5	1.55E-4	3.56E-4
Xe-133	2.99E-5	7.88E-5	1.45E-4
Xe-135m	3.82E-4	6.36E-4	8.54E-4
Xe-135	2.57E-4	5.77E-4	9.94E-4
Xe-137	1.14E-4	1.52E-3	3.92E-3
Xe-138	1.13E-3	2.10E-3	3.13E-3
Ar-41	1.57E-3	2.28E-3	3.10E-3

* $(\chi/q)_s$, B_i, and b_i values obtained from other tables in the ODCM.

3.2 Gaseous Effluent Dose Rate - Compliance with 10 CFR 20

Dose rates resulting from the release of noble gases, and radioiodines and particulates must be calculated to show compliance with 10 CFR 20. The limits of 10 CFR 20 are conservatively applied on an instantaneous basis at the hypothetical worst case location.

3.2.1 Noble Gases

The dose rate in unrestricted areas resulting from noble gas effluents is limited to 500 mrem/yr to the total body and 3000 mrem/yr to the skin. The set point determinations discussed in the previous section are based on the dose calculational method presented in NUREG-0133. [4] The represent a backward solution to the limiting dose equations in NUREG-0133. Setting alarm set trip points in this manner will assure that the limits of 10 CFR 20 are met for noble gas releases. Therefore, no routine dose calculations for noble gases will be needed to show compliance with this part. Routine calculations will be made for doses from noble gas releases to show compliance with 10 CFR 50, Appendix I.

3.2.2 Radioiodine Particulates and Other Radionuclides

The dose rate in unrestricted areas resulting from the release of radioiodines and particulates with half lives greater than 8 days is limited to 1500 mrem/yr to any organ. The calculation of dose rate from radioiodines and particulates will be performed for drywell purges prior to the release and weekly for all releases. The calculations will be based on the results of analyses obtained pursuant to the MNGP Technical Specifications. The following general equation is used to show compliance with 10 CFR 20:

$$\sum_j \sum_i P_{ij} \left[W_s \dot{Q}_{is} + W_v \dot{Q}_{iv} \right] < 1500 \text{ mrem/yr} \quad (3.2\text{-}1)$$

where

P_{ij} = infant critical organ dose parameter for radioiodines and particulates with half lives greater than 8 days, for radionuclide i and pathway j (if pathway j exists at the point of interest);

= mrem/yr per $\mu Ci/m^3$ for inhalation pathways;

= m^2 mrem/yr per μCi/sec for food and ground plane pathways;

$\dot{Q}_{is}$ = the release rate of radionuclide i, in gaseous effluents from free-standing stack, μCi/sec;

$\dot{Q}_{iv}$ = the release rate of radionuclide i in gaseous effluent from all vent releases, μCi/sec;

W_v = the calculated annual average dispersion parameter for estimating the dose to an individual at the controlling location due to all vent releases:

W_v = sec/m^3 for the inhalation pathway and for tritium in the food pathway;

W_v = $meters^{-2}$ for the food and ground plane pathways;

W_s = the calculated annual average dispersion parameter for estimating the dose to an individual at the controlling location due to free-standing stack releases:

W_s = sec/m^3 for the inhalation pathway and for tritium in the food pathway;

W_s = meters^{-2} for the food and ground plane pathways;

Radioiodines and particulates will be released from the off gas stack or the reactor building vent. However, as stated in NUREG-0133, the critical receptor will be identified based on the reactor building vent D/Q . To show compliance, doses will be calculated for the critical milk animal location using all releases. Inhalation, ground plane exposure and milk consumption will be assumed to exist at this location. Selection of the actual receptor and dispersion parameters is discussed in section 3.2.3. If no milk animals are shown to exist within five miles of the site, then compliance will be shown at the critical boundary location. Only inhalation and ground plane exposure will be assumed to exist if the site boundary is used. Equation 3.2.2 will be used to show compliance with 10 CFR 20 for all radioiodine and particulate releases.

$$\sum_i P_{i_I}\left[(X/Q_v)\,\dot{Q}_{iv} + (X/Q_s)\dot{Q}_{is}\right] + \sum_i P_{i_G}\left[(D/Q_v)\,\dot{Q}_{iv} + (D/Q_s)\dot{Q}_{is}\right] +$$

$$\sum_i P_{i_M}\left[(D/Q_v)\,\dot{Q}_{iv} + (D/Q_s)\,\dot{Q}_{is}\right] < 1500 \text{ mrem/yr} \qquad (3.2\text{-}2)$$

where

P_{i_I} = infant critical organ dose parameter for radionuclide i for the inhalation pathway, mrem/yr per μCi/m^3;

P_{i_G} = infant critical organ dose parameter for radionuclide i for the ground plane pathway, m^2 mrem/yr per μCi/sec

P_{i_M} = infant critical organ dose parameter for radionuclide i for either the cow milk or goat milk pathway, m^2 mrem/yr per μCi/sec;

$(\chi/Q)_v$ = annual average relative concentration for long-term release from the reactor building vent at the critical location, sec/m^3 (Appendix A, Table A-3);

$(\chi/Q)_s$ = annual average relative concentration for long-term releases from the off-gas stack at the critical location, sec/m^3 (Appendix A, Table A-6);

$(D/Q)_v$ = annual average relative deposition for long-term release from the reactor building vent at the critical location $1/m^2$ (Appendix A, Table A-3);

$(D/Q)_s$ = annual average relative deposition for long-term release from the off-gas stack at the critical location, $1/m^2$ (Appendix A, Table A-6)

$\dot{Q}_{iv}$ = the release rate of radionuclide i from the reactor building vent for the week of interest, μCi/sec;

$\dot{Q}_{is}$ = the release rate of radionuclide i from the off-gas stack for the week of interest, μCi/sec.

The values of P_i are given in Table 3.2-1. For the food pathway (milk) the P_i value for tritium is in terms of mrem/yr per μCi/m^3. Therefore, the dispersion factor in the milk portion of Equation 3.2.2 will be χ/Q for tritium. Dispersion parameters (χ/Q, D/Q) have been calculated using the USNRC computer code "XOQDOQ" and are given in Appendix A. Dose calculations using Equation 3.2.2 will be made once per week. The source terms ($\dot{Q}_{iv}$ and $\dot{Q}_{is}$) will be determined from the results of analysis of weekly stack and reactor building particulate filters and charcoal cartridges. These source terms include all gaseous releases from MNGP. They will be recorded and reported as the total dose for compliance with 10 CFR 20.

A component of the total off gas stack source term will be short-term purge releases occurring as a result of containment drywell purging. Dose rate calculations will be made on this component separately to further assure compliance with 10 CFR 20 prior to release. The calculated dose rate will be used only to determine whether or not the drywell can be purged. All doses from drywell purges will be accounted for and reported through the weekly calculations discussed above. Release rates will be determined from the results of analyses of samples from the drywell. The term $\dot{Q}_{is}$ for the calculation of drywell purge doses will be determined by mulitplying the concentration of each nuclide in the drywell by the rate of release. Credit will be taken for the expected reduction in radionuclide concentration due to use of the standby gas treatment system. Equation 3.2.2 will be used to calculate doses with the exception of Q_{iv} which will be 0. Prior to drywell purging the dose rate limit for the drywell purge will be determined using the previous weeks dose rates as an estimate of the dose rates for the present week as follows:

$$BL = 1500 - D_{cv} - D_{cs} + D_{dw} \qquad (3.2\text{-}3)$$

where

BL = limiting dose rate for the batch, mrem/yr;

D_{cv} = previous week's dose rate from reactor building continuous releases, mrem/yr;

D_{cs} = previous week's dose rate from off-gas stack continuous releases, mrem/hr;

D_{dw} = previous week's dose rate from drywell purge releases, mrem/yr.

Although mechanical vacuum pump releases are batch mode, they cannot be sampled prior to release. For this reason, no prerelease dose calculations can be

made from this source. Experience has shown mechanical vacuum pump release to be well within 10 CFR 20 limits.

3.2.3 Critical Receptor Identification

As stated in 5.2.1 of NUREG-0133, when the critical receptor is different for stack and vent releases, the controlling location for vent releases should be used. For this reason the reactor building vent dispersion parameters will be used to identify the critical receptor. As discussed previously, weekly and batch dose calculations will be performed for the critical milk animal. The critical milk animal will be selected following the annual milk animal census and will be the milk animal which can be assigned the highest D/Q as obtained from Appendix A, Table A-5 of this document.

TABLE 3.2-1

P_i VALUES FOR AN INFANT FOR THE MNGP

Isotope	Inhalation		Ground Plane		Cow Milk		Goat Milk
H-3	6.47(2)		0		2.38(3)		4.86(3)
P-32	2.03(6)		0		1.60(11)		1.93(11)
Mn-54	1.00(6)		1.09(9)		3.89(7)		4.68(6)
Fe-59	1.02(6)		3.92(8)		3.93(8)		5.11(6)
Co-58	7.77(5)		5.29(8)		6.06(7)		7.28(6)
Co-60	4.51(6)		4.40(9)		2.10(8)		2.52(7)
Zn-65	6.47(5)		6.89(8)		1.90(10)		2.29(9)
Rb-86	1.90(5)		1.28(7)		2.22(10)		2.67(9)
Sr-89	2.03(6)		3.16(4)		1.27(10)		2.66(10)
Sr-90	4.09(7)		-		1.21(11)		2.55(11)
Y-91	2.45(6)		1.52(6)		5.26(6)		6.32(5)
Zr-95	1.75(6)		3.48(8)		8.28(5)		9.95(4)
Nb-95	4.79(5)		1.95(8)		2.06(8)		2.48(7)
Ru-103	5.52(5)		1.55(8)		1.05(5)		1.27(4)
Ru-106	1.16(7)		2.99(8)		1.44(6)		1.73(5)
Ag-110m	3.67(6)		3.14(9)		1.46(10)		1.75(9)
Cd-115m	-		-		-		-
Sn-123	-		-		-		-
Sn-126	-		-		-		-
Sb-124	-		-		-		-
Sb-125	-		-		-		-
Te-127m	1.31(6)		1.18(5)		1.04(9)		1.24(8)
Te-129m	1.68(6)		2.86(7)		1.40(9)		1.68(8)
Cs-134	7.03(5)		2.81(9)		6.79(10)		2.04(11)
Cs-136	1.35(5)		2.13(8)		5.76(9)		1.73(10)
Cs-137	6.12(5)		1.15(9)		6.02(10)		1.81(11)
Ba-140	1.60(6)		2.94(7)		2.41(8)		2.89(7)
Ce-141	5.17(5)		1.98(7)		1.37(7)		1.65(6)
Ce-144	9.84(6)		5.84(7)		1.33(8)		1.60(7)
I-131	1.48(7)		2.46(7)		1.06(12)		1.27(12)
I-133	3.56(6)		3.54(6)		9.80(9)		1.18(10)

3.3 Gaseous Effluents - Compliance with 10 CFR 50

Doses resulting from the release of noble gases, and radioiodines and particulates must be calculated to show compliance with Appendix I of 10 CFR 50. The calculations will be performed monthly for all gaseous effluents.

3.3.1 Noble Gas

3.3.1.1 Dose Equations

The air dose at the critical receptor due to noble gases released in gaseous effluents is determined by Equations 3.3-1 and 3.3-2. The critical receptor will be identified as described in Section 3.3.4.

For gamma radiation:

$$3.17 \times 10^{-8} \sum_i M_i \left[(X/Q)_v \; Q_{iv} + (X/Q)_v \; q_{iv} \right] + B_i Q_{is} + b_i q_{is}$$

< 5 mrad for any calendar quarter
< 10 mrad for any calendar year (3.3-1)

For beta radiation:

$$3.17 \times 10^{-8} \sum_i N_i \left[(X/Q)_v \; Q_{iv} + (X/q)_v q_{iv} + (X/Q)_s Q_{is} + (X/q)_s q_{is} \right]$$

< 10 mrad for any calendar quarter
< 20 marad for any calendar year (3.3-2)

where:

M_i = The air dose factor due to gamma emissions for each identified noble gas radionuclide i, mrad/yr per $\mu Ci/m^3$;

N_i = the air dose factor due to beta emissions for each identified noble gas radionuclide i, mrad/yr per $\mu Ci/m^3$;

$(X/Q)_v$ = the annual average relative concentration for areas at or beyond the site boundary for long-term reactor building vent releases (greater than 500 hrs/yr) sec/m^3 (Appendix A, Table A-3);

$(X/q)_v$ = the relative concentration for areas at or beyond the site boundary for short-term reactor vent releases (equal to or less than 500/hrs/year), sec/m^3;

$(X/Q)_s$ = the annual average relative concentration for areas at or beyond the site boundary for long-term off-gas stack releases (greater than 500 hrs/year), sec/m^3 (Appendix A, Table A-6);

$(X/q)_s$ = the relative concentration for areas at or beyond the site boundary for short-term off-gas stack releases (equal to or less than 500 hrs/year), sec/m^3 (Appendix A, Table A-9);

q_{is} = the average release of noble gas radionuclide i in gaseous effluents for short-term off-gas stack releases (equal to or less than 500 hrs/year), μCi;

q_{iv} = the average total release of noble gas radionuclide i in gaseous effluents for short-term reactor building vent releases (equal to or less than 500 hrs/year), μCi;

Q_{is} = the total release of noble gas radionuclide i in gaseous releases for long-term off-gas stack releases (greater than 500 hrs/year), μCi;

Q_{iv} = the total release of noble gas radionuclide i in gaseous effluents for long-term reactor building vent releases (greater than 500 hrs/year), μCi;

B_i	=	the constant for long-term releases (greater than 500 hrs/yr) for each identified noble gas radionuclide i accounting for the gamma radiation from the elevated finite plume, mrad/yr per μCi/sec;
b_i	=	the constant for short-term releases (equal to or less than 500 hrs/yr) for each identified noble gas radionuclide i accounting fro the gamma radiation from the elevated finite plume, mrad/yr per μCi/sec;
3.17×10^{-8}	=	the inverse of the number of seconds in a year.

Noble gases will be released from MNGP from the reactor building vent and the off-gas stack. The reactor building vent releases will be long-term only. Therefore, the q_{iv} term in Equation 3.3-1 and 3.3-2 will be 0. The long-term vent release rate, Q_{iv}, will be determined from the reactor building vent continuous noble gas monitor and periodic isotopic analysis. The off-gas stack continuous noble gas monitor records both long and short-term stack releases. As stated in Section 3.3.2 of this manual, drywell purges will be the only quantifiable short-term releases from MNGP. Therefore, to separate these two terms the drywell source term should be subtracted from the total off-gas stack source term. Periodic isotopic analysis of main condenser off-gas and isotopic analysis of eqch drywell purge prior to release is used in conjunction with the total activity measured by the monitor to qualify individual noble gas isotopes released.

Long-term χ/Q's were given in Appendix A for vent and stack releases. Short-term χ/Q's were calculated using the USNRC computer code "XOQDOQ" assuming 144 hours per year drywell purge and are given in Appendix A, Tables A9, A10, and A11. Values of M and N were calculated using the methodology presented in NUREG-0133 and are given in Table 3.3-1. Table 3.3-2 presents values of B_i and b_i calculated using the USNRC computer code "RABFIN." This code was also used to calculate values of v_i presented in Section 3.1. Values of v_i were calculated by multiplying V_i by the ration of b_i to B_i.

3.3.1.2 Cumulation of Doses

Doses calculated monthly will be summed for comparison with quarterly and annual limits. The monthly results will be added to the doses cumulated from the other months in the quarter of interest and in the year of interest and compared to the limits given in Equations 3.3-1 and 3.3-2. If these limits are exceeded, a Special Report will be submitted to the USNRC in accordance with the MNGP Technical Specifications. If twice the limits are exceeded, a Special Report showing compliance with 40 CFR 190 will be submitted.

3.3.2 Raidioidine, Particulates, and Other Radionuclides

3.3.2.1 Dose Equations

The dose to an individual from radioiodines and particulates with half-lives greater than 8 days in gaseous effluents released to unrestricted areas is determined by the following expressions:

During any calendar quarter or year-

$$3.17 \times 10^{-8} \sum_{j} \sum_{i} R_{ijak} \left[W_s Q_{is} + + w_s q_{is} + W_v Q_{iv} + w_v q_{iv} \right]$$

$$< 7.5 \text{ mrem (per quarter)}$$

$$< 15 \text{ mrem (per calendar year)} \qquad (3.3\text{-}3)$$

where:

Q_{is} = release of radionuclide i for long-term off-gas stack releases (greater than 500 hrs/yr), μCi;

Q_{iv} = release of radionuclide i for long-term reactor building vent releases (greater than 500 hrs/yr), μCi;

q_{is} = release of radionuclide i for short-term off-gas stack releases (equal to or less than 500 hrs/yr), μCi;

q_{iv} = release of isotope i for short-term reactor building vent releases (equal to or less than 500 hrs/yr), μCi;

W_s = dispersion parameter (χ/Q or D/Q depending on pathway) for estimating dose to an individual at the controlling location for long-term off-gas stack releases (greater than 550 hrs/yr);

W_v = the dispersion parameter (χ/Q or D/Q) for estimating the dose to an individual at the controlling location for long-term vent releases (greater than 500 hrs/yr);

w_s = dispersion parameter (χ/Q or D/Q) for estimating the dose to an individual at the controlling location for short-term off-gas stack releases (equal to or less than 500 hrs/yr);

w_v = the dispersion parameter (χ/Q or D/Q) for estimating the dose to an individual at the controlling location for short-term reactor building vent releases (equal to or less than 500 hrs/yr);

3.17×10^{-8} = the inverse of the number of seconds in a year;

R_{ijak} = the dose factor for each identified radionuclide i, pathway j, age group a, and organ k, m^2 mrem/yr per Ci/sec or merem/yr per μCi/m^3.

The above equation will be applied to each combination of age group and organ. Values of R_{ijak} have been calculated using the methodology given in NUREG-0133

and are given in Tables 3.3-3 through 3.3-21. The equation will be applied to a controlling location utilizing the following: residence, vegetable garden, meat animal, milk animal. The selection of the actual receptor is discussed in Section 3.3.3. The source terms and dispersion parameters in Equation 3.3-3 are obtained in the same manner as in Section 3.2. The W values are in terms of χ/Q (sec/m^3) for the inhalation pathways and for tritium in all pathways. They are in terms of D/Q (m^{-2}) for all other pathways excluding tritium. No adjustment to the above limits is required for C-14 since the individual doses due to this nuclide are expected to be less than 0.01 mrem/yr.

3.3.2.2 Cumulation of Doses

Doses calculated monthly will be summed for comparison with quarterly and annual limits. The monthly results will be added to the doses cumulated form the other months in the quarter of interest and in the year of interest and compared with the limits in Equation 3.3-3. If these limits are exceeded, a Special Report will be submitted in accordance with the MNGP Technical Specifications. If twice the limits are exceeded, a Special Report showing compiance with 40 CFR 190 will be submitted.

3.3.2.3 Projection of Doses

Doses resulting from the release of gaseous effluents will be projected monthly. The doses calculated for the present month will be used as the projected doses unless information exists indicating that actual releases could differ significantly in the next month. In this case the source term should be adjusted to relfect this information and the justification for the adjustment noted. If the sum of the accumulated doses to date for the quarter and the projected doses for the remainder of the quarter exceed 25 percent of the annual limtis in Equations 3.3-1, 3.3-2 or 3.3-3, additional components of the off-gas treatment system will be operated to reduce releases.

3.3.3 Critical Receptor Identification

The critical receptors for compliance with 10 CFR 50, Appendix I will be identified. For the noble gas specification the critical location will be based on the external dose pathway only. This location will be the off-site location with the highest long-term reactor building vent X/Q and will be selected using the X/Q values given in Appendix A, Table A-5. This location will be that used for showing compliance with 10 CFR 20 and remain the same unless meteorological data is reevaluated or the site boundary changes.

The critical location for the radioiodine and particulate pathway will be selected once per year. This selection will follow the annual land use census perfomred with 5 miles of the MNGP. Each of the following locations will be evaluated as potential critical receptors prior to the implementation of the effluent technical specifications. The critical receptor will be selected based on this evaluation.

1. Residences in each sector
2. Vegetable garden producing leafy green vegetables
3. All identified milk animal locations.

Following the annual survey, doses will be calculated using Equation 3.3-3 for all newly identified receptors and those receptors whose characteristics have changed significantly. The calculation will include appropriate information shown to exst at each location. The dispersion parameters given in this manual should be employed. The total releases reported for the previous calendar year should be used as the source term.

REFERENCES FOR SECTION 3

(1) "NSP - Monticello Nuclear Generating Plant," Appendix I Analysis - Supplement No. 1 - Docket No. 50-263, Table 2.1-4.

(2) "NSP - Monticello Nuclear Generating Plant," Appendix I Analysis - Supplement No. 1 - Docket No. 50-263, Figure 2.1-5.

(3) "NSP - Monticello Nuclear Generating Plant," Appendix I Analysis - Supplement No. 1 - Docket No. 50-263, Table 3.1-3.

(4) U.S. Nuclear Regulatory Commission, "Preparation of Radiological Effluent Technical Specifications for Nuclear Power Plants," NUREG-0133, 1978.

TABLE 3.3-1

DOSE FACTORS FOR NOBLE GASES AND DAUGHTERS*

Radionuclide	Total Body Dose Factor K_i (mrem/yr per μCi/m³)	Skin Dose Factor L_i (mrem/yr per μCi/m³)	Gamma Air Dose Factor M_i (mrad/yr per μCi/m³)	Beta Air Dose Factor N_i (mrad/yr per μCi/m³)
Kr-83m	7.56E-02**	---	1.93E+01	2.88E+02
Kr-85m	1.17E+03	1.46E+03	1.23E+03	1.97E+03
Kr-85	1.61E+01	1.34E+03	1.72E+01	1.95E+03
Kr-87	5.92E+03	9.73E+03	6.17E+03	1.03E+04
Kr-88	1.47E+04	2.37E+03	1.52E+04	2.93E+03
Kr-89	1.66E+04	1.01E+04	1.73E+04	1.06E+04
Kr-90	1.56E+04	7.29E+03	1.63E+04	7.83E+03
Xe-131m	9.15E+01	4.76E+02	1.56E+02	1.11E+03
Xe-133m	2.51E+02	9.94E+02	3.27E+02	1.48E+03
Xe-133	2.94E+02	3.06E+02	3.53E+02	1.05E+03
Xe-135m	3.12E+03	7.11E+02	3.36E+03	7.39E+02
Xe-135	1.81E+03	1.86E+03	1.92E+03	2.46E+03
Xe-137	1.42E+03	1.22E+04	1.51E+03	1.27E+04
Xe-138	8.83E+03	4.13E+03	9.21E+03	4.75E+03
Ar-41	8.84E+03	2.69E+03	9.30E+03	3.28E+03

*The listed dose factors are for radionuclides that may be detected in gaseous effluents.
**7.56E-02 = 7.56×10^{-2}.

TABLE 3.3-2

DOSE PARAMETERS FOR FINITE ELEVATED PLUMES*

Noble Gas Radionuclide	Total Body V_i** (mrem/yr per μCi/sec)	Gamma Air B_i** (mrad/yr hr μCi/sec)	Total Body v_i*** (mrem/yr per μCi/sec)	Gamma Air b_i*** (mrad/yr per μCi/sec)
Kr - 83m	2.61E-9	3.77E-7	2.99E-9	4.32E-7
Kr - 85m	1.39E-4	2.07E-4	1.59E-4	2.37E-4
Kr - 85	2.10E-6	3.18E-6	2.40E-6	3.64E-6
Kr - 87	6.33E-4	9.52E-4	7.25E-4	1.09E-3
Kr - 88	1.66E-3	2.49E-3	1.90E-3	2.85E-3
Kr - 89	1.12E-3	1.68E-3	1.28E-3	1.92E-3
Xe - 131m	3.31E-5	5.21E-5	3.79E-5	5.97E-5
Xe - 133m	2.51E-5	4.09E-5	2.87E-5	4.68E-5
Xe - 133	2.61E-5	4.08E-5	2.99E-5	4.67E-5
Xe - 135m	3.34E-4	5.06E-4	3.82E-4	5.79E-4
Xe - 135	2.24E-4	3.37E-4	2.57E-4	3.86E-4
Xe - 137	9.99E-5	1.51E-4	1.14E-4	1.73E-4
Xe - 138	9.90E-4	1.49E-3	1.13E-3	1.70E-3
Xe - 139	5.79E-5	8.69E-5	6.63E-5	9.95E-5
Ar - 41	1.20E-3	1.80E-3	1.38E-3	2.07E-3

* All values are for the critical boundary location 0.51 mi from the stack in the SSE sector

** Values are annual average

*** Values are for 144 hours per year purge

TABLE 3.3-3 R VALUES FOR THE MONTICELLO NUCLEAR GENERATING PLANT*

PATHWAY = GROUND
AGE GROUP EQUALS ALL AGES

NUCLIDE	T.BODY	GI-TRACT	BONE	LIVER	KIDNEY	THYROID	LUNG	SKIN
CR 51	4.66E 06	4.66E 06	4.66E 06	4.66E 06	4.66E 06	4.66E 06	4.66E 06	5.51E 06
MN 54	1.34E 09	1.34E 09	1.34E 09	1.34E 09	1.34E 09	1.34E 09	1.34E 09	1.57E 09
FE 59	2.75E 08	2.75E 08	2.75E 08	2.75E 08	2.75E 08	2.75E 08	2.75E 08	3.23E 08
CO 58	3.79E 08	3.79E 08	3.79E 08	3.79E 08	3.79E 08	3.79E 08	3.79E 08	4.44E 08
CO 60	2.15E 10	2.15E 10	2.15E 10	2.15E 10	2.15E 10	2.15E 10	2.15E 10	2.52E 10
ZN 65	7.49E 08	7.49E 08	7.49E 08	7.49E 08	7.49E 08	7.49E 08	7.49E 08	8.61E 08
SR 89	2.23E 04	2.23E 04	2.23E 04	2.23E 04	2.23E 04	2.23E 04	2.23E 04	2.58E 04
ZR 95	2.49E 08	2.49E 08	2.49E 08	2.49E 08	2.49E 08	2.49E 08	2.49E 08	2.89E 08
I 131	1.72E 07	1.72E 07	1.72E 07	1.72E 07	1.72E 07	1.72E 07	1.72E 07	2.09E 07
I 133	2.47E 06	2.47E 06	2.47E 06	2.47E 06	2.47E 06	2.47E 06	2.47E 06	3.00E 06
CS134	6.82E 09	6.82E 09	6.82E 09	6.82E 09	6.82E 09	6.82E 09	6.82E 09	7.96E 09
CS136	1.49E 08	1.49E 08	1.49E 08	1.49E 08	1.49E 08	1.49E 08	1.49E 08	1.69E 08
CS137	1.03E 10	1.03E 10	1.03E 10	1.03E 10	1.03E 10	1.03E 10	1.03E 10	1.20E 10
BA140	2.05E 07	2.05E 07	2.05E 07	2.05E 07	2.05E 07	2.05E 07	2.05E 07	2.34E 07
CE141	1.36E 07	1.36E 07	1.36E 07	1.36E 07	1.36E 07	1.36E 07	1.36E 07	1.53E 07

*R VALUES IN UNITS OF MREM/YR PER CI/M FOR INHALATION AND TRITIUM, AND IN UNITS OF M -MREM/YR PER CI/SEC FOR ALL OTHERS

TABLE 3.3-4 R VALUES FOR THE MONTICELLO NUCLEAR GENERATING PLANT*

PATHWAY = VEGET
AGE GROUP EQUALS ADULT

NUCLIDE	T.BODY	GI-TRACT	BONE	LIVER	KIDNEY	THYROID	LUNG	SKIN
H 3	2.28E 03	2.28E 03	0.00E-01	2.28E 03	2.28E 03	2.28E 03	2.28E 03	2.28E 03
CR 51	4.60E 04	1.16E 07	0.00E-01	0.00E-01	1.01E 04	2.75E 04	6.10E 04	0.00E-01
MN 54	5.83E 07	9.36E 08	0.00E-01	3.05E 08	9.09E 07	0.00E-01	0.00E-01	0.00E-01
FE 59	1.12E 08	9.75E 08	1.24E 08	2.93E 08	0.00E-01	0.00E-01	8.17E 07	0.00E-01
CO 58	6.71E 07	6.07E 08	0.00E-01	2.99E 07	0.00E-01	0.00E-01	0.00E-01	0.00E-01
CO 60	3.67E 08	3.12E 09	0.00E-01	1.66E 08	0.00E-01	0.00E-01	0.00E-01	0.00E-01
ZN 65	5.77E 08	8.04E 08	4.01E 08	1.28E 09	8.54E 08	0.00E-01	0.00E-01	0.00E-01
SR 89	2.87E 08	1.60E 09	1.00E 10	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01
SR 90	1.64E 11	1.93E 10	6.70E 11	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01
ZR 95	2.51E 05	1.17E 09	1.16E 06	3.71E 05	5.82E 05	0.00E-01	0.00E-01	0.00E-01
I 131	6.61E 07	3.04E 07	8.07E 07	1.15E 08	1.98E 08	3.78E 10	0.00E-01	0.00E-01
I 133	1.12E 06	3.30E 06	2.11E 06	3.67E 06	6.40E 06	5.39E 08	0.00E-01	0.00E-01
CS134	8.83E 09	1.89E 08	4.54E 09	1.08E 10	3.49E 09	0.00E-01	1.16E 09	0.00E-01
CS136	1.19E 08	1.88E 07	4.19E 07	1.66E 08	9.21E 07	0.00E-01	1.26E 07	0.00E-01
CS137	5.94E 09	1.76E 08	6.63E 09	9.07E 09	3.08E 09	0.00E-01	1.02E 09	0.00E-01
BA140	8.40E 06	2.64E 08	1.28E 08	1.61E 05	5.47E 04	0.00E-01	9.22E 04	0.00E-01
CE141	1.48E 04	4.99E 08	1.93E 05	1.31E 05	6.07E 04	0.00E-01	0.00E-01	0.00E-01

*R VALUES IN UNITS OF MREM/YR PER CI/M FOR INHALATION AND TRITIUM, AND IN UNITS OF M -MREM/YR PER CI/SEC FOR ALL OTHERS

TABLE 3.3-5 R VALUES FOR THE MONTICELLO NUCLEAR GENERATING PLANT*

PATHWAY = VEGET
AGE GROUP EQUALS TEEN

NUCLIDE	T.BODY	GI-TRACT	BONE	LIVER	KIDNEY	THYROID	LUNG	SKIN
H 3	2.61E 03	2.61E 03	0.00E-01	2.61E 03	2.61E 03	2.61E 03	2.61E 03	2.61E 03
CR 51	6.11E 04	1.03E 07	0.00E-01	0.00E-01	1.34E 04	3.39E 04	8.72E 04	0.00E-01
MN 54	8.79E 07	9.09E 08	0.00E-01	4.43E 08	1.32E 08	0.00E-01	0.00E-01	0.00E-01
FE 59	1.60E 08	9.78E 08	1.77E 08	4.14E 08	0.00E-01	0.00E-01	1.30E 08	0.00E-01
CO 58	9.79E 07	5.85E 08	0.00E-01	4.25E 07	0.00E-01	0.00E-01	0.00E-01	0.00E-01
CO 60	5.57E 08	3.22E 09	0.00E-01	2.47E 08	0.00E-01	0.00E-01	0.00E-01	0.00E-01
ZN 65	8.68E 08	7.88E 08	5.36E 08	1.86E 09	1.19E 09	0.00E-01	0.00E-01	0.00E-01
SR 89	4.36E 08	1.81E 09	1.52E 10	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01
SR 90	2.05E 11	2.33E 10	8.32E 11	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01
ZR 95	3.68E 05	1.23E 09	1.69E 06	5.35E 05	7.86E 05	0.00E-01	0.00E-01	0.00E-01
I 131	5.77E 07	2.13E 07	7.68E 07	1.07E 08	1.85E 08	3.14E 10	0.00E-01	0.00E-01
I 133	1.01E 06	2.51E 06	1.96E 06	3.32E 06	5.83E 06	4.64E 08	0.00E-01	0.00E-01
CS134	7.54E 09	2.02E 08	6.90E 09	1.62E 10	5.16E 09	0.00E-01	1.97E 09	0.00E-01
CS136	1.13E 08	1.35E 07	4.28E 07	1.68E 08	9.16E 07	0.00E-01	1.44E 07	0.00E-01
CS137	4.90E 09	2.00E 08	1.06E 10	1.41E 10	4.78E 09	0.00E-01	1.86E 09	0.00E-01
BA140	8.88E 06	2.12E 08	1.38E 08	1.69E 05	5.72E 04	0.00E-01	1.14E 05	0.00E-01
CE141	2.12E 04	5.29E 08	2.77E 05	1.85E 05	8.70E 04	0.00E-01	0.00E-01	0.00E-01

*R VALUES IN UNITS OF MREM/YR PER CI/M FOR INHALATION AND TRITIUM, AND IN UNITS OF M -MREM/YR PER CI/SEC FOR ALL OTHERS

TABLE 3.3-6 R VALUES FOR THE MONTICELLO NUCLEAR GENERATING PLANT*

PATHWAY = VEGET
AGE GROUP EQUALS CHILD

NUCLIDE	T.BODY	GI-TRACT	BONE	LIVER	KIDNEY	THYROID	LUNG	SKIN
H 3	4.04E 03	4.04E 03	0.00E-01	4.04E 03	4.04E 03	4.04E 03	4.04E 03	4.04E 03
CR 51	1.16E 05	6.15E 06	0.00E-01	0.00E-01	1.76E 04	6.44E 04	1.18E 05	0.00E-01
MN 54	1.73E 08	5.44E 08	0.00E-01	6.49E 08	1.82E 08	0.00E-01	0.00E-01	0.00E-01
FE 59	3.17E 08	6.62E 08	3.93E 08	6.36E 08	0.00E-01	0.00E-01	1.84E 08	0.00E-01
CO 58	1.92E 08	3.66E 08	0.00E-01	6.27E 07	0.00E-01	0.00E-01	0.00E-01	0.00E-01
CO 60	1.11E 09	2.08E 09	0.00E-01	3.76E 08	0.00E-01	0.00E-01	0.00E-01	0.00E-01
ZN 65	1.70E 09	4.81E 08	1.03E 09	2.74E 09	1.73E 09	0.00E-01	0.00E-01	0.00E-01
SR 89	1. 09	1.40E 09	3.62E 10	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01
SR 90	3.49E 11	1.86E 10	1.38E 12	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01
ZR 95	7.44E 05	8.71E 08	3.80E 06	8.35E 05	1.20E 06	0.00E-01	0.00E-01	0.00E-01
I 131	8.16E 07	1.28E 07	1.43E 08	1.44E 08	2.36E 08	4.75E 10	0.00E-01	0.00E-01
I 133	1.67E 06	1.78E 06	3.57E 06	4.42E 06	7.36E 06	8.21E 08	0.00E-01	0.00E-01
CS134	5.40E 09	1.38E 08	1.56E 10	2.56E 10	7.93E 09	0.00E-01	2.84E 09	0.00E-01
CS136	1.43E 08	7.77E 06	8.04E 07	2.21E 08	1.18E 08	0.00E-01	1.76E 07	0.00E-01
CS137	3.52E 09	1.50E 08	2.49E 10	2.39E 10	7.78E 09	0.00E-01	2.80E 09	0.00E-01
BA140	1.61E 07	1.40E 08	2.76E 08	2.42E 05	7.87E 04	0.00E-01	1.44E 05	0.00E-01
CE141	4.75E 04	3.99E 08	6.42E 05	3.20E 05	1.40E 05	0.00E-01	0.00E-01	0.00E-01

*R VALUES IN UNITS OF MREM/YR PER CI/M FOR INHALATION AND TRITIUM, AND IN UNITS OF M -MREM/YR PER CI/SEC FOR ALL OTHERS

TABLE 3.3-7 R VALUES FOR THE MONTICELLO NUCLEAR GENERATING PLANT*

PATHWAY = MEAT
AGE GROUP EQUALS ADULT

NUCLIDE	T.BODY	GI-TRACT	BONE	LIVER	KIDNEY	THYROID	LUNG	SKIN
H 3	3.27E 02	3.27E 02	0.00E-01	3.27E 02	3.27E 02	3.27E 02	3.27E 02	3.27E 02
CR 51	3.26E 03	8.21E 05	0.00E-01	0.00E-01	7.19E 02	1.95E 03	4.33E 03	0.00E-01
MN 54	8.98E 05	1.44E 07	0.00E-01	4.71E 06	1.40E 06	0.00E-01	0.00E-01	0.00E-01
FE 59	1.12E 08	9.73E 08	1.24E 08	2.92E 08	0.00E-01	0.00E-01	8.16E 07	0.00E-01
CO 58	1.95E 07	1.76E 08	0.00E-01	8.68E 06	0.00E-01	0.00E-01	0.00E-01	0.00E-01
CO 60	8.87E 07	7.55E 08	0.00E-01	4.02E 07	0.00E-01	0.00E-01	0.00E-01	0.00E-01
ZN 65	3.06E 08	4.27E 08	2.13E 08	6.78E 08	4.53E 08	0.00E-01	0.00E-01	0.00E-01
SR 89	4.12E 06	2.30E 07	1.43E 08	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01
SR 90	1.76E 09	2.07E 08	7.17E 09	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01
ZR 95	1.94E 05	9.07E 08	8.92E 05	2.86E 05	4.49E 05	0.00E-01	0.00E-01	0.00E-01
I 131	4.33E 06	1.99E 06	5.28E 06	7.55E 06	1.29E 07	2.48E 09	0.00E-01	0.00E-01
I 133	1.13E-01	3.34E-01	2.14E-01	3.72E-01	6.49E-01	5.46E 01	0.00E-01	0.00E-01
CS134	6.68E 08	1.43E 07	3.43E 08	8.17E 08	2.64E 08	0.00E-01	8.78E 07	0.00E-01
CS136	1.61E 07	2.53E 06	5.65E 06	2.23E 07	1.24E 07	0.00E-01	1.70E 06	0.00E-01
CS137	4.33E 08	1.28E 07	4.83E 08	6.61E 08	2.24E 08	0.00E-01	7.46E 07	0.00E-01
BA140	9.01E 05	2.83E 07	1.38E 07	1.73E 04	5.87E 03	0.00E-01	9.89E 03	0.00E-01
CE141	4.96E 02	1.67E 07	6.47E 03	4.38E 03	2.03E 03	0.00E-01	0.00E-01	0.00E-01

*R VALUES IN UNITS OF MREM/YR PER CI/M FOR INHALATION AND TRITIUM, AND IN UNITS OF M -MREM/YR PER CI/SEC FOR ALL OTHERS

TABLE 3.3-8 R VALUES FOR THE MONTICELLO NUCLEAR GENERATING PLANT*

PATHWAY = MEAT
AGE GROUP EQUALS TEEN

NUCLIDE	T.BODY	GI-TRACT	BONE	LIVER	KIDNEY	THYROID	LUNG	SKIN
H 3	1.95E 02	1.95E 02	0.00E-01	1.95E 02	1.95E 02	1.95E 02	1.95E 02	1.95E 02
CR 51	2.61E 03	4.39E 05	0.00E-01	0.00E-01	5.72E 02	1.45E 03	3.73E 03	0.00E-01
MN 54	7.12E 05	7.37E 06	0.00E-01	3.59E 06	1.07E 06	0.00E-01	0.00E-01	0.00E-01
FE 59	8.95E 07	5.48E 08	9.93E 07	2.32E 08	0.00E-01	0.00E-01	7.31E 07	0.00E-01
CO 58	1.54E 07	9.22E 07	0.00E-01	6.69E 06	0.00E-01	0.00E-01	0.00E-01	0.00E-01
CO 60	7.03E 07	4.06E 08	0.00E-01	3.12E 07	0.00E-01	0.00E-01	0.00E-01	0.00E-01
ZN 65	2.43E 08	2.20E 08	1.50E 08	5.20E 08	3.33E 08	0.00E-01	0.00E-01	0.00E-01
SR 89	3.47E 06	1.44E 07	1.21E 08	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01
SR 90	1.15E 09	1.30E 08	4.64E 09	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01
ZR 95	1.55E 05	5.20E 08	7.15E 05	2.25E 05	3.31E 05	0.00E-01	0.00E-01	0.00E-01
I 131	3.30E 06	1.22E 06	4.39E 06	6.14E 06	1.06E 07	1.79E 09	0.00E-01	0.00E-01
I 133	9.25E-02	2.30E-01	1.79E-01	3.03E-01	5.32E-01	4.23E 01	0.00E-01	0.00E-01
CS134	2.98E 08	7.99E 06	2.73E 08	6.42E 08	2.04E 08	0.00E-01	7.79E 07	0.00E-01
CS136	1.16E 07	1.40E 06	4.41E 06	1.73E 07	9.44E 06	0.00E-01	1.49E 06	0.00E-01
CS137	1.86E 08	7.59E 06	4.01E 08	5.34E 08	1.82E 08	0.00E-01	7.06E 07	0.00E-01
BA140	7.33E 05	1.75E 07	1.14E 07	1.39E 04	4.72E 03	0.00E-01	9.37E 03	0.00E-01
CE141	4.17E 02	1.04E 07	5.43E 03	3.63E 03	1.71E 03	0.00E-01	0.00E-01	0.00E-01

*R VALUES IN UNITS OF MREM/YR PER CI/M FOR INHALATION AND TRITIUM, AND IN UNITS OF M -MREM/YR PER CI/SEC FOR ALL OTHERS

TABLE 3.3-9 R VALUES FOR THE MONTICELLO NUCLEAR GENERATING PLANT*

PATHWAY = MEAT
AGE GROUP EQUALS CHILD

NUCLIDE	T.BODY	GI-TRACT	BONE	LIVER	KIDNEY	THYROID	LUNG	SKIN
H 3	2.36E 02	2.36E 02	0.00E-01	2.36E 02	2.36E 02	2.36E 02	2.36E 02	2.36E 02
CR 51	4.07E 03	2.16E 05	0.00E-01	0.00E-01	6.17E 02	2.26E 03	4.12E 03	0.00E-01
MN 54	1.09E 06	3.45E 06	0.00E-01	4.11E 06	1.15E 06	0.00E-01	0.00E-01	0.00E-01
FE 59	1.42E 08	2.97E 08	1.76E 08	2.85E 08	0.00E-01	0.00E-01	8.26E 07	0.00E-01
CO 58	2.39E 07	4.56E 07	0.00E-01	7.82E 06	0.00E-01	0.00E-01	0.00E-01	0.00E-01
CO 60	1.09E 08	2.05E 08	0.00E-01	3.70E 07	0.00E-01	0.00E-01	0.00E-01	0.00E-01
ZN 65	3.72E 08	1.05E 08	2.25E 08	5.99E 08	3.77E 08	0.00E-01	0.00E-01	0.00E-01
SR 89	6.55E 06	8.87E 06	2.29E 08	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01
SR 90	1.52E 09	8.08E 07	6.00E 09	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01
ZR 95	2.48E 05	2.91E 08	1.27E 06	2.79E 05	3.99E 05	0.00E-01	0.00E-01	0.00E-01
I 131	4.65E 06	7.29E 05	8.14E 06	8.19E 06	1.34E 07	2.71E 09	0.00E-01	0.00E-01
I 133	1.55E-01	1.66E-01	3.32E-01	4.11E-01	6.85E-01	7.63E 01	0.00E-01	0.00E-01
CS134	1.67E 08	4.26E 06	4.81E 08	7.90E 08	2.45E 08	0.00E-01	8.78E 07	0.00E-01
CS136	1.35E 07	7.34E 05	7.60E 06	2.09E 07	1.11E 07	0.00E-01	1.66E 06	0.00E-01
CS137	1.04E 08	4.43E 06	7.39E 08	7.07E 08	2.30E 08	0.00E-01	8.29E 07	0.00E-01
BA140	1.22E 06	1.06E 07	2.10E 07	1.84E 04	5.98E 03	0.00E-01	1.10E 04	0.00E-01
CE141	7.57E 02	6.36E 06	1.02E 04	5.10E 03	2.24E 03	0.00E-01	0.00E-01	0.00E-01

*R VALUES IN UNITS OF MREM/YR PER CI/M FOR INHALATION AND TRITIUM, AND IN UNITS OF M -MREM/YR PER CI/SEC FOR ALL OTHERS

TABLE 3.3-10 R VALUES FOR THE MONTICELLO NUCLEAR GENERATING PLANT*

PATHWAY = COW MILK
AGE GROUP EQUALS ADULT

NUCLIDE	T.BODY	GI-TRACT	BONE	LIVER	KIDNEY	THYROID	LUNG	SKIN
H 3	7.69E 02	7.69E 02	0.00E-01	7.69E 02	7.69E 02	7.69E 02	7.69E 02	7.69E 02
CR 51	1.32E 04	3.32E 06	0.00E-01	0.00E-01	2.91E 03	7.90E 03	1.75E 04	0.00E-01
MN 54	8.25E 05	1.32E 07	0.00E-01	4.32E 06	1.29E 06	0.00E-01	0.00E-01	0.00E-01
FE 59	1.25E 07	1.09E 08	1.39E 07	3.26E 07	0.00E-01	0.00E-01	9.10E 06	0.00E-01
CO 58	5.03E 06	4.55E 07	0.00E-01	2.24E 06	0.00E-01	0.00E-01	0.00E-01	0.00E-01
CO 60	1.93E 07	1.65E 08	0.00E-01	8.77E 06	0.00E-01	0.00E-01	0.00E-01	0.00E-01
ZN 65	1.18E 09	1.65E 09	8.21E 08	2.61E 09	1.75E 09	0.00E-01	0.00E-01	0.00E-01
SR 89	1.97E 07	1.10E 08	6.85E 08	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01
SR 90	6.62E 09	7.80E 08	2.70E 10	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01
ZR 95	9.72E 01	4.55E 05	4.48E 02	1.44E 02	2.25E 02	0.00E-01	0.00E-01	0.00E-01
I 131	1.19E 08	5.49E 07	1.45E 08	2.08E 08	3.57E 08	6.82E 10	0.00E-01	0.00E-01
I 133	1.05E 06	3.09E 06	1.98E 06	3.44E 06	6.01E 06	5.06E 08	0.00E-01	0.00E-01
CS134	5.74E 09	1.23E 08	2.95E 09	7.02E 09	2.27E 09	0.00E-01	7.54E 08	0.00E-01
CS136	3.55E 08	5.60E 07	1.25E 08	4.93E 08	2.74E 08	0.00E-01	3.76E 07	0.00E-01
CS137	3.66E 09	1.08E 08	4.09E 09	5.59E 09	1.90E 09	0.00E-01	6.31E 08	0.00E-01
BA140	8.43E 05	2.65E 07	1.29E 07	1.62E 04	5.49E 03	0.00E-01	9.25E 03	0.00E-01
CE141	1.71E 02	5.78E 06	2.24E 03	1.51E 03	7.02E 02	0.00E-01	0.00E-01	0.00E-01

*R VALUES IN UNITS OF MREM/YR PER CI/M FOR INHALATION AND TRITIUM, AND IN UNITS OF M -MREM/YR PER CI/SEC FOR ALL OTHERS

TABLE 3.3-11 R VALUES FOR THE MONTICELLO NUCLEAR GENERATING PLANT*

PATHWAY = COW MTLK
AGE GROUP EQUALS TEEN

NUCLIDE	T.BODY	GI-TRACT	BONE	LIVER	KIDNEY	THYROID	LUNG	SKIN
H 3	1.00E 03	1.00E 03	0.00E-01	1.00E 03	1.00E 03	1.00E 03	1.00E 03	1.00E 03
CR 51	2.31E 04	3.88E 06	0.00E-01	0.00E-01	5.06E 03	1.28E 04	3.30E 04	0.00E-01
MN 54	1.43E 06	1.48E 07	0.00E-01	7.20E 06	2.15E 06	0.00E-01	0.00E-01	0.00E-01
FE 59	2.18E 07	1.34E 08	2.42E 07	5.65E 07	0.00E-01	0.00E-01	1.78E 07	0.00E-01
CO 58	8.70E 06	5.21E 07	0.00E-01	3.78E 06	0.00E-01	0.00E-01	0.00E-01	0.00E-01
CO 60	3.35E 07	1.94E 08	0.00E-01	1.49E 07	0.00E-01	0.00E-01	0.00E-01	0.00E-01
ZN 65	2.04E 09	1.05E 09	1.26E 09	4.38E 09	2.80E 09	0.00E-01	0.00E-01	0.00E-01
SR 89	3.62E 07	1.50E 08	1.26E 09	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01
SR 90	9.42E 09	1.07E 09	3.81E 10	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01
ZR 95	1.70E 02	5.70E 05	7.83E 02	2.47E 02	3.63E 02	0.00E-01	0.00E-01	0.00E-01
I 131	1.98E 08	7.31E 07	2.64E 08	3.69E 08	6.36E 08	1.08E 11	0.00E-01	0.00E-01
I 133	1.87E 06	4.64E 06	3.61E 06	6.13E 06	1.08E 07	8.56E 08	0.00E-01	0.00E-01
CS134	5.60E 09	1.50E 08	5.12E 09	1.21E 10	3.83E 09	0.00E-01	1.46E 09	0.00E-01
CS136	5.62E 08	6.73E 07	2.13E 08	8.37E 08	4.55E 08	0.00E-01	7.18E 07	0.00E-01
CS137	3.44E 09	1.40E 08	7.42E 09	9.87E 09	3.36E 09	0.00E-01	1.30E 09	0.00E-01
BA140	1.50E 06	3.58E 07	2.32E 07	2.84E 04	9.65E 03	0.00E-01	1.91E 04	0.00E-01
CE141	3.14E 02	7.83E 06	4.10E 03	2.74E 03	1.29E 03	0.00E-01	0.00E-01	0.00E-01

*R VALUES IN UNITS OF MREM/YR PER CI/M FOR INHALATION AND TRITIUM, AND IN UNITS OF M -MREM/YR PER CI/SEC FOR ALL OTHERS

TABLE 3.3-12 R VALUES FOR THE MONTICELLO NUCLEAR GENERATING PLANT*

PATHWAY = COW MILK
AGE GROUP EQUALS CHILD

NUCLIDE	T.BODY	GI-TRACT	BONE	LIVER	KIDNEY	THYROID	LUNG	SKIN
H 3	1.58E 03	1.58E 03	0.00E-01	1.58E 03	1.58E 03	1.58E 03	1.58E 03	1.58E 03
CR 51	4.71E 04	2.50E 06	0.00E-01	0.00E-01	7.14E 03	2.61E 04	4.77E 04	0.00E-01
MN 54	2.87E 06	9.04E 06	0.00E-01	1.08E 07	3.02E 06	0.00E-01	0.00E-01	0.00E-01
FE 59	4.52E 07	9.45E 07	5.61E 07	9.08E 07	0.00E-01	0.00E-01	2.63E 07	0.00E-01
CO 58	1.77E 07	3.37E 07	0.00E-01	5.77E 06	0.00E-01	0.00E-01	0.00E-01	0.00E-01
CO 60	6.81E 07	1.28E 08	0.00E-01	2.31E 07	0.00E-01	0.00E-01	0.00E-01	0.00E-01
ZN 65	4.10E 09	1.16E 09	2.47E 09	6.59E 09	4.15E 09	0.00E-01	0.00E-01	0.00E-01
SR 89	8.93E 07	1.21E 08	3.13E 09	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01
SR 90	1.63E 10	8.68E 08	6.44E 10	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01
ZR 95	3.56E 02	4.17E 05	1.82E 03	4.00E 02	5.72E 02	0.00E-01	0.00E-01	0.00E-01
I 131	3.66E 08	5.73E 07	6.40E 08	6.44E 08	1.06E 09	2.13E 11	0.00E-01	0.00E-01
I 133	4.11E 06	4.38E 06	8.78E 06	1.09E 07	1.81E 07	2.02E 09	0.00E-01	0.00E-01
CS134	4.09E 09	1.05E 08	1.18E 10	1.94E 10	6.01E 09	0.00E-01	2.16E 09	0.00E-01
CS136	8.53E 08	4.63E 07	4.80E 08	1.32E 09	7.02E 08	0.00E-01	1.05E 08	0.00E-01
CS137	2.52E 09	1.07E 08	1.79E 10	1.71E 10	5.57E 09	0.00E-01	2.00E 09	0.00E-01
BA140	3.27E 06	2.84E 07	5.60E 07	4.91E 04	1.60E 04	0.00E-01	2.93E 04	0.00E-01
CE141	7.47E 02	6.28E 06	1.01E 04	5.03E 03	2.21E 03	0.00E-01	0.00E-01	0.00E-01

*R VALUES IN UNITS OF MREM/YR PER CI/M FOR INHALATION AND TRITIUM, AND IN UNITS OF M -MREM/YR PER CI/SEC FOR ALL OTHERS

TABLE 3.3-13 R VALUES FOR THE MONTICELLO NUCLEAR GENERATING PLANT*

PATHWAY = COW MILK
AGE GROUP EQUALS INFANT

NUCLIDE	T.BODY	GI-TRACT	BONE	LIVER	KIDNEY	THYROID	LUNG	SKIN
H 3	2.40E 03	2.40E 03	0.00E-01	2.40E 03	2.40E 03	2.40E 03	2.40E 03	2.40E 03
CR 51	7.46E 04	2.17E 06	0.00E-01	0.00E-01	1.06E 04	4.87E 04	9.47E 04	0.00E-01
MN 54	4.54E 06	7.36E 06	0.00E-01	2.00E 07	4.44E 06	0.00E-01	0.00E-01	0.00E-01
FE 59	7.21E 07	8.74E 07	1.05E 08	1.83E 08	0.00E-01	0.00E-01	5.41E 07	0.00E-01
CO 58	2.88E 07	2.88E 07	0.00E-01	1.15E 07	0.00E-01	0.00E-01	0.00E-01	0.00E-01
CO 60	1.11E 08	1.12E 08	0.00E-01	4.71E 07	0.00E-01	0.00E-01	0.00E-01	0.00E-01
ZN 65	5.26E 09	9.63E 09	3.32E 09	1.14E 10	5.53E 09	0.00E-01	0.00E-01	0.00E-01
SR 89	1.70E 08	1.22E 08	5.94E 09	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01
SR 90	1.79E 10	8.75E 08	7.01E 10	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01
ZR 95	5.58E 02	3.92E 05	3.23E 03	7.87E 02	8.48E 02	0.00E-01	0.00E-01	0.00E-01
I 131	6.92E 08	5.62E 07	1.34E 09	1.57E 09	1.04E 09	5.17E 11	0.00E-01	0.00E-01
I 133	7.91E 06	4.57E 06	1.85E 07	2.70E 07	3.17E 07	4.91E 09	0.00E-01	0.00E-01
CS134	3.59E 09	9.65E 07	1.90E 10	3.55E 10	9.14E 09	0.00E-01	3.75E 09	0.00E-01
CS136	1.03E 09	4.19E 07	9.37E 08	2.76E 09	1.10E 09	0.00E-01	2.25E 08	0.00E-01
CS137	2.37E 09	1.04E 08	2.85E 10	3.34E 10	8.96E 09	0.00E-01	3.63E 09	0.00E-01
BA140	5.94E 06	2.83E 07	1.15E 08	1.15E 05	2.74E 04	0.00E-01	7.08E 04	0.00E-01
CE141	1.44E 03	6.30E 06	2.00E 04	1.22E 04	3.76E 03	0.00E-01	0.00E-01	0.00E-01

*R VALUES IN UNITS OF MREM/YR PER CI/M FOR INHALATION AND TRITIUM, AND IN UNITS OF M -MREM/YR PER CI/SEC FOR ALL OTHERS

TABLE 3.3-14 R VALUES FOR THE MONTICELLO NUCLEAR GENERATING PLANT*

PATHWAY = GOATMILK
AGE GROUP EQUALS ADULT

NUCLIDE	T.BODY	GI-TRACT	BONE	LIVER	KIDNEY	THYROID	LUNG	SKIN
H 3	1.57E 03	1.57E 03	0.00E-01	1.57E 03	1.57E 03	1.57E 03	1.57E 03	1.57E 03
CR 51	1.59E 03	3.99E 05	0.00E-01	0.00E-01	3.49E 02	9.48E 02	2.11E 03	0.00E-01
MN 54	9.89E 04	1.59E 06	0.00E-01	5.19E 05	1.54E 05	0.00E-01	0.00E-01	0.00E-01
FE 59	1.62E 05	1.41E 06	1.80E 05	4.23E 05	0.00E-01	0.00E-01	1.18E 05	0.00E-01
CO 58	6.03E 05	5.46E 06	0.00E-01	2.69E 05	0.00E-01	0.00E-01	0.00E-01	0.00E-01
CO 60	2.32E 06	1.98E 07	0.00E-01	1.05E 06	0.00E-01	0.00E-01	0.00E-01	0.00E-01
ZN 65	1.42E 08	1.97E 08	9.85E 07	3.14E 08	2.10E 08	0.00E-01	0.00E-01	0.00E-01
SR 89	4.13E 07	2.31E 08	1.44E 09	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01
SR 90	1.39E 10	1.64E 09	5.67E 10	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01
ZR 95	1.17E 01	5.46E 04	5.37E 01	1.72E 01	2.70E 01	0.00E-01	0.00E-01	0.00E-01
I 131	1.43E 08	6.59E 07	1.74E 08	2.50E 08	4.28E 08	8.18E 10	0.00E-01	0.00E-01
I 133	1.26E 06	3.71E 06	2.37E 06	4.13E 06	7.21E 06	6.07E 08	0.00E-01	0.00E-01
CS134	1.72E 10	3.69E 08	8.85E 09	2.11E 10	6.82E 09	0.00E-01	2.26E 09	0.00E-01
CS136	1.06E 09	1.68E 08	3.75E 08	1.48E 09	8.23E 08	0.00E-01	1.13E 08	0.00E-01
CS137	1.10E 10	3.25E 08	1.23E 10	1.68E 10	5.70E 09	0.00E-01	1.89E 09	0.00E-01
BA140	1.01E 05	3.18E 06	1.54E 06	1.94E 03	6.59E 02	0.00E-01	1.11E 03	0.00E-01
CE141	2.06E 01	6.94E 05	2.68E 02	1.81E 02	8.43E 01	0.00E-01	0.00E-01	0.00E-01

*R VALUES IN UNITS OF MREM/YR PER CI/M FOR INHALATION AND TRITIUM, AND IN UNITS OF M -MREM/YR PER CI/SEC FOR ALL OTHERS

TABLE 3.3-15 R VALUES FOR THE MONTICELLO NUCLEAR GENERATING PLANT*

PATHWAY = GOATMILK
AGE GROUP EQUALS TEEN

NUCLIDE	T.BODY	GI-TRACT	BONE	LIVER	KIDNEY	THYROID	LUNG	SKIN
H 3	2.04E 03	2.04E 03	0.00E-01	2.04E 03	2.04E 03	2.04E 03	2.04E 03	2.04E 03
CR 51	2.77E 03	4.66E 05	0.00E-01	0.00E-01	6.07E 02	1.54E 03	3.95E 03	0.00E-01
MN 54	1.71E 05	1.77E 06	0.00E-01	8.64E 05	2.58E 05	0.00E-01	0.00E-01	0.00E-01
FE 59	2.83E 05	1.74E 06	3.14E 05	7.34E 05	0.00E-01	0.00E-01	2.31E 05	0.00E-01
CO 58	1.04E 06	6.25E 06	0.00E-01	4.53E 05	0.00E-01	0.00E-01	0.00E-01	0.00E-01
CO 60	4.02E 06	2.32E 07	0.00E-01	1.78E 06	0.00E-01	0.00E-01	0.00E-01	0.00E-01
ZN 65	2.45E 08	2.22E 08	1.51E 08	5.25E 08	3.36E 08	0.00E-01	0.00E-01	0.00E-01
SR 89	7.59E 07	3.16E 08	2.65E 09	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01
SR 90	1.98E 10	2.25E 09	8.01E 10	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01
ZR 95	2.04E 01	6.84E 04	9.40E 01	2.97E 01	4.36E 01	0.00E-01	0.00E-01	0.00E-01
I 131	2.38E 08	8.77E 07	3.17E 08	4.43E 08	7.63E 08	1.29E 11	0.00E-01	0.00E-01
I 133	2.24E 06	5.57E 06	4.34E 06	1.36E 06	1.29E 07	1.03E 09	0.00E-01	0.00E-01
CS134	1.68E 10	4.50E 08	1.54E 10	3.62E 10	1.15E 10	0.00E-01	4.39E 09	0.00E-01
CS136	1.69E 09	2.02E 08	6.38E 08	2.51E 09	1.37E 09	0.00E-01	2.15E 08	0.00E-01
CS137	1.03E 10	4.21E 08	2.22E 10	2.96E 10	1.01E 10	0.00E-01	3.91E 09	0.00E-01
BA140	1.80E 05	4.30E 06	2.79E 06	3.41E 03	1.16E 03	0.00E-01	2.30E 03	0.00E-01
CE141	3.77E 01	9.39E 05	4.92E 02	3.28E 02	1.55E 02	0.00E-01	0.00E-01	0.00E-01

*R VALUES IN UNITS OF MREM/YR PER CI/M FOR INHALATION AND TRITIUM, AND IN UNITS OF M -MREM/YR PER CI/SEC FOR ALL OTHERS

TABLE 3.3-16 R VALUES FOR THE MONTICELLO NUCLEAR GENERATING PLANT*

PATHWAY = GOATMILK
AGE GROUP EQUALS CHILD

NUCLIDE	T.BODY	GI-TRACT	BONE	LIVER	KIDNEY	THYROID	LUNG	SKIN
H 3	3.23E 03	3.23E 03	0.00E-01	3.23E 03	3.23E 03	3.23E 03	3.23E 03	3.23E 03
CR 51	5.65E 03	3.00E 05	0.00E-01	0.00E-01	8.57E 02	3.14E 03	5.73E 03	0.00E-01
MN 54	3.44E 05	1.08E 06	0.00E-01	1.29E 06	3.62E 05	0.00E-01	0.00E-01	0.00E-01
FE 59	5.88E 05	1.23E 06	7.29E 05	1.18E 06	0.00E-01	0.00E-01	3.42E 05	0.00E-01
CO 58	2.12E 06	4.04E 06	0.00E-01	6.92E 05	0.00E-01	0.00E-01	0.00E-01	0.00E-01
CO 60	8.17E 06	1.53E 07	0.00E-01	2.77E 06	0.00E-01	0.00E-01	0.00E-01	0.00E-01
ZN 65	4.92E 08	1.39E 08	2.97E 08	7.91E 08	4.98E 08	0.00E-01	0.00E-01	0.00E-01
SR 89	1.87E 08	2.54E 08	6.56E 09	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01
SR 90	3.43E 10	1.82E 09	1.35E 11	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01
ZR 95	4.27E 01	5.01E 04	2.18E 02	4.80E 01	6.87E 01	0.00E-01	0.00E-01	0.00E-01
I 131	4.39E 08	6.88E 07	7.68E 08	7.72E 08	1.27E 09	2.55E 11	0.00E-01	0.00E-01
I 133	4.93E 06	5.25E 06	1.05E 07	1.30E 07	2.17E 07	2.42E 09	0.00E-01	0.00E-01
CS134	1.23E 10	3.14E 08	3.55E 10	5.82E 10	1.80E 10	0.00E-01	6.47E 09	0.00E-01
CS136	2.56E 09	1.39E 08	1.44E 09	3.96E 09	2.11E 09	0.00E-01	3.14E 08	0.00E-01
CS137	7.57E 09	3.21E 08	5.36E 10	5.13E 10	1.67E 10	0.00E-01	6.01E 09	0.00E-01
BA140	3.92E 05	3.41E 06	6.72E 06	5.89E 03	1.92E 03	0.00E-01	3.51E 03	0.00E-01
CE141	8.97E 01	7.54E 05	1.21E 03	6.04E 02	2.65E 02	0.00E-01	0.00E-01	0.00E-01

*R VALUES IN UNITS OF MREM/YR PER CI/M FOR INHALATION AND TRITIUM, AND IN UNITS OF M -MREM/YR PER CI/SEC FOR ALL OTHERS

TABLE 3.3-17 R VALUES FOR THE MONTICELLO NUCLEAR GENERATING PLANT*

PATHWAY = GOATMILK
AGE GROUP EQUALS INFANT

NUCLIDE	T.BODY	GI-TRACT	BONE	LIVER	KIDNEY	THYROID	LUNG	SKIN
H 3	4.90E 03	4.90E 03	0.00E-01	4.90E 03	4.90E 03	4.90E 03	4.90E 03	4.90E 03
CR 51	8.95E 03	2.61E 05	0.00E-01	0.00E-01	1.28E 03	5.84E 03	1.14E 04	0.00E-01
MN 54	5.45E 05	8.83E 05	0.00E-01	2.40E 06	5.33E 05	0.00E-01	0.00E-01	0.00E-01
FE 59	9.37E 05	1.14E 06	1.36E 06	2.38E 06	0.00E-01	0.00E-01	7.03E 05	0.00E-01
CO 58	3.45E 06	3.45E 06	0.00E-01	1.38E 06	0.00E-01	0.00E-01	0.00E-01	0.00E-01
CO 60	1.34E 07	1.35E 07	0.00E-01	5.65E 06	0.00E-01	0.00E-01	0.00E-01	0.00E-01
ZN 65	6.31E 08	1.16E 09	3.99E 08	1.37E 09	6.63E 08	0.00E-01	0.00E-01	0.00E-01
SR 89	3.58E 08	2.57E 08	1.25E 10	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01
SR 90	3.75E 10	1.84E 09	1.47E 11	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01
ZR 95	6.70E 01	4.70E 04	3.88E 02	9.45E 01	1.02E 02	0.00E-01	0.00E-01	0.00E-01
I 131	8.31E 08	6.74E 07	1.60E 09	1.89E 09	2.21E 09	6.21E 11	0.00E-01	0.00E-01
I 133	9.49E 06	5.48E 06	2.23E 07	3.24E 07	3.81E 07	5.89E 09	0.00E-01	0.00E-01
CS134	1.08E 10	2.89E 08	5.71E 10	1.07E 11	2.74E 10	0.00E-01	1.12E 10	0.00E-01
CS136	3.09E 09	1.26E 08	2.81E 09	8.27E 09	3.30E 09	0.00E-01	6.74E 08	0.00E-01
CS137	7.10E 09	3.13E 08	8.55E 10	1.00E 11	2.69E 10	0.00E-01	1.09E 10	0.00E-01
BA140	7.13E 05	3.40E 06	1.38E 07	1.38E 04	3.29E 03	0.00E-01	8.50E 03	0.00E-01
CE141	1.72E 02	7.57E 05	2.40E 03	1.46E 03	4.52E 02	0.00E-01	0.00E-01	0.00E-01

*R VALUES IN UNITS OF MREM/YR PER CI/M FOR INHALATION AND TRITIUM, AND IN UNITS OF M -MREM/YR PER CI/SEC FOR ALL OTHERS

TABLE 3.3-18 R VALUES FOR THE MONTICELLO NUCLEAR GENERATING PLANT*

PATHWAY = INHAL
AGE GROUP EQUALS ADULT

NUCLIDE	T.BODY	GI-TRACT	BONE	LIVER	KIDNEY	THYROID	LUNG	SKIN
H 3	1.26E 03	1.26E 03	0.00E-01	1.26E 03	1.26E 03	1.26E 03	1.26E 03	1.26E 03
CR 51	9.99E 01	3.32E 03	0.00E-01	0.00E-01	2.28E 01	5.94E 01	1.44E 04	0.00E-01
MN 54	6.29E 03	7.72E 04	0.00E-01	3.95E 04	9.83E 03	0.00E-01	1.40E 06	0.00E-01
FE 59	1.05E 04	1.88E 05	1.17E 04	2.77E 04	0.00E-01	0.00E-01	1.01E 06	0.00E-01
CO 58	2.07E 03	1.06E 05	0.00E-01	1.58E 03	0.00E-01	0.00E-01	9.27E 05	0.00E-01
CO 60	1.48E 04	2.84E 05	0.00E-01	1.15E 04	0.00E-01	0.00E-01	5.96E 06	0.00E-01
ZN 65	4.65E 04	5.34E 04	3.24E 04	1.03E 05	6.89E 04	0.00E-01	8.63E 05	0.00E-01
SR 89	8.71E 03	3.49E 05	3.04E 05	0.00E-01	0.00E-01	0.00E-01	1.40E 06	0.00E-01
SR 90	6.09E 06	7.21E 05	9.91E 07	0.00E-01	0.00E-01	0.00E-01	9.59E 06	0.00E-01
ZR 95	2.32E 04	1.50E 05	1.07E 05	3.44E 04	5.41E 04	0.00E-01	1.77E 06	0.00E-01
I 131	2.05E 04	6.27E 03	2.52E 04	3.57E 04	6.12E 04	1.19E 07	0.00E-01	0.00E-01
I 133	4.51E 03	8.87E 03	8.63E 03	1.48E 04	2.58E 04	2.15E 06	0.00E-01	0.00E-01
CS134	7.27E 05	1.04E 04	3.72E 05	8.47E 05	2.87E 05	0.00E-01	9.75E 04	0.00E-01
CS136	1.10E 05	1.17E 04	3.90E 04	1.46E 05	8.55E 04	0.00E-01	1.20E 04	0.00E-01
CS137	4.27E 05	8.39E 03	4.78E 05	6.20E 05	2.22E 05	0.00E-01	7.51E 04	0.00E-01
BA140	2.56E 03	2.18E 05	3.90E 04	4.90E 01	1.67E 01	0.00E-01	1.27E 06	0.00E-01
CE141	1.53E 03	1.20E 05	1.99E 04	1.35E 04	6.25E 03	0.00E-01	3.61E 05	0.00E-01

*R VALUES IN UNITS OF MREM/YR PER CI/M FOR INHALATION AND TRITIUM, AND IN UNITS OF M -MREM/YR PER CI/SEC FOR ALL OTHERS

TABLE 3.3-19 R VALUES FOR THE MONTICELLO NUCLEAR GENERATING PLANT*

PATHWAY = INHAL
AGE GROUP EQUALS TEEN

NUCLIDE	T.BODY	GI-TRACT	BONE	LIVER	KIDNEY	THYROID	LUNG	SKIN
H 3	1.27E 03	1.27E 03	0.00E-01	1.27E 03	1.27E 03	1.27E 03	1.27E 03	1.27E 03
CR 51	1.35E 02	3.00E 03	0.00E-01	0.00E-01	3.07E 01	7.49E 01	2.09E 04	0.00E-01
MN 54	8.39E 03	6.67E 04	0.00E-01	5.10E 04	1.27E 04	0.00E-01	1.98E 06	0.00E-01
FE 59	1.43E 04	1.78E 05	1.59E 04	3.69E 04	0.00E-01	0.00E-01	1.53E 06	0.00E-01
CO 58	2.77E 03	9.51E 04	0.00E-01	2.07E 03	0.00E-01	0.00E-01	1.34E 06	0.00E-01
CO 60	1.98E 04	2.59E 05	0.00E-01	1.51E 04	0.00E-01	0.00E-01	8.71E 06	0.00E-01
ZN 65	6.23E 04	4.66E 04	3.85E 04	1.33E 05	8.63E 04	0.00E-01	1.24E 06	0.00E-01
SR 89	1.25E 04	3.71E 05	4.34E 05	0.00E-01	0.00E-01	0.00E-01	2.41E 06	0.00E-01
SR 90	6.67E 06	7.64E 05	1.08E 08	0.00E-01	0.00E-01	0.00E-01	1.65E 07	0.00E-01
ZR 95	3.15E 04	1.49E 05	1.45E 05	4.58E 04	6.73E 04	0.00E-01	2.68E 06	0.00E-01
I 131	2.64E 04	6.48E 03	3.54E 04	4.90E 04	8.39E 04	1.46E 07	0.00E-01	0.00E-01
I 133	6.21E 03	1.03E 04	1.21E 04	2.05E 04	3.59E 04	2.92E 06	0.00E-01	0.00E-01
CS134	5.48E 05	9.75E 03	5.02E 05	1.13E 06	3.75E 05	0.00E-01	1.46E 05	0.00E-01
CS136	1.37E 05	1.09E 04	5.14E 04	1.93E 05	1.10E 05	0.00E-01	1.77E 04	0.00E-01
CS137	3.11E 05	8.47E 03	6.69E 05	8.47E 05	3.04E 05	0.00E-01	1.21E 05	0.00E-01
BA140	3.51E 03	2.28E 05	5.46E 04	6.69E 01	2.28E 01	0.00E-01	2.03E 06	0.00E-01
CE141	2.16E 03	1.26E 05	2.84E 04	1.89E 04	8.87E 03	0.00E-01	6.13E 05	0.00E-01

*R VALUES IN UNITS OF MREM/YR PER CI/M FOR INHALATION AND TRITIUM, AND IN UNITS OF M -MREM/YR PER CI/SEC FOR ALL OTHERS

TABLE 3.3-20 R VALUES FOR THE MONTICELLO NUCLEAR GENERATING PLANT*

PATHWAY = INHAL
AGE GROUP EQUALS CHILD

NUCLIDE	T.BODY	GI-TRACT	BONE	LIVER	KIDNEY	THYROID	LUNG	SKIN
H 3	1.12E 03	1.12E 03	0.00E-01	1.12E 03	1.12E 03	1.12E 03	1.12E 03	1.12E 03
CR 51	1.54E 02	1.08E 03	0.00E-01	0.00E-01	2.43E 01	8.53E 01	1.70E 04	0.00E-01
MN 54	9.50E 03	2.29E 04	0.00E-01	4.29E 04	1.00E 04	0.00E-01	1.57E 06	0.00E-01
FE 59	1.67E 04	7.06E 04	2.07E 04	3.34E 04	0.00E-01	0.00E-01	1.27E 06	0.00E-01
CO 58	3.16E 03	3.43E 04	0.00E-01	1.77E 03	0.00E-01	0.00E-01	1.10E 06	0.00E-01
CO 60	2.26E 04	9.61E 04	0.00E-01	1.31E 04	0.00E-01	0.00E-01	7.06E 06	0.00E-01
ZN 65	7.02E 04	1.63E 04	4.25E 04	1.13E 05	7.13E 04	0.00E-01	9.94E 05	0.00E-01
SR 89	1.72E 04	1.67E 05	5.99E 05	0.00E-01	0.00E-01	0.00E-01	2.15E 06	0.00E-01
SR 90	6.43E 06	3.43E 05	1.01E 08	0.00E-01	0.00E-01	0.00E-01	1.47E 07	0.00E-01
ZR 95	3.69E 04	6.10E 04	1.90E 05	4.17E 04	5.95E 04	0.00E-01	2.23E 06	0.00E-01
I 131	2.72E 04	2.84E 03	4.80E 04	4.80E 04	7.87E 04	1.62E 07	0.00E-01	0.00E-01
I 133	7.68E 03	5.47E 03	1.66E 04	2.03E 04	3.37E 04	3.84E 06	0.00E-01	0.00E-01
CS134	2.24E 05	3.84E 03	6.50E 05	1.01E 06	3.30E 05	0.00E-01	1.21E 05	0.00E-01
CS136	1.16E 05	4.17E 03	6.50E 04	1.71E 05	9.53E 04	0.00E-01	1.45E 04	0.00E-01
CS137	1.28E 05	3.61E 03	9.05E 05	8.24E 05	2.82E 05	0.00E-01	1.04E 05	0.00E-01
BA140	4.32E 03	1.02E 05	7.39E 04	6.47E 01	2.11E 01	0.00E-01	1.74E 06	0.00E-01
CE141	2.89E 03	5.65E 04	3.92E 04	1.95E 04	8.53E 03	0.00E-01	5.43E 05	0.00E-01

*R VALUES IN UNITS OF MREM/YR PER CI/M FOR INHALATION AND TRITIUM, AND IN UNITS OF M -MREM/YR PER CI/SEC FOR ALL OTHERS

TABLE 3.3-21 R VALUES FOR THE MONTICELLO NUCLEAR GENERATING PLANT*

PATHWAY = INHAL
AGE GROUP EQUALS INFANT

NUCLIDE	T.BODY	GI-TRACT	BONE	LIVER	KIDNEY	THYROID	LUNG	SKIN
H 3	6.46E 02	6.46E 02	0.00E-01	6.46E 02	6.46E 02	6.46E 02	6.46E 02	6.46E 02
CR 51	8.93E 01	3.56E 02	0.00E-01	0.00E-01	1.32E 01	5.75E 01	1.28E 04	0.00E-01
MN 54	4.98E 03	7.05E 03	0.00E-01	2.53E 04	4.98E 03	0.00E-01	9.98E 05	0.00E-01
FE 59	9.46E 03	2.47E 04	1.35E 04	2.35E 04	0.00E-01	0.00E-01	1.01E 06	0.00E-01
CO 58	1.82E 03	1.11E 04	0.00E-01	1.22E 03	0.00E-01	0.00E-01	7.76E 05	0.00E-01
CO 60	1.18E 04	3.19E 04	0.00E-01	8.01E 03	0.00E-01	0.00E-01	4.50E 06	0.00E-01
ZN 65	3.10E 04	5.13E 04	1.93E 04	6.25E 04	3.24E 04	0.00E-01	6.46E 05	0.00E-01
SR 89	1.14E 04	6.39E 04	3.97E 05	0.00E-01	0.00E-01	0.00E-01	2.03E 06	0.00E-01
SR 90	2.59E 06	1.31E 05	4.08E 07	0.00E-01	0.00E-01	0.00E-01	1.12E 07	0.00E-01
ZR 95	2.03E 04	2.17E 04	1.15E 05	2.78E 04	3.10E 04	0.00E-01	1.75E 06	0.00E-01
I 131	1.96E 04	1.06E 03	3.79E 04	4.43E 04	5.17E 04	1.48E 07	0.00E-01	0.00E-01
I 133	5.59E 03	2.15E 03	1.32E 04	1.92E 04	2.24E 04	3.55E 06	0.00E-01	0.00E-01
CS134	7.44E 04	1.33E 03	3.96E 05	7.02E 05	1.90E 05	0.00E-01	7.95E 04	0.00E-01
CS136	5.28E 04	1.43E 03	4.82E 04	1.34E 05	5.63E 04	0.00E-01	1.17E 04	0.00E-01
CS137	4.54E 04	1.33E 03	5.48E 05	6.11E 05	1.72E 05	0.00E-01	7.12E 04	0.00E-01
BA140	2.89E 03	3.83E 04	5.59E 04	5.59E 01	1.34E 01	0.00E-01	1.59E 06	0.00E-01
CE141	1.99E 03	2.15E 04	2.77E 04	1.66E 04	5.24E 03	0.00E-01	5.16E 05	0.00E-01

*R VALUES IN UNITS OF MREM/YR PER CI/M FOR INHALATION AND TRITIUM, AND IN UNITS OF M -MREM/YR PER CI/SEC FOR ALL OTHERS

4.0 INFORMATION RELATED TO 40 CFR 190 and 40 CFR 141

The Technical Specifications require that when the calculated doses associated with the effluent releases exceed twice the limits of any section, the licensee shall prepare and submit a Special Report to the Commission and limit subsequent releases such that the dose or dose commitment to a real individual from all uranium fuel cycle sources is limited to < 25 mrem to the total body or any organ (except the thyroid, which is limited to < 75 mrem) over 12 consecutive months. This special Report is to include an analysis which demonstrates that radiation exposures to all real individuals from all uranium fuel cycle sources (including all liquid and gaseous effluent pathways and direct radiation) are less than the standards in 40 CFR Part 190, Environmental Radiation Protection Standards for Nuclear Power Operations. If analysis indicates that releases resulting in doses that exceed the 40 CFR 190 Standard may have occured, then a variance from the Commission to permit such releases will be requested or if possible, action will be taken to reduce subsequent releases. The Technical Specifications consider doses to a real individual and apply to each reactor but do not include any other portion of the uranium fuel cycle or direct shine from the reactor.

The "Uranium fuel cycle" is defined in 40 CFR Part 190.02(b) as:

> "Uranium fuel cycle means the operations of milling of uranium ore, chemical conversion of uranium, isotopic enrichment of uranium, fabrication of uranium fuel, generation of electricity by a light-water-cooled nuclear power plant using uranium fuel, and reprocessing of spent uranium fuel, to the extent that these directly support the production of electrical power for public use utilizing nuclear energy, but excludes mining operations, operations at waste disposal sites, transportation of any radioactive material in support of these operations, and the reuse of recovered non-uranium special nuclear and by-product materials from the cycle."

The Special Report will contain:

1) A determination of which uranium fuel cycle facilities or operations, in addition to the nuclear power reactor units at the site, contribute to the annual dose to the maximum exposed member of the public.

Nuclear fuel facilities over five miles from MNGP need not be considered in this determination.

2) A determination of the maximum exposed member of the public.

3) A determination of the total annual dose to this person from all existing pathways and sources of radioactive effluents and direct radiation using the methodologies described in this ODCM. Where additional information on pathways and nuclides is needed, the best available information will be used and documented.

4) A determination of the dose resulting from direct radiation from the plant and storage facilities.

The total body and organ doses resulting from liquid effluents from the MNGP will be summed with the doses resulting from releases of noble gases, radioiodines and particulates. These doses will be based upon releases from the MNGP during the past 3 quarters and from the quarter in which twice the specification was exceeded. The doses from the MNGP will be summed with the doses to the maximum exposed individual contributed from other operation of the uranium fuel cycle.

The direct dose components will be determined by either calculation or actual measurement. The N-16 component of direct radiation may be calculated using SKYSHINE, A Computer Procedure for Evaluating Effects of Structure Design on N-16 Gamma-Ray Dose Rates, Radiation Research Associates, Inc. Report RRA-T7209, November 1972. (AVAILABLE IN THE NSP-NSS LIBRARY)

MNGP shine dose computations have been made and are contained in a report introduced into the FTOL hearing record as exhibit number 2 (see response to interogatories 5 and 6, Docket 50-263). The calculation or actual measurement will be documented in this Special Report.

If the quarterly or annual doses due to liquid releases exceed the values listed in Section 2.3.3, a special report shall be submitted to the USNRC and shall include information related to 40 CFR 141 such as analysis of Mississippi River water and an analysis of possible impacts through the drinking water pathway.

5.0 RADIATION ENVIRONMENTAL MONITORING PROGRAM

5.1 Sampling

Table 5.1-1 and Figure 5.1-1 specify the current sampling locations based on the latest land use census.

TABLE 5.1-1

MONTICELLO NUCLEAR GENERATING PLANT
RADIATION ENVIRONMENTAL MONITORING PROGRAM
SAMPLING LOCATIONS

TYPE OF SAMPLE	CODE*	COLLECTION SITE	LOCATION
River Water	M-8[c]	Upstream of Plant	0.2 mi @ 285°/WNW
River Water	M-9	Downstream of Plant	0.4 mi @ 62°/ENE
Drinking Water	M-14	City of Minneapolis	36 mi @ 128°/SE
Well Water	M-10[c]	Kirchenbauer Farm	11.5 mi @ 323°/NW
Well Water	M-11	City of Monticello	3.2 mi @ 128°/SE
Well Water	M-12	Plant Well #1	0.2 mi @ 267°/W
Well Water	M-13	Trunnel Farm	0.3 mi @ 214°/SW
Sediment-River	M-8[c]	Upstream of Plant	0.2 mi @ 285°/WNW
Sediment-River	M-9	Downstream of Plant	0.4 mi @ 62°/ENE
Sediment-Shoreline	M-15	Montissippi Park	1.6 mi @ 117°/ESE
Periphyton or Macroinvertebrates	M-8[c]	Upstream of Plant	0.2 mi @ 285°/WNW
	M-9	Downstream of Plant	0.4 mi @ 62°/ENE
Vegetation-Aquatic	M-8[c]	Upstream of Plant	0.2 mi @ 285°/WNW
Vegetation-Aquatic	M-9	Downstream of Plant	0.4 mi @ 62°/ENE
Fish	M-8[c]	Upstream of Plant	0.2 mi @ 285°/WNW
Fish	M-9	Downstream of Plant	0.4 mi @ 62°/ENE
Milk	M-10[c]	Kirchenbauer Farm	11.5 mi @ 323°/NW
Milk	M-18	Olson Farm	2.5 mi @ 24°/NNE
Milk	M-24	Nelson Farm	2.4 mi @ 269°/W
Milk	M-25	Shovelain Farm	3.0 mi @ 250°/WSW
Milk	M-26	Peterson Farm	2.3 mi @ 111°/ESE
Topsoil	M-1[c]	Air Station M-1	11.1 mi @ 306°/NW
Topsoil	M-2[c]	Air Station M-2	8.8 mi @ 39°/NE
Topsoil	M-3	Air Station M-3	0.7 mi @ 353°/N
Topsoil	M-4	Air Station M-4	0.8 mi @ 23°/NNE
Topsoil	M-5	Air Station M-5	0.5 mi @ 181°/S
Topsoil	M-6	Air Station M-6	0.9 mi @ 150°/SSE
Topsoil	M-7	Air Station M-7	2.7 mi @ 136°/SE
Topsoil	M-18	Olson Farm	2.5 mi @ 24°/NNE
Topsoil	M-19	Plant Site Area	1.0 mi @ 323°/NW
Topsoil	M-21	Ewing Farm	4.9 mi @ 115°/ESE
Topsoil	M-26	Peterson Farm	2.3 mi @ 111°/ESE
Topsoil	M-27	Hageman Residence	1.4 mi @ 131°/SE

TABLE 5.1-1 (continued)

MONTICELLO NUCLEAR GENERATING PLANT
RADIATION ENVIRONMENTAL MONITORING PROGRAM
SAMPLING LOCATIONS

TYPE OF SAMPLE	CODE*	COLLECTION SITE	LOCATION
Vegetation-Natural	M-10[c]	Kirchenbauer Farm	11.5 mi @ 323°/NW
Vegetation-Natural	M-18	Olson Farm	2.5 mi @ 24°/NNE
Vegetation-Natural	M-19	Plant Site Area	1.0 mi @ 323°/NW
Small Mammals	M-17[c]	Heberling Farm	12.0 mi @ 258°/WNW
Small Mammals	M-16	Plant Site (on site)	On-Site
Cultivated Crops			
(Leafy Green Veg)	M-10[c]	Kirchenbauer Farm	11.5 mi @ 323°/NW
	M-16	Plant Site (on site)	On-Site
(Corn)	M-10[c]	Kirchenbauer Farm	11.5 mi @ 323°/NW
	M-18	Olson Farm	2.5 mi @ 24°/NNE
(Potatoes)	M-10[c]	Kirchenbauer Farm	11.5 mi @ 323°/NW
	M-21	Ewing Farm	4.9 mi @ 115°/ESE
Particulates (air) and TLD's	M-1[c]	Air Station M-1	11.1 mi @ 306°/NW
Particulates (air) and TLD's	M-2[c]	Air Station M-2	8.8 mi @ 39°/NE
Particulates (air) and TLD's	M-3	Air Station M-3	0.7 mi @ 353°/N
Particulates (air) and TLD's	M-4	Air Station M-4	0.8 mi @ 23°/NNE
Particulates (air) and TLD's	M-5	Air Station M-5	0.5 mi @ 181°/S
Particulates (air) and TLD's	M-6	Air Station M-6	0.9 mi @ 150°/SSE
Particulates (air) and TLD's	M-7	Air Station M-7	2.7 mi @ 136°/SE
Radioiodine (air)	M-1[c]	Air Station M-1	11.1 mi @ 306°/NW
Radioiodine (air)	M-5	Air Station M-5	0.5 mi @ 181°/S
Radioiodine (air)	M-7	Air Station M-7	2.7 mi @ 136°/SE

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

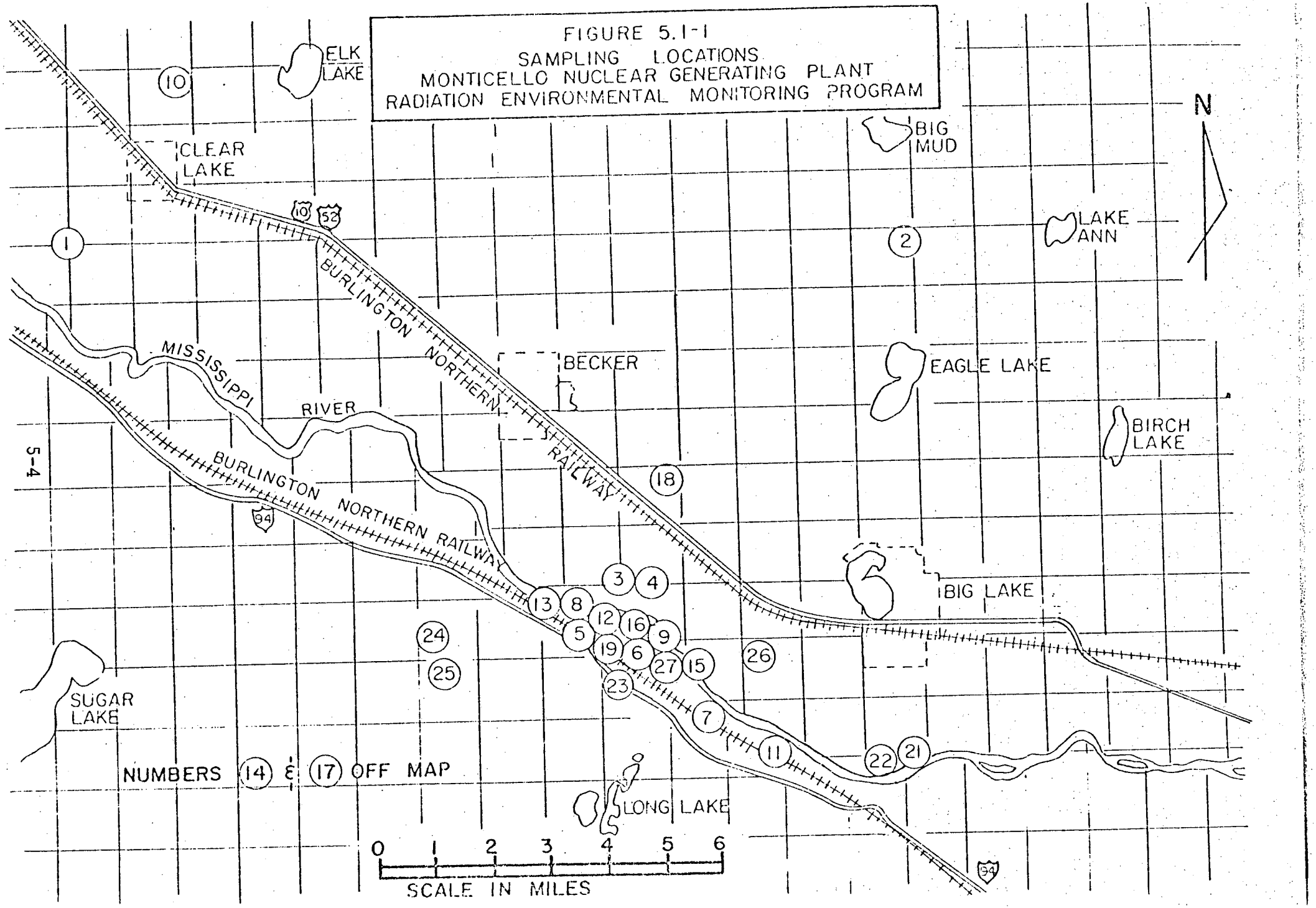

FIGURE 5.1-1
SAMPLING LOCATIONS
MONTICELLO NUCLEAR GENERATING PLANT
RADIATION ENVIRONMENTAL MONITORING PROGRAM

APPENDICES

APPENDIX A - METEOROLOGICAL ANALYSES

Table A-1	Release Conditions
Table A-2	Site Boundaries from Reactor and from Stack
Table A-3	Reactor Vent - Mixed Mode - Long Term - Site Boundary - χ/Q & D/Q
Table A-4	Reactor Vent - Mixed Mode - Long Term - Standard Distances - χ/Q
Table A-5	Reactor Vent - Mixed Mode - Long Term - Standard Distances - D/Q
Table A-6	Off-Gas Stack - Elevated - Long Term - Site Boundary - χ/Q and D/Q
Table A-7	Off-Gas Stack - Elevated - Long Term - Standard Distances - χ/Q
Table A-8	Off-Gas Stack - Elevated - Long Term - Standard Distances - D/Q
Table A-9	Off-Gas Stack - Elevated - Short Term - Site Boundary - χ/Q & D/Q
Table A-10	Off-Gas Stack - Elevated - Short Term - Standard Distances - χ/Q
Table A-11	Off-Gas Stack - Elevated - Short Term - Standard Distances - D/Q

APPENDIX - A

Summary of Dispersion Calculational Procedures

Updepleted, undecayed dispersion parameters were computed using the computer program XOQDOQ (Sagendorf and Goll, 1977). Specifically, sector average χ/Q and D/Q values were obtained for a sector width of 22.5 degrees. Credit was taken for momentum plume rise and effective plume height was adjusted for local terrain height for elevated releases. Building wake corrections were used to adjust calculations for ground-level releases. Standard open terrain recirculation correction factors were also applied as available as default values in XOQDOQ.

Dispersion calculations were based on mixed mode releases for the reactor vent and elevated releases for the off-gas stack. A summary of release conditions used as input to XOQDOQ is presented in Table A-1 and controlling site boundary distances are defined in Table A-2. Computed χ/Q and D/Q values for unrestricted area boundary locations (relative to release points) and for standard distances (to five miles from the source in 0.1 mile increments) are presented in Tables A-3 through A-11.

For certain meteorological and release conditions, the enveloping interpolation routines in XOQDOQ used to compute short-term χ/Q and D/Q values do not provide reasonable results. Because of this, results were reviewed for consistency and where possible, the distributions of calculated χ/Q values were enveloped and interpolated by hand.

In some cases, use of the NRC methodology is implemented in XOQDOQ for estimating short-term dispersion values results in values which are lower than the annual values. For these cases, the annual average χ/Q and D/Q values are used to conservatively represent short-term values.

X/Q and D/Q values for onsite EPA locations were adjusted (multiplied by a factor of 0.238) to account for limited daily exposure of workers in accordance with NUREG-0473.

Onsite meteorological data for the period September 1, 1976 through August 31, 1978 (as presented in Appendices B and C) were used in input to XOQDOQ. Data were collected and ΔT stability classes were defined in conformance with NRC Regulatory Guide 1.23. Dispersion calculations for the reactor vent were based on $\Delta T_{42.7-10m}$ and 10 meter wind data (joint data recovery of 94 percent). Dispersion calculations for the off gas stack was based on $\Delta T_{100-10m}$ and 100 meter wind data (joint data recovery of 95 percent).

REFERENCES

1. Sagendorf, J. F. and Goll, J. T., XOQDOQ Program for the Evaluation of Routine Effluent Releases at Nuclear Power Stations, NUREG-0324, U. S. Nuclear Regulatory Commission, September 1977.

TABLE A-1

MONTICELLO RELEASE CONDITIONS

	Reactor Vent	Off-Gas Stack
Type Release	Mixed Mode (Long-Term)	Elevated (Long and Short-Term)
Release Point Height (m)	42	100
Adjacent Building Height (m)	42	42
Relative Location to Adjacent Structures	Adjacent to Turbine Building	400' SE of Reactor Building
Exit Velocity (m/sec)	6.1	19.0
Internal Stack Diameter (m)	2.41	0.36
Building Cross-Sectional Area* (m^2)	1,480	N.A.
Purge Frequency** (times/yr.)	N.A.	6
Purge Duration ** (hours/release)	N.A	24

* Applied to ground level releases.

** Applied to short-term calculations only.

TABLE A-2

Distances (Miles) to Controlling Unrestricted Area** Boundary Locations

	Column 1 As Measured from Reactor Vent		Column 2* As Measured from Off-Gas Stack	
	Sector	Distance	Sector	Distance
	N	0.51	N	0.59
	NNE	0.58	N	0.63
	NE	0.65	NNE	0.65
	ENE	0.83	ENE	0.78
	E	0.59	E	0.50
	ESE	0.59	ESE	0.50
	SE	0.61	SSE	0.51
	SSE	0.43	S	0.36
	S	0.34	SSW	0.31
	SSW	0.32	SW	0.33
	SW	0.32	SW	0.33
	WSW	0.35	WSW	0.38
	W	0.48	W	0.56
	WNW	0.68	NW	0.78
	NW	0.43	NW	0.53
	NNW	0.53	NNW	0.61
EPA Onsite Monitoring Area Min. Dist.	E	0.38	E	0.29
	ESE	0.31	ESE	0.20
	SE	0.36	ESE	0.26
EPA Onsite Monitoring Area Max. Dist.	E	0.57	E	0.48
	ESE	0.62	E	0.52
	SE	0.50	ESE	0.39

* Locations specified in Column 2 are the same geographic points as specified in Column 1 although the reference points are different.

** The unrestricted area is defined in the MNLP Technical Specifications.

TABLE A-3

Monticello Reactor Vent Dispersion Parameters
for Long Term Mixed Mode Releases >500Hrs/Yr or >150Hrs/Qtr
for Unrestricted Area Boundary Locations (identified in Table A-2)

Site Boundary Sector *	X/Q (sec/m^3)	D/Q (1/m^2)
N	2.09E-06	2.89E-08
NNE	1.29E-06	1.82E-08
NE	7.56E-07	9.42E-09
ENE	6.11E-07	5.62E-09
E	1.38E-06	1.45E-08
ESE	2.42E-06	3.15E-08
SE	2.53E-06	3.30E-08
SSE	4.08E-06	5.95E-08
S	2.30E-06	3.08E-08
SSW	1.80E-06	2.15E-08
SW	1.96E-06	2.54E-08
WSW	1.54E-06	1.72E-08
W	1.10E-06	1.23E-08
WNW	1.22E-06	1.19E-08
NW	2.11E-06	2.61E-08
NNW	1.87E-06	2.55E-08
E**	5.52E-07	6.57E-09
ESE**	1.31E-06	1.96E-08
SE**	1.16E-06	1.69E-08
E**	3.38E-07	3.62E-09
ESE**	5.55E-07	7.12E-09
SE**	7.64E-07	1.06E-08

* Measured relevant to the Reactor Vent.
Period of Record: 9/1/76-8/31/78

**On-site EPA locations.

TABLE A-4

Monticello Reactor Vent Dispersion Parameters (X/Q), sec/m^3,
for Long Term Mixed Mode Releases >500 Hrs/Yr or>150 Hrs/Qtr
for Standard Distances (As Measured from the Reactor Vent)

Miles

Sector *	0.1	0.2	0.3	0.4	0.5	0.6	0.7
N	2.94E-05	8.91E-06	4.59E-06	2.98E-06	2.17E-06	1.74E-06	1.46E-06
NNE	1.98E-05	6.24E-06	3.25E-06	2.11E-06	1.55E-06	1.25E-06	1.06E-06
NE	1.22E-05	3.84E-06	2.02E-06	1.33E-06	9.98E-07	8.21E-07	7.09E-07
ENE	1.25E-05	3.91E-06	2.05E-06	1.35E-06	1.01E-06	8.46E-07	7.44E-07
E	1.97E-05	6.02E-06	3.20E-06	2.16E-06	1.64E-06	1.36E-06	1.19E-06
ESE	3.48E-05	1.05E-05	5.71E-06	3.89E-06	2.94E-06	2.40E-06	2.04E-06
SE	3.91E-05	1.17E-05	6.34E-06	4.28E-06	3.20E-06	2.57E-06	2.15E-06
SSE	4.15E-05	1.26E-05	6.78E-06	4.52E-06	3.35E-06	2.70E-06	2.28E-06
S	1.60E-05	4.95E-06	2.69E-06	1.82E-06	1.39E-06	1.16E-06	1.02E-06
SSW	1.14E-05	3.54E-06	1.97E-06	1.39E-06	1.11E-06	9.79E-07	8.94E-07
SW	1.28E-05	3.85E-06	2.15E-06	1.51E-06	1.21E-06	1.06E-06	9.58E-07
WSW	1.08E-05	3.29E-06	1.85E-06	1.32E-06	1.06E-06	9.52E-07	8.89E-07
W	1.21E-05	3.73E-06	2.01E-06	1.37E-06	1.07E-06	9.24E-07	8.42E-07
WNW	1.96E-05	6.01E-06	3.24E-06	2.17E-06	1.64E-06	1.37E-06	1.19E-06
NW	2.15E-05	6.49E-06	3.45E-06	2.32E-06	1.76E-06	1.45E-06	1.25E-06
NNW	2.71E-05	8.24E-06	4.24E-06	2.74E-06	2.00E-06	1.61E-06	1.36E-06

* Measured relevant to the Reactor Vent.
Period of Record: 9/1/76-8/31/78

TABLE A-4 (Cont.)

Monticello Reactor Vent Dispersion Parameters (χ/Q), sec/m^3, for Long Term Mixed Mode Releases >500 Hrs/Yr or>150 Hrs/Qtr for Standard Distances (As Measured from the Reactor Vent)

Miles

Sector*	0.8	0.9	1.0	1.1	1.2	1.3	1.4
N	1.21E-06	9.77E-07	8.18E-07	7.00E-07	6.10E-07	5.39E-07	4.82E-07
NNE	8.85E-07	7.19E-07	6.07E-07	5.24E-07	4.59E-07	4.08E-07	3.66E-07
NE	6.02E-07	4.94E-07	4.19E-07	3.61E-07	3.16E-07	2.80E-07	2.50E-07
ENE	6.46E-07	5.41E-07	4.69E-07	4.13E-07	3.69E-07	3.32E-07	3.02E-07
E	1.02E-06	8.42E-07	7.16E-07	6.20E-07	5.45E-07	4.85E-07	4.35E-07
ESE	1.69E-06	1.35E-06	1.11E-06	9.35E-07	7.99E-07	6.92E-07	6.06E-07
SE	1.76E-06	1.39E-06	1.13E-06	9.46E-07	8.03E-07	6.93E-07	6.04E-07
SSE	1.89E-06	1.51E-06	1.25E-06	1.06E-06	9.14E-07	7.98E-07	7.06E-07
S	8.69E-07	7.17E-07	6.09E-07	5.27E-07	4.63E-07	4.12E-07	3.71E-07
SSW	7.94E-07	6.74E-07	5.85E-07	5.14E-07	4.57E-07	4.10E-07	3.70E-07
SW	8.43E-07	7.09E-07	6.09E-07	5.31E-07	4.68E-07	4.16E-07	3.73E-07
WSW	8.07E-07	6.97E-07	6.12E-07	5.44E-07	4.87E-07	4.39E-07	3.99E-07
W	7.50E-07	6.40E-07	5.59E-07	4.95E-07	4.42E-07	3.99E-07	3.63E-07
WNW	1.02E-06	8.42E-07	7.17E-07	6.22E-07	5.47E-07	4.87E-07	4.38E-07
NW	1.05E-06	8.55E-07	7.15E-07	6.10E-07	5.29E-07	4.64E-07	4.11E-07
NNW	1.13E-06	9.14E-07	7.68E-07	6.60E-07	5.76E-07	5.10E-07	4.57E-07

* Measured relevant to the Reactor Vent.
Period of Record: 9/1/76-8/31/78

TABLE A-4 (Cont.)

Monticello Reactor Vent Dispersion Parameters (X/Q), sec/m^3, for Long Term Mixed Mode Releases >500 Hrs/Yr or>150 Hrs/Qtr for Standard Distances (As Measured from the Reactor Vent)

	Miles						
Sector*	1.5	1.6	1.7	1.8	1.9	2.0	2.1
N	4.35E-07	3.91E-07	3.54E-07	3.23E-07	2.96E-07	2.72E-07	2.52E-07
NNE	3.32E-07	3.00E-07	2.72E-07	2.49E-07	2.28E-07	2.11E-07	1.95E-07
NE	2.25E-07	2.07E-07	1.92E-07	1.78E-07	1.67E-07	1.57E-07	1.48E-07
ENE	2.77E-07	2.56E-07	2.37E-07	2.21E-07	2.07E-07	1.94E-07	1.83E-07
E	3.94E-07	3.57E-07	3.25E-07	2.97E-07	2.73E-07	2.53E-07	2.34E-07
ESE	5.36E-07	4.78E-07	4.29E-07	3.88E-07	3.53E-07	3.23E-07	2.97E-07
SE	5.33E-07	4.80E-07	4.35E-07	3.97E-07	3.65E-07	3.37E-07	3.12E-07
SSE	6.31E-07	5.63E-07	5.05E-07	4.57E-07	4.16E-07	3.80E-07	3.49E-07
S	3.36E-07	3.03E-07	2.74E-07	2.49E-07	2.28E-07	2.10E-07	1.94E-07
SSW	3.37E-07	3.20E-07	3.05E-07	2.92E-07	2.81E-07	2.71E-07	2.62E-07
SW	3.37E-07	3.17E-07	2.99E-07	2.83E-07	2.70E-07	2.58E-07	2.47E-07
WSW	3.64E-07	3.44E-07	3.26E-07	3.10E-07	2.95E-07	2.82E-07	2.71E-07
W	3.32E-07	3.16E-07	3.01E-07	2.89E-07	2.78E-07	2.69E-07	2.61E-07
WNW	3.97E-07	3.74E-07	3.54E-07	3.37E-07	3.23E-07	3.12E-07	3.02E-07
NW	3.68E-07	3.33E-07	3.03E-07	2.78E-07	2.57E-07	2.38E-07	2.21E-07
NNW	4.13E-07	3.73E-07	3.39E-07	3.10E-07	2.85E-07	2.63E-07	2.44E-07

* Measured relevant to the Reactor Vent.
Period of Record: 9/1/76-8/31/78

TABLE A-4 (Cont.)

Monticello Reactor Vent Dispersion Parameters (X/Q), sec/m^3,
for Long Term Mixed Mode Releases >500 Hrs/Yr or >150 Hrs/Qtr
for Standard Distances (As Measured from the Reactor Vent)

Miles

Sector*	2.2	2.3	2.4	2.5	2.6	2.7	2.8
N	2.34E-07	2.18E-07	2.04E-07	1.92E-07	1.83E-07	1.75E-07	1.68E-07
NNE	1.82E-07	1.70E-07	1.59E-07	1.50E-07	1.41E-07	1.33E-07	1.26E-07
NE	1.40E-07	1.32E-07	1.26E-07	1.20E-07	1.13E-07	1.07E-07	1.02E-07
ENE	1.73E-07	1.64E-07	1.56E-07	1.49E-07	1.41E-07	1.34E-07	1.27E-07
E	2.18E-07	2.04E-07	1.91E-07	1.80E-07	1.69E-07	1.60E-07	1.51E-07
ESE	2.74E-07	2.53E-07	2.36E-07	2.20E-07	2.05E-07	1.93E-07	1.81E-07
SE	2.91E-07	2.73E-07	2.56E-07	2.41E-07	2.26E-07	2.12E-07	1.99E-07
SSE	3.22E-07	2.99E-07	2.78E-07	2.59E-07	2.43E-07	2.29E-07	2.15E-07
S	1.80E-07	1.68E-07	1.57E-07	1.47E-07	1.42E-07	1.37E-07	1.33E-07
SSW	2.55E-07	2.48E-07	2.41E-07	2.35E-07	2.20E-07	2.06E-07	1.94E-07
SW	2.38E-07	2.30E-07	2.22E-07	2.15E-07	2.04E-07	1.93E-07	1.83E-07
WSW	2.60E-07	2.51E-07	2.42E-07	2.34E-07	2.18E-07	2.04E-07	1.92E-07
W	2.54E-07	2.48E-07	2.42E-07	2.37E-07	2.25E-07	2.14E-07	2.04E-07
WNW	2.93E-07	2.85E-07	2.79E-07	2.73E-07	2.64E-07	2.55E-07	2.47E-07
NW	2.07E-07	1.94E-07	1.82E-07	1.72E-07	1.66E-07	1.60E-07	1.55E-07
NNW	2.28E-07	2.13E-07	2.00E-07	1.88E-07	1.78E-07	1.68E-07	1.60E-07

* Measured relevant to the Reactor Vent.
Period of Record: 9/1/76-8/31/78

TABLE A-4 (Cont.)

Monticello Reactor Vent Dispersion Parameters (χ/Q), sec/m^3, for Long Term Mixed Mode Releases >500 Hrs/Yr or>150 Hrs/Qtr for Standard Distances (As Measured from the Reactor Vent)

Sector*	Miles 2.9	3.0	3.1	3.2	3.3	3.4	3.5
N	1.62E-07	1.56E-07	1.51E-07	1.46E-07	1.41E-07	1.37E-07	1.33E-07
NNE	1.20E-07	1.14E-07	1.09E-07	1.04E-07	9.91E-08	9.49E-08	9.10E-08
NE	9.64E-08	9.16E-08	8.73E-08	8.33E-08	7.96E-08	7.62E-08	7.30E-08
ENE	1.21E-07	1.16E-07	1.11E-07	1.06E-07	1.02E-07	9.75E-08	9.37E-08
E	1.44E-07	1.36E-07	1.30E-07	1.24E-07	1.18E-07	1.13E-07	1.09E-07
ESE	1.71E-07	1.61E-07	1.53E-07	1.45E-07	1.38E-07	1.31E-07	1.25E-07
SE	1.88E-07	1.77E-07	1.68E-07	1.59E-07	1.51E-07	1.44E-07	1.37E-07
SSE	2.04E-07	1.93E-07	1.83E-07	1.74E-07	1.66E-07	1.58E-07	1.51E-07
S	1.29E-07	1.25E-07	1.22E-07	1.19E-07	1.17E-07	1.14E-07	1.12E-07
SSW	1.83E-07	1.73E-07	1.63E-07	1.55E-07	1.47E-07	1.40E-07	1.33E-07
SW	1.75E-07	1.67E-07	1.59E-07	1.52E-07	1.46E-07	1.40E-07	1.34E-07
WSW	1.80E-07	1.70E-07	1.60E-07	1.52E-07	1.44E-07	1.37E-07	1.30E-07
W	1.95E-07	1.87E-07	1.79E-07	1.72E-07	1.65E-07	1.59E-07	1.53E-07
WNW	2.40E-07	2.33E-07	2.26E-07	2.19E-07	2.13E-07	2.07E-07	2.01E-07
NW	1.50E-07	1.46E-07	1.42E-07	1.39E-07	1.36E-07	1.33E-07	1.31E-07
NNW	1.52E-07	1.45E-07	1.38E-07	1.32E-07	1.26E-07	1.21E-07	1.17E-07

* Measured relevant to the Reactor Vent.
Period of Record: 9/1/76-8/31/78

TABLE A-4 (Cont.)

Monticello Reactor Vent Dispersion Parameters (χ/Q), sec/m^3, for Long Term Mixed Mode Releases >500 Hrs/Yr or>150 Hrs/Qtr for Standard Distances (As Measured from the Reactor Vent)

Sector*	Miles 3.6	3.7	3.8	3.9	4.0	4.1	4.2
N	1.28E-07	1.23E-07	1.18E-07	1.14E-07	1.10E-07	1.06E-07	1.02E-07
NNE	8.74E-08	8.40E-08	8.09E-08	7.80E-08	7.52E-08	7.26E-08	7.02E-08
NE	7.01E-08	6.74E-08	6.48E-08	6.24E-08	6.02E-08	5.81E-08	5.61E-08
ENE	9.02E-08	8.69E-08	8.38E-08	8.10E-08	7.82E-08	7.57E-08	7.33E-08
E	1.04E-07	1.00E-07	9.62E-08	9.26E-08	8.92E-08	8.61E-08	8.31E-08
ESE	1.19E-07	1.14E-07	1.09E-07	1.05E-07	1.01E-07	9.66E-08	9.29E-08
SE	1.31E-07	1.25E-07	1.20E-07	1.15E-07	1.10E-07	1.06E-07	1.02E-07
SSE	1.45E-07	1.40E-07	1.36E-07	1.31E-07	1.27E-07	1.23E-07	1.19E-07
S	1.08E-07	1.05E-07	1.02E-07	9.95E-08	9.69E-08	9.44E-08	9.20E-08
SSW	1.29E-07	1.25E-07	1.21E-07	1.17E-07	1.13E-07	1.10E-07	1.07E-07
SW	1.31E-07	1.27E-07	1.24E-07	1.20E-07	1.17E-07	1.14E-07	1.11E-07
WSW	1.27E-07	1.23E-07	1.20E-07	1.17E-07	1.14E-07	1.11E-07	1.09E-07
W	1.46E-07	1.39E-07	1.33E-07	1.28E-07	1.22E-07	1.17E-07	1.13E-07
WNW	1.91E-07	1.82E-07	1.74E-07	1.66E-07	1.59E-07	1.52E-07	1.46E-07
NW	1.26E-07	1.23E-07	1.19E-07	1.16E-07	1.13E-07	1.10E-07	1.07E-07
NNW	1.12E-07	1.08E-07	1.04E-07	1.01E-07	9.73E-08	9.41E-08	9.11E-08

* Measured relevant to the Reactor Vent.
Period of Record: 9/1/76-8/31/78

TABLE A-4 (Cont.)

Monticello Reactor Vent Dispersion Parameters (X/Q), sec/m^3,
for Long Term Mixed Mode Releases >500 Hrs/Yr or>150 Hrs/Qtr
for Standard Distances (As Measured from the Reactor Vent)

Miles

Sector*	4.3	4.4	4.5	4.6	4.7	4.8	4.9
N	9.86E-08	9.54E-08	9.23E-08	8.95E-08	8.68E-08	8.42E-08	8.18E-08
NNE	6.79E-08	6.57E-08	6.37E-08	6.18E-08	6.00E-08	5.83E-08	5.66E-08
NE	5.43E-08	5.25E-08	5.09E-08	4.93E-08	4.78E-08	4.65E-08	4.51E-08
ENE	7.10E-08	6.89E-08	6.68E-08	6.49E-08	6.31E-08	6.14E-08	5.97E-08
E	8.04E-08	7.77E-08	7.53E-08	7.29E-08	7.07E-08	6.87E-08	6.67E-08
ESE	8.95E-08	8.63E-08	8.33E-08	8.04E-08	7.78E-08	7.52E-08	7.28E-08
SE	9.84E-08	9.48E-08	9.15E-08	8.84E-08	8.55E-08	8.27E-08	8.01E-08
SSE	1.16E-07	1.13E-07	1.10E-07	1.06E-07	1.03E-07	9.92E-08	9.61E-08
S	8.98E-08	8.77E-08	8.57E-08	8.28E-08	8.00E-08	7.74E-08	7.50E-08
SSW	1.04E-07	1.01E-07	9.84E-08	9.49E-08	9.16E-08	8.85E-08	8.55E-08
SW	1.08E-07	1.05E-07	1.02E-07	9.82E-08	9.46E-08	9.12E-08	8.79E-08
WSW	1.06E-07	1.03E-07	1.01E-07	9.72E-08	9.36E-08	9.03E-08	8.72E-08
W	1.08E-07	1.04E-07	1.00E-07	9.69E-08	9.36E-08	9.04E-08	8.74E-08
WNW	1.40E-07	1.35E-07	1.30E-07	1.25E-07	1.20E-07	1.16E-07	1.12E-07
NW	1.04E-07	1.02E-07	9.92E-08	9.58E-08	9.26E-08	8.95E-08	8.67E-08
NNW	8.83E-08	8.57E-08	8.32E-08	8.07E-08	7.82E-08	7.60E-08	7.38E-08

* Measured relevant to the Reactor Vent.
Period of Record: 9/1/76-8/31/78

TABLE A-4 (Cont.)

Monticello Reactor Vent Dispersion Parameters (χ/Q), sec/m^3, for Long Term Mixed Mode Releases >500 Hrs/Yr or >150 Hrs/Qtr for Standard Distances (As Measured from the Reactor Vent)

Miles

Sector*	5.0
N	7.94E-08
NNE	5.51E-08
NE	4.39E-08
ENE	5.82E-08
E	6.48E-08
ESE	7.06E-08
SE	7.76E-08
SSE	9.31E-08
S	7.26E-08
SSW	8.28E-08
SW	8.49E-08
WSW	8.42E-08
W	8.46E-08
WNW	1.08E-07
NW	8.40E-08
NNW	7.18E-08

* Measured relevant to the Reactor Vent.
Period of Record: 9/1/76-8/31/78

TABLE A-5

Monticello Reactor Vent Dispersion Parameters (D/Q), $1/m^2$,
for Long Term Mixed Mode Releases >500 Hrs/Yr or >150 Hrs/Qtr
for Standard Distances (As Measured from the Reactor Vent)

Sector*	Miles 0.1	0.2	0.3	0.4	0.5	0.6	0.7
N	2.75E-07	1.10E-07	6.31E-08	4.18E-08	3.01E-08	2.28E-08	1.80E-08
NNE	1.89E-07	7.89E-08	4.70E-08	3.17E-08	2.30E-08	1.74E-08	1.37E-08
NE	1.11E-07	4.68E-08	2.81E-08	1.91E-08	1.39E-08	1.06E-08	8.41E-09
ENE	1.03E-07	4.32E-08	2.61E-08	1.78E-08	1.31E-08	1.00E-08	7.94E-09
E	1.58E-07	6.46E-08	3.80E-08	2.56E-08	1.87E-08	1.42E-08	1.13E-08
ESE	3.79E-07	1.49E-07	8.53E-08	5.66E-08	4.09E-08	3.11E-08	2.46E-08
SE	4.31E-07	1.67E-07	9.41E-08	6.19E-08	4.43E-08	3.36E-08	2.65E-08
SSE	4.49E-07	1.77E-07	1.01E-07	6.65E-08	4.78E-08	3.62E-08	2.86E-08
S	1.47E-07	6.03E-08	3.58E-08	2.43E-08	1.79E-08	1.38E-08	1.10E-08
SSW	9.22E-08	3.85E-08	2.33E-08	1.62E-08	1.21E-08	9.50E-09	7.72E-09
SW	1.21E-07	4.80E-08	2.79E-08	1.90E-08	1.41E-08	1.10E-08	8.89E-09
WSW	8.33E-08	3.44E-08	2.07E-08	1.44E-08	1.09E-08	8.57E-09	7.01E-09
W	9.09E-08	3.80E-08	2.29E-08	1.58E-08	1.18E-08	9.18E-09	7.41E-09
WNW	1.51E-07	6.16E-08	3.65E-08	2.49E-08	1.83E-08	1.41E-08	1.13E-08
NW	1.86E-07	7.43E-08	4.30E-08	2.89E-08	2.11E-08	1.62E-08	1.29E-08
NNW	2.45E-07	9.85E-08	5.73E-08	3.82E-08	2.76E-08	2.10E-08	1.66E-08

* Measured relevant to the Reactor Vent.
Period of Record: 9/1/76-8/31/78

TABLE A-5 (Cont.)

Monticello Reactor Vent Dispersion Parameters (D/Q), $1/m^2$,
for Long Term Mixed Mode Releases >500 Hrs/Yr or >150 Hrs/Qtr
for Standard Distances (As Measured from the Reactor Vent)

Miles

Sector*	0.8	0.9	1.0	1.1	1.2	1.3	1.4
N	1.38E-08	1.02E-08	7.88E-09	6.23E-09	5.03E-09	4.14E-09	3.55E-09
NNE	1.05E-08	7.83E-09	6.02E-09	4.76E-09	3.85E-09	3.17E-09	2.72E-09
NE	6.48E-09	4.84E-09	3.74E-09	2.96E-09	2.40E-09	1.98E-09	1.66E-09
ENE	6.14E-09	4.60E-09	3.56E-09	2.83E-09	2.30E-09	1.90E-09	1.60E-09
E	8.71E-09	6.51E-09	5.04E-09	4.00E-09	3.24E-09	2.68E-09	2.24E-09
ESE	1.89E-08	1.41E-08	1.09E-08	8.64E-09	7.00E-09	5.77E-09	4.83E-09
SE	2.03E-08	1.51E-08	1.17E-08	9.22E-09	7.45E-09	6.14E-09	5.13E-09
SSE	2.19E-08	1.63E-08	1.26E-08	9.93E-09	8.03E-09	6.61E-09	5.75E-09
S	8.57E-09	6.44E-09	5.01E-09	3.99E-09	3.46E-09	2.85E-09	2.38E-09
SSW	6.08E-09	4.63E-09	3.63E-09	2.92E-09	2.39E-09	2.09E-09	1.76E-09
SW	6.99E-09	5.31E-09	4.16E-09	3.34E-09	2.73E-09	2.41E-09	2.02E-09
WSW	5.56E-09	4.26E-09	3.36E-09	2.71E-09	2.23E-09	1.86E-09	1.63E-09
W	5.81E-09	4.41E-09	3.45E-09	2.77E-09	2.27E-09	1.89E-09	1.65E-09
WNW	8.82E-09	6.65E-09	5.17E-09	4.13E-09	3.36E-09	2.79E-09	2.48E-09
NW	9.99E-09	7.50E-09	5.82E-09	4.63E-09	3.76E-09	3.11E-09	2.61E-09
NNW	1.27E-08	9.47E-09	7.30E-09	5.78E-09	4.67E-09	3.85E-09	3.32E-09

* Measured relevant to the Reactor Vent.
Period of Record: 9/1/76-8/31/78

TABLE A-5 (Cont.)

Monticello Reactor Vent Dispersion Parameters (D/Q), $1/m^2$,
for Long Term Mixed Mode Releases >500 Hrs/Yr or >150 Hrs/Qtr
for Standard Distances (As Measured from the Reactor Vent)

	Miles						
Sector*	1.5	1.6	1.7	1.8	1.9	2.0	2.1
N	3.00E-09	2.57E-09	2.22E-09	1.93E-09	1.70E-09	1.51E-09	1.34E-09
NNE	2.30E-09	1.97E-09	1.71E-09	1.49E-09	1.31E-09	1.16E-09	1.04E-09
NE	1.41E-09	1.21E-09	1.05E-09	9.18E-10	8.12E-10	7.20E-10	6.44E-10
ENE	1.36E-09	1.17E-09	1.01E-09	8.84E-10	7.81E-10	6.94E-10	6.20E-10
E	1.91E-09	1.64E-09	1.42E-09	1.24E-09	1.09E-09	9.71E-10	8.67E-10
ESE	4.09E-09	3.51E-09	3.04E-09	2.65E-09	2.34E-09	2.07E-09	1.85E-09
SE	4.34E-09	3.72E-09	3.22E-09	2.81E-09	2.48E-09	2.19E-09	1.96E-09
SSE	4.86E-09	4.16E-09	3.59E-09	3.13E-09	2.75E-09	2.43E-09	2.17E-09
S	2.03E-09	1.74E-09	1.50E-09	1.31E-09	1.16E-09	1.02E-09	9.13E-10
SSW	1.50E-09	1.33E-09	1.15E-09	1.01E-09	9.52E-10	8.43E-10	7.52E-10
SW	1.72E-09	1.52E-09	1.32E-09	1.15E-09	1.08E-09	9.53E-10	8.49E-10
WSW	1.39E-09	1.25E-09	1.09E-09	9.64E-10	9.16E-10	8.11E-10	7.23E-10
W	1.40E-09	1.24E-09	1.08E-09	9.44E-10	8.93E-10	7.91E-10	7.05E-10
WNW	2.10E-09	1.84E-09	1.59E-09	1.39E-09	1.28E-09	1.13E-09	1.01E-09
NW	2.22E-09	1.91E-09	1.65E-09	1.45E-09	1.28E-09	1.13E-09	1.01E-09
NNW	2.81E-09	2.40E-09	2.08E-09	1.81E-09	1.59E-09	1.42E-09	1.27E-09

*Measured relevant to the Reactor Vent.
Period of Record: 9/1/76-8/31/78

TABLE A-5 (Cont.)

Monticello Reactor Vent Dispersion Parameters (D/Q), $1/m^2$,
for Long Term Mixed Mode Releases >500 Hrs/Yr or >150 Hrs/Qtr
for Standard Distances (As Measured from the Reactor Vent)

Miles

Sector*	2.2	2.3	2.4	2.5	2.6	2.7	2.8
N	1.21E-09	1.09E-09	9.85E-10	8.97E-10	8.29E-10	7.64E-10	7.05E-10
NNE	9.29E-10	8.38E-10	7.60E-10	6.92E-10	6.33E-10	5.81E-10	5.35E-10
NE	5.78E-10	5.23E-10	4.83E-10	4.40E-10	4.03E-10	3.70E-10	3.41E-10
ENE	5.70E-10	5.14E-10	4.67E-10	4.25E-10	3.89E-10	3.57E-10	3.29E-10
E	7.79E-10	7.03E-10	6.38E-10	5.82E-10	5.32E-10	4.89E-10	4.51E-10
ESE	1.66E-09	1.50E-09	1.36E-09	1.24E-09	1.13E-09	1.04E-09	9.56E-10
SE	1.81E-09	1.63E-09	1.47E-09	1.35E-09	1.23E-09	1.13E-09	1.04E-09
SSE	1.94E-09	1.75E-09	1.59E-09	1.44E-09	1.32E-09	1.21E-09	1.11E-09
S	8.19E-10	7.38E-10	6.69E-10	6.09E-10	5.59E-10	5.16E-10	4.76E-10
SSW	6.74E-10	6.08E-10	5.51E-10	5.02E-10	4.60E-10	4.22E-10	3.90E-10
SW	7.61E-10	6.86E-10	6.22E-10	5.66E-10	5.18E-10	4.75E-10	4.38E-10
WSW	6.49E-10	5.85E-10	5.30E-10	4.83E-10	4.42E-10	4.07E-10	3.75E-10
W	6.33E-10	5.71E-10	5.18E-10	4.72E-10	4.32E-10	3.98E-10	3.67E-10
WNW	9.02E-10	8.14E-10	7.38E-10	6.72E-10	6.15E-10	5.66E-10	5.22E-10
NW	9.09E-10	8.48E-10	7.69E-10	7.00E-10	6.48E-10	5.95E-10	5.52E-10
NNW	1.14E-09	1.03E-09	9.29E-10	8.46E-10	7.77E-10	7.14E-10	6.59E-10

* Measured relevant to the Reactor Vent.
Period of Record: 9/1/76-8/31/78

TABLE A-5 (Cont.)

Monticello Reactor Vent Dispersion Parameters (D/Q), $1/m^2$,
for Long Term Mixed Mode Releases >500 Hrs/Yr or >150 Hrs/Qtr
for Standard Distances (As Measured from the Reactor Vent)

Miles

Sector*	2.9	3.0	3.1	3.2	3.3	3.4	3.5
N	6.52E-10	6.09E-10	5.67E-10	5.30E-10	5.00E-10	4.71E-10	4.46E-10
NNE	4.95E-10	4.59E-10	4.26E-10	3.97E-10	3.71E-10	3.48E-10	3.27E-10
NE	3.15E-10	2.92E-10	2.72E-10	2.53E-10	2.37E-10	2.22E-10	2.08E-10
ENE	3.04E-10	2.82E-10	2.62E-10	2.44E-10	2.28E-10	2.14E-10	2.01E-10
E	4.16E-10	3.86E-10	3.59E-10	3.34E-10	3.12E-10	2.93E-10	2.75E-10
ESE	8.83E-10	8.18E-10	7.60E-10	7.08E-10	6.61E-10	6.19E-10	5.80E-10
SE	9.59E-10	8.88E-10	8.25E-10	7.68E-10	7.17E-10	6.71E-10	6.30E-10
SSE	1.03E-09	9.56E-10	8.89E-10	8.28E-10	7.73E-10	7.24E-10	6.79E-10
S	4.42E-10	4.12E-10	3.93E-10	3.68E-10	3.44E-10	3.24E-10	3.05E-10
SSW	3.61E-10	3.35E-10	3.13E-10	2.92E-10	2.74E-10	2.58E-10	2.45E-10
SW	4.05E-10	3.76E-10	3.50E-10	3.27E-10	3.06E-10	2.87E-10	2.71E-10
WSW	3.47E-10	3.23E-10	3.01E-10	2.81E-10	2.64E-10	2.48E-10	2.34E-10
W	3.40E-10	3.16E-10	2.95E-10	2.76E-10	2.60E-10	2.44E-10	2.31E-10
WNW	4.83E-10	4.49E-10	4.19E-10	3.91E-10	3.68E-10	3.90E-10	3.98E-10
NW	5.13E-10	4.78E-10	4.54E-10	4.25E-10	3.99E-10	3.75E-10	3.53E-10
NNW	6.10E-10	5.66E-10	5.27E-10	4.92E-10	4.61E-10	4.33E-10	4.08E-10

* Measured relevant to the Reactor Vent.
Period of Record: 9/1/76-8/31/78

TABLE A-5 (Cont.)

Monticello Reactor Vent Dispersion Parameters (D/Q), $1/m^2$,
for Long Term Mixed Mode Releases >500 Hrs/Yr or >150 Hrs/Qtr
for Standard Distances (As Measured from the Reactor Vent)

Miles

Section*	3.6	3.7	3.8	3.9	4.0	4.1	4.2
N	4.22E-10	4.00E-10	3.80E-10	3.62E-10	3.45E-10	3.30E-10	3.16E-10
NNE	3.08E-10	2.90E-10	2.74E-10	2.59E-10	2.46E-10	2.34E-10	2.22E-10
NE	1.96E-10	1.86E-10	1.75E-10	1.65E-10	1.57E-10	1.49E-10	1.41E-10
ENE	1.89E-10	1.78E-10	1.68E-10	1.59E-10	1.51E-10	1.43E-10	1.36E-10
E	2.58E-10	2.43E-10	2.29E-10	2.17E-10	2.05E-10	1.95E-10	1.85E-10
ESE	5.45E-10	5.13E-10	4.84E-10	4.57E-10	4.33E-10	4.10E-10	3.89E-10
SE	5.93E-10	5.58E-10	5.27E-10	4.98E-10	4.72E-10	4.48E-10	4.26E-10
SSE	6.46E-10	6.09E-10	5.76E-10	5.55E-10	5.27E-10	5.02E-10	4.79E-10
S	2.88E-10	2.73E-10	2.59E-10	2.46E-10	2.35E-10	2.24E-10	2.14E-10
SSW	2.30E-10	2.18E-10	2.07E-10	1.97E-10	1.88E-10	1.80E-10	1.72E-10
SW	2.55E-10	2.42E-10	2.29E-10	2.18E-10	2.28E-10	2.33E-10	2.22E-10
WSW	2.21E-10	2.10E-10	1.99E-10	1.90E-10	1.81E-10	1.73E-10	1.66E-10
W	2.19E-10	2.08E-10	1.98E-10	1.88E-10	1.80E-10	1.72E-10	1.65E-10
WNW	3.75E-10	3.55E-10	3.36E-10	3.19E-10	3.04E-10	2.89E-10	2.76E-10
NW	3.34E-10	3.17E-10	3.01E-10	2.86E-10	2.73E-10	2.61E-10	2.50E-10
NNW	3.85E-10	3.64E-10	3.45E-10	3.28E-10	3.12E-10	3.04E-10	2.90E-10

* Measured relevant to the Reactor Vent.
Period of Record: 9/1/76-8/31/78

TABLE A-5 (Cont.)

Monticello Reactor Vent Dispersion Parameters (D/Q), $1/m^2$,
for Long Term Mixed Mode Releases >500 Hrs/Yr or >150 Hrs/Qtr
for Standard Distances (As Measured from the Reactor Vent)

Miles

Sector*	4.3	4.4	4.5	4.6	4.7	4.8	4.9
N	3.03E-10	2.91E-10	2.80E-10	2.70E-10	2.61E-10	2.52E-10	2.44E-10
NNE	2.12E-10	2.02E-10	1.93E-10	1.84E-10	1.76E-10	1.69E-10	1.62E-10
NE	1.35E-10	1.28E-10	1.23E-10	1.17E-10	1.12E-10	1.07E-10	1.03E-10
ENE	1.29E-10	1.23E-10	1.18E-10	1.12E-10	1.08E-10	1.03E-10	9.88E-11
E	1.76E-10	1.67E-10	1.59E-10	1.52E-10	1.45E-10	1.39E-10	1.33E-10
ESE	3.70E-10	3.52E-10	3.35E-10	3.20E-10	3.05E-10	2.92E-10	2.79E-10
SE	4.05E-10	3.87E-10	3.69E-10	3.53E-10	3.38E-10	3.24E-10	3.11E-10
SSE	4.61E-10	4.41E-10	4.26E-10	4.09E-10	3.94E-10	3.80E-10	3.66E-10
S	2.05E-10	1.97E-10	1.90E-10	1.83E-10	1.76E-10	1.70E-10	1.65E-10
SSW	1.65E-10	1.59E-10	1.53E-10	1.48E-10	1.43E-10	1.38E-10	1.34E-10
SW	2.42E-10	2.42E-10	2.41E-10	2.30E-10	2.20E-10	2.10E-10	2.01E-10
WSW	1.59E-10	1.53E-10	1.58E-10	1.52E-10	1.47E-10	1.42E-10	1.37E-10
W	1.59E-10	1.53E-10	1.48E-10	1.43E-10	1.38E-10	1.34E-10	1.30E-10
WNW	2.64E-10	2.53E-10	2.42E-10	2.33E-10	2.24E-10	2.16E-10	2.08E-10
NW	2.39E-10	2.30E-10	2.22E-10	2.14E-10	2.07E-10	2.00E-10	1.93E-10
NNW	2.78E-10	2.67E-10	2.57E-10	2.47E-10	2.38E-10	2.30E-10	2.22E-10

* Measured relevant to the Reactor Vent.
Period of Record: 9/1/76-8/31/78

TABLE A-5 (Cont.)

Monticello Reactor Vent Dispersion Parameters (D/Q), $1/m^2$,
for Long Term Mixed Mode Releases >500 Hrs/Yr or >150 Hrs/Qtr
for Standard Distances (As Measured from the Reactor Vent)

	Miles
Sector*	5.0
N	2.36E-10
NNE	1.56E-10
NE	9.90E-11
ENE	9.49E-11
E	1.27E-10
ESE	2.68E-10
SE	2.99E-10
SSE	3.54E-10
S	1.60E-10
SSW	1.30E-10
SW	1.93E-10
WSW	1.33E-10
W	1.27E-10
WNW	2.01E-10
NW	1.87E-10
NNW	2.15E-10

*Measured relevant to the Reactor Vent.
Period of Record: 9/1/76-8/31/78

TABLE A-6

Monticello Off-Gas Stack Dispersion Parameters
for Long Term Elevated Releases >500 Hrs/Yr or >150 Hrs/Qtr
for Site Boundary Locations (identified in Table A-2)

Site Boundary Sector*	X/Q(sec/m^3)	D/Q (1/m^2)
N	7.04E-08	4.51E-09
NNE	7.06E-08	4.30E-09
NE	1.00E-07	6.18E-09
ENE	6.20E-08	2.34E-09
E	4.45E-08	2.77E-09
ESE	5.28E-08	3.93E-09
SE	5.50E-08	4.98E-09
SSE	3.99E-08	4.20E-09
S	1.83E-08	2.63E-09
SSW	1.17E-08	1.46E-09
SW	1.17E-08	1.46E-09
WSW	1.34E-08	1.34E-09
W	3.42E-08	1.67E-09
WNW	7.22E-08	2.43E-09
NW	5.67E-08	2.82E-09
NNW	1.08E-07	5.80E-09
E**	5.02E-09	8.28E-10
ESE**	1.74E-09	8.50E-10
SE**	4.47E-09	1.14E-09
E**	1.03E-08	6.74E-10
ESE**	1.09E-08	6.45E-10
SE**	9.95E-09	1.04E-09

* Measured relevant to the Reactor Vent.
Period of Record: 9/1/76-8/31/78

**On-site EPA locations.

TABLE A-7

Monticello Off-Gas Stack Dispersion Parameters (X/Q), sec/m^3,
for Long Term Elevated Releases >500 Hrs/Yr or >150 Hrs/Qtr
for Standard Distances (As Measured from the Off-Gas Stack)

Miles

Sector*	0.1	0.2	0.3	0.4	0.5	0.6	0.7
N	2.39E-11	4.33E-08	6.96E-08	7.18E-08	7.08E-08	7.05E-08	7.15E-08
NNE	3.93E-11	6.93E-08	1.04E-07	1.03E-07	1.02E-07	1.01E-07	9.96E-08
NE	1.15E-11	2.27E-08	4.42E-08	5.50E-08	6.09E-08	6.34E-08	6.46E-08
ENE	1.00E-11	1.96E-08	3.74E-08	4.75E-08	5.48E-08	5.94E-08	6.22E-08
E	3.09E-12	7.35E-09	2.33E-08	3.64E-08	4.44E-08	4.93E-08	5.30E-08
ESE	2.80E-12	7.63E-09	2.67E-08	4.30E-08	5.31E-08	5.99E-08	6.61E-08
SE	5.57E-12	1.31E-08	3.90E-08	5.97E-08	7.41E-08	8.66E-08	9.91E-08
SSE	6.56E-12	1.40E-08	3.27E-08	4.50E-08	5.37E-08	6.41E-08	7.81E-08
S	4.93E-12	1.23E-08	3.06E-08	4.42E-08	5.35E-08	6.15E-08	6.95E-08
SSW	1.62E-12	4.83E-09	1.73E-08	2.95E-08	3.77E-08	4.45E-08	5.11E-08
SW	5.96E-13	2.06E-09	9.62E-09	1.69E-08	2.21E-08	2.73E-08	3.37E-08
WSW	3.07E-13	1.30E-09	7.80E-09	1.43E-08	1.87E-08	2.33E-08	2.94E-08
W	1.87E-12	6.43E-09	1.74E-08	2.59E-08	3.15E-08	3.63E-08	4.14E-08
WNW	1.56E-12	5.49E-09	2.06E-08	3.41E-08	4.21E-08	4.76E-08	5.27E-08
NW	5.29E-12	1.20E-08	3.15E-08	4.53E-08	5.46E-08	6.24E-08	6.92E-08
NNW	3.03E-11	5.55E-08	9.01E-08	9.73E-08	1.02E-07	1.07E-07	1.11E-07

* Measured relevant to the Off-Gas Stack.
Period of Record: 9/1/76-8/31/78

TABLE A-7 (Cont.)

Monticello Off-Gas Stack Dispersion Parameters (χ/Q), sec/m^3,
for Long Term Elevated Releases >500 Hrs/Yr or >150 Hrs/Qtr
for Standard Distances (As Measured from the Off-Gas Stack)

Miles

Sector*	0.8	0.9	1.0	1.1	1.2	1.3	1.4
N	7.07E-08	6.72E-08	6.55E-08	6.42E-08	6.30E-08	6.18E-08	6.05E-08
NNE	9.48E-08	8.63E-08	8.08E-08	7.65E-08	7.29E-08	6.97E-08	6.67E-08
NE	6.26E-08	5.76E-08	5.41E-08	5.13E-08	4.89E-08	4.69E-08	4.50E-08
ENE	6.13E-08	5.70E-08	5.38E-08	5.12E-08	4.89E-08	4.67E-08	4.47E-08
E	5.36E-08	5.10E-08	4.91E-08	4.74E-08	4.58E-08	4.43E-08	4.27E-08
ESE	6.89E-08	6.75E-08	6.63E-08	6.51E-08	6.36E-08	6.19E-08	6.00E-08
SE	1.06E-07	1.05E-07	1.04E-07	1.02E-07	9.96E-08	9.66E-08	9.32E-08
SSE	9.01E-08	9.61E-08	1.01E-07	1.04E-07	1.06E-07	1.06E-07	1.05E-07
S	7.41E-08	7.41E-08	7.42E-08	7.39E-08	7.31E-08	7.19E-08	7.04E-08
SSW	5.49E-08	5.49E-08	5.49E-08	5.44E-08	5.37E-08	5.26E-08	5.13E-08
SW	3.88E-08	4.13E-08	4.31E-08	4.43E-08	4.49E-08	4.49E-08	4.45E-08
WSW	3.49E-08	3.82E-08	4.10E-08	4.32E-08	4.46E-08	4.55E-08	4.58E-08
W	4.50E-08	4.59E-08	4.69E-08	4.77E-08	4.80E-08	4.80E-08	4.77E-08
WNW	5.52E-08	5.45E-08	5.42E-08	5.39E-08	5.33E-08	5.26E-08	5.16E-08
NW	7.18E-08	6.96E-08	6.77E-08	6.59E-08	6.40E-08	6.21E-08	6.01E-08
NNW	1.08E-07	9.96E-08	9.36E-08	8.85E-08	8.40E-08	8.00E-08	7.63E-08

* Measured relevant to the Off-Gass Stack.
Period of Record: 9/1/76-8/31/78

TABLE A-7 (Cont.)

Monticello Off-Gas Stack Dispersion Parameters (X/Q), sec/m^3
for Long Term Elevated Releases >500 Hrs/Yr or >150 Hrs/Qtr
for Standard Distances (As Measured from the Off-Gas Stack)

Miles

Sector*	1.5	1.6	1.7	1.8	1.9	2.0	2.1
N	5.91E-08	5.66E-08	5.43E-08	5.20E-08	4.99E-08	4.78E-08	4.59E-08
NNE	6.40E-08	6.06E-08	5.74E-08	5.45E-08	5.17E-08	4.92E-08	4.69E-08
NE	4.33E-08	4.23E-08	4.14E-08	4.05E-08	3.96E-08	3.88E-08	3.79E-08
ENE	4.28E-08	4.10E-08	3.93E-08	3.77E-08	3.62E-08	3.47E-08	3.34E-08
E	4.12E-08	3.94E-08	3.76E-08	3.60E-08	3.44E-08	3.29E-08	3.15E-08
ESE	5.80E-08	5.59E-08	5.39E-08	5.18E-08	4.98E-08	4.78E-08	4.60E-08
SE	8.97E-08	8.77E-08	8.55E-08	8.32E-08	8.07E-08	7.83E-08	7.59E-08
SSE	1.04E-07	9.98E-08	9.58E-08	9.19E-08	8.80E-08	8.42E-08	8.06E-08
S	6.85E-08	6.54E-08	6.23E-08	5.93E-08	5.65E-08	5.39E-08	5.14E-08
SSW	4.99E-08	5.03E-08	5.04E-08	5.04E-08	5.02E-08	4.99E-08	4.95E-08
SW	4.37E-08	4.46E-08	4.51E-08	4.54E-08	4.55E-08	4.54E-08	4.52E-08
WSW	4.57E-08	4.71E-08	4.81E-08	4.88E-08	4.92E-08	4.94E-08	4.95E-08
W	4.71E-08	4.79E-08	4.85E-08	4.89E-08	4.90E-08	4.90E-08	4.89E-08
WNW	5.05E-08	5.10E-08	5.12E-08	5.13E-08	5.12E-08	5.11E-08	5.08E-08
NW	5.81E-08	5.64E-08	5.47E-08	5.30E-08	5.13E-08	4.97E-08	4.82E-08
NNW	7.29E-08	6.89E-08	6.52E-08	6.18E-08	5.87E-08	5.58E-08	5.31E-08

* Measured relevant to the Off-Gas Stack.
Period of Record: 9/1/76-8/31/78

TABLE A-7 (Cont.)

Monticello Off-Gas Stack Dispersion Parameters (χ/Q), sec/m^3, for Long Term Elevated Releases >500 Hrs/Yr or >150 Hrs/Qtr for Standard Distances (As Measured from the Off-Gas Stack)

Miles

Sector*	2.2	2.3	2.4	2.5	2.6	2.7	2.8
N	4.41E-08	4.23E-08	4.07E-08	3.92E-08	3.82E-08	3.73E-08	3.64E-08
NNE	4.48E-08	4.28E-08	4.09E-08	3.92E-08	3.76E-08	3.61E-08	3.47E-08
NE	3.71E-08	3.63E-08	3.55E-08	3.47E-08	3.35E-08	3.24E-08	3.13E-08
ENE	3.21E-08	3.09E-08	2.98E-08	2.87E-08	2.76E-08	2.65E-08	2.55E-08
E	3.02E-08	2.90E-08	2.78E-08	2.67E-08	2.57E-08	2.47E-08	2.38E-08
ESE	4.42E-08	4.25E-08	4.09E-08	3.94E-08	3.79E-08	3.66E-08	3.53E-08
SE	7.35E-08	7.12E-08	6.89E-08	6.68E-08	6.38E-08	6.11E-08	5.85E-08
SSE	7.72E-08	7.39E-08	7.08E-08	6.79E-08	6.53E-08	6.28E-08	6.05E-08
S	4.91E-08	4.69E-08	4.48E-08	4.29E-08	4.20E-08	4.11E-08	4.03E-08
SSW	4.90E-08	4.85E-08	4.79E-08	4.73E-08	4.51E-08	4.30E-08	4.11E-08
SW	4.49E-08	4.46E-08	4.42E-08	4.38E-08	4.23E-08	4.09E-08	3.96E-08
WSW	4.93E-08	4.91E-08	4.88E-08	4.84E-08	4.63E-08	4.42E-08	4.24E-08
W	4.86E-08	4.83E-08	4.79E-08	4.75E-08	4.59E-08	4.44E-08	4.30E-08
WNW	5.05E-08	5.01E-08	4.97E-08	4.93E-08	4.84E-08	4.75E-08	4.66E-08
NW	4.67E-08	4.52E-08	4.38E-08	4.25E-08	4.19E-08	4.14E-08	4.08E-08
NNW	5.06E-08	4.83E-08	4.62E-08	4.42E-08	4.24E-08	4.07E-08	3.91E-08

* Measured relevant to the Off-Gas Stack.
Period of Record: 9/1/76-8/31/78

TABLE A-7 (Cont.)

Monticello Off-Gas Stack Dispersion Parameters (X/Q), sec/m^3,
for Long Term Elevated Releases >500 Hrs/Yr or >150 Hrs/Qtr
for Standard Distances (As Measured from the Off-Gas Stack)

Miles

Sector*	2.9	3.0	3.1	3.2	3.3	3.4	3.5
N	3.55E-08	3.47E-08	3.39E-08	3.31E-08	3.24E-08	3.17E-08	3.10E-08
NNE	3.34E-08	3.22E-08	3.11E-08	3.00E-08	2.90E-08	2.80E-08	2.71E-08
NE	3.03E-08	2.93E-08	2.84E-08	2.76E-08	2.67E-08	2.60E-08	2.52E-08
ENE	2.46E-08	2.37E-08	2.29E-08	2.21E-08	2.14E-08	2.07E-08	2.00E-08
E	2.30E-08	2.22E-08	2.14E-08	2.07E-08	2.00E-08	1.94E-08	1.88E-08
ESE	3.41E-08	3.29E-08	3.18E-08	3.08E-08	2.98E-08	2.89E-08	2.80E-08
SE	5.62E-08	5.39E-08	5.18E-08	4.98E-08	4.80E-08	4.62E-08	4.46E-08
SSE	5.83E-08	5.62E-08	5.42E-08	5.23E-08	5.05E-08	4.89E-08	4.73E-08
S	3.94E-08	3.86E-08	3.78E-08	3.70E-08	3.63E-08	3.55E-08	3.49E-08
SSW	3.93E-08	3.77E-08	3.61E-08	3.47E-08	3.34E-08	3.21E-08	3.09E-08
SW	3.84E-08	3.72E-08	3.61E-08	3.51E-08	3.41E-08	3.32E-08	3.23E-08
WSW	4.06E-08	3.90E-08	3.74E-08	3.60E-08	3.47E-08	3.34E-08	3.22E-08
W	4.17E-08	4.04E-08	3.93E-08	3.81E-08	3.70E-08	3.60E-08	3.50E-08
WNW	4.58E-08	4.50E-08	4.42E-08	4.34E-08	4.27E-08	4.20E-08	4.14E-08
NW	4.02E-08	3.96E-08	3.90E-08	3.85E-08	3.79E-08	3.74E-08	3.68E-08
NNW	3.76E-08	3.62E-08	3.49E-08	3.36E-08	3.25E-08	3.14E-08	3.03E-08

* Measured relevant to the Off-Gas Stack.
Period of Record: 9/1/76-8/31/78

TABLE A-7 (Cont.)

Monticello Off-Gas Stack Dispersion Parameters (X/Q), sec/m^3,
for Long Term Elevated Releases >500 Hrs/Yr or >150 Hrs/Qtr
for Standard Distances (As Measured from the Off-Gas Stack)

Miles

Sector*	3.6	3.7	3.8	3.9	4.0	4.1	4.2
N	3.00E-08	2.91E-08	2.82E-08	2.74E-08	2.66E-08	2.59E-08	2.51E-08
NNE	2.63E-08	2.54E-08	2.47E-08	2.40E-08	2.33E-08	2.26E-08	2.20E-08
NE	2.45E-08	2.39E-08	2.32E-08	2.26E-08	2.20E-08	2.15E-08	2.09E-08
ENE	1.94E-08	1.88E-08	1.83E-08	1.77E-08	1.73E-08	1.68E-08	1.63E-08
E	1.82E-08	1.77E-08	1.71E-08	1.66E-08	1.62E-08	1.57E-08	1.53E-08
ESE	2.72E-08	2.64E-08	2.56E-08	2.49E-08	2.42E-08	2.35E-08	2.29E-08
SE	4.30E-08	4.16E-08	4.02E-08	3.89E-08	3.77E-08	3.65E-08	3.54E-08
SSE	4.60E-08	4.49E-08	4.37E-08	4.27E-08	4.16E-08	4.06E-08	3.97E-08
S	3.39E-08	3.30E-08	3.22E-08	3.14E-08	3.06E-08	2.99E-08	2.92E-08
SSW	3.01E-08	2.93E-08	2.86E-08	2.79E-08	2.72E-08	2.65E-08	2.59E-08
SW	3.17E-08	3.12E-08	3.07E-08	3.02E-08	2.98E-08	2.93E-08	2.89E-08
WSW	3.17E-08	3.12E-08	3.07E-08	3.03E-08	2.98E-08	2.94E-08	2.89E-08
W	3.38E-08	3.26E-08	3.15E-08	3.05E-08	2.95E-08	2.86E-08	2.77E-08
WNW	3.99E-08	3.84E-08	3.71E-08	3.58E-08	3.46E-08	3.35E-08	3.24E-08
NW	3.60E-08	3.51E-08	3.43E-08	3.35E-08	3.28E-08	3.20E-08	3.13E-08
NNW	2.94E-08	2.84E-08	2.76E-08	2.67E-08	2.60E-08	2.52E-08	2.45E-08

* Measured relevant to the Off-Gas Stack.
Period of Record: 9/1/76-8/31/78

TABLE A-7 (Cont.)

Monticello Off-Gas Stack Dispersion Parameters (X/Q), sec/m^3,
for Long Term Elevated Releases >500 Hrs/Yr or >150 Hrs/Qtr
for Standard Distances (As Measured from the Off-Gas Stack)

Miles

Sector*	4.3	4.4	4.5	4.6	4.7	4.8	4.9
N	2.45E-08	2.38E-08	2.32E-08	2.26E-08	2.20E-08	2.15E-08	2.10E-08
NNE	2.14E-08	2.08E-08	2.03E-08	1.98E-08	1.93E-08	1.88E-08	1.84E-08
NE	2.04E-08	1.99E-08	1.95E-08	1.90E-08	1.86E-08	1.82E-08	1.78E-08
ENE	1.59E-08	1.55E-08	1.51E-08	1.47E-08	1.44E-08	1.40E-08	1.37E-08
E	1.49E-08	1.45E-08	1.42E-08	1.38E-08	1.35E-08	1.31E-08	1.28E-08
ESE	2.23E-08	2.18E-08	2.12E-08	2.07E-08	2.02E-08	1.97E-08	1.93E-08
SE	3.43E-08	3.33E-08	3.24E-08	3.15E-08	3.06E-08	2.98E-08	2.90E-08
SSE	3.88E-08	3.79E-08	3.71E-08	3.60E-08	3.50E-08	3.41E-08	3.32E-08
S	2.85E-08	2.79E-08	2.73E-08	2.65E-08	2.57E-08	2.50E-08	2.43E-08
SSW	2.53E-08	2.48E-08	2.42E-08	2.35E-08	2.28E-08	2.22E-08	2.16E-08
SW	2.85E-08	2.81E-08	2.77E-08	2.69E-08	2.61E-08	2.53E-08	2.46E-08
WSW	2.85E-08	2.81E-08	2.77E-08	2.69E-08	2.61E-08	2.53E-08	2.46E-08
W	2.68E-08	2.60E-08	2.53E-08	2.46E-08	2.39E-08	2.33E-08	2.26E-08
WNW	3.14E-08	3.05E-08	2.95E-08	2.87E-08	2.79E-08	2.71E-08	2.64E-08
NW	3.07E-08	3.00E-08	2.94E-08	2.86E-08	2.78E-08	2.70E-08	2.63E-08
NNW	2.38E-08	2.32E-08	2.26E-08	2.20E-08	2.14E-08	2.08E-08	2.03E-08

* Measured relevant to the Off-Gas Stack.
Period of Record: 9/1/76-8/31/78

TABLE A-7 (Cont.)

Monticello Off-Gas Stack Dispersion Parameters (χ/Q), sec/m^3, for Long Term Elevated Releases >500 Hrs/Yr or >150 Hrs/Qtr for Standard Distances (As Measured from the Off-Gas Stack)

Miles

Sector*	5.0
N	2.05E-08
NNE	1.79E-08
NE	1.74E-08
ENE	1.34E-08
E	1.25E-08
ESE	1.88E-08
SE	2.82E-08
SSE	3.23E-08
S	2.36E-08
SSW	2.10E-08
SW	2.39E-08
WSW	2.39E-08
W	2.21E-08
WNW	2.57E-08
NW	2.57E-08
NNW	1.98E-08

*Measured relevant to the Off-Gas Stack.
Period of Record: 9/1/76-8/31/78

TABLE A-8

Monticello Off-Gas Stack Dispersion Parameters (D/Q), $1/m^2$, for Long Term Elevated Releases >500 Hrs/Yr or >150 Hrs/Qtr for Standard Distances (As Measured from the Off-Gas Stack)

Sector*	Miles 0.1	0.2	0.3	0.4	0.5	0.6	0.7
N	1.44E-09	4.89E-09	6.31E-09	5.66E-09	5.00E-09	4.44E-09	4.00E-09
NNE	2.25E-09	7.63E-09	9.79E-09	8.72E-09	7.59E-09	6.61E-09	5.82E-09
NE	1.06E-09	3.60E-09	4.65E-09	4.17E-09	3.68E-09	3.27E-09	2.94E-09
ENE	9.73E-10	3.30E-09	4.25E-09	3.81E-09	3.34E-09	2.95E-09	2.64E-09
E	7.84E-10	2.67E-09	3.45E-09	3.11E-09	2.77E-09	2.49E-09	2.27E-09
ESE	1.06E-09	3.61E-09	4.70E-09	4.31E-09	3.92E-09	3.63E-09	3.42E-09
SE	1.42E-09	4.87E-09	6.41E-09	6.00E-09	5.64E-09	5.40E-09	5.30E-09
SSE	1.19E-09	4.11E-09	5.46E-09	5.20E-09	5.00E-09	4.92E-09	4.96E-09
S	9.90E-10	3.38E-09	4.42E-09	4.08E-09	3.75E-09	3.50E-09	3.34E-09
SSW	5.92E-10	2.02E-09	2.65E-09	2.45E-09	2.25E-09	2.11E-09	2.03E-09
SW	3.23E-10	1.11E-09	1.48E-09	1.41E-09	1.35E-09	1.33E-09	1.34E-09
WSW	2.97E-10	1.03E-09	1.38E-09	1.33E-09	1.31E-09	1.32E-09	1.36E-09
W	4.41E-10	1.51E-09	1.98E-09	1.85E-09	1.72E-09	1.64E-09	1.59E-09
WNW	6.23E-10	2.13E-09	2.78E-09	2.56E-09	2.35E-09	2.20E-09	2.10E-09
NW	7.59E-10	2.59E-09	3.39E-09	3.13E-09	2.87E-09	2.69E-09	2.57E-09
NNW	1.94E-09	6.59E-09	8.48E-09	7.59E-09	6.66E-09	5.88E-09	5.25E-09

* Measured relevant to the Off-Gas Stack.
Period of Record: 9/1/76-8/31/78

TABLE A-8 (Cont.)

Monticello Off-Gas Stack Dispersion Parameters (D/Q), $1/m^2$, for Long Term Elevated Releases >500 Hrs/Yr or >150 Hrs/Qtr for Standard Distances (As Measured from the Off-Gas Stack)

Miles

Sector*	0.8	0.9	1.0	1.1	1.2	1.3	1.4
N	3.47E-09	2.90E-09	2.39E-09	1.98E-09	1.67E-09	1.42E-09	1.23E-09
NNE	4.93E-09	4.00E-09	3.24E-09	2.65E-09	2.20E-09	1.85E-09	1.58E-09
NE	2.56E-09	2.13E-09	1.76E-09	1.46E-09	1.23E-09	1.05E-09	9.02E-10
ENE	2.27E-09	1.88E-09	1.54E-09	1.27E-09	1.06E-09	9.03E-10	7.75E-10
E	2.01E-09	1.70E-09	1.41E-09	1.18E-09	1.00E-09	8.59E-10	7.45E-10
ESE	3.12E-09	2.74E-09	2.32E-09	1.97E-09	1.69E-09	1.47E-09	1.29E-09
SE	5.02E-09	4.56E-09	3.94E-09	3.38E-09	2.94E-09	2.58E-09	2.29E-09
SSE	4.81E-09	4.46E-09	3.89E-09	3.37E-09	2.95E-09	2.61E-09	2.32E-09
S	3.09E-09	2.74E-09	2.34E-09	1.99E-09	1.72E-09	1.50E-09	1.32E-09
SSW	1.88E-09	1.67E-09	1.43E-09	1.22E-09	1.05E-09	9.18E-10	8.09E-10
SW	1.30E-09	1.21E-09	1.05E-09	9.14E-10	8.00E-10	7.06E-10	6.29E-10
WSW	1.35E-09	1.27E-09	1.12E-09	9.76E-10	8.59E-10	7.62E-10	6.81E-10
W	1.49E-09	1.35E-09	1.16E-09	9.93E-10	8.61E-10	7.54E-10	6.66E-10
WNW	1.93E-09	1.71E-09	1.46E-09	1.24E-09	1.07E-09	9.35E-10	8.22E-10
NW	2.37E-09	2.10E-09	1.80E-09	1.53E-09	1.32E-09	1.15E-09	1.01E-09
NNW	4.52E-09	3.73E-09	3.06E-09	2.53E-09	2.12E-09	1.80E-09	1.54E-09

* Measured relevant to the Off-Gas Stack.
Period of Record: 9/1/76-8/31/78

TABLE A-8 (Cont.)

Monticello Off-Gas Stack Dispersion Parameters (D/Q), $1/m^2$, for Long Term Elevated Releases >500 Hrs/Yr or >150 Hrs/Qtr for Standard Distances (As Measured from the Off-Gas Stack)

Miles

Sector*	1.5	1.6	1.7	1.8	1.9	2.0	2.1
N	1.07E-09	9.36E-10	8.27E-10	7.36E-10	6.92E-10	6.30E-10	5.75E-10
NNE	1.36E-09	1.18E-09	1.03E-09	9.08E-10	8.58E-10	7.77E-10	7.07E-10
NE	7.84E-10	6.88E-10	6.08E-10	5.41E-10	5.09E-10	4.63E-10	4.23E-10
ENE	6.72E-10	5.88E-10	5.18E-10	4.59E-10	4.32E-10	3.93E-10	3.58E-10
E	6.51E-10	5.75E-10	5.10E-10	4.56E-10	4.28E-10	3.90E-10	3.57E-10
ESE	1.14E-09	1.01E-09	9.06E-10	8.16E-10	7.64E-10	6.99E-10	6.43E-10
SE	2.04E-09	1.83E-09	1.65E-09	1.50E-09	1.40E-09	1.28E-09	1.18E-09
SSE	2.08E-09	1.87E-09	1.70E-09	1.54E-09	1.44E-09	1.32E-09	1.22E-09
S	1.17E-09	1.04E-09	9.35E-10	8.44E-10	7.89E-10	7.23E-10	6.66E-10
SSW	7.17E-10	6.41E-10	5.76E-10	5.20E-10	4.86E-10	4.46E-10	4.10E-10
SW	5.63E-10	5.08E-10	4.60E-10	4.18E-10	3.90E-10	3.59E-10	3.31E-10
WSW	6.12E-10	5.53E-10	5.02E-10	4.58E-10	4.26E-10	3.93E-10	3.63E-10
W	5.93E-10	5.32E-10	4.79E-10	4.34E-10	4.05E-10	3.72E-10	3.42E-10
WNW	7.28E-10	6.50E-10	5.84E-10	5.27E-10	4.92E-10	4.51E-10	4.15E-10
NW	8.97E-10	8.01E-10	7.20E-10	6.50E-10	6.07E-10	5.57E-10	5.12E-10
NNW	1.34E-09	1.17E-09	1.03E-09	9.12E-10	8.59E-10	7.81E-10	7.12E-10

* Measured relevant to the Off-Gas Stack.
Period of Record: 9/1/76-8/31/78

TABLE A-8 (Cont.)

Monticello Off-Gas Stack Dispersion Parameters (D/Q), $1/m^2$, for Long Term Elevated Releases >500 Hrs/Yr or >150 Hrs/Qtr for Standard Distances (As Measured from the Off-Gas Stack)

Sector*	Miles 2.2	2.3	2.4	2.5	2.6	2.7	2.8
N	5.28E-10	4.86E-10	4.49E-10	4.17E-10	3.87E-10	3.61E-10	3.37E-10
NNE	6.46E-10	5.93E-10	5.46E-10	5.05E-10	4.68E-10	4.35E-10	4.06E-10
NE	3.88E-10	3.58E-10	3.30E-10	3.06E-10	2.85E-10	2.65E-10	2.48E-10
ENE	3.28E-10	3.02E-10	2.79E-10	2.58E-10	2.40E-10	2.24E-10	2.09E-10
E	3.28E-10	3.03E-10	2.80E-10	2.60E-10	2.42E-10	2.26E-10	2.11E-10
ESE	5.93E-10	5.48E-10	5.09E-10	4.73E-10	4.41E-10	4.12E-10	3.86E-10
SE	1.09E-09	1.01E-09	9.43E-10	8.78E-10	8.21E-10	7.68E-10	7.20E-10
SSE	1.13E-09	1.05E-09	9.78E-10	9.12E-10	8.52E-10	7.98E-10	7.48E-10
S	6.14E-10	5.69E-10	5.28E-10	4.92E-10	4.59E-10	4.29E-10	4.02E-10
SSW	3.79E-10	3.76E-10	3.90E-10	3.92E-10	3.62E-10	3.34E-10	3.10E-10
SW	3.07E-10	2.98E-10	3.09E-10	3.18E-10	2.93E-10	2.71E-10	2.51E-10
WSW	3.36E-10	3.41E-10	3.44E-10	3.58E-10	3.30E-10	3.05E-10	2.83E-10
W	3.17E-10	3.11E-10	3.09E-10	3.19E-10	2.94E-10	2.72E-10	2.53E-10
WNW	3.83E-10	3.86E-10	3.86E-10	3.89E-10	3.59E-10	3.45E-10	3.20E-10
NW	4.73E-10	4.38E-10	4.07E-10	3.78E-10	3.53E-10	3.30E-10	3.09E-10
NNW	6.53E-10	6.01E-10	5.55E-10	5.14E-10	4.77E-10	4.44E-10	4.15E-10

* Measured relevant to the Off-Gas Stack.
Period of Record: 9/1/76-8/31/78

TABLE A-8 (Cont.)

Monticello Off-Gas Stack Dispersion Parameters (D/Q), $1/m^2$, for Long Term Elevated Releases >500 Hrs/Yr or >150 Hrs/Qtr for Standard Distances (As Measured from the Off-Gas Stack)

Miles

Sector*	2.9	3.0	3.1	3.2	3.3	3.4	3.5
N	3.16E-10	2.96E-10	2.78E-10	2.62E-10	2.47E-10	2.33E-10	2.20E-10
NNE	3.79E-10	3.55E-10	3.33E-10	3.13E-10	2.95E-10	2.78E-10	2.63E-10
NE	2.32E-10	2.18E-10	2.04E-10	1.92E-10	1.81E-10	1.71E-10	1.62E-10
ENE	1.95E-10	1.83E-10	1.72E-10	1.62E-10	1.52E-10	1.44E-10	1.36E-10
E	1.98E-10	1.86E-10	1.75E-10	1.64E-10	1.55E-10	1.46E-10	1.39E-10
ESE	3.62E-10	3.40E-10	3.20E-10	3.02E-10	2.85E-10	2.69E-10	2.55E-10
SE	6.76E-10	6.35E-10	5.98E-10	5.64E-10	5.33E-10	5.04E-10	4.77E-10
SSE	7.03E-10	6.62E-10	6.23E-10	5.88E-10	5.56E-10	5.26E-10	4.98E-10
S	3.77E-10	3.54E-10	3.33E-10	3.14E-10	2.97E-10	2.81E-10	2.66E-10
SSW	2.88E-10	2.68E-10	2.50E-10	2.34E-10	2.20E-10	2.06E-10	1.94E-10
SW	2.44E-10	2.27E-10	2.12E-10	1.98E-10	1.86E-10	1.75E-10	1.64E-10
WSW	2.63E-10	2.45E-10	2.29E-10	2.14E-10	2.01E-10	1.89E-10	1.78E-10
W	2.47E-10	2.30E-10	2.15E-10	2.01E-10	1.88E-10	1.77E-10	1.66E-10
WNW	2.97E-10	2.76E-10	2.58E-10	2.41E-10	2.26E-10	2.12E-10	2.00E-10
NW	2.90E-10	2.73E-10	2.57E-10	2.42E-10	2.28E-10	2.16E-10	2.04E-10
NNW	3.88E-10	3.64E-10	3.41E-10	3.21E-10	3.03E-10	2.86E-10	2.70E-10

* Measured relevant to the Off-Gas Stack.
Period of Record: 9/1/76-8/31/78

TABLE A-8 (Cont.)

Monticello Off-Gas Stack Dispersion Parameters (D/Q), $1/m^2$, for Long Term Elevated Releases >500 Hrs/Yr or >150 Hrs/Qtr for Standard Distances (As Measured from the Off-Gas Stack)

Miles

Sector*	3.6	3.7	3.8	3.9	4.0	4.1	4.2
N	2.09E-10	1.98E-10	1.88E-10	1.78E-10	1.70E-10	1.62E-10	1.54E-10
NNE	2.49E-10	2.36E-10	2.24E-10	2.13E-10	2.02E-10	1.93E-10	1.84E-10
NE	1.53E-10	1.45E-10	1.38E-10	1.31E-10	1.25E-10	1.19E-10	1.13E-10
ENE	1.29E-10	1.22E-10	1.16E-10	1.10E-10	1.05E-10	9.98E-11	9.51E-11
E	1.31E-10	1.24E-10	1.18E-10	1.12E-10	1.07E-10	1.02E-10	9.71E-11
ESE	2.42E-10	2.29E-10	2.18E-10	2.07E-10	1.97E-10	1.88E-10	1.79E-10
SE	4.53E-10	4.30E-10	4.08E-10	3.88E-10	3.69E-10	3.52E-10	3.36E-10
SSE	4.72E-10	4.48E-10	4.26E-10	4.05E-10	3.85E-10	3.67E-10	3.50E-10
S	2.52E-10	2.46E-10	2.34E-10	2.32E-10	2.34E-10	2.23E-10	2.12E-10
SSW	1.83E-10	1.73E-10	1.64E-10	1.59E-10	1.51E-10	1.43E-10	1.36E-10
SW	1.55E-10	1.46E-10	1.38E-10	1.31E-10	1.24E-10	1.18E-10	1.12E-10
WSW	1.68E-10	1.62E-10	1.54E-10	1.46E-10	1.38E-10	1.31E-10	1.25E-10
W	1.57E-10	1.48E-10	1.40E-10	1.33E-10	1.26E-10	1.20E-10	1.14E-10
WNW	1.88E-10	1.78E-10	1.68E-10	1.59E-10	1.51E-10	1.44E-10	1.37E-10
NW	1.94E-10	1.86E-10	1.77E-10	1.73E-10	1.76E-10	1.67E-10	1.59E-10
NNW	2.56E-10	2.43E-10	2.30E-10	2.19E-10	2.08E-10	1.98E-10	1.89E-10

* Measured relevant to the Off-Gas Stack.
Period of Record: 9/1/76-8/31/78

TABLE A-8 (Cont.)

Monticello Off-Gas Stack Dispersion Parameters (D/Q), $1/m^2$, for Long Term Elevated Releases >500 Hrs/Yr or >150 Hrs/Qtr for Standard Distances (As Measured from the Off-Gas Stack)

Sector*	Miles 4.3	4.4	4.5	4.6	4.7	4.8	4.9
N	1.47E-10	1.41E-10	1.34E-10	1.29E-10	1.23E-10	1.18E-10	1.13E-10
NNE	1.75E-10	1.67E-10	1.60E-10	1.53E-10	1.47E-10	1.41E-10	1.35E-10
NE	1.08E-10	1.03E-10	9.88E-11	9.45E-11	9.05E-11	8.68E-11	8.32E-11
ENE	9.08E-11	8.67E-11	8.29E-11	7.94E-11	7.60E-11	7.28E-11	6.99E-11
E	9.26E-11	8.85E-11	8.46E-11	8.10E-11	7.75E-11	7.43E-11	7.13E-11
ESE	1.71E-10	1.63E-10	1.56E-10	1.49E-10	1.43E-10	1.37E-10	1.31E-10
SE	3.20E-10	3.06E-10	2.92E-10	2.80E-10	2.68E-10	2.57E-10	2.46E-10
SSE	3.34E-10	3.19E-10	3.05E-10	2.92E-10	2.80E-10	2.68E-10	2.57E-10
S	2.08E-10	1.98E-10	1.89E-10	1.81E-10	1.73E-10	1.66E-10	1.59E-10
SSW	1.30E-10	1.24E-10	1.18E-10	1.13E-10	1.08E-10	1.03E-10	9.90E-11
SW	1.08E-10	1.03E-10	9.82E-11	9.39E-11	8.98E-11	8.59E-11	8.24E-11
WSW	1.19E-10	1.13E-10	1.08E-10	1.03E-10	9.88E-11	9.46E-11	9.06E-11
W	1.08E-10	1.03E-10	9.87E-11	9.43E-11	9.02E-11	8.64E-11	8.28E-11
WNW	1.30E-10	1.24E-10	1.18E-10	1.13E-10	1.08E-10	1.04E-10	9.94E-11
NW	1.58E-10	1.51E-10	1.44E-10	1.38E-10	1.32E-10	1.26E-10	1.21E-10
NNW	1.80E-10	1.72E-10	1.65E-10	1.58E-10	1.51E-10	1.45E-10	1.39E-10

* Measured relevant to the Off-Gas Stack.
Period of Record: 9/1/76-8/31/78

TABLE A-8 (Cont.)

Monticello Off-Gas Stack Dispersion Parameters (D/Q), $1/m^2$, for Long Term Elevated Releases >500 Hrs/Yr or >150 Hrs/Qtr for Standard Distances (As Measured from the Off-Gas Stack)

	Miles
Sector*	5.0
N	1.09E-10
NNE	1.30E-10
NE	7.99E-11
ENE	6.71E-11
E	6.84E-11
ESE	1.26E-10
SE	2.36E-10
SSE	2.46E-10
S	1.52E-10
SSW	9.49E-11
SW	7.90E-11
WSW	8.69E-11
W	7.94E-11
WNW	9.53E-11
NW	1.16E-10
NNW	1.33E-10

*Measured relevant to the Off-Gas Stack.
Period of Record: 9/1/76-8/31/78

TABLE A-9

Monticello Off-Gas Stack Dispersion Parameters
for Short Term Elevated Releases ≤ 500 Hrs/Yr or ≤ 150 Hrs/Qtr
for Site Boundary Locations (Identified in Table A-2)

Site Boundary Sector*	X/Q (sec/m^3)	D/Q (1/m^2)
N	1.55E-07	9.93E-09
NNE	1.41E-07	8.59E-09
NE	1.88E-07	1.16E-08
ENE	1.60E-07	6.04E-09
E	1.47E-07	9.15E-09
ESE	***	***
SE	***	***
SSE	***	***
S	***	***
SSW	***	***
SW	***	***
WSW	***	***
W	5.95E-08	2.91E-09
WNW	1.39E-07	4.68E-09
NW	***	***
NNW	2.33E-07	1.25E-08
E**	***	***
ESE**	***	***
SE**	***	***
E**	3.40E-08	2.23E-09
ESE**	3.50E-08	2.08E-09
SE**	***	***

* Measured relevant to the reactor vent.
Period of Record: 9/1/76-8/31/78

** On-site EPA locations.

***See appropriate Long Term values

TABLE A-10

Monticello Off-Gas Stack Dispersion Parameters
(χ/q), sec/m^3, for Short Term Elevated Releases $\leq$ 500 Hrs./yr. or $\leq$ 150 Hrs./Qtr.
for Standard Distances (As Measured from the Off-Gas Stack)

	Miles						
Sector*	0.1	0.2	0.3	0.4	0.5	0.6	0.7
N	**	**	**	1.67E-07	1.85E-07	1.50E-07	1.18E-07
NNE	**	**	**	2.82E-07	2.50E-07	2.12E-07	1.69E-07
NE	**	**	**	7.93E-08	1.29E-07	1.21E-07	1.08E-07
ENE	**	**	**	1.63E-07	1.87E-07	1.77E-07	1.46E-07
E	**	**	**	8.63E-08	1.47E-07	1.29E-07	1.07E-07
ESE	**	**	**	***	***	6.17E-08	1.02E-07
SE	**	**	**	***	***	***	1.17E-07
SSE	**	**	**	***	***	***	1.04E-07
S	**	**	**	***	***	7.75E-08	1.13E-07
SSW	**	**	**	***	***	7.15E-08	1.03E-07
SW	**	**	**	***	***	4.73E-08	8.22E-08
WSW	**	**	**	***	***	3.82E-08	6.85E-08
W	**	**	**	***	4.06E-08	7.49E-08	8.73E-08
WNW	**	**	**	***	4.56E-08	8.41E-08	9.88E-08
NW	**	**	**	***	***	7.36E-08	1.08E-07
NNW	**	**	**	2.73E-07	2.57E-07	2.37E-07	1.94E-07

* Measured relevant to the Reactor Vent.
Period of Record: 9/1/76-8/31/78

** Values < value for 0.4 miles

*** See appropriate Long Term values

TABLE A-10 (Cont.)

Monticello Off-Gas Stack Dispersion Parameters
(χ/q), sec/m^3, for Short Term Elevated Releases $\leq$ 500 Hrs./yr. or $\leq$ 150 Hrs./Qtr.
for Standard Distances (As Measured from the Off-Gas Stack)

Miles

	0.8	0.9	1.0	1.1	1.2	1.3	1.4
N	1.52E-07	1.77E-07	1.94E-07	1.82E-07	1.96E-07	1.87E-07	2.07E-07
NNE	1.83E-07	2.05E-07	2.18E-07	2.30E-07	2.15E-07	1.99E-07	2.13E-07
NE	1.30E-07	1.60E-07	1.67E-07	1.75E-07	1.76E-07	1.61E-07	1.55E-07
ENE	1.62E-07	1.80E-07	1.75E-07	1.84E-07	1.96E-07	1.94E-07	1.91E-07
E	1.38E-07	1.62E-07	1.65E-07	1.75E-07	1.72E-07	1.59E-07	1.77E-07
ESE	1.36E-07	1.62E-07	1.71E-07	1.57E-07	1.62E-07	1.64E-07	1.70E-07
SE	1.56E-07	1.84E-07	1.98E-07	1.93E-07	2.02E-07	2.06E-07	2.46E-07
SSE	1.42E-07	1.78E-07	1.97E-07	2.50E-07	2.26E-07	2.35E-07	2.77E-07
S	1.55E-07	1.86E-07	2.07E-07	1.92E-07	2.08E-07	2.01E-07	2.71E-07
SSW	1.43E-07	1.64E-07	1.81E-07	1.86E-07	1.83E-07	1.79E-07	2.01E-07
SW	1.17E-07	1.45E-07	1.63E-07	1.77E-07	1.70E-07	1.74E-07	2.58E-07
WSW	9.91E-08	1.25E-07	1.31E-07	1.43E-07	1.62E-07	1.59E-07	2.45E-07
W	1.25E-07	1.56E-07	1.76E-07	1.86E-07	2.00E-07	2.04E-07	2.77E-07
WNW	1.39E-07	1.71E-07	1.89E-07	1.96E-07	2.04E-07	2.12E-07	2.79E-07
NW	1.44E-07	1.71E-07	1.89E-07	1.83E-07	1.72E-07	1.85E-07	2.15E-07
NNW	2.00E-07	2.24E-07	2.43E-07	2.48E-07	2.36E-07	2.14E-07	3.06E-07

* Measured relevant to the Reactor Vent.
Period of Record: 9/1/76-8/31/78

TABLE A-10 (Cont.)

Monticello Off-Gas Stack Dispersion Parameters
(χ/q), sec/m^3, for Short Term Elevated Releases $\leq$ 500 Hrs./yr. or $\leq$ 150 Hrs./Qtr.
for Standard Distances (As Measured from the Off-Gas Stack)

Miles

Sector*	1.5	1.6	1.7	1.8	1.9	2.0	2.1
N	2.56E-07	1.89E-07	2.10E-07	2.05E-07	1.94E-07	1.88E-07	1.79E-07
NNE	2.59E-07	1.94E-07	2.23E-07	2.13E-07	1.97E-07	1.87E-07	1.77E-07
NE	1.71E-07	1.63E-07	1.55E-07	1.86E-07	1.77E-07	1.74E-07	1.66E-07
ENE	1.82E-07	1.67E-07	2.13E-07	1.89E-07	1.74E-07	1.69E-07	1.64E-07
E	1.73E-07	1.61E-07	1.51E-07	1.88E-07	1.75E-07	1.66E-07	1.59E-07
ESE	1.84E-07	1.77E-07	1.70E-07	***	1.55E-07	1.52E-07	1.50E-07
SE	2.06E-07	2.05E-07	1.90E-07	2.00E-07	2.01E-07	1.89E-07	1.77E-07
SSE	2.25E-07	2.10E-07	2.01E-07	2.21E-07	1.77E-07	1.78E-07	1.78E-07
S	2.10E-07	***	2.38E-07	2.35E-07	2.18E-07	2.04E-07	1.97E-07
SSW	1.90E-07	1.84E-07	2.46E-07	2.34E-07	2.24E-07	2.20E-07	2.17E-07
SW	1.80E-07	1.74E-07	1.69E-07	1.87E-07	2.01E-07	1.99E-07	1.91E-07
WSW	1.78E-07	1.76E-07	1.72E-07	1.89E-07	2.00E-07	1.99E-07	1.94E-07
W	2.14E-07	2.22E-07	2.50E-07	2.50E-07	2.32E-07	2.31E-07	2.23E-07
WNW	1.96E-07	1.87E-07	1.81E-07	1.97E-07	2.11E-07	2.09E-07	2.01E-07
NW	2.00E-07	1.90E-07	2.59E-07	2.40E-07	2.28E-07	2.10E-07	2.01E-07
NNW	2.28E-07	2.01E-07	1.96E-07	1.92E-07	1.87E-07	1.81E-07	1.74E-07

*Measured relevant to the Off-Gas Stack
Period of Record: 9/1/76 - 8/31/78

***See appropriate Long Term values

TABLE A-10 (Cont.)

Monticello Off-Gas Stack Dispersion Parameters
(χ/q), sec/m^3, for Short Term Elevated Releases $\leq$ 500 Hrs./yr. or $\leq$ 150 Hrs./Qtr.
for Standard Distances (As Measured from the Off-Gas Stack)

	Miles						
Sector *	2.2	2.3	2.4	2.5	2.6	2.7	2.8
N	1.70E-07	1.66E-07	1.58E-07	1.54E-07	1.51E-07	1.47E-07	1.37E-07
NNE	1.70E-07	1.62E-07	1.57E-07	1.51E-07	1.46E-07	1.44E-07	1.38E-07
NE	1.60E-07	1.53E-07	1.53E-07	1.47E-07	1.40E-07	1.36E-07	1.30E-07
ENE	1.57E-07	1.50E-07	1.47E-07	1.44E-07	1.36E-07	1.33E-07	1.28E-07
E	1.49E-07	1.44E-07	1.36E-07	1.33E-07	1.27E-07	1.23E-07	1.17E-07
ESE	1.48E-07	1.46E-07	1.43E-07	1.38E-07	1.33E-07	1.28E-07	1.23E-07
SE	1.95E-07	1.68E-07	1.64E-07	1.61E-07	1.55E-07	1.66E-07	1.60E-07
SSE	1.69E-07	1.58E-07	1.58E-07	1.50E-07	1.42E-07	1.35E-07	1.60E-07
S	1.65E-07	1.58E-07	1.51E-07	1.46E-07	1.41E-07	1.40E-07	1.65E-07
SSW	2.10E-07	2.11E-07	2.12E-07	1.89E-07	1.82E-07	1.76E-07	1.71E-07
SW	1.81E-07	1.90E-07	1.93E-07	1.93E-07	2.32E-07	2.23E-07	2.11E-07
WSW	1.82E-07	1.86E-07	1.79E-07	1.72E-07	1.90E-07	1.84E-07	2.12E-07
W	2.15E-07	2.18E-07	2.20E-07	2.19E-07	2.10E-07	2.08E-07	2.05E-07
WNW	1.89E-07	1.89E-07	1.90E-07	1.93E-07	2.26E-07	2.18E-07	2.11E-07
NW	1.91E-07	1.86E-07	1.80E-07	1.76E-07	1.72E-07	1.69E-07	1.64E-07
NNW	1.72E-07	1.68E-07	1.68E-07	1.59E-07	1.54E-07	1.45E-07	1.36E-07

*Measured relevant to the Off-Gas Stack
Period of Record: 9/1/76 - 8/31/78

TABLE A-10 (Cont.)

Monticello Off-Gas Stack Dispersion Parameters
(χ/q), sec/m^3, for Short Term Elevated Releases $\leq$ 500 Hrs./yr. or $\leq$ 150 Hrs./Qtr.
for Standard Distances (As Measured from the Off-Gas Stack)

Sector*	Miles 2.9	3.0	3.1	3.2	3.3	3.4	3.5
N	1.35E-07	1.34E-07	1.32E-07	1.30E-07	1.28E-07	1.25E-07	1.23E-07
NNE	1.30E-07	1.26E-07	1.22E-07	1.19E-07	1.15E-07	1.12E-07	1.09E-07
NE	1.22E-07	1.20E-07	1.16E-07	1.14E-07	1.11E-07	1.09E-07	1.06E-07
ENE	1.21E-07	1.18E-07	1.15E-07	1.13E-07	1.10E-07	1.07E-07	1.04E-07
E	1.13E-07	1.10E-07	1.05E-07	1.03E-07	1.01E-07	1.01E-07	9.17E-08
ESE	1.19E-07	1.14E-07	1.08E-07	1.06E-07	1.03E-07	9.93E-08	9.89E-08
SE	1.31E-07	1.33E-07	1.35E-07	1.32E-07	1.26E-07	1.20E-07	1.15E-07
SSE	1.30E-07	1.32E-07	1.34E-07	1.35E-07	1.31E-07	1.26E-07	1.22E-07
S	1.63E-07	1.54E-07	1.46E-07	1.42E-07	1.34E-07	1.33E-07	1.32E-07
SSW	1.66E-07	1.57E-07	1.51E-07	1.46E-07	1.39E-07	1.34E-07	1.31E-07
SW	1.97E-07	1.82E-07	1.79E-07	1.71E-07	1.64E-07	1.59E-07	1.54E-07
WSW	2.02E-07	1.95E-07	1.85E-07	1.77E-07	1.69E-07	1.62E-07	1.54E-07
W	2.01E-07	1.92E-07	1.90E-07	1.84E-07	1.82E-07	1.78E-07	1.71E-07
WNW	2.02E-07	1.96E-07	1.92E-07	1.90E-07	1.85E-07	1.78E-07	1.75E-07
NW	1.70E-07	1.50E-07	1.48E-07	1.47E-07	1.39E-07	1.37E-07	1.38E-07
NNW	1.31E-07	1.30E-07	1.27E-07	1.22E-07	1.19E-07	1.16E-07	1.13E-07

*Measured relevant to the Off-Gas Stack
Period of Record: 9/1/76 - 8/31/78

TABLE A-10 (Cont.)

Monticello Off-Gas Stack Dispersion Parameters
(χ/q), sec/m^3, for Short Term Elevated Releases $\leq$ 500 Hrs./yr. or $\leq$ 150 Hrs./Qtr.
for Standard Distances (As Measured from the Off-Gas Stack)

Miles

Sector*	3.6	3.7	3.8	3.9	4.0	4.1	4.2
N	1.18E-07	1.15E-07	1.14E-07	1.11E-07	1.08E-07	1.06E-07	1.05E-07
NNE	1.07E-07	1.05E-07	1.01E-07	9.83E-08	9.61E-08	9.38E-08	9.04E-08
NE	1.03E-07	1.01E-07	9.84E-08	9.65E-08	9.20E-08	9.00E-08	8.81E-08
ENE	1.03E-07	1.01E-07	9.56E-08	9.34E-08	9.07E-08	8.79E-08	8.58E-08
E	9.00E-08	8.74E-08	8.37E-08	8.17E-08	7.94E-08	7.80E-08	7.64E-08
ESE	9.67E-08	9.46E-08	8.97E-08	8.91E-08	8.79E-08	8.64E-08	8.45E-08
SE	1.10E-07	1.06E-07	1.06E-07	1.02E-07	9.89E-08	1.03E-07	9.99E-08
SSE	1.18E-07	1.15E-07	1.11E-07	1.08E-07	1.12E-07	1.10E-07	1.08E-07
S	1.27E-07	1.23E-07	1.21E-07	1.17E-07	1.13E-07	1.10E-07	1.10E-07
SSW	1.27E-07	1.24E-07	1.21E-07	1.17E-07	1.15E-07	1.13E-07	1.08E-07
SW	1.52E-07	1.46E-07	1.43E-07	1.43E-07	1.41E-07	1.40E-07	1.38E-07
WSW	1.49E-07	1.43E-07	1.44E-07	1.43E-07	1.34E-07	1.33E-07	1.34E-07
W	1.66E-07	1.61E-07	1.56E-07	1.49E-07	1.42E-07	1.39E-07	1.35E-07
WNW	1.73E-07	1.67E-07	1.63E-07	1.58E-07	1.54E-07	1.49E-07	1.45E-07
NW	1.34E-07	1.27E-07	1.25E-07	1.24E-07	1.21E-07	1.19E-07	1.17E-07
NNW	1.10E-07	1.07E-07	1.02E-07	1.00E-07	9.75E-08	9.52E-08	9.37E-08

*Measured relevant to the Off-Gas Stack
Period of Record: 9/1/76 - 8/31/78

TABLE A-10 (Cont.)

Monticello Off-Gas Stack Dispersion Parameters
(χ/q), sec/m^3, for Short Term Elevated Releases $\leq$ 500 Hrs./yr. or $\leq$ 150 Hrs./Qtr.
for Standard Distances (As Measured from the Off-Gas Stack)

Miles

Sector*	4.3	4.4	4.5	4.6	4.7	4.8	4.9
N	1.01E-07	9.83E-08	9.37E-08	9.14E-08	8.97E-08	8.80E-08	8.61E-08
NNE	8.88E-08	8.71E-08	8.63E-08	8.42E-08	8.14E-08	8.00E-08	7.84E-08
NE	8.69E-08	8.53E-08	8.40E-08	8.25E-08	8.19E-08	8.02E-08	7.81E-08
ENE	8.42E-08	8.26E-08	8.09E-08	7.87E-08	7.69E-08	7.55E-08	7.38E-08
E	7.33E-08	7.27E-08	7.02E-08	6.85E-08	6.71E-08	6.56E-08	6.40E-08
ESE	8.27E-08	8.10E-08	7.40E-08	7.77E-08	7.61E-08	7.46E-08	7.32E-08
SE	9.71E-08	9.47E-08	9.24E-08	9.01E-08	8.78E-08	8.56E-08	8.18E-08
SSE	1.07E-07	1.02E-07	1.02E-07	9.90E-08	9.66E-08	9.41E-08	1.19E-07
S	1.06E-07	1.04E-07	1.02E-07	9.72E-08	9.63E-08	9.35E-08	9.03E-08
SSW	1.05E-07	1.03E-07	1.01E-07	9.78E-08	9.46E-08	9.20E-08	9.00E-08
SW	1.38E-07	1.37E-07	1.34E-07	1.30E-07	1.26E-07	1.24E-07	1.22E-07
WSW	1.31E-07	1.28E-07	1.28E-07	1.22E-07	1.20E-07	1.19E-07	1.18E-07
W	1.33E-07	1.28E-07	1.25E-07	1.24E-07	1.20E-07	1.17E-07	1.15E-07
WNW	1.43E-07	1.38E-07	1.35E-07	1.33E-07	1.33E-07	1.27E-07	1.25E-07
NW	1.14E-07	1.12E-07	1.11E-07	1.07E-07	1.04E-07	1.01E-07	9.74E-08
NNW	9.12E-08	8.89E-08	8.64E-08	8.31E-08	8.26E-08	8.08E-08	7.72E-08

*Measured relevant to the Off-Gas Stack
Period Record: 9/1/76 - 8/31/78

TABLE A-10 (Cont.)

Monticello Off-Gas Stack Dispersion Parameters
(χ/q), sec/m^3, for Short Term Elevated Releases $\leq$ 500 Hrs./yr. or $\leq$ 150 Hrs./Qtr.
for Standard Distances (As Measured from the Off-Gas Stack)

Miles

Sector*	5.0
N	8.28E-08
NNE	7.56E-08
NE	7.58E-08
ENE	7.11E-08
E	6.33E-08
ESE	7.16E-08
SE	8.10E-08
SSE	1.11E-07
S	8.84E-08
SSW	8.80E-08
SW	1.19E-07
WSW	1.13E-07
W	1.13E-07
WNW	1.21E-07
NW	9.51E-08
NNW	7.53E-08

*Measured relevant to the Off-Gas Stack
Period Record: 9/1/76 - 8/31/78

TABLE A-11

Monticello Off-Gas Stack Dispersion Parameters
(D/q), $1/m^2$, for Short Term Elevated Releases ≤ 500 Hrs./yr. or ≤ 150 Hrs./Qtr.
for Standard Distances (As Measured from the Off-Gas Stack)

	Miles						
Sector*	0.1	0.2	0.3	0.4	0.5	0.6	0.7
N	**	**	**	1.32E-08	1.31E-08	9.45E-09	6.60E-09
NNE	**	**	**	2.39E-08	1.86E-08	1.39E-08	9.88E-09
NE	**	**	**	6.01E-09	7.80E-09	6.24E-09	4.92E-09
ENE	**	**	**	1.31E-08	1.14E-08	8.79E-09	6.20E-09
E	**	**	**	7.37E-09	9.17E-09	6.52E-09	4.58E-09
ESE	**	**	**	***	***	3.74E-09	5.28E-09
SE	**	**	**	***	***	***	6.26E-09
SSE	**	**	**	***	***	***	6.60E-09
S	**	**	**	***	***	4.41E-09	5.43E-09
SSW	**	**	**	***	***	3.39E-09	4.09E-09
SW	**	**	**	***	***	2.30E-09	3.34E-09
WSW	**	**	**	***	***	2.16E-09	3.17E-09
W	**	**	**	***	2.22E-09	3.38E-09	3.35E-09
WNW	**	**	**	***	2.55E-09	3.89E-09	3.94E-09
NW	**	**	**	***	***	3.17E-09	4.01E-09
NNW	**	**	**	2.13E-08	1.68E-08	1.30E-08	9.18E-09

*Measured relevant to the Off-Gas Stack
Period of Record: 9/1/76 - 8/31/78

** Values < value for 0.4 miles

***See appropriate Long Term values

TABLE A-11 (Cont.)

Monticello Off-Gas Stack Dispersion Parameters
(D/q), $1/m^3$, for Short Term Elevated Releases $\leq$ 500 Hrs./yr. or $\leq$ 150 Hrs./Qtr.
for Standard Distances (As Measured from the Off-Gas Stack)

	Miles						
Sector *	0.8	0.9	1.0	1.1	1.2	1.3	1.4
N	7.46E-09	7.64E-09	7.08E-09	5.61E-09	5.20E-09	4.30E-09	4.21E-09
NNE	9.52E-09	9.50E-09	8.74E-09	7.97E-09	6.49E-09	5.28E-09	5.05E-09
NE	5.32E-09	5.92E-09	5.43E-09	4.98E-09	4.43E-09	3.60E-09	3.11E-09
ENE	6.00E-09	5.94E-09	5.01E-09	4.56E-09	4.25E-09	3.75E-09	3.31E-09
E	5.18E-09	5.40E-09	4.74E-09	4.36E-09	3.76E-09	3.08E-09	3.09E-09
ESE	6.16E-09	6.58E-09	5.98E-09	4.72E-09	4.30E-09	3.89E-09	3.66E-09
SE	7.39E-09	7.99E-09	7.50E-09	6.40E-09	5.96E-09	5.50E-09	6.04E-09
SSE	7.58E-09	8.26E-09	7.59E-09	6.02E-09	6.29E-09	5.79E-09	6.12E-09
S	6.46E-09	6.88E-09	6.53E-09	5.17E-09	4.89E-09	4.19E-09	5.08E-09
SSW	4.90E-09	4.99E-09	4.71E-09	4.17E-09	3.58E-09	3.12E-09	3.17E-09
SW	5.67E-09	4.25E-09	3.97E-09	3.65E-09	3.03E-09	2.74E-09	3.65E-09
WSW	3.83E-09	4.16E-09	3.58E-09	3.23E-09	3.12E-09	2.66E-09	3.64E-09
W	4.14E-09	4.59E-09	4.35E-09	3.87E-09	3.59E-09	3.20E-09	3.87E-09
WNW	4.86E-09	5.37E-09	5.09E-09	4.51E-09	4.10E-09	3.77E-09	4.44E-09
NW	4.75E-09	5.16E-09	5.03E-09	4.25E-09	3.55E-09	3.43E-09	3.86E-09
NNW	8.37E-09	8.39E-09	7.94E-09	7.09E-09	5.96E-09	4.82E-09	6.18E-09

*Measured relevant to the Off-Gas Stack
Period Record: 9/1/76 - 8/31/78

TABLE A-11 (Cont.)

Monticello Off-Gas Stack Dispersion Parameters
(D/q), $1/m^2$, for Short Term Elevated Releases $\leq$ 500 Hrs./yr. or $\leq$ 150 Hrs./Qtr.
for Standard Distances (As Measured from the Off-Gas Stack)

	Miles						
Sector*	2.2	2.3	2.4	2.5	2.6	2.7	2.8
N	2.04E-09	1.90E-09	1.75E-09	1.64E-09	1.53E-09	1.42E-09	1.27E-09
NNE	2.45E-09	2.25E-09	2.10E-09	1.95E-09	1.82E-09	1.73E-09	1.61E-09
NE	1.67E-09	1.51E-09	1.42E-09	1.30E-09	1.19E-09	1.11E-09	1.03E-09
ENE	1.61E-09	1.47E-09	1.38E-09	1.29E-09	1.18E-09	1.12E-09	1.04E-09
E	1.62E-09	1.51E-09	1.37E-09	1.30E-09	1.20E-09	1.12E-09	1.04E-09
ESE	1.99E-09	1.88E-09	1.78E-09	1.66E-09	1.55E-09	1.44E-09	1.34E-09
SE	2.89E-09	2.38E-09	2.24E-09	2.12E-09	1.97E-09	2.09E-09	1.97E-09
SSE	2.47E-09	2.24E-09	2.18E-09	2.01E-09	1.85E-09	1.72E-09	1.98E-09
S	2.06E-09	1.92E-09	1.80E-09	1.67E-09	1.54E-09	1.46E-09	1.64E-09
SSW	1.62E-09	1.64E-09	1.73E-09	1.57E-09	1.46E-09	1.37E-09	1.29E-09
SW	1.24E-09	1.27E-09	1.35E-09	1.40E-09	1.60E-09	1.48E-09	1.34E-09
WSW	1.24E-09	1.29E-09	1.26E-09	1.27E-09	1.35E-09	1.27E-09	1.42E-09
W	1.40E-09	1.40E-09	1.42E-09	1.47E-09	1.35E-09	1.27E-09	1.20E-09
WNW	1.43E-09	1.46E-09	1.48E-09	1.52E-09	1.68E-09	1.58E-09	1.44E-09
NW	1.93E-09	1.80E-09	1.67E-09	1.57E-09	1.45E-09	1.35E-09	1.25E-09
NNW	2.22E-09	2.09E-09	2.02E-09	1.85E-09	1.74E-09	1.58E-09	1.44E-09

*Measured relevant to the Off-Gas Stack
Period: 9/1/76 - 8/31/78

TABLE A-11 (Cont.)

Monticello Off-Gas Stack Dispersion Parameters
(D/q), $1/m^3$, for Short Term Elevated Releases ≤ 500 Hrs./yr. or ≤ 150 Hrs./Qtr.
for Standard Distances (As Measured from the Off-Gas Stack)

Miles

Sector*	1.5	1.6	1.7	1.8	1.9	2.0	2.1
N	4.63E-09	3.13E-09	3.20E-09	2.90E-09	2.69E-09	2.48E-09	2.24E-09
NNE	5.50E-09	3.78E-09	4.02E-09	3.56E-09	3.27E-09	2.95E-09	2.66E-09
NE	3.10E-09	2.65E-09	2.28E-09	2.48E-09	2.27E-09	2.08E-09	1.85E-09
ENE	2,86E-09	2.40E-09	2.81E-09	2.31E-09	2.08E-09	1.91E-09	1.76E-09
E	2.73E-09	2.35E-09	2.05E-09	2.39E-09	2.18E-09	1.96E-09	1.81E-09
ESE	3.62E-09	3.20E-09	2.86E-09	***	2.38E-09	2.22E-09	2.10E-09
SE	4.68E-09	4.28E-09	3.67E-09	3.61E-09	3.49E-09	3.09E-09	2.75E-09
SSE	4.50E-09	3.93E-09	3.57E-09	3.70E-09	2.90E-09	2.79E-09	2.69E-09
S	3.59E-09	***	3.58E-09	3.34E-09	3.04E-09	2.74E-09	2.55E-09
SSW	2.73E-09	2.34E-09	2.81E-09	2.42E-09	2.17E-09	1.97E-09	1.80E-09
SW	2.32E-09	1.98E-09	1.72E-09	1.72E-09	1.72E-09	1.57E-09	1.40E-09
WSW	2.38E-09	2.07E-09	1.80E-09	1.77E-09	1.73E-09	1.58E-09	1.42E-09
W	2.70E-09	2.47E-09	2.47E-09	2.22E-09	1.92E-09	1.75E-09	1.57E-09
WNW	2.83E-09	2 38E-09	2.06E-09	2.02E-09	2.03E-09	1.84E-09	1.64E-09
NW	3.09E-09	2.70E-09	3.41E-09	2.94E-09	2.70E-09	2.35E-09	2.13E-09
NNW	4.19E-09	3.41E-09	3.09E-09	2.84E-09	2.74E-09	2.54E-09	2.33E-09

*Measured relevant to the Off-Gas Stack
Period Record: 9/1/76 - 8/13/78

***See appropriate Long Term values

TABLE A-11 (Cont.)

Monticello Off-Gas Stack Dispersion Parameters
(D/q), $1/m^2$, for Short Term Elevated Releases ≤ 500 Hrs./yr. or ≤ 150 Hrs./Qtr.
for Standard Distances (As Measured from the Off-Gas Stack)

Miles

Sector*	2.9	3.0	3.1	3.2	3.3	3.4	3.5
N	1.20E-09	1.15E-09	1.08E-09	1.03E-09	9.77E-10	9.22E-10	8.74E-10
NNE	1.47E-09	1.39E-09	1.31E-09	1.25E-09	1.17E-09	1.11E-09	1.06E-09
NE	9.37E-10	8.90E-10	8.37E-10	7.98E-10	7.54E-10	7.19E-10	6.82E-10
ENE	9.64E-10	9.11E-10	8.65E-10	8.28E-10	7.85E-10	7.41E-10	7.09E-10
E	9.72E-10	9.18E-10	8.55E-10	8.15E-10	7.80E-10	7.63E-10	6.77E-10
ESE	1.26E-09	1.18E-09	1.09E-09	1.04E-09	9.85E-10	9.24E-10	9.01E-10
SE	1.58E-09	1.57E-09	1.56E-09	1.49E-09	1.40E-09	1.31E-09	1.23E-09
SSE	1.57E-09	1.55E-09	1.54E-09	1.52E-09	1.44E-09	1.36E-09	1.28E-09
S	1.56E-09	1.41E-09	1.29E-09	1.21E-09	1.10E-09	1.05E-09	1.01E-09
SSW	1.22E-09	1.12E-09	1.04E-09	9.83E-10	9.12E-10	8.63E-10	8.24E-10
SW	1.25E-09	1.11E-09	1.05E-09	9.69E-10	8.96E-10	8.36E-10	7.83E-10
WSW	1.31E-09	1.22E-09	1.13E-09	1.05E-09	9.80E-10	9.14E-10	8.49E-10
W	1.19E-09	1.09E-09	1.04E-09	9.69E-10	9.26E-10	8.75E-10	8.11E-10
WNW	1.31E-09	1.21E-09	1.12E-09	1.06E-09	9.78E-10	9.00E-10	8.43E-10
NW	1.23E-09	1.03E-09	9.72E-10	9.26E-10	8.37E-10	7.94E-10	7.63E-10
NNW	1.35E-09	1.30E-09	1.25E-09	1.17E-09	1.11E-09	1.06E-09	1.01E-09

*Measured relevant to the Off-Gas Stack
Period of Record: 9/1/76 - 8/31/78

TABLE A-11 (Cont.)

Monticello Off-Gas Stack Dispersion Parameters
(D/q), $1/m^2$ for Short Term Elevated Releases $\leq$ 500 Hrs./yr. or $\leq$ 150 Hrs./Qtr.
for Standard Distances (As Measured from the Off-Gas Stack)

	Miles						
Sector*	3.6	3.7	3.8	3.9	4.0	4.1	4.2
N	8.20E-10	7.85E-10	7.57E-10	7.26E-10	6.90E-10	6.64E-10	6.42E-10
NNE	1.01E-09	9.76E-10	9.14E-10	8.72E-10	8.35E-10	7.98E-10	7.55E-10
NE	6.45E-10	6.15E-10	5.85E-10	5.60E-10	5.22E-10	4.99E-10	4.77E-10
ENE	6.83E-10	6.52E-10	6.06E-10	5.79E-10	5.51E-10	5.22E-10	5.00E-10
E	6.49E-10	6.16E-10	5.77E-10	5.51E-10	5.25E-10	5.05E-10	4.85E-10
ESE	8.60E-10	8.21E-10	7.64E-10	7.41E-10	7.16E-10	6.91E-10	6.61E-10
SE	1.16E-09	1.10E-09	1.08E-09	1.02E-09	9.68E-10	9.93E-10	9.48E-10
SSE	1.21E-09	1.15E-09	1.08E-09	1.02E-09	1.04E-09	9.94E-10	9.52E-10
S	9.44E-10	9.15E-10	8.76E-10	8.65E-10	8.63E-10	8.23E-10	7.95E-10
SSW	7.76E-10	7.35E-10	6.96E-10	6.69E-10	6.35E-10	6.08E-10	5.70E-10
SW	7.42E-10	6.82E-10	6.45E-10	6.21E-10	5.90E-10	5.64E-10	5.37E-10
WSW	7.90E-10	7.45E-10	7.21E-10	6.88E-10	6.21E-10	5.94E-10	5.78E-10
W	7.69E-10	7.29E-10	6.93E-10	6.50E-10	6.08E-10	5.83E-10	5.56E-10
WNW	8.16E-10	7.73E-10	7.41E-10	7.05E-10	6.72E-10	6.38E-10	6.11E-10
NW	7.24E-10	6.75E-10	6.45E-10	6.43E-10	6.48E-10	6.19E-10	5.95E-10
NNW	9.60E-10	9.10E-10	8.53E-10	8.18E-10	7.82E-10	7.49E-10	7.22E-10

*Measured relevant to the Off-Gas Stack
Period of Record: 9/1/76 - 8/31/78

TABLE A-11 (Cont.)

Monticello Off-Gas Stack Dispersion Parameters
(D/q), $1/m^2$, for Short Term Elevated Releases $\leq$ 500 Hrs./Yr. or $\leq$ 150 Hrs./Qtr.
for Standard Distances (As Measured from the Off-Gas Stack)

Miles

Sector*	4.3	4.4	4.5	4.6	4.7	4.8	4.9
N	6.07E-10	5.80E-10	5.43E-10	5.20E-10	5.01E-10	4.83E-10	4.65E-10
NNE	7.27E-10	7.00E-10	6.81E-10	6.52E-10	6.20E-10	5.98E-10	5.76E-10
NE	4.61E-10	4.42E-10	4.27E-10	4.10E-10	3.99E-10	3.83E-10	3.66E-10
ENE	4.81E-10	4.63E-10	4.45E-10	4.24E-10	4.07E-10	3.92E-10	3.76E-10
E	4.55E-10	4.43E-10	4.19E-10	4.02E-10	3.86E-10	3.71E-10	3.55E-10
ESE	6.34E-10	6.06E-10	5.45E-10	5.59E-10	5.39E-10	5.19E-10	4.97E-10
SE	9.05E-10	8.70E-10	8.33E-10	8.01E-10	7.69E-10	7.38E-10	6.94E-10
SSE	9.43E-10	8.59E-10	8.39E-10	8.03E-10	7.73E-10	7.40E-10	9.18E-10
S	7.75E-10	7.42E-10	7.10E-10	6.65E-10	6.49E-10	6.21E-10	5.91E-10
SSW	5.39E-10	5.15E-10	4.91E-10	4.69E-10	4.47E-10	4.28E-10	4.13E-10
SW	5.23E-10	5.02E-10	4.74E-10	4.53E-10	4.35E-10	4.22E-10	4.08E-10
WSW	5.46E-10	5.16E-10	4.98E-10	4.69E-10	4.55E-10	4.45E-10	4.34E-10
W	5.35E-10	5.09E-10	4.89E-10	4.77E-10	4.53E-10	4.36E-10	4.20E-10
WNW	5.91E-10	5.61E-10	5.41E-10	5.24E-10	5.16E-10	4.87E-10	4.69E-10
NW	5.88E-10	5.66E-10	5.44E-10	5.17E-10	4.96E-10	4.72E-10	4.48E-10
NNW	6.90E-10	6.60E-10	6.30E-10	5.96E-10	5.83E-10	5.61E-10	5.28E-10

*Measured relevant to the Off-Gas Stack
Period of Record: 9/1/76 - 8/31/78

TABLE A-11 (Cont.)

Monticello Off-Gas Stack Dispersion Parameters
(D/q), $1/m^2$, for Short Term Elevated Releases $\leq$ 500 Hrs./yr. or $\leq$ 150 Hrs./Qtr.
for Standard Distances (As Measured from the Off-Gas Stack)

Miles

Sector*	5.0
N	4.39E-10
NNE	5.46E-10
NE	3.48E-10
ENE	3.56E-10
E	3.45E-10
ESE	4.80E-10
SE	6.78E-10
SSE	8.45E-10
S	5.70E-10
SSW	3.98E-10
SW	3.92E-10
WSW	4.12E-10
W	4.05E-10
WNW	4.48E-10
NW	4.31E-10
NNW	5.06E-10

*Measured relevant to the Off-Gas Stack
Period of Record: 9/1/76 - 8/31/78

APPENDIX - B

Monticello 10m Wind and $\Delta T_{42.7-10m}$ Stability

Joint Frequency Distributions (9/1/76 - 8/31/78)

NORTHERN STATES POWER COMPANY - MONTICELLO NUCLEAR GENERATING PLANT
SITE METEOROLOGY - FREQUENCY DISTRIBUTION TABLES

HOURS AT EACH WIND SPEED AND DIRECTION

PERIOD OF RECORD 9/ 1/76 THROUGH 8/31/78
STABILITY CLASS A
ELEVATION 10 METER

	WIND SPEED (MPH) AT 10 METER LEVEL						
DIRECTION	1 TO 3	4 TO 7	8 TO 12	13 TO 18	19 TO 24	ABOVE 24	TOTAL
N	4	18	63	30	7	0	122
NNE	2	20	30	14	2	0	68
NE	1	13	21	26	2	2	65
ENE	1	14	16	4	0	0	35
E	0	28	40	12	0	0	80
ESE	3	33	50	5	6	0	97
SE	2	26	50	35	12	3	128
SSE	8	46	96	122	11	0	283
S	9	36	68	117	42	3	275
SSW	5	63	94	58	20	4	244
SW	4	35	64	32	5	3	143
WSW	3	25	74	26	0	0	128
W	0	29	47	18	1	0	95
WNW	4	34	73	79	14	0	204
NW	3	29	58	61	3	0	154
NNW	6	29	109	67	13	0	224
VAR	0	0	0	0	0	0	0

B-2

TOTAL HOURS THIS CLASS 2350
HOURS OF CALM THIS CLASS 5
PERCENT OF ALL DATA THIS CLASS 14.27

NORTHERN STATES POWER COMPANY - MONTICELLO NUCLEAR GENERATING PLANT
SITE METEOROLOGY - FREQUENCY DISTRIBUTION TABLES

HOURS AT EACH WIND SPEED AND DIRECTION

PERIOD OF RECORD 9/ 1/76 THROUGH 8/31/78
STABILITY CLASS B
ELEVATION 10 METER

	WIND SPEED (MPH) AT 10 METER LEVEL						
DIRECTION	1 TO 3	4 TO 7	8 TO 12	13 TO 18	19 TO 24	ABOVE 24	TOTAL
N	2	14	19	4	0	1	40
NNE	4	10	8	5	0	0	27
NE	0	6	3	2	0	0	11
ENE	1	11	7	2	0	0	21
E	0	13	4	0	0	0	17
ESE	1	15	10	3	3	0	32
SE	0	9	9	9	0	0	27
SSE	2	12	9	9	0	0	32
S	2	13	21	7	1	0	44
SSW	1	22	19	4	0	0	46
SW	0	11	10	3	0	0	24
WSW	1	12	11	3	0	0	27
W	0	12	19	8	2	1	42
WNW	0	11	20	21	5	1	58
NW	1	8	22	13	3	0	47
NNW	1	8	40	26	4	1	80
VAR	0	0	0	0	0	0	0

TOTAL HOURS THIS CLASS	575
HOURS OF CALM THIS CLASS	0
PERCENT OF ALL DATA THIS CLASS	3.49

NORTHERN STATES POWER COMPANY - MONTICELLO NUCLEAR GENERATING PLANT
SITE METEOROLOGY - FREQUENCY DISTRIBUTION TABLES

HOURS AT EACH WIND SPEED AND DIRECTION

PERIOD OF RECORD 9/ 1/76 THROUGH 8/31/78
STABILITY CLASS C
ELEVATION 10 METER

	WIND SPEED (MPH) AT 10 METER LEVEL						
DIRECTION	1 TO 3	4 TO 7	8 TO 12	13 TO 18	19 TO 24	ABOVE 24	TOTAL
N	0	12	16	8	0	0	36
NNE	3	13	13	4	1	0	34
NE	2	10	11	5	2	0	30
ENE	1	19	4	2	0	0	26
E	0	8	10	2	0	0	20
ESE	2	14	12	5	2	0	35
SE	0	12	16	9	0	0	37
SSE	0	10	21	8	0	0	39
S	6	12	28	18	3	0	67
SSW	3	16	12	3	2	1	37
SW	3	11	14	3	1	0	32
WSW	2	5	11	2	0	0	20
W	4	22	19	5	1	0	51
WNW	4	23	38	19	3	0	87
NW	3	17	18	30	4	0	72
NNW	2	22	40	27	5	1	97
VAR	0	0	0	0	0	0	0

TOTAL HOURS THIS CLASS	720
HOURS OF CALM THIS CLASS	0
PERCENT OF ALL DATA THIS CLASS	4.37

NORTHERN STATES POWER COMPANY - MONTICELLO NUCLEAR GENERATING PLANT
SITE METEOROLOGY - FREQUENCY DISTRIBUTION TABLES

HOURS AT EACH WIND SPEED AND DIRECTION

PERIOD OF RECORD 9/ 1/76 THROUGH 8/31/78
STABILITY CLASS D
ELEVATION 10 METER

	WIND SPEED (MPH) AT 10 METER LEVEL						
DIRECTION	1 TO 3	4 TO 7	8 TO 12	13 TO 18	19 TO 24	ABOVE 24	TOTAL
N	9	107	135	39	1	0	291
NNE	32	132	87	18	1	0	270
NE	37	129	116	50	3	0	335
ENE	43	153	66	30	1	0	293
E	29	125	64	27	0	0	245
ESE	28	107	148	60	4	0	347
SE	16	103	153	36	2	0	310
SSE	13	97	103	35	2	0	250
S	19	84	96	33	1	0	233
SSW	16	73	70	19	6	1	185
SW	19	58	52	10	4	0	143
WSW	14	69	63	14	2	1	163
W	16	79	98	33	3	5	234
WNW	13	112	262	159	25	2	573
NW	17	82	255	232	61	3	650
NNW	19	104	247	246	49	1	666
VAR	0	0	0	0	0	0	0

TOTAL HOURS THIS CLASS	5198
HOURS OF CALM THIS CLASS	10
PERCENT OF ALL DATA THIS CLASS	31.56

NORTHERN STATES POWER COMPANY - MONTICELLO NUCLEAR GENERATING PLANT
SITE METEOROLOGY - FREQUENCY DISTRIBUTION TABLES

HOURS AT EACH WIND SPEED AND DIRECTION

PERIOD OF RECORD 9/ 1/76 THROUGH 8/31/78
STABILITY CLASS E
ELEVATION 10 METER

DIRECTION	WIND SPEED (MPH) AT 10 METER LEVEL 1 TO 3	4 TO 7	8 TO 12	13 TO 18	19 TO 24	ABOVE 24	TOTAL
N	20	98	57	6	0	0	181
NNE	43	81	35	2	0	0	161
NE	35	94	41	6	2	0	178
ENE	50	122	29	10	0	0	211
E	36	109	40	2	0	0	187
ESE	26	117	46	6	0	0	195
SE	19	111	136	18	2	0	286
SSE	20	95	116	33	1	0	265
S	22	84	144	43	1	0	294
SSW	22	72	99	25	9	0	227
SW	23	84	57	10	2	0	176
WSW	37	86	44	4	0	0	171
W	30	156	123	12	4	0	325
WNW	24	195	233	41	2	0	495
NW	20	133	247	84	0	0	484
NNW	25	145	217	38	1	0	426
VAR	0	0	0	0	0	0	0

TOTAL HOURS THIS CLASS 4269
HOURS OF CALM THIS CLASS 7
PERCENT OF ALL DATA THIS CLASS 25.92

NORTHERN STATES POWER COMPANY - MONTICELLO NUCLEAR GENERATING PLANT
SITE METEOROLOGY - FREQUENCY DISTRIBUTION TABLES

HOURS AT EACH WIND SPEED AND DIRECTION

PERIOD OF RECORD 9/ 1/76 THROUGH 8/31/78
STABILITY CLASS F
ELEVATION 10 METER

DIRECTION	WIND SPEED (MPH) AT 10 METER LEVEL 1 TO 3	4 TO 7	8 TO 12	13 TO 18	19 TO 24	ABOVE 24	TOTAL
N	30	62	3	0	0	0	95
NNE	37	54	0	0	0	0	91
NE	29	29	0	0	0	0	58
ENE	32	28	0	0	0	0	60
E	32	59	5	0	0	0	96
ESE	25	97	11	0	0	0	133
SE	22	83	19	0	0	0	124
SSE	16	122	12	0	0	0	150
S	24	93	31	3	0	0	151
SSW	27	67	14	0	0	0	108
SW	27	52	7	0	0	0	86
WSW	52	68	8	0	0	0	128
W	51	91	14	0	0	0	156
WNW	28	68	9	0	0	0	105
NW	36	67	12	0	0	0	115
NNW	30	119	29	0	0	0	178
VAR	0	0	0	0	0	0	0

TOTAL HOURS THIS CLASS 1847
HOURS OF CALM THIS CLASS 13
PERCENT OF ALL DATA THIS CLASS 11.21

NORTHERN STATES POWER COMPANY - MONTICELLO NUCLEAR GENERATING PLANT
SITE METEOROLOGY - FREQUENCY DISTRIBUTION TABLES

HOURS AT EACH WIND SPEED AND DIRECTION

PERIOD OF RECORD 9/ 1/76 THROUGH 8/31/78
STABILTIY CLASS G
ELEVATION 10 METER

	WIND SPEED (MPH) AT 10 METER LEVEL						
DIRECTION	1 TO 3	4 TO 7	8 TO 12	13 TO 18	19 TO 24	ABOVE 24	TOTAL
N	45	31	0	0	0	0	76
NNE	40	16	0	0	0	0	56
NE	33	12	0	0	0	0	45
ENE	31	5	0	0	0	0	36
E	46	18	0	0	0	0	64
ESE	47	54	2	0	0	0	103
SE	52	34	1	1	0	0	88
SSE	67	111	3	6	0	0	187
S	64	109	23	2	0	0	198
SSW	61	65	10	2	0	0	138
SW	43	32	1	0	0	0	76
WSW	77	37	0	0	0	0	114
W	53	31	0	0	0	0	84
WNW	37	13	2	0	0	0	52
NW	49	15	3	4	0	0	71
NNW	47	48	2	0	0	0	97
VAR	0	0	0	0	0	0	0

TOTAL HOURS THIS CLASS 1512
HOURS OF CALM THIS CLASS 27
PERCENT OF ALL DATA THIS CLASS 9.18

NORTHERN STATES POWER COMPANY - MONTICELLO NUCLEAR GENERATING PLANT
SITE METEOROLOGY - FREQUENCY DISTRIBUTION TABLES

HOURS AT EACH WIND SPEED AND DIRECTION

PERIOD OF RECORD 9/ 1/76 THROUGH 8/31/78
ALL CLASSES COMBINED
ELEVATION 10 METER

	WIND SPEED (MPH) AT 10 METER LEVEL						
DIRECTION	1 TO 3	4 TO 7	8 TO 12	13 TO 18	19 TO 24	ABOVE 24	TOTAL
N	110	342	293	87	8	1	841
NNE	161	326	173	43	4	0	707
NE	137	293	192	89	9	2	722
ENE	159	352	122	48	1	0	682
E	143	360	163	43	0	0	709
ESE	132	437	279	79	15	0	942
SE	111	378	384	108	16	3	1000
SSE	126	493	360	213	14	0	1206
S	146	431	411	223	48	3	1262
SSW	135	378	318	111	37	6	985
SW	119	283	205	58	12	3	680
WSW	186	302	211	49	2	1	751
W	154	420	320	76	11	6	987
WNW	110	456	637	319	49	3	1574
NW	129	351	615	424	71	3	1593
NNW	130	475	684	404	72	3	1768
VAR	0	0	0	0	0	0	0

DATA RECOVERY SUMMARY FOR PERIOD

TOTAL HOURS	17520
HOURS OF CALM	62
HOURS OF BAD DATA	1049
PERCENT DATA RECOVERY	94.01

PERCENT ACCEPTABLE OBSERVATIONS IN EACH STABILITY CLASS

CLASS A	14.27
CLASS B	3.49
CLASS C	4.37
CLASS D	31.56
CLASS E	25.92
CLASS F	11.21
CLASS G	9.18

AVERAGE WIND SPEED FOR EACH WIND CATEGORY

1 TO 3 MPH	2.5
4 TO 7 MPH	5.5
8 TO 12 MPH	9.7
13 TO 18 MPH	14.7
19 TO 24 MPH	20.6
ABOVE 24 MPH	27.2

APPENDIX - C

Monticello 100m Wind and $\Delta T_{100-10m}$ Stability

Joint Frequency Distributions (9/1/76-8/31/78)

NORTHERN STATES POWER COMPANY - MONTICELLO NUCLEAR GENERATING PLANT
SITE METEOROLOGY - FREQUENCY DISTRIBUTION TABLES

HOURS AT EACH WIND SPEED AND DIRECTION

PERIOD OF RECORD 9/ 1/76 THROUGH 8/31/78
STABILITY CLASS A
ELEVATION 100 M

DIRECTION	WIND SPEED (MPH) AT 100 M LEVEL 1 TO 3	4 TO 7	8 TO 12	13 TO 18	19 TO 24	ABOVE 24	TOTAL
N	0	1	2	10	1	0	14
NNE	0	1	1	1	0	0	3
NE	0	0	1	0	0	0	1
ENE	0	0	0	0	1	0	1
E	0	1	4	0	0	0	5
ESE	0	0	4	0	0	0	4
SE	0	0	4	8	0	6	18
SSE	0	1	5	42	36	15	99
S	0	1	3	28	35	12	79
SSW	0	1	10	37	53	39	140
SW	0	0	4	19	8	5	36
WSW	0	0	3	16	10	1	30
W	0	0	0	7	2	0	9
WNW	0	0	2	4	1	2	9
NW	0	0	3	6	6	3	18
NNW	0	0	1	14	4	0	19
VAR	0	0	0	0	0	0	0

TOTAL HOURS THIS CLASS 489
HOURS OF CALM THIS CLASS 4
PERCENT OF ALL DATA THIS CLASS 2.95

NORTHERN STATES POWER COMPANY - MONTICELLO NUCLEAR GENERATING PLANT
SITE METEOROLOGY - FREQUENCY DISTRIBUTION TABLES

HOURS AT EACH WIND SPEED AND DIRECTION

PERIOD OF RECORD 9/ 1/76 THROUGH 8/31/78
STABILITY CLASS B
ELEVATION 100 M

DIRECTION	WIND SPEED (MPH) AT 100 M LEVEL 1 TO 3	4 TO 7	8 TO 12	13 TO 18	19 TO 24	ABOVE 24	TOTAL
N	0	3	13	18	3	0	37
NNE	0	6	3	9	2	2	22
NE	0	1	7	6	0	0	14
ENE	0	2	3	7	2	0	14
E	0	2	15	1	0	0	18
ESE	0	5	17	3	0	2	27
SE	1	7	15	9	2	2	36
SSE	1	9	28	12	8	2	60
S	0	5	23	18	3	0	49
SSW	0	8	28	17	5	2	60
SW	0	7	18	8	5	1	39
WSW	0	7	8	14	2	1	32
W	0	4	8	18	5	0	35
WNW	0	4	12	17	7	6	46
NW	1	5	14	23	12	5	60
NNW	0	1	8	25	11	2	47
VAR	0	0	0	0	0	0	0

TOTAL HOURS THIS CLASS 602
HOURS OF CALM THIS CLASS 6
PERCENT OF ALL DATA THIS CLASS 3.64

NORTHERN STATES POWER COMPANY - MONTICELLO NUCLEAR GENERATING PLANT
SITE METEOROLOGY - FREQUENCY DISTRIBUTION TABLES

HOURS AT EACH WIND SPEED AND DIRECTION

PERIOD OF RECORD 9/ 1/76 THROUGH 8/31/78
STABILITY CLASS G
ELEVATION 100 M

DIRECTION	WIND SPEED (MPH) AT 100 M LEVEL 1 TO 3	4 TO 7	8 TO 12	13 TO 18	19 TO 24	ABOVE 24	TOTAL
N	3	9	26	25	13	2	78
NNE	2	12	14	14	8	2	52
NE	1	7	9	8	2	0	27
ENE	0	5	12	6	1	0	24
E	0	13	19	1	2	0	35
ESE	0	13	25	11	1	1	51
SE	2	17	12	8	4	0	43
SSE	0	26	38	19	10	2	95
S	0	15	23	13	7	4	62
SSW	0	28	33	23	11	2	97
SW	0	20	24	17	4	0	65
WSW	3	17	27	14	3	1	65
W	3	10	20	14	8	3	58
WNW	3	10	16	27	18	9	83
NW	2	8	22	38	26	10	106
NNW	2	3	16	42	19	8	90
VAR	0	0	0	0	0	0	0

TOTAL HOURS THIS CLASS	1041
HOURS OF CALM THIS CLASS	10
PERCENT OF ALL DATA THIS CLASS	6.29

NORTHERN STATES POWER COMPANY - MONTICELLO NUCLEAR GENERATING PLANT
SITE METEOROLOGY - FREQUENCY DISTRIBUTION TABLES

HOURS AT EACH WIND SPEED AND DIRECTION

PERIOD OF RECORD 9/ 1/76 THROUGH 8/31/78
STABILITY CLASS D
ELEVATION 100 M

DIRECTION	WIND SPEED (MPH) AT 100 M LEVEL 1 TO 3	4 TO 7	8 TO 12	13 TO 18	19 TO 24	ABOVE 24	TOTAL
N	11	51	95	181	130	82	550
NNE	11	41	106	120	50	12	340
NE	15	53	105	93	25	8	299
ENE	14	41	131	83	59	12	340
E	18	61	103	62	38	6	288
ESE	17	55	101	85	47	31	336
SE	13	57	108	152	68	23	421
SSE	9	63	119	148	71	17	427
S	16	61	95	122	61	8	363
SSW	14	61	85	120	46	34	360
SW	14	54	80	74	32	11	265
WSW	13	52	69	44	21	11	210
W	8	45	89	59	29	17	247
WNW	14	51	141	165	77	62	510
NW	7	50	170	366	312	143	1048
NNW	12	52	176	312	350	229	1131
VAR	0	0	0	0	0	0	0

TOTAL HOURS THIS CLASS 7264
HOURS OF CALM THIS CLASS 129
PERCENT OF ALL DATA THIS CLASS 43.87

NORTHERN STATES POWER COMPANY - MONTICELLO NUCLEAR GENERATING PLANT
SITE METEOROLOGY - FREQUENCY DISTRIBUTION TABLES

HOURS AT EACH WIND SPEED AND DIRECTION

PERIOD OF RECORD 9/ 1/76 THROUGH 8/31/79
STABILITY CLASS E
ELEVATION 100 M

DIRECTION	WIND SPEED (MPH) AT 100 M LEVEL 1 TO 3	4 TO 7	8 TO 12	13 TO 18	19 TO 24	ABOVE 24	TOTAL
N	4	17	59	99	82	11	272
NNE	7	18	37	68	32	3	165
NE	4	16	47	58	20	2	147
ENE	4	33	68	93	27	9	234
E	4	27	64	75	15	2	187
ESE	5	20	46	74	37	11	193
SE	10	23	63	97	58	3	254
SSE	5	22	58	94	105	16	300
S	5	13	57	140	97	20	332
SSW	2	25	49	115	125	22	338
SW	7	24	67	102	84	18	302
WSW	3	19	42	73	37	8	182
W	5	20	47	55	35	2	164
WNW	4	18	63	136	93	13	327
NW	6	15	71	172	141	12	417
NNW	3	27	86	244	198	17	575
VAR	0	0	0	0	0	0	0

TOTAL HOURS THIS CLASS 4433
HOURS OF CALM THIS CLASS 44
PERCENT OF ALL DATA THIS CLASS 26.77

NORTHERN STATES POWER COMPANY - MONTICELLO NUCLEAR GENERATING PLANT
SITE METEOROLOGY - FREQUENCY DISTRIBUTION TABLES

HOURS AT EACH WIND SPEED AND DIRECTION

PERIOD OF RECORD 9/ 1/76 THROUGH 8/31/78
STABILITY CLASS F
ELEVATION 100 M

DIRECTION	WIND SPEED (MPH) AT 100 M LEVEL 1 TO 3	4 TO 7	8 TO 12	13 TO 18	19 TO 24	ABOVE 24	TOTAL
N	3	12	28	45	28	0	116
NNE	2	4	15	39	16	1	77
NE	4	7	23	49	17	1	101
ENE	1	7	19	40	6	3	76
E	4	10	26	15	3	0	58
ESE	8	16	28	31	14	2	99
SE	2	7	28	46	19	5	107
SSE	2	8	25	62	40	1	138
S	1	12	30	60	36	1	140
SSW	1	11	28	58	57	4	159
SW	3	14	19	75	33	2	146
WSW	5	6	22	28	29	0	90
W	1	14	22	27	16	0	80
WNW	4	10	44	49	27	1	135
NW	4	12	37	87	29	0	169
NNW	4	14	38	51	21	1	129
VAR	0	0	0	0	0	0	0

TOTAL HOURS THIS CLASS 1826
HOURS OF CALM THIS CLASS 6
PERCENT OF ALL DATA THIS CLASS 11.03

NORTHERN STATES POWER COMPANY - MONTICELLO NUCLEAR GENERATING PLANT
SITE METEOROLOGY - FREQUENCY DISTRIBUTION TABLES

HOURS AT EACH WIND SPEED AND DIRECTION

PERIOD OF RECORD 9/ 1/76 THROUGH 8/31/78
STABILTIY CLASS G
ELEVATION 100 M

DIRECTION	WIND SPEED (MPH) AT 100 M LEVEL 1 TO 3	4 TO 7	8 TO 12	13 TO 18	19 TO 24	ABOVE 24	TOTAL
N	6	8	16	9	0	0	39
NNE	3	12	15	8	1	0	39
NE	4	6	11	16	4	0	41
ENE	6	11	15	11	3	1	47
E	8	7	11	11	1	0	38
ESE	1	12	9	16	2	0	40
SE	5	9	10	5	9	1	39
SSE	6	6	12	8	11	1	44
S	2	6	13	30	12	1	64
SSW	1	14	26	55	21	0	117
SW	1	9	21	26	25	3	85
WSW	5	16	29	16	14	0	80
W	3	14	8	16	18	2	61
WNW	5	15	23	21	9	0	73
NW	2	7	14	17	1	0	41
NNW	8	13	21	7	5	0	54
VAR	0	0	0	0	0	0	0

TOTAL HOURS THIS CLASS 904
HOURS OF CALM THIS CLASS 2
PERCENT OF ALL DATA THIS CLASS 5.46

NORTHERN STATES POWER COMPANY - MONTICELLO NUCLEAR GENERATING PLANT
SITE METEOROLOGY - FREQUENCY DISTRIBUTION TABLES

HOURS AT EACH WIND SPEED AND DIRECTION

PERIOD OF RECORD 9/ 1/76 THROUGH 8/31/78
ALL CLASSES COMBINED
ELEVATION 100 M

DIRECTION	WIND SPEED (MPH) AT 100 M LEVEL 1 TO 3	4 TO 7	8 TO 12	13 TO 18	19 TO 24	ABOVE 24	TOTAL
N	27	101	239	387	257	95	1106
NNE	25	94	191	259	109	20	698
NE	28	90	203	230	68	11	630
ENE	25	99	248	240	99	25	736
E	34	121	242	165	59	8	629
ESE	31	121	230	220	101	47	750
SE	33	120	240	325	160	40	918
SSE	23	135	285	385	281	54	1163
S	24	113	244	411	251	46	1089
SSW	18	148	259	425	318	103	1271
SW	25	128	233	321	191	40	938
WSW	29	117	200	205	116	22	689
W	20	107	194	196	113	24	654
WNW	30	108	301	419	232	93	1183
NW	22	97	331	709	527	173	1859
NNW	29	110	346	695	608	257	2045
VAR	0	0	0	0	0	0	0

C-9

DATA RECOVERY SUMMARY FOR PERIOD

TOTAL HOURS	17520
HOURS OF CALM	201
HOURS OF BAD DATA	961
PERCENT DATA RECOVERY	94.51

PERCENT ACCEPTABLE OBSERVATIONS IN EACH STABILITY CLASS

CLASS A	2.95
CLASS B	3.64
CLASS C	6.29
CLASS D	43.87
CLASS E	26.77
CLASS F	11.03
CLASS G	5.46

AVERAGE WIND SPEED FOR EACH WIND CATEGORY

1 TO 3 MPH	2.5
4 TO 7 MPH	5.8
8 TO 12 MPH	10.1
13 TO 18 MPH	15.4
19 TO 24 MPH	20.9
ABOVE 24 MPH	28.1