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See RPLS

SUBJECT: Rev 0 to "Offsite Dose Calculation Manual." W/two oversize figures.

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1. The purpose of this document is to provide a comprehensive overview of the current status of the project and to identify the key areas that require further attention. The information presented herein is based on the most recent data available and is intended to serve as a guide for decision-making.

2.0 PROJECT STATUS

2.1 The project is currently in the planning phase, with the following key milestones identified:

- Completion of the initial requirements gathering phase by the end of the month.
- Initiation of the design and development phase in the second quarter.
- Completion of the testing and deployment phase by the end of the year.

2.2 The project team has identified several key risks that could impact the successful completion of the project. These risks include:

- Limited resources and budget constraints.
- Potential delays in the procurement of necessary hardware and software.
- Changes in requirements or scope during the development phase.

2.3 The project team has developed a detailed project plan that outlines the tasks, responsibilities, and timelines for each phase of the project. This plan will be used to monitor progress and ensure that the project is completed on time and within budget.

2.4 The project team has also identified several key areas that require further attention and resources. These areas include:

- The need for additional personnel to support the design and development phase.
- The need for additional funding to cover the costs of hardware and software procurement.
- The need for ongoing communication and coordination with the project sponsor and other stakeholders.

3.0



NIAGARA MOHAWK POWER CORPORATION/300 ERIE BOULEVARD WEST, SYRACUSE, N.Y. 13202/TELEPHONE (315) 474-1511

March 5, 1986
(NMP2L 0650)

Ms. Elinor G. Adensam, Director
BWR Project Directorate No. 3
U.S. Nuclear Regulatory Commission
7920 Norfolk Avenue
Washington, DC 20555

Dear Ms. Adensam:

Re: Nine Mile Point Unit 2
Docket No. 50-410

Enclosed are ten copies of the Nine Mile Point Unit 2 Off Site Dose Calculation Manual (ODCM) for your use. This information is referenced in the Unit 2 Technical Specifications Section 6.14.

Sincerely,


C. V. Mangan
Senior Vice President

CVM/NLR/ar
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UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

In the Matter of)
Niagara Mohawk Power Corporation)
(Nine Mile Point Unit 2))

Docket No. 50-410

AFFIDAVIT

C. V. Mangan, being duly sworn, states that he is Senior Vice President of Niagara Mohawk Power Corporation; that he is authorized on the part of said Corporation to sign and file with the Nuclear Regulatory Commission the documents attached hereto; and that all such documents are true and correct to the best of his knowledge, information and belief.

C. V. Mangan

Subscribed and sworn to before me, a Notary Public in and for the State of New York and County of Orangetown, this 5th day of March, 1986.

Janis M. Macro
Notary Public in and for
Orangetown County, New York

My Commission expires:

JANIS M. MACRO

Notary Public in the State of New York
Qualified in Onondaga County No. 4784555
My Commission Expires March 30, 1987.

FOR INFORMATION ONLY

NINE MILE POINT NUCLEAR STATION

NINE MILE POINT UNIT 2

OFF-SITE DOSE CALCULATION MANUAL (ODCM)

<u>APPROVALS</u>	<u>SIGNATURES</u>	<u>DATE AND INITIALS</u>	<u>REVISION 0</u>	<u>REVISION 1</u>	<u>REVISION 2</u>
Chemistry and Radiation Management Superintendent E. W. Leach	<u><i>E. W. Leach</i></u>	<u>10/30/85</u> <u>EWL</u>			
Station Superintendent NMPNS Unit 2 R. B. Abbott	<u><i>R. B. Abbott</i></u>	<u>10/31/85</u> <u>RBA</u>			
General Superintendent Nuclear Generation T. J. Perkins	<u><i>T. J. Perkins</i></u>	<u>10/31/85</u> <u>TJP</u>			

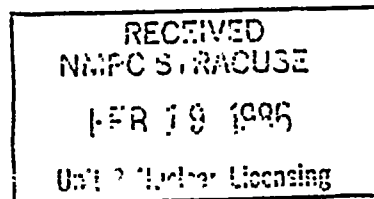
Summary of Pages

Revision 0 (Effective 10/31/85)

PAGE
1-52

DATE
October 1985

NIAGARA MOHAWK POWER CORPORATION



THIS PROCEDURE NOT TO BE
USED AFTER OCTOBER 1987
SUBJECT TO PERIODIC REVIEW.

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1.0

INTRODUCTION

This is the OFFSITE DOSE CALCULATION MANUAL (ODCM), referenced in the Nine Mile Point - Unit 2 Technical Specifications. It describes the methodology for liquid and gaseous effluent monitor alarm setpoint calculations, the methodology for computing the offsite dose due to liquid effluents, gaseous effluents, and the uranium fuel cycle as well as the radiological environmental monitoring and interlaboratory comparison programs.

The ODCM will be reviewed and approved by the NRC. Changes shall be provided in the semi annual radioactive effluent release reports submitted to the NRC.

2.0

LIQUID EFFLUENTS

Service Water A and B, Cooling Tower Blowdown and the Liquid Radioactive Waste Discharge comprise the Radioactive Liquid Effluents at Unit 2. Presently there are no temporary outdoor tanks containing radioactive water capable of affecting the nearest known or future water supply in an unrestricted area. NUREG 0133 and Regulatory Guide 1.109, Rev. 1 were followed in the development of this section.

2.1 Liquid Effluent Monitor Alarm Setpoint Determination

2.1.1 Basis

To provide a safe margin of assurance that the instantaneous concentration of radionuclides in liquid form at the point of discharge into the unrestricted area do not exceed the limits of 10CFR Part 20, Appendix B, Table II, Column 2.

Methodology for calculating alarm setpoint is described, as these are the setpoints which require action as described in the Technical Specifications. However, the monitors have alert setpoints which may require action as described in station procedures. These are normally set at half the alarm setpoint, but may vary as described in station procedures.

2.1.2 Setpoint Determination Methodology

2.1.2.1 Liquid Radwaste Effluent Monitor Alarm Setpoint:

$$\text{Alarm setpoint} \leq kF \sum_1 (C_i CF_i) \div [f \sum_1 (C_i / MPC_i)] + \text{Background.}$$

Where:

k = Factor to account for sample analysis, detector, flow and dilution flow measurement error.

f = Radwaste flow rate (gpm) alarm and control setpoint.

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2.1.2.1 (Cont'd)

C_1 = Concentration of isotope 1 ($\mu\text{Ci/ml}$) in Radwaste tank prior to dilution.

CF_1 = Detector calibration factor for isotope 1 (Net cpm/ $\mu\text{Ci/ml}$) Table 2-1.

MPC_1 = Concentration limit for isotope 1 from 10CFR Part 20 Appendix B, Table II, Column 2 ($\mu\text{Ci/ml}$).

F = Nonradioactive dilution flow rate (gpm).

Background = Detector response (cpm) when sample chamber is filled with nonradioactive water.

- NOTE:
1. $\Sigma(C_1 CF_1)$ may be evaluated from field measurements and utilized in lieu of specific CF_1 's of Table 2-1.
 2. MPC for noble gases dissolved or entrained is $2.00E-4\mu\text{Ci/ml}$.

2.1.2.2 Service Water A and B and Cooling Tower Blowdown Radiation Detector Alarm Setpoint

$$\text{Alarm setpoint} \leq kF \sum_i (C_1 CF_1) \div [f \sum_i (C_1 / MPC_1)] + \text{Background.}$$

Where:

k = Factor to account sample analysis and detector error.

C_1 = Concentration of isotope 1 ($\mu\text{Ci/ml}$).

CF_1 = Detector calibration factor for isotope 1 (net cpm/ $\mu\text{Ci/ml}$) Listed in Table 2-1.

f = Service water A, B or Cooling Tower Blowdown flow rate (gpm).

F = Nonradioactive Dilution flow rate (gpm).

MPC_1 = Concentration limit for isotope 1 from 10CFR Part 20 Appendix B, Table II, Column 2 ($\mu\text{Ci/ml}$).

Background = Detector response (cpm) when sample chamber is filled with nonradioactive water.

- NOTE:
1. $\Sigma(C_1 CF_1)$ may be evaluated from field measurements and utilized in lieu of specific CF_1 's of Table 2-1.
 2. MPC for noble gases dissolved or entrained is $2.00E-4\mu\text{Ci/ml}$.

TABLE 2-1

LIQUID EFFLUENT DETECTORS RESPONSES*

<u>NUCLIDE</u>	<u>(CPM/μCl/ml) $\times 10^8$</u>
Sr 89	0.78E-04
Sr 91	1.22
Sr 92	0.817
Y 91	2.47
Y 92	0.205
Zr 95	0.835
Nb 95	0.85
Mo 99	0.232
Tc 99m	0.232
Te 132	1.12
Ba 140	0.499
Ce 144	0.103
Br 84	1.12
I 131	1.01
I 132	2.63
I 133	0.967
I 134	2.32
I 135	1.17
Cs 134	1.97
Cs 136	2.89
Cs 137	0.732
Cs 138	1.45
Mn 54	0.842
Mn 56	1.2
Fe 59	0.863
Co 58	1.14
Co 60	1.65

* Values from SWEC purchase specification NMP2-P281F.

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2.2

Liquid Effluent Dose Calculation Methodology

The dose contributions will be calculated for all radionuclides identified in liquid effluents release to unrestricted areas using the following expression:

$$D_{\tau} = \sum_i [A_{i\tau} \sum_l \Delta t_l C_{il} F_l]$$

Where:

D_{τ} = the cumulative dose commitment to the total body or any organ, τ , from the liquid effluents for the total time period $\sum_l \Delta t_l$, in mRem.

Δt_l = the length of the l th time period over which C_{il} and F_l are averaged for all liquid releases, in hours.

C_{il} = the average concentration of radionuclide, i , in undiluted liquid effluent during time period Δt_l from any liquid release, in $\mu\text{Ci/ml}$.

$A_{i\tau}$ = the site related ingestion dose commitment factor to the total body or any organ τ for each identified principal gamma and beta emitter listed in Table 2-2 in mrem-ml per hr- μCi . $A_{i\tau}$ is calculated using the methodology of NUREG 0133 Section 4.3.1. (The factor D_w , used to take into account the dilution of C_{il} to the point of adult water consumption is 78.6.)
See NMP Unit 2 ER-OLS, Table 5.4-2.

F_l = the near field average dilution factor for C_{il} during any liquid effluent release. Defined as the ratio of the maximum undiluted liquid waste flow during release to the product of the average flow from the site discharge structure to unrestricted receiving waters, times 5.9. (5.9 is the site specific applicable factor for the mixing effect of the discharge structure.) See NMP Unit 2 ER-OLS, Table 5.4-2.



TABLE 2-2

 A_{1T} VALUES - LIQUID* $\frac{\text{mrem} - \text{ml}}{\text{hr} - \mu\text{Ci}}$

NUCLIDE	T BODY	GI-TRACT	BONE	LIVER	KIDNEY	THYROID	LUNG
H 3	2.93E-1	2.93E-1	--	2.93E-1	2.93E-1	2.93E-1	2.93E-1
Cr 51	1.28	3.21E2	--	--	2.81E-1	7.62E-1	1.69
Mn 54	8.36E2	1.34E4	--	4.38E3	1.30E3	--	--
Fe 59	9.38E2	8.16E3	1.04E3	2.45E3	--	--	6.84E2
Co 58	2.01E2	1.82E3	--	8.96E1	--	--	--
Co 60	5.68E2	4.84E3	--	2.57E2	--	--	--
Zn 65	3.33E4	4.64E4	2.32E4	7.37E4	4.93E4	--	--
Sr 89	6.40E2	3.58E3	2.23E4	--	--	--	--
Sr 90	1.35E5	1.59E4	5.49E5	--	--	--	--
Zr 95	5.64E-2	2.64E2	2.60E-1	8.33E-2	1.31E-1	--	--
Mo 99	2.02E1	2.46E2	--	1.06E2	2.40E2	--	--
I 131	1.25E2	5.74E1	1.52E2	2.17E2	3.73E2	7.13E4	--
I 133	2.75E1	8.11E1	5.19E1	9.03E1	1.57E2	1.33E4	--
Cs 134	5.79E5	1.24E4	2.98E5	7.09E5	2.29E5	--	7.61E4
Cs 136	8.86E4	1.40E4	3.12E4	1.23E5	6.85E4	--	9.39E3
Cs 137	3.42E5	1.01E4	3.81E5	5.22E5	1.77E5	--	5.89E4
Ba 140	1.36E1	4.27E2	2.07E2	2.61E-1	8.86E-2	--	1.49E-1
Ce 141	2.18E-3	7.34E1	2.84E-2	1.92E-2	8.92E-3	--	--
Nb 95	1.34E2	1.51E6	4.47E2	2.48E2	2.46E2	--	--
La 140	2.01E-2	5.60E3	1.51E-1	7.62E-2	--	--	--
Ce 144	7.95E-2	5.01E2	1.48	6.19E-1	3.67E-1	--	--

* Calculated in accordance with NUREG 0133, Section 4.3.1

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3.0

GASEOUS EFFLUENTS

The Main Stack and the combined Reactor/Radwaste Building Vent comprise the Gaseous Effluent Release Points. Although the Offgas System is not a Release Point, it is operated in such a way to limit actual or potential offsite doses. NUREG 0133 and Regulatory Guide 1.109, Rev. 1 were followed, except where noted, in the development of this section.

3.1 Gaseous Effluent Monitor Setpoint Determination

3.1.1 Basis

To provide a safe margin of assurance that the instantaneous release rate of radionuclides in gaseous effluents from the site to areas at and beyond the site boundary will not exceed 500mRem/yr to the total body.

Methodology for calculating alarm setpoint is described, as these are the setpoints which require action as described in the Technical Specifications. However, the monitors also have alert setpoints as well, which may require action as described in station procedures. These are normally set at half of the alarm setpoint, but may vary as described in station procedures.

3.1.2 Setpoint Determination Methodology

3.1.2.1 Stack Noble Gas Detector Alarm Setpoint

$$\text{Alarm Setpoint} \leq k R \sum_i (C_i CF_i) \div [F \sum_i (C_i V_i)] + \text{Background}$$

Where:

k = Factor to account for detector and effluent flow measurement errors.

R = A value of 500 mRem/yr or less depending upon the release rate from other points within the site such that the total rate corresponds to ≤ 500 mRem/yr.

C_i = Concentration of isotope i, (μCi/cc).

CF_i = Detector response to isotope i, (Net cpm/μCi/cc). Table 3-1.

F = Effluent flow rate, (cc/sec).

V_i = The constant for each identified noble gas radionuclide accounting for total body dose from the elevated finite plume, in mrem/yr per μCi/sec. Table 3-2.

Background = Detector response (cpm) when sample chamber is filled with nonradioactive air.

NOTE: $\sum(C_i CF_i)$ may be evaluated from direct field measurements.

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3.1.2.2 Vent Noble Gas Detector Setpoint

$$\text{Alarm Setpoint} \leq k R \sum_i (C_i CF_i) \div [F(X/Q)_v \sum_i (C_i K_i)] + \text{Background}$$

Where:

- k = Factor to account for detector and effluent flow measurement errors.
- R = A value of 500 mRem/yr or less depending upon the release rate from other points within the site such that the total rate corresponds to ≤ 500 mRem/yr.
- C_i = Concentration of isotope i , ($\mu\text{Ci/cc}$).
- CF_i = Detector response to isotope i , (net cpm/ $\mu\text{Ci/cc}$). Table 3-1.
- F = Effluent flow rate, (m^3/sec).
- $(X/Q)_v$ = Highest annual average atmospheric dispersion coefficient at the site boundary: $2.0\text{E-}6$ sec/ m^3 . (FES, NUREG1085, Table D-2)
- K_i = The total body dose factor due to gamma emissions for each identified noble gas radionuclide, in mRem/yr per $\mu\text{Ci}/\text{m}^3$. Table 3-3.
- Background = Detector response (cpm) when sample chamber is filled with nonradioactive air.

Note: $\sum (C_i CF_i)$ may be evaluated from direct measurements.

3.1.2.3 Offgas Pretreatment Noble Gas Detector Setpoint

Alarm setpoint is based on $100\mu\text{Ci/sec/MWt}$ limit rather than methodology of NUREG 0133 Section 5.6.2 to be more conservative.

$$\text{Alarm Setpoint} \leq k 332,300 (60) \sum_i (C_i CF_i) \div [f \sum_i C_i] + \text{Background}$$

Where:

- k = Factor to account for detector, analysis and flow measurement errors.
- $332,300 = 3323 \text{ MW}_T \times 100 \mu\text{Ci/sec/MW}_T$.
- 60 = 60 sec/min.
- C_i = Concentration of nuclide i , ($\mu\text{Ci/cc}$).
- CF_i = Detector Response (net cpm/ $\mu\text{Ci/cc}$).
- f = Offgas system flowrate(cc/min).

Background = Detector response (cpm) when sample chamber is filled with nonradioactive air.

3.1.2.4 Offgas Hydrogen Detector

Alarm setpoint is less than or equal to 4% by Hydrogen volume.

TABLE 3-1

STACK AND VENT NOBLE GAS*
DETECTOR RESPONSE

<u>NUCLIDE</u>	<u>NET CPM/μCi/cc</u>
Kr 85	1.00E+5
Kr 85m	6.60E+7
Kr 87	3.00E+7
Kr 88	3.70E+6
Xe 133	6.10E+6
Xe 133m	9.60E+6
Xe 135	5.30E+7
Xe 135m	1.90E+7
Xe 138	5.60E+7

OFFGAS PRETREATMENT**
DETECTOR RESPONSE

<u>NUCLIDE</u>	<u>NET CPM/μCi/cc</u>
Kr 85	4.30E+3
Kr 85m	4.80E+3
Kr 87	8.00E+3
Kr 88	7.60E+3
Xe 133	1.75E+3
Xe 133m	--
Xe 135	5.10E+3
Xe 135m	--
Xe 137	8.10E+3
Xe 138	7.10E+3

*Values from SWEC purchase specification NMP2-U213A

**Values from SWEC purchase specification NMP2-P281F



3.2 Dose Rate Calculation Methodology:

3.2.1 Total body dose rate due to noble gases:

$$\text{mrem/yr} = \sum_i [V_i \dot{Q}_{is} + K_i ((\bar{X}/Q) \dot{V} Q_{iv})]$$

3.2.2 Skin dose rate due to noble gases:

$$\text{mrem/yr} = \sum_i [(L_i (\bar{X}/Q)_s + 1.1 B_i) \dot{Q}_{is} + (L_i + 1.1 M_i)((\bar{X}/Q) \dot{V} Q_{iv})]$$

3.2.3 Organ dose rates due to iodine-131, iodine-133, tritium and all radionuclides in particulate form with half-lives greater than 8 days:

$$\text{mrem/yr} = \sum_i P_i [W_s \dot{Q}_{is} + W_v \dot{Q}_{iv}]$$

3.2.4 NOTE: See Section 3.3.4 for symbol definition and notes.

3.3 Dose Calculations Methodology

3.3.1 Gamma air dose due to noble gases:

$$\text{mrad} = 3.17\text{E-}8 \sum_i M_i [(\bar{X}/Q)_v \dot{Q}_{iv} + B_i \dot{Q}_{is}]$$

3.3.2 Beta air dose due to noble gases:

$$\text{mrad} = 3.17\text{E-}8 \sum_i N_i [(\bar{X}/Q)_v \dot{Q}_{iv} + (\bar{X}/Q)_s \dot{Q}_{is}]$$

3.3.3 Organ dose due to iodine-131, iodine-133, tritium and all radionuclides in particulate form with half-lives greater than 8 days:

$$\text{mrem} = 3.17\text{E-}8 \sum_i R_i [W_s \dot{Q}_{is} + W_v \dot{Q}_{iv}]$$

3.3.4 Note:(1) When a nuclide's dose factor for an organ is less than the total body factor, then the total body factor will be used in its place to calculate the organ's dose.

(2) Organ doses are evaluated assuming the worst case dispersion factor for each respective pathway. It should be noted that this is conservative.

(3) In lieu of the use of average annual dispersion factors, dispersion factors calculated for real meteorology during the period of release may be used in conjunction with release data in calculating doses.

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3.3.4 (Cont'd)

Symbol Definition

$3.17E-8$ = The inverse of the number of seconds in a year.

B_1 = The constant for long term releases for each identified noble gas radionuclide accounting for the gamma radiation from the elevated finite plume, mrad/yr per $\mu\text{Ci/sec}$. Table 3-2.

V_1 = The constant for long-term releases for each identified noble gas radionuclide accounting for the gamma radiation from the elevated finite plume, in mrem/yr per $\mu\text{Ci/sec}$. Table 3-2.

K_1 = The total body dose factor due to gamma emissions for each identified noble gas radionuclide, in mrem/yr per $\mu\text{Ci/m}^3$. Table 3-3.

L_1 = The skin dose factor due to beta emissions for each identified noble gas radionuclide, in mrem/yr per $\mu\text{Ci/m}^3$. Table 3-3.

M_1 = The air dose factor due to gamma emissions for each identified noble gas radionuclide, in mrad/yr per $\mu\text{Ci/m}^3$ (unit conversion constant of 1.1 mrem/mrad converts air dose to skin dose). Table 3-3.

N_1 = The air dose factor due to beta emissions for each identified noble gas radionuclide, in mrad/yr per $\mu\text{Ci/m}^3$. Table 3-3.

P_1 = The dose parameter for radionuclides other than noble gases for the inhalation pathway, in mrem/yr per $\mu\text{Ci/m}^3$ and for food and ground plane pathways, in m^2 (mrem/yr per $\mu\text{Ci/sec}$). The dose factors are based on the critical individual organ and most restrictive age group (infant). Table 3-3 thru 3-6.

R_1 = The dose factor for each identified radionuclide, i , in $\text{m}^2(\text{mrem/yr})$ per $\mu\text{Ci/sec}$ or mrem/yr per $\mu\text{Ci/m}^3$. Table 3-7 thru 3-21.

Q_{1s} = The release rate of radionuclides, i , in gaseous effluents from the stack, in $\mu\text{Ci/sec}$.

Q_{1v} = The release rate of radionuclides, i , in gaseous effluent from the vent, in $\mu\text{Ci/sec}$.

$\sim Q_{1s}$ = The activity of a radionuclide, i , for releases from the vent, in μCi . Releases shall be cumulative over the calendar quarter or year as appropriate.

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- \tilde{Q}_{1v} = The activity of a radionuclide, i, for releases from the vent, in μCi . Releases shall be cumulative over the calendar quarter or year as appropriate.
- $(\overline{X/Q})_v$ = $1.7\text{E-}6$ sec/ m^3 . For vent releases. The highest calculated annual average relative concentration at or beyond the unrestricted area boundary. CT Main Study Oct. 85.
- $(\overline{X/Q})_s$ = $2.1\text{E-}8$ sec/ m^3 . For stack releases. The highest calculated annual average relative concentration at or beyond the unrestricted area boundary. NMP Unit 2 ER-OLS Table 7B-4.
- W_v = The highest calculated annual average dispersion parameter for estimating the dose to an individual at the controlling location due to vent releases. Table 3-22. (X/Q or D/Q)
- W_s = The highest calculated annual average dispersion parameter for estimating the dose to an individual at the controlling location due to stack releases. Table 3-22. (X/Q or D/Q)

TABLE 3-2

PLUME SHINE PARAMETERS*

<u>NUCLIDE</u>	<u>B_1 (mrad/yr \div μCi/sec)</u>	<u>V_1 (mrem/yr \div μCi/sec)</u>
Kr 83m		
Kr 85		
Kr 85m		
Kr 87		
Kr 88		
Kr 89		
Kr 90		

NOTE: The valves in this table will be provided at
a later time.

Xe 131m

Xe 133

Xe 133m

Xe 135

Xe 135m

Xe 137

Xe 138

Ar 41

* B_1 and V_1 are calculated for critical site boundary location; 1.6km
in the easterly direction.

248

TABLE 3-3
DOSE FACTORS*

<u>Nuclide</u>	<u>K_i(γ-Body)**</u>	<u>L_i(β-Skin)**</u>	<u>M_i(γ-Air)***</u>	<u>N_i(β-Air)***</u>
Kr 83m	7.56E-02	---	1.93E1	2.88E2
Kr 85m	1.17E3	1.46E3	1.23E3	1.97E3
Kr 85	1.61E1	1.34E3	1.72E1	1.95E3
Kr 87	5.92E3	9.73E3	6.17E3	1.03E4
Kr 88	1.47E4	2.37E3	1.52E4	2.93E3
Kr 89	1.66E4	1.01E4	1.73E4	1.06E4
Kr 90	1.56E4	7.29E3	1.63E4	7.83E3
Xe 131m	9.15E1	4.76E2	1.56E2	1.11E3
Xe 133m	2.51E2	9.94E2	3.27E2	1.48E3
Xe 133	2.94E2	3.06E2	3.53E2	1.05E3
Xe 135m	3.12E3	7.11E2	3.36E3	7.39E2
Xe 135	1.81E3	1.86E3	1.92E3	2.46E3
Xe 137	1.42E3	1.22E4	1.51E3	1.27E4
Xe 138	8.83E3	4.13E3	9.21E3	4.75E3
Ar 41	8.84E3	2.69E3	9.30E3	3.28E3

*From, Table B-1. Regulatory Guide 1.109 Rev. 1

**mrem/yr per $\mu\text{Ci}/\text{m}^3$.

***mrad/yr per $\mu\text{Ci}/\text{m}^3$.

TABLE 3-4

P₁ VALUES - GROUND PLANE**

$$\frac{m^2}{\mu Ci/sec} - \frac{mrem/yr}{\mu Ci/sec}$$

<u>NUCLIDE</u>	<u>TOTAL BODY</u>	<u>SKIN</u>
H 3	-----	-----
C 14	-----	-----
Cr 51	6.64E6	7.85E6
Mn 54	1.10E9	1.29E9
Fe 59	3.88E8	4.56E8
Co 58	5.27E8	6.18E8
Co 60	4.40E9	5.17E9
Zn 65	6.87E8	7.90E8
Sr 89	3.06E4	3.56E4
Sr 90	-----	-----
Zr 95	3.44E8	3.99E8
* Nb 95	3.50E8	4.12E8
Mo 99	5.71E6	6.61E6
I 131	2.46E7	2.98E7
I 133	3.50E6	4.26E6
Cs 134	2.81E9	3.28E9
Cs 137	1.15E9	1.34E9
Ba 140	2.93E7	3.35E7
* La 140	2.10E8	2.38E8
Ce 141	1.95E7	2.20E7
Ce 144	5.85E7	6.77E7

*Daughter Decay Product. Activity level and effective half life assumed to equal parent nuclide.

**Calculated in accordance with NUREG 0133, Section 5.2.1.2.

-15- October 1985



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TABLE 3-5

P_i VALUES - INHALATION**mrem/yrμCi/m³

<u>NUCLIDE</u>	<u>BONE</u>	<u>LIVER</u>	<u>T. BODY</u>	<u>THYROID</u>	<u>KIDNEY</u>	<u>LUNG</u>	<u>GI-LLI</u>
H 3	---	6.47E2	6.47E2	6.47E2	6.47E2	6.47E2	6.47E2
C 14	2.65E4	5.31E3	5.31E3	5.31E3	5.31E3	5.31E3	5.31E3
Cr 51	--	--	8.95E1	5.75E1	1.32E1	1.28E4	3.57E2
Mn 54	--	2.53E4	4.98E3	--	4.98E3	1.00E6	7.06E3
Fe 59	1.36E4	2.35E4	9.48E3	--	--	1.02E6	2.48E4
Co 58	--	1.22E3	1.82E3	--	--	7.77E5	1.11E4
Co 60	--	8.02E3	1.18E4	--	--	4.51E6	3.19E4
Zn 65	1.93E4	6.26E4	3.11E4	--	3.25E4	6.47E5	5.14E4
Sr 89	3.98E5	--	1.14E4	--	--	2.03E6	6.40E4
Sr 90	4.09E7	--	2.59E6	--	--	1.12E7	1.31E5
Zr 95	1.15E5	2.79E4	2.03E4	--	3.11E4	1.75E6	2.17E4
*Nb 95	1.57E4	6.43E3	3.78E3	--	4.72E3	4.79E5	1.27E4
Mo 99	--	1.65E2	3.23E1	--	2.65E2	1.35E5	4.87E4
I 131	3.79E4	4.44E4	1.96E4	1.48E7	5.18E4	--	1.06E3
I 133	1.32E4	1.92E4	5.60E3	3.56E6	2.24E4	--	2.16E3
Cs 134	3.96E5	7.03E5	7.45E4	--	1.90E5	7.97E4	1.33E3
Cs 137	5.49E5	6.12E5	4.55E4	--	1.72E5	7.13E4	1.33E3
Ba 140	5.60E4	5.60E1	2.90E3	--	1.34E1	1.60E6	3.84E4
*La 140	5.05E2	2.00E2	5.15E1	--	--	1.68E5	8.48E4
Ce 141	2.77E4	1.67E4	1.99E3	--	5.25E3	5.17E5	2.16E4
Ce 144	3.19E6	1.21E6	1.76E5	--	5.38E5	9.84E6	1.48E5

*Daughter Decay Product. Activity level and effective half life assumed to equal parent nuclide.

**Calculated in accordance with NUREG 0133, Section 5.2.1.1.

TABLE 3-6

P_i VALUES - FOOD (Cow Milk)***m² - mrem/yr ÷ µCi/sec

NUCLIDE	BONE	LIVER	T. BODY	THYROID	KIDNEY	LUNG	GI-LLI
*H 3	--	2.40E3	2.40E3	2.40E3	2.40E3	2.40E3	2.40E3
*C 14	3.23E6	6.89E5	6.89E5	6.89E5	6.89E5	6.89E5	6.89E5
Cr 51	--	--	1.64E5	1.07E5	2.34E4	2.08E5	4.78E6
Mn 54	--	3.97E7	8.99E6	--	8.80E6	--	1.46E7
Fe 59	2.28E8	3.99E8	1.57E8	--	--	1.18E8	1.91E8
Co 58	--	2.47E7	6.16E7	--	--	--	6.15E7
Co 60	--	8.98E7	2.12E8	--	--	--	2.14E8
Zn 65	5.65E9	1.94E10	8.94E9	--	9.40E9	--	1.64E10
Sr 89	1.28E10	--	3.67E8	--	--	--	2.63E8
Sr 90	1.24E11	--	3.15E10	--	--	--	1.55E9
Zr 95	6.93E3	1.69E3	1.20E3	--	1.82E3	--	8.41E5
**Nb 95	7.07E5	2.91E5	1.68E5	--	2.09E5	--	2.46E8
Mo 99	--	2.12E8	4.13E7	--	3.17E8	--	6.98E7
I 131	2.77E9	3.26E9	1.43E9	1.07E12	3.81E9	--	1.16E8
I 133	3.69E7	5.37E7	1.57E7	9.77E9	6.31E7	--	9.09E6
Cs 134	3.71E10	6.92E10	6.99E9	--	1.78E10	7.31E9	1.88E8
Cs 137	5.24E10	6.13E10	4.35E9	--	1.65E10	6.67E9	1.92E8
Ba 140	2.45E8	2.45E5	1.26E7	--	5.83E4	1.51E5	6.03E7
**La 140	3.79E2	1.49E2	3.84E1	--	--	--	1.75E6
Ce 141	4.41E4	2.69E4	3.17E3	--	8.30E3	--	1.39E7
Ce 144	2.37E6	9.69E5	1.33E5	--	3.92E5	--	1.36E8

*mrem/yr per µCi/m³.

**Daughter Decay Product. Activity level and effective half life assumed to equal parent nuclide.

***Calculated in accordance with NUREG 0133, Section 5.2.1.3.

-17- October 1985



TABLE 3-7

R_i VALUES - INHALATION - INFANT**mrem/yrμCi/m³

<u>NUCLIDE</u>	<u>BONE</u>	<u>LIVER</u>	<u>T. BODY</u>	<u>THYROID</u>	<u>KIDNEY</u>	<u>LUNG</u>	<u>GI-LLI</u>
H 3	--	6.47E2	6.47E2	6.47E2	6.47E2	6.47E2	6.47E2
C 14	2.65E4	5.31E3	5.31E3	5.31E3	5.31E3	5.31E3	5.31E3
Cr 51	--	--	8.95E1	5.75E1	1.32E1	1.28E4	3.57E2
Mn 54	--	2.53E4	4.98E3	--	4.98E3	1.00E6	7.06E3
Fe 59	1.36E4	2.35E4	9.48E3	--	--	1.02E6	2.48E4
Co 58	--	1.22E3	1.82E3	--	--	7.77E5	1.11E4
Co 60	--	8.02E3	1.18E4	--	--	4.51E6	3.19E4
Zn 65	1.93E4	6.26E4	3.11E4	--	3.25E4	6.47E5	5.14E4
Sr 89	3.98E5	--	1.14E4	--	--	2.03E6	6.40E4
Sr 90	4.09E7	--	2.59E6	--	--	1.12E7	1.31E5
Zr 95	1.15E5	2.79E4	2.03E4	--	3.11E4	1.75E6	2.17E4
*Nb 95	1.57E4	6.43E3	3.78E3	--	4.72E3	4.79E5	1.27E4
Mo 99	--	1.65E2	3.23E1	--	2.65E2	1.35E5	4.87E4
I 131	3.79E4	4.44E4	1.96E4	1.48E7	5.18E4	--	1.06E3
I 133	1.32E4	1.92E4	5.60E3	3.56E6	2.24E4	--	2.16E3
Cs 134	3.96E5	7.03E5	7.45E4	--	1.90E5	7.97E4	1.33E3
Cs 137	5.49E5	6.12E5	4.55E4	--	1.72E5	7.13E4	1.33E3
Ba 140	5.60E4	5.60E1	2.90E3	--	1.34E1	1.60E6	3.84E4
*La 140	5.05E2	2.00E2	5.15E1	--	--	1.68E5	8.48E4
Ce 141	2.77E4	1.67E4	1.99E3	--	5.25E3	5.17E5	2.16E4
Ce 144	3.19E6	1.21E6	1.76E5	--	5.38E5	9.84E6	1.48E5

*Daughter Decay Product. Activity level and effective half life assumed to equal parent nuclide.

**This and following R_i Tables Calculated in accordance with NUREG 0133, Section 5.3.1, except C 14 values in accordance with Regulatory Guide 1.109, Equation C-8.



TABLE 3 - 8

 R_1 VALUES - INHALATION - CHILDmrem/yr $\mu\text{Ci}/\text{m}^3$

<u>NUCLIDE</u>	<u>BONE</u>	<u>LIVER</u>	<u>T. BODY</u>	<u>THYROID</u>	<u>KIDNEY</u>	<u>LUNG</u>	<u>GI-LLI</u>
H 3	--	1.12E3	1.12E3	1.12E3	1.12E3	1.12E3	1.12E3
C 14	3.59E4	6.73E3	6.73E3	6.73E3	6.73E3	6.73E3	6.73E3
Cr 51	--	--	1.54E2	8.55E1	2.43E1	1.70E4	1.08E3
Mn 54	--	4.29E3	9.51E3	--	1.00E4	1.58E6	2.29E4
Fe 59	2.07E4	3.34E4	1.67E4	--	--	1.27E6	7.07E4
Co 58	--	1.77E3	3.16E3	--	--	1.11E6	3.44E4
Co 60	--	1.31E4	2.26E4	--	--	7.07E6	9.62E4
Zn 65	4.26E4	1.13E5	7.03E4	--	7.14E4	9.95E5	1.63E4
Sr 89	5.99E5	--	1.72E4	--	--	2.16E6	1.67E5
Sr 90	1.01E8	--	6.44E6	--	--	1.48E7	3.43E5
Zr 95	1.90E5	4.18E4	3.70E4	--	5.96E4	2.23E6	6.11E4
*Nb 95	2.35E4	9.18E3	6.55E3	--	8.62E3	6.14E5	3.70E4
Mo 99	--	1.72E2	4.26E1	--	3.92E2	1.35E5	1.27E5
I 131	4.81E4	4.81E4	2.73E4	1.62E7	7.88E4	--	2.84E3
I 133	1.66E4	2.03E4	7.70E3	3.85E6	3.38E4	--	5.48E3
Cs 134	6.51E5	1.01E6	2.25E5	--	3.30E5	1.21E5	3.85E3
Cs 137	9.07E5	8.25E5	1.28E5	--	2.82E5	1.04E5	3.62E3
Ba 140	7.40E4	6.48E1	4.33E3	--	2.11E1	1.74E6	1.02E5
*La 140	6.44E2	2.25E2	7.55E1	--	--	1.83E5	2.26E5
Ce 141	3.92E4	1.95E4	2.90E3	--	8.55E3	5.44E5	5.66E4
Ce 144	6.77E6	2.12E6	3.61E6	--	1.17E6	1.20E7	3.89E5

*Daughter Decay Product. Activity level and effective half life assumed to equal parent nuclide.

TABLE 3 - 9

 R_1 VALUES - INHALATION - TEENmrem/yr $\mu\text{Ci}/\text{m}^3$

<u>NUCLIDE</u>	<u>BONE</u>	<u>LIVER</u>	<u>T. BODY</u>	<u>THYROID</u>	<u>KIDNEY</u>	<u>LUNG</u>	<u>GI-LLI</u>
H 3	--	1.27E3	1.27E3	1.27E3	1.27E3	1.27E3	1.27E3
C 14	2.60E4	4.87E3	4.87E3	4.87E3	4.87E3	4.87E3	4.87E3
Cr 51	--	--	1.35E2	7.50E1	3.07E1	2.10E4	3.00E3
Mn 54	--	5.11E4	8.40E3	--	1.27E4	1.98E6	6.68E4
Fe 59	1.59E4	3.70E4	1.43E4	--	--	1.53E6	1.78E4
Co 58	--	2.07E3	2.78E3	--	--	1.34E6	9.52E4
Co 60	--	1.51E4	1.98E4	--	--	8.72E6	2.59E5
Zn 65	3.86E4	1.34E5	6.24E4	--	8.64E4	1.24E6	4.66E4
Sr 89	4.34E5	--	1.25E4	--	--	2.42E6	3.71E5
Sr 90	1.08E8	--	6.68E6	--	--	1.65E7	7.65E5
Zr 95	1.46E5	4.58E4	3.15E4	--	6.74E4	2.69E6	1.49E5
*Nb 95	1.86E4	1.03E4	5.66E3	--	1.00E4	7.51E5	9.68E4
Mo 99	--	1.69E2	3.22E1	--	4.11E2	1.54E5	2.69E5
I 131	3.54E4	4.91E4	2.64E4	1.46E7	8.40E4	--	6.49E3
I 133	1.22E4	2.05E4	6.22E3	2.92E6	3.59E4	--	1.03E4
Cs 134	5.02E5	1.13E6	5.49E5	--	3.75E5	1.46E5	9.76E3
Cs 137	6.70E5	8.48E5	3.11E5	--	3.04E5	1.21E5	8.48E3
Ba 140	5.47E4	6.70E1	3.52E3	--	2.28E1	2.03E6	2.29E5
*La 140	4.79E2	2.36E2	6.26E1	--	--	2.14E5	4.87E5
Ce 141	2.84E4	1.90E4	2.17E3	--	8.88E3	6.14E5	1.26E5
Ce 144	4.89E6	2.02E6	2.62E5	--	1.21E6	1.34E7	8.64E5

*Daughter Decay Product. Activity level and effective half life assumed to equal parent nuclide.



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TABLE 3 - 10

R₁ VALUES - INHALATION - ADULTmrem/yrμCi/m³

<u>NUCLIDE</u>	<u>BONE</u>	<u>LIVER</u>	<u>T. BODY</u>	<u>THYROID</u>	<u>KIDNEY</u>	<u>LUNG</u>	<u>GI-LLI</u>
H 3	--	1.26E3	1.26E3	1.26E3	1.26E3	1.26E3	1.26E3
C 14	1.82E4	3.41E3	3.41E3	3.41E3	3.41E3	3.41E3	3.41E3
Cr 51	--	--	1.00E2	5.95E1	2.28E1	1.44E4	3.32E3
Mn 54	--	3.96E4	6.30E3	--	9.84E3	1.40E6	7.74E4
Fe 59	1.18E4	2.78E4	1.06E4	--	--	1.02E6	1.88E5
Co 58	--	1.58E3	2.07E3	--	--	9.28E5	1.06E5
Co 60	--	1.15E4	1.48E4	--	--	5.97E6	2.85E5
Zn 65	3.24E4	1.03E5	4.66E4	--	6.90E4	8.64E5	5.34E4
Sr 89	3.04E5	--	8.72E3	--	--	1.40E6	3.50E5
Sr 90	9.92E7	--	6.10E6	--	--	9.60E6	7.22E5
Zr 95	1.07E5	3.44E4	2.33E4	--	5.42E4	1.77E6	1.50E5
*Nb 95	1.41E4	7.82E3	4.21E3	--	7.74E3	5.05E5	1.04E5
Mo 99	--	1.21E2	2.30E1	--	2.91E2	9.12E4	2.48E5
I 131	2.52E4	3.58E4	2.05E4	1.19E7	6.13E4	--	6.28E3
I 133	8.64E3	1.48E4	4.52E3	2.15E6	2.58E4	--	8.88E3
Cs 134	3.73E5	8.48E5	7.28E5	--	2.87E5	9.76E4	1.04E4
Cs 137	4.78E5	6.21E5	4.28E5	--	2.22E5	7.52E4	8.40E3
Ba 140	3.90E4	4.90E1	2.57E3	--	1.67E1	1.27E6	2.18E5
*La 140	3.44E2	1.74E2	4.58E1	--	--	1.36E5	4.58E5
Ce 141	1.99E4	1.35E4	1.53E3	--	6.26E3	3.62E5	1.20E5
Ce 144	3.43E6	1.43E6	1.84E5	--	8.48E5	7.78E6	8.16E5

*Daughter Decay Product. Activity level and effective half life assumed to equal parent nuclide.

TABLE 3-11

R₁ VALUES - GROUND PLANE

ALL AGE GROUPS

 m^2 - mrem/yr ÷ μ Ci/sec

<u>NUCLIDE</u>	<u>TOTAL BODY</u>	<u>SKIN</u>
H 3	--	--
C 14	--	--
Cr 51	4.65E6	5.50E6
Mn 54	1.40E9	1.64E9
Fe 59	2.73E8	3.20E8
Co 58	3.80E8	4.45E8
Co 60	2.15E10	2.53E10
Zn 65	7.46E8	8.57E8
Sr 89	2.16E4	2.51E4
Sr 90	--	--
Zr 95	2.45E8	2.85E8
*Nb 95	2.50E8	2.94E8
Mo 99	3.99E6	4.63E6
I 131	1.72E7	2.09E7
I 133	2.45E6	2.98E6
Cs 134	6.83E9	7.97E9
Cs 137	1.03E10	1.20E10
Ba 140	2.05E7	2.35E7
*La 140	1.47E8	1.66E8
Ce 141	1.37E7	1.54E7
Ce 144	6.96E7	8.07E7

*Daughter Decay Product. Activity level and effective half life assumed to equal parent nuclide.



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TABLE 3 - 12

R₁ VALUES-COWMILK-INFANT m^2 -mrem/yr ÷ μ Ci/sec

NUCLIDE	BONE	LIVER	T. BODY	THYROID	KIDNEY	LUNG	GI-LLI
*H 3	--	2.38E3	2.38E3	2.38E3	2.38E3	2.38E3	2.38E3
*C 14	3.23E6	6.89E5	6.89E5	6.89E5	6.89E5	6.89E5	6.89E5
Cr 51	--	--	8.35E4	5.45E4	1.19E4	1.06E5	2.43E6
Mn 54	--	2.51E7	5.68E6	--	5.56E6	--	9.21E6
Fe 59	1.22E8	2.13E8	8.38E7	--	--	6.29E7	1.02E8
Co-58	--	1.39E7	3.46E7	--	--	--	3.46E7
Co 60	--	5.90E7	1.39E8	--	--	--	1.40E8
Zn 65	3.53E9	1.21E10	5.58E9	--	5.87E9	--	1.02E10
Sr 89	6.93E9	--	1.99E8	--	--	--	1.42E8
Sr 90	8.19E10	--	2.09E10	--	--	--	1.02E9
Zr 95	3.85E3	9.39E2	6.66E2	--	1.01E3	--	4.68E5
**Nb 95	3.93E5	1.62E5	9.35E4	--	1.16E5	--	1.37E8
Mo 99	--	1.04E8	2.03E7	--	1.55E8	--	3.43E7
I 131	1.36E9	1.60E9	7.04E8	5.26E11	1.87E9	--	5.72E7
I 133	1.81E7	2.64E7	7.72E6	4.79E9	3.10E7	--	4.46E6
Cs 134	2.41E10	4.49E10	4.54E9	--	1.16E10	4.74E9	1.22E8
Cs 137	3.47E10	4.06E10	2.88E9	--	1.09E10	4.41E9	1.27E8
Ba 140	1.21E8	1.21E5	6.22E6	--	2.87E4	7.42E4	2.97E7
**La 140	1.86E2	7.35E1	1.89E1	--	--	--	8.63E5
Ce 141	2.28E4	1.39E4	1.64E3	--	4.28E3	--	7.18E6
Ce 144	1.49E6	6.10E5	8.34E4	--	2.46E5	--	8.54E7

*mrem/yr per μ Ci/m³.

**Daughter Decay Product. Activity level and effective half life assumed to equal parent nuclide.



TABLE 3 - 13

R₁ VALUES-COWMILK-CHILD $\frac{m^2}{m^2}$ -mrem/yr ÷ μ Ci/sec

NUCLIDE	BONE	LIVER	T. BODY	THYROID	KIDNEY	LUNG	GI-LLI
*H 3	--	1.57E3	1.57E3	1.57E3	1.57E3	1.57E3	1.57E3
*C 14	1.65E6	3.29E5	3.29E5	3.29E5	3.29E5	3.29E5	3.29E5
Cr 51	--	--	5.27E4	2.93E4	7.99E3	5.34E4	2.80E6
Mn 54	--	1.35E7	3.59E6	--	3.78E6	--	1.13E7
Fe 59	6.52E7	1.06E8	5.26E7	--	--	3.06E7	1.10E8
Co 58	--	6.94E6	2.13E7	--	--	--	4.05E7
Co 60	--	2.89E7	8.52E7	--	--	--	1.60E8
Zn 65	2.63E9	7.00E9	4.35E9	--	4.41E9	--	1.23E9
Sr 89	3.64E9	--	1.04E8	--	--	--	1.41E8
Sr 90	7.53E10	--	1.91E10	--	--	--	1.01E9
Zr 95	2.17E3	4.77E2	4.25E2	--	6.83E2	--	4.98E5
**Nb 95	2.10E5	8.19E4	5.85E4	--	7.70E4	--	1.52E8
Mo 99	--	4.07E7	1.01E7	--	8.69E7	--	3.37E7
I 131	6.51E8	6.55E8	3.72E8	2.17E11	1.08E9	--	5.83E7
I 133	8.58E6	1.06E7	4.01E6	1.97E9	1.77E7	--	4.27E6
Cs 134	1.50E10	2.45E10	5.18E9	--	7.61E9	2.73E9	1.32E8
Cs 137	2.17E10	2.08E10	3.07E9	--	6.78E9	2.44E9	1.30E8
Ba 140	5.87E7	5.14E4	3.43E6	--	1.67E4	3.07E4	2.97E7
**La 140	8.92E1	3.12E1	1.05E1	--	--	--	8.69E5
Ce 141	1.15E4	5.73E3	8.51E2	--	2.51E3	--	7.15E6
Ce 144	1.04E6	3.26E5	5.55E4	--	1.80E5	--	8.49E7

*mrem/yr per μ Ci/m³.

**Daughter Decay Product. Activity level and effective half life assumed to equal parent nuclide.



TABLE 3 - 14

R₁ VALUES-COWMILK-TEEN $\frac{m^2}{m^2}$ -mrem/yr ÷ μ Ci/sec

NUCLIDE	BONE	LIVER	T. BODY	THYROID	KIDNEY	LUNG	GI-LLI.
*H 3	--	9.94E2	9.94E2	9.94E2	9.94E2	9.94E2	9.94E2
*C 14	6.70E5	1.34E5	1.34E5	1.34E5	1.34E5	1.35E5	1.34E5
Cr 51	--	--	2.58E4	1.44E4	5.66E3	3.69E4	4.34E6
Mn 54	--	9.01E6	1.79E6	--	2.69E6	--	1.85E7
Fe 59	2.81E7	6.57E7	2.54E7	--	--	2.07E7	1.55E8
Co 58	--	4.55E6	1.05E7	--	--	--	6.27E7
Co 60	--	1.86E7	4.19E7	--	--	--	2.42E8
Zn 65	1.34E9	4.65E9	2.17E9	--	2.97E9	--	1.97E9
Sr 89	1.47E9	--	4.21E7	--	--	--	1.75E8
Sr 90	4.45E10	--	1.10E10	--	--	--	1.25E9
Zr 95	9.34E2	2.95E2	2.03E2	--	4.33E2	--	6.80E5
**Nb 95	9.32E4	5.17E4	2.85E4	--	5.01E4	--	2.21E8
Mo 99	--	2.24E7	4.27E6	--	5.12E7	--	4.01E7
I 131	2.68E8	3.76E8	2.02E8	1.10E11	6.47E8	--	7.44E7
I 133	3.53E6	5.99E6	1.83E6	8.36E8	1.05E7	--	4.53E6
Cs 134	6.49E9	1.53E10	7.08E9	--	4.85E9	1.85E9	1.90E8
Cs 137	9.02E9	1.20E10	4.18E9	--	4.08E9	1.59E9	1.71E8
Ba 140	2.43E7	2.98E4	1.57E6	--	1.01E4	2.00E4	3.75E7
**La 140	3.73E1	1.83E1	4.87E0	--	--	--	1.05E6
Ce 141	4.67E3	3.12E3	3.58E2	--	1.47E3	--	8.91E6
Ce 144	4.22E5	1.74E5	2.27E4	--	1.04E5	--	1.06E8

*mrem/yr per μ Ci/m³.

**Daughter Decay Product. Activity level and effective half life assumed to equal parent nuclide.

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TABLE 3 - 15

R₁ VALUES-COWMILK-ADULT $\frac{m^2}{m} \text{-mrem/yr} \div \mu\text{Ci/sec}$

NUCLIDE	BONE	LIVER	T. BODY	THYROID	KIDNEY	LUNG	GI-LLI
*H 3	--	7.63E2	7.63E2	7.63E2	7.63E2	7.63E2	7.63E2
*C 14	3.63E5	7.26E4	7.26E4	7.26E4	7.26E4	7.26E4	7.26E4
Cr 51	--	--	1.48E4	8.85E3	3.26E3	1.96E4	3.72E6
Mn 54	--	5.41E6	1.03E6	--	1.61E6	--	1.66E7
Fe 59	1.61E7	3.79E7	1.45E7	--	--	1.06E7	1.26E8
Co 58	--	2.70E6	6.05E6	--	--	--	5.47E7
Co 60	--	1.10E7	2.42E7	--	--	--	2.06E8
Zn 65	8.71E8	2.77E9	1.25E9	--	1.85E9	--	1.75E9
Sr 89	7.99E8	--	2.29E7	--	--	--	1.28E8
Sr 90	3.15E10	--	7.74E9	--	--	--	9.11E8
Zr 95	5.34E2	1.71E2	1.16E2	--	2.69E2	--	5.43E5
**Nb 95	5.46E4	3.04E4	1.63E4	--	3.00E4	--	1.84E8
Mo 99	--	1.24E7	2.36E6	--	2.81E7	--	2.87E7
I 131	1.48E8	2.12E8	1.21E8	6.94E10	3.63E8	--	5.58E7
I 133	1.93E6	3.36E6	1.02E6	4.94E8	5.86E6	--	3.02E6
Cs 134	3.74E9	8.89E9	7.27E9	--	2.88E9	9.55E8	1.56E8
Cs 137	4.97E9	6.80E9	4.46E9	--	2.31E9	7.68E8	1.32E8
Ba 140	1.35E7	1.69E4	8.83E5	--	5.75E3	9.69E3	2.77E7
**La 140	2.07E1	1.05E1	2.76E0	--	--	--	7.67E5
Ce 141	2.54E3	1.72E3	1.95E2	--	7.99E2	--	6.58E6
Ce 144	2.29E5	9.58E4	1.23E4	--	5.68E4	--	7.74E7

*mrem/yr per $\mu\text{Ci/m}^3$.

**Daughter Decay Product. Activity level and effective half life assumed to equal parent nuclide.



TABLE 3 - 16

 R_1 VALUES-COWMEAT-CHILD $\frac{m^2}{m} \text{mrem/yr} \div \mu\text{Ci/sec}$

NUCLIDE	BONE	LIVER	T. BODY	THYROID	KIDNEY	LUNG	GI-LLI
*H 3	--	2.34E2	2.34E2	2.34E2	2.34E2	2.34E2	2.34E2
*C 14	5.29E5	1.06E5	1.06E5	1.06E5	1.06E5	1.06E5	1.06E5
Cr 51	--	--	4.55E3	2.52E3	6.90E2	4.61E3	2.41E5
Mn 54	--	5.15E6	1.37E6	--	1.44E6	--	4.32E6
Fe 59	2.04E8	3.30E8	1.65E8	--	--	9.58E7	3.44E8
Co 58	--	9.41E6	2.88E7	--	--	--	5.49E7
Co 60	--	4.64E7	1.37E8	--	--	--	2.57E8
Zn 65	2.38E8	6.35E8	3.95E8	--	4.00E8	--	1.12E8
Sr 89	2.65E8	--	7.57E6	--	--	--	1.03E7
Sr 90	7.01E9	--	1.78E9	--	--	--	9.44E7
Zr 95	1.51E6	3.32E5	2.95E5	--	4.75E5	--	3.46E8
**Nb 95	2.41E6	9.38E5	6.71E5	--	8.82E5	--	1.74E9
Mo 99	--	5.42E4	1.34E4	--	1.16E5	--	4.48E4
I 131	8.27E6	8.32E6	4.73E7	2.75E9	1.37E7	--	7.40E5
I 133	2.87E-1	3.55E-1	1.34E-1	6.60E-1	5.92E-1	--	1.43E-1
Cs 134	6.09E8	1.00E9	2.11E8	--	3.10E8	1.11E8	5.39E6
Cs 137	8.99E8	8.60E8	1.27E8	--	2.80E8	1.01E8	5.39E6
Ba 140	2.20E7	1.93E4	1.28E6	--	6.27E3	1.15E4	1.11E7
**La 140	1.67E2	5.84E1	1.97E1	--	--	--	1.63E6
Ce 141	1.17E4	5.82E3	8.64E2	--	2.55E3	--	7.26E6
Ce 144	1.48E6	4.65E5	7.91E4	--	2.57E5	--	1.21E8

*mrem/yr per $\mu\text{Ci/m}^3$.

**Daughter Decay Product. Activity level and effective half life assumed to equal parent nuclide.

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TABLE 3 - 17

R₁ VALUES-COWMEAT-TEEN $\frac{2}{m}$ -mrem/y ÷ μ Ci/sec

NUCLIDE	BONE	LIVER	T. BODY	THYROID	KIDNEY	LUNG	GI-LLI
*H 3	—	1.94E2	1.94E2	1.94E2	1.94E2	1.94E2	1.94E2
*C 14	2.81E5	5.62E4	5.62E4	5.62E4	5.62E4	5.62E4	5.62E4
Cr 51	—	—	2.93E3	1.62E3	6.39E2	4.16E3	4.90E5
Mn 54	—	4.50E6	8.93E5	—	1.34E6	—	9.24E6
Fe 59	1.15E8	2.69E8	1.04E8	—	—	8.47E7	6.36E8
Co 58	—	8.05E6	1.86E7	—	—	—	1.11E8
Co 60	—	3.90E7	8.80E7	—	—	—	5.09E8
Zn 65	1.59E8	5.52E8	2.57E8	—	3.53E8	—	2.34E8
Sr 89	1.40E8	—	4.01E6	—	—	—	1.67E7
Sr 90	5.42E9	—	1.34E9	—	—	—	1.52E8
Zr 95	8.50E5	2.68E5	1.84E5	—	3.94E5	—	6.19E8
**Nb 95	1.40E6	7.74E5	4.26E5	—	7.51E5	—	3.31E9
Mo 99	—	3.90E4	7.43E3	—	8.92E4	—	6.98E4
I 131	4.46E6	6.24E6	3.35E6	1.82E9	1.07E7	—	1.23E6
I 133	1.55E-1	2.62E-1	8.00E-2	3.66E1	4.60E-1	—	1.99E-1
Cs 134	3.46E8	8.13E8	3.77E8	—	2.58E8	9.87E7	1.01E7
Cs 137	4.88E8	6.49E8	2.26E8	—	2.21E8	8.58E7	9.24E6
Ba 140	1.19E7	1.46E4	7.68E5	—	4.95E3	9.81E3	1.84E7
**La 140	9.12E1	4.48E1	1.19E1	—	—	—	2.57E6
Ce 141	6.19E3	4.14E3	4.75E2	—	1.95E3	—	1.18E7
Ce 144	7.87E5	3.26E5	4.23E4	—	1.94E5	—	1.98E8

*mrem/yr per μ Ci/m³.

**Daughter Decay Product. Activity level and effective half life assumed to equal parent nuclide.

TABLE 3 - 18

R₁ VALUES-COWMEAT-ADULT $\text{m}^2\text{-mrem/yr} + \mu\text{Ci/sec}$

<u>NUCLIDE</u>	<u>BONE</u>	<u>LIVER</u>	<u>T. BODY</u>	<u>THYROID</u>	<u>KIDNEY</u>	<u>LUNG</u>	<u>GI-LLI</u>
*H 3	--	3.25E2	3.25E2	3.25E2	3.25E2	3.25E2	3.25E2
*C 14	3.33E5	6.66E4	6.66E4	6.66E4	6.66E4	6.66E4	6.66E4
Cr 51	--	--	3.65E3	2.18E3	8.03E2	4.84E3	9.17E5
Mn 54	--	5.90E6	1.13E6	--	1.76E6	--	1.81E7
Fe 59	1.44E8	3.39E8	1.30E8	--	--	9.46E7	1.13E9
Co 58	--	1.04E7	2.34E7	--	--	--	2.12E8
Co 60	--	5.03E7	1.11E8	--	--	--	9.45E8
Zn 65	2.26E8	7.19E8	3.25E8	--	4.81E8	--	4.53E8
Sr 89	1.66E8	--	4.76E6	--	--	--	2.66E7
Sr 90	8.38E9	--	2.06E9	--	--	--	2.42E8
Zr 95	1.06E6	3.40E5	2.30E5	--	5.34E5	--	1.08E9
**Nb 95	1.79E6	9.94E5	5.35E5	--	9.83E5	--	6.04E9
Mo 99	--	4.71E4	8.97E3	--	1.07E5	--	1.09E5
I 131	5.37E6	7.67E6	4.40E6	2.52E9	1.32E7	--	2.02E6
I 133	1.85E-1	3.22E-1	9.81E-2	4.73E1	5.61E-1	--	2.89E-1
Cs 134	4.35E8	1.03E9	8.45E8	--	3.35E8	1.11E8	1.81E7
Cs 137	5.88E8	8.04E8	5.26E8	--	2.73E8	9.07E7	1.56E7
Ba 140	1.44E7	1.81E4	9.44E5	--	6.15E3	1.04E4	2.97E7
**La 140	1.11E2	5.59E1	1.48E1	--	--	--	4.10E6
Ce 141	7.38E3	4.99E3	5.66E2	--	2.32E3	--	1.91E7
Ce 144	9.33E5	3.90E5	5.01E4	--	2.31E5	--	3.16E8

*mrem/yr per $\mu\text{Ci/m}^3$.

**Daughter Decay Product. Activity level and effective half life assumed to equal parent nuclide.

TABLE 3 - 19

 R_1 VALUES-VEGETATION-CHILD m^2 -mrem/yr ÷ μ Ci/sec

NUCLIDE	BONE	LIVER	T. BODY	THYROID	KIDNEY	LUNG	GI-LLI
*H 3	--	4.01E3	4.01E3	4.01E3	4.01E3	4.01E3	4.01E3
*C 14	3.50E6	7.01E5	7.01E5	7.01E5	7.01E5	7.01E5	7.01E5
Cr 51	--	--	1.17E5	6.49E4	1.77E4	1.18E5	6.20E6
Mn 54	--	6.65E8	1.77E8	--	1.86E8	--	5.58E8
Fe 59	3.97E8	6.42E8	3.20E8	--	--	1.86E8	6.69E8
Co 58	--	6.45E7	1.97E8	--	--	--	3.76E8
Co 60	--	3.78E8	1.12E9	--	--	--	2.10E9
Zn 65	8.12E8	2.16E9	1.35E9	--	1.36E9	--	3.80E8
Sr 89	3.59E10	--	1.03E9	--	--	--	1.39E9
Sr 90	1.24E12	--	3.15E11	--	--	--	1.67E10
Zr 95	3.86E6	8.50E5	7.56E5	--	1.22E6	--	8.86E8
**Nb 95	7.50E5	2.92E5	2.09E5	--	2.74E5	--	5.40E8
Mo 99	--	7.70E6	1.91E6	--	1.65E7	--	6.37E6
I 131	1.43E8	1.44E8	8.16E7	4.75E10	2.36E8	--	1.28E7
I 133	3.52E6	4.35E6	1.65E6	8.08E8	7.25E6	--	1.75E6
Cs 134	1.60E10	2.63E10	5.55E9	--	8.15E9	2.93E9	1.42E8
Cs 137	2.39E10	2.29E10	3.38E9	--	7.46E9	2.68E9	1.43E8
Ba 140	2.77E8	2.43E5	1.62E7	--	7.90E4	1.45E5	1.40E8
**La 140	3.37E4	1.18E4	3.97E3	--	--	--	3.28E8
Ce 141	6.56E5	3.27E5	4.85E4	--	1.43E5	--	4.08E8
Ce 144	1.27E8	3.98E7	6.78E6	--	2.21E7	--	1.04E10

*mrem/yr per μ Ci/ m^3 .

**Daughter Decay Product. Activity level and effective half life assumed to equal parent nuclide.

TABLE 3 - 20

 R_1 VALUES-VEGETATION-TREEN $\frac{2}{m}$ mrem/yr \div μ Ci/sec

NUCLIDE	BONE	LIVER	T. BODY	THYROID	KIDNEY	LUNG	GI-LLI
*H 3.	--	2.59E3	2.59E3	2.59E3	2.59E3	2.59E3	2.59E3
*C 14	1.45E6	2.91E5	2.91E5	2.91E5	2.91E5	2.91E5	2.91E5
Cr 51	--	--	6.16E4	3.42E4	1.35E4	8.79E4	1.03E7
Mn 54	--	4.54E8	9.01E7	--	1.36E8	--	9.32E8
Fe 59	1.79E8	4.18E8	1.61E8	--	--	1.32E8	9.89E8
Co 58	--	4.37E7	1.01E8	--	--	--	6.02E8
Co 60	--	2.49E8	5.60E8	--	--	--	3.24E9
Zn 65	4.24E8	1.47E9	6.86E8	--	9.41E8	--	6.23E8
Sr 89	1.51E10	--	4.33E8	--	--	--	1.80E9
Sr 90	7.51E11	--	1.85E11	--	--	--	2.11E10
Zr 95	1.72E6	5.44E5	3.74E5	--	7.99E5	--	1.26E9
**Nb 95	3.44E5	1.91E5	1.05E5	--	1.85E5	--	8.16E8
Mo 99	--	5.64E6	1.08E6	--	1.29E7	--	1.01E7
I 131	7.68E7	1.07E8	5.78E7	3.14E10	1.85E8	--	2.13E7
I 133	1.93E6	3.27E6	9.98E5	4.57E8	5.74E6	--	2.48E6
Cs 134	7.10E9	1.67E10	7.75E9	--	5.31E9	2.03E9	2.08E8
Cs 137	1.01E10	1.35E10	4.69E9	--	4.59E9	1.78E9	1.92E8
Ba 140	1.38E8	1.69E5	8.91E6	--	5.74E4	1.14E5	2.13E8
**La 140	1.69E4	8.32E3	2.21E3	--	--	--	4.78E8
Ce 141	2.83E5	1.89E5	2.17E4	--	8.89E4	--	5.40E8
Ce 144	5.27E7	2.18E7	2.83E6	--	1.30E7	--	1.33E10

*mrem/yr per μ Ci/m³

**Daughter Decay Product. Activity level and effective half life assumed to equal parent nuclide.



TABLE 3 - 21

 R_1 VALUES-VEGETATION-ADULT m^2 -mrem/yr ÷ μ Ci/sec

NUCLIDE	BONE	LIVER	T. BODY	THYROID	KIDNEY	LUNG	GI-LLI
*H 3	---	2.26E3	2.26E3	2.26E3	2.26E3	2.26E3	2.26E3
*C 14	8.97E5	1.79E5	1.79E5	1.79E5	1.79E5	1.79E5	1.79E5
Cr 51	---	---	4.64E4	2.77E4	1.02E4	6.15E4	1.17E7
Mn 54	---	3.13E7	5.97E7	---	9.31E7	---	9.58E8
Fe 59	1.26E8	2.96E8	1.13E8	---	---	8.27E7	1.02E9
Co 58	---	3.08E7	6.90E7	---	---	---	6.24E8
Co 60	---	1.67E8	3.69E8	---	---	---	3.14E9
Zn 65	3.17E8	1.01E9	4.56E8	---	6.75E8	---	6.36E8
Sr 89	9.95E6	---	2.86E8	---	---	---	1.60E9
Sr 90	6.05E11	---	1.48E11	---	---	---	1.75E10
Zr 95	1.18E6	3.77E5	2.55E5	---	5.92E5	---	1.20E9
**Nb 95	2.41E5	1.34E5	7.20E4	---	1.32E5	---	8.13E8
Mo 99	---	6.14E6	1.17E6	---	1.39E7	---	1.42E7
I 131	8.07E7	1.15E8	6.61E7	3.78E10	1.98E8	---	3.05E7
I 133	2.08E6	3.61E6	1.10E6	5.31E8	6.30E6	---	3.25E6
Cs 134	4.67E9	1.11E10	9.08E9	---	3.59E9	1.19E9	1.94E8
Cs 137	6.36E9	8.70E9	5.70E9	---	2.95E9	9.81E8	1.68E8
Ba 140	1.29E8	1.61E5	8.42E6	---	5.49E4	9.25E4	2.65E8
**La 140	1.58E4	7.93E3	2.11E3	---	---	---	5.86E8
Ce 141	1.97E5	1.33E5	1.51E4	---	6.19E4	---	5.09E8
Ce 144	3.29E7	1.38E7	1.77E6	---	8.16E6	---	1.11E10

*mrem/yr per μ Ci/ m^3

**Daughter Decay Product. Activity level and effective half life assumed to equal parent nuclide.

TABLE 3-22
DISPERSION PARAMETERS AT CONTROLLING LOCATIONS*
W_v and W_s VALUES

<u>VENT</u>	<u>DIRECTION</u>	<u>DISTANCE (m)</u>	<u>X/Q (sec/m³)</u>	<u>D/Q (m⁻²)</u>
Inhalation and Ground Plane	E	1,842	1.42E-7	2.90E-9
Cow Milk	ESE	2,417	5.44E-8	9.52E-10
Meat Animal	E	1,842	1.42E-7	2.58E-9
Vegetation	E	2,072	1.29E-7	2.21E-9
<u>STACK</u>				
Inhalation and Ground Plane	E	1,711	8.50E-9	1.33E-9
Cow Milk	ESE	2,366	8.84E-9	5.88E-10
Meat Animal	E	1,711	1.04E-8	1.36E-9
Vegetation	E	1,940	1.07E-8	1.24E-9

NOTE: Inhalation and Ground Plane are annual average values. Others are grazing season only.

*NMP-Unit 2 ER-OLS, Appendix 7B

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URANIUM FUEL CYCLE

The "Uranium Fuel Cycle" is defined in 40 CFR Part 190.02 (b) as follows:

"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."

Section 3/4.11.4 of the Technical Specifications requires that when the calculated doses associated with the effluent releases exceed twice the applicable quarter or annual limits, Niagara Mohawk shall evaluate the calendar year doses and, if required, submit a Special Report to the NRC and limit subsequent releases such that the 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). This report is to demonstrate 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 limits in 40 CFR Part 190. If releases that result in doses exceeding the 40 CFR 190 limits have occurred, then a variance from the NRC to permit such releases will be requested and if possible, action will be taken to reduce subsequent releases.

The report to the NRC shall contain:

- 1) Identification of all uranium fuel cycle facilities or operations within 5 miles of the nuclear power reactor units at the site, that contribute to the annual dose of the maximum exposed member of the public.
- 2) Identification of the maximum exposed member of the public and a determination of the total annual dose to this person from all existing pathways and sources of radioactive effluents and direct radiation.

The total body and organ doses resulting from radioactive material in liquid effluents from Nine Mile Point Unit 2 will be summed with the doses resulting from the releases of noble gases, radioiodines, and particulates. The direct dose components will also be determined by either calculation or actual measurement. The doses from Nine Mile Point Unit 2 will be added to the doses to the maximum exposed individual that are contributed from other uranium fuel cycle operations within 5 miles of the site.

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4.0 (Cont'd)

For the purpose of calculating doses, the results of the Environmental Monitoring Program may be included to provide more refined estimates of doses to a real maximum exposed individual. Estimated doses, as calculated from station effluents, may be replaced by doses calculated from actual environmental sample results.

4.1 Evaluation of Doses From Liquid Effluents

For the evaluation of doses to real members of the public from liquid effluents, the fish consumption and shoreline sediment ground dose will be considered. The dose associated with fish consumption may be calculated using the ODCM methodology or by calculating a dose to man based on actual fish sample analysis data. The dose associated with shoreline sediment is based on the assumption that the shoreline would be utilized as a recreational area. This dose may be derived from liquid effluent data or from actual shoreline sediment sample analysis data.

Doses to members of the public from the fish consumption and shoreline sediment pathways will be calculated using Regulatory Guide 1.109 or ODCM methodology.

4.2 Evaluation of Doses From Gaseous Effluents

For the evaluation of doses to real members of the public from gaseous effluents, the pathways contained in section 3.0 of the ODCM will be considered. However, any updated field data may be utilized that concerns locations of real individuals, real time meteorological data, location of critical receptors, etc. Data from the most recent census and sample location surveys should be utilized. Doses may also be calculated from actual environmental sample media, as available. Environmental sample media data such as TLD, air sample, milk sample and vegetable (food crop) sample data may be utilized in lieu of effluent calculational data.

Doses to members of the public from the pathways contained in ODCM section 3.0 as a result of gaseous effluents will be calculated using the dose factors of Regulatory Guide 1.109 or the methodology of the ODCM, as applicable.

4.3 Evaluation of Doses From Direct Radiation

Section 3.11.4.a of the Technical Specifications requires that the dose contribution as a result of direct radiation be considered when evaluating whether the dose limitations of 40 CFR 190 have been exceeded. Direct radiation doses as a result of the reactor, turbine and radwaste buildings and outside radioactive storage tanks (as applicable) may be evaluated by engineering calculations or by evaluating environmental TLD results at critical receptor locations, site boundary or other special interest locations.

Section 6.9.1.8 of the Nine Mile Point Unit 2 Technical Specifications requires that the Semiannual Effluent Release Report include an assessment of the radiation doses from radioactive liquid and gaseous effluents to members of the public due to their activities inside the site boundary as defined by Figure 5.1.3 of the specifications. A member of the public, as defined by the Technical Specifications, would be represented by an individual who visits the sites' Energy Information Center for the purpose of observing the educational displays or for picnicing and associated activities. It is assumed that an individual would spend four hours per week for twelve weeks at the Energy Information Center. The time spent at the facility is assumed to occur from approximately July 1 to September 30 of each year. Thus, the first Semiannual Effluent Release Report will not address this particular dose because the summer season is the period of concern. The second report will address this dose based on forty eight hours occupancy.

The pathways considered for the evaluation include the inhalation pathway with the resultant lung dose and the direct radiation dose pathway with the associated total body dose. The direct radiation dose pathway, in actuality, include several pathways. These include: the direct radiation gamma dose to an individual from on overhead plume, a submersion gamma plume dose, and a ground plane dose (deposition). Other pathways, such as the ingestion pathway, are not applicable. In addition, pathways associated with water related recreational activities are not applicable here. These include swimming and wading which are prohibited at the facility.

The inhalation pathway is evaluated by identifying the applicable radionuclides (radioiodine, tritium and particulates) in the effluent for the appropriate time period. The radionuclide concentrations are then multiplied by the appropriate X/Q value, inhalation dose factor, air intake rate, and the fractional portion of the year in question. Thus, the inhalation pathway is evaluated using the following equation adapted from Regulatory Guide 1.109.

$$R = \sum_i [C_i F X/Q DFA_{ija} R_a t]$$

where :

R = the dose for the period in question to the lung (j) for all radionuclides (i) for the adult age group (a) in mrem per time period.

C_i = The average concentration in the stack release of radionuclide i in pCi/m³ for the period in question

F = Average effluent flowrate in m³/sec.

1. A. J.

2. B. J.

3. C. J.

4. D. J.

5. E. J.

6. F. J.

7. G. J.

8. H. J.

9. I. J.

10. J. J.

11. K. J.

12. L. J.

13. M. J.

14. N. J.

15. O. J.

16. P. J.

17. Q. J.

18. R. J.

19. S. J.

20. T. J.

21. U. J.

22. V. J.

23. W. J.

24. X. J.

25. Y. J.

26. Z. J.

27. AA. J.

28. AB. J.

29. AC. J.

30. AD. J.

31. AE. J.

32. AF. J.

33. AG. J.

34. AH. J.

35. AI. J.

36. AJ. J.

37. AK. J.

38. AL. J.

4.4 (Cont'd)

- X/Q = The plume dispersion parameter for a location 0.50 miles west of NMP-1 (The plume dispersion parameter is $8.09E-9$ (stack) and $2.87E-7$ (vent) and was obtained from the NMP-Unit 2 FSAR, Table 2G-2 and 2G-3. A X/Q value based on real time meteorology may also be utilized for the period in question).
- DFA_{ija} = the inhalation dose factor for radionuclide i , the lung j , and adult age group a in mrem per pCi found on Table E-10 of Regulatory Guide 1.109.
- R_a = annual air intake for individuals in age group a in M^3 per year (this value is $8,000 M^3$ per year and was obtained from Table E-5 of Regulatory Guide 1.109).
- t = fractional portion of the year for which radionuclide i was detected and for which a dose is to be calculated (equals 0.23 years).

The direct radiation gamma dose pathway includes any gamma doses from an overhead plume, submersion in the plume and ground plane dose (deposition). This general pathway will be evaluated by average environmental TLD readings. At least two environmental TLD locations will be utilized and located in the approximate area of the Energy Information Center (EIC) and the facility picnic area. These TLDs will be placed in the field on approximately July 1 and removed on approximately September 30 of each year (this time interval is composed of one quarterly TLD collection period). The average TLD readings will be adjusted by the average control TLD readings. This is accomplished by subtracting the average quarterly control TLD value from the average EIC TLD value. The applicable quarterly control TLD values will be utilized after adjusting for the appropriate time period (as applicable).

5.0 ENVIRONMENTAL MONITORING PROGRAM

5.1 Sampling Stations

The current sampling locations are specified in Table 5-1 and Figures 5.1-1, 5.1-2. The Environmental Monitoring Program is a joint effort between the Niagara Mohawk Power Corporation and the New York Power Authority, the owners and operators of the Nine Mile Point Units 1 and 2 and the James A. FitzPatrick Nuclear Power Plants, respectively. Sampling locations are chosen on the basis of historical average dispersion or deposition parameters from both units.

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5.1 (Cont'd)

The average dispersion and deposition parameters for the two units have been calculated for a 5 year period, 1978 through 1982. These dispersion calculations are attached. The calculated dispersion or deposition parameters will be compared to the results of the annual land use census. If it is determined that a milk sampling location exists at a location that yields a significantly higher (e.g. 50%) calculated D/Q rate, the new milk sampling location will be added to the monitoring program within 30 days. If a new location is added, the old location that yields the lowest calculated D/Q may be dropped from the program after October 31 of that year.

5.2 Interlaboratory Comparison Program

Analyses shall be performed on samples containing known quantities of radioactive materials that are supplied as part of a Commission approved or sponsored Interlaboratory Comparison Program, such as the EPA Crosscheck Program. Participation shall be only for those media, e.g., air, milk, water, etc., that are included in the Nine Mile Point Environmental Monitoring Program and for which cross check samples are available. The site identification symbol or the actual Quality Control sample results shall be reported in the Annual Radiological Environmental Operating Report so that the Commission staff may evaluate the results.

Specific sample media for which EPA Cross Check Program samples are available include the following:

- gross beta in air particulate filters
- gamma emitters in air particulate filters
- I-131 in milk
- gamma emitters in milk
- gamma emitters in food product
- gamma emitters in water
- tritium in water
- I-131 in water

5.3 Capabilities for Thermoluminescent Dosimeters Used for Environmental Measurements

Required detection capabilities for thermoluminescent dosimeters used for environmental measurements required by the Technical Specifications are based on ANSI Standard N545, section 4.3. Required detection capabilities are as follows. TLDs are defined as phosphors packaged for field use.

In regard to the detection capabilities for thermoluminescent dosimeters, only one determination is required to evaluate the above capabilities per type of TLD. Furthermore, the above capabilities may be determined by the vendor who supplies the TLDs.

- 5.3.1 Uniformity shall be determined by giving TLDs from the same batch an exposure equal to that resulting from an exposure rate of 10 uR/hr during the field cycle. The responses obtained shall have a relative standard deviation of less than 7.5%. A total of at least 5 TLDs shall be evaluated.
- 5.3.2 Reproducibility shall be determined by giving TLDs repeated exposures equal to that resulting from an exposure rate of 10 uR/hr during the field cycle. The average of the relative standard deviations of the responses shall be less than 3.0%. A total of at least 4 TLDs shall be evaluated.
- 5.3.3 Dependence of exposure interpretation on the length of a field cycle shall be examined by placing TLDs for a period equal to at least a field cycle and a period equal to half the same field cycle in an area where the exposure rate is known to be constant. This test shall be conducted under approximate average winter temperatures and approximate average summer temperatures. For these tests, the ratio of the response obtained in the field cycle to twice that obtained for half the field cycle shall not be less than 0.85. At least 6 TLDs shall be evaluated.
- 5.3.4 Energy dependence shall be evaluated by the response of TLDs to photons for several energies between approximately 30 keV and 3 MeV. The response shall not differ from that obtained with the calibration source by more than 25% for photons with energies greater than 80 keV and shall not be enhanced by more than a factor of two for photons with energies less than 80 keV. A total of at least 8 TLDs shall be evaluated.
- 5.3.5 The directional dependence of the TLD response shall be determined by comparing the response of the TLD exposed in the routine orientation with respect to the calibration source with the response obtained for different orientations. To accomplish this, the TLD shall be rotated through at least two perpendicular planes. The response averaged over all directions shall not differ from the response obtained in the standard calibration position by more than 10%. A total of at least 4 TLDs shall be evaluated.
- 5.3.6 Light dependence shall be determined by placing TLDs in the field for a period equal to the field cycle under the four conditions found in ANSI N545, section 4.3.6. The results obtained for the unwrapped TLDs shall not differ from those obtained for the TLDs wrapped in aluminum foil by more than 10%. A total of at least 4 TLDs shall be evaluated for each of the four conditions.

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5.3.7 Moisture dependence shall be determined by placing TLDs (that is, the phosphors packaged for field use) for a period equal to the field cycle in an area where the exposure rate is known to be constant. The TLDs shall be exposed under two conditions: (1) packaged in a thin, sealed plastic bag, and (2) packaged in a thin, sealed plastic bag with sufficient water to yield observable moisture throughout the field cycle. The TLD or phosphor, as appropriate, shall be dried before readout. The response of the TLD exposed in the plastic bag containing water shall not differ from that exposed in the regular plastic bag by more than 10%. A total of at least 4 TLDs shall be evaluated for each condition.

5.3.8 Self irradiation shall be determined by placing TLDs for a period equal to the field cycle in an area where the exposure rate is less than 10 uR/hr and the exposure during the field cycle is known. If necessary, corrections shall be applied for the dependence of exposure interpretation on the length of the field cycle (ANSI N545, section 4.3.3). The average exposure inferred from the responses of the TLDs shall not differ from the known exposure by more than an exposure equal to that resulting from an exposure rate of 10 uR/hr during the field cycle. A total of at least 3 TLDs shall be evaluated.

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Nine Mile Point Nuclear Station
Radiological Environmental Monitoring Program
Sampling Locations

Table 5.1

Type of Sample	*Map Location	Collection Site	Location
Radioiodine and Particulates (air)	1	Nine Mile Point Road north	1.8 mi @ 88° E
Radioiodine and Particulates (air)	2	Co. Rt. 29 & Lake Road	1.1 mi @ 104° ESE
Radioiodine and Particulates (air)	3	Co. Rt. 29	1.5 mi @ 132° SE
Radioiodine and Particulates (air)	4	Village of Lycoming, NY	1.8 mi @ 143° SE
Radioiodine and Particulates (air)	5	Montario Point Road	16.4 mi @ 42° NE
Direct Radiation (TLD)	6	North Shoreline Area	0.1 mi @ 5° N
Direct Radiation (TLD)	7	North Shoreline Area	0.1 mi @ 25° NNE
Direct Radiation (TLD)	8	North Shoreline Area	0.2 mi @ 45° NE
Direct Radiation (TLD)	9	North Shoreline Area	0.8 mi @ 70° ENE
Direct Radiation (TLD)	10	JAF east boundary	1.0 mi @ 90° E
Direct Radiation (TLD)	11	Rt. 29	1.1 mi @ 115° ESE
Direct Radiation (TLD)	12	Rt. 29	1.4 mi @ 133° SE
Direct Radiation (TLD)	13	Miner Road	1.6 mi @ 159° SSE
Direct Radiation (TLD)	14	Miner Road	1.6 mi @ 181° S
Direct Radiation (TLD)	15	Lakeview Road	1.2 mi @ 200° SSW
Direct Radiation (TLD)	16	Lakeview Road	1.1 mi @ 225° SW
Direct Radiation (TLD)	17	Site Meteorological Tower	0.7 mi @ 250° WSW
Direct Radiation (TLD)	18	Energy Information Center	0.4 mi @ 265° W

*Map - See Figures 5.1-1 and 5.1-2

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Nine Mile Point Nuclear Station Unit 1
Radiological Environmental Monitoring Program
Sampling Locations

Table 5.1
(Continued)

Type of Sample	* Map Location	Collection Site	Location
Direct Radiation (TLD)	19	North Shoreline	0.2 mi @ 294° WNW
Direct Radiation (TLD)	20	North Shoreline	0.1 mi @ 315° NW
Direct Radiation (TLD)	21	North Shoreline	0.1 mi @ 341° NNW
Direct Radiation (TLD)	22	Demster Beach Road	4.8 mi @ 97° E
Direct Radiation (TLD)	23	Leavitt Road	4.1 mi @ 111° ESE
Direct Radiation (TLD)	24	Rt. 104	4.2 mi @ 135° SE
Direct Radiation (TLD)	25	Rt. 51A	4.8 mi @ 156° SSE
Direct Radiation (TLD)	26	Maiden Lane Road	4.4 mi @ 183° S
Direct Radiation (TLD)	27	Co. Rt. 53	4.4 mi @ 205° SSW
Direct Radiation (TLD)	28	Co. Rt. 1	4.7 mi @ 223° SW
Direct Radiation (TLD)	29	Lake Shoreline	4.1 mi @ 237° WSW
Direct Radiation (TLD)	30	Phoenix, NY Control	19.8 mi @ 170° S-SSE
Direct Radiation (TLD)	31	S.W. Oswego, Control	12.6 mi @ 226° SW
Direct Radiation (TLD)	32	Scriba, NY	3.6 mi @ 199° SSW
Direct Radiation (TLD)	33	Alcan Aluminum, Rt. 1A	3.1 mi @ 220° SW
Direct Radiation (TLD)	34	Lycoming, NY	1.8 mi @ 143° SE
Direct Radiation (TLD)	35	New Haven, NY	5.3 mi @ 123° ESE
Direct Radiation (TLD)	36	W. Boundary, Bible Camp	0.9 mi @ 237° SW-WSW
Direct Radiation (TLD)	37	Lake Road	1.2 mi @ 101° E-ESE
Surface Water	38	OSS Inlet Canal	7.6 mi @ 235° SW-WSW
Surface Water	39	JAFNPP Inlet Canal	0.5 mi @ 70° ENE

*Map - See Figures 5.1-1 and 5.1-2

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Nine Mile Point Nuclear Station Unit 1
Radiological Environmental Monitoring Program
Sampling Locations

Table 5.1
(Continued)

Type of Sample	*Map Location	Collection Site	Location
Shoreline Sediment	40	Sunset Bay Shoreline	1.5 mi @ 80° E
Fish	41	NMP Site Discharge Area	0.3 mi @ 315° NW
Fish	42	NMP Site Discharge Area	and/or 0.6 mi @ 55° NE
Fish	43	Oswego Harbor Area	6.2 mi @ 235° WSW
Milk	44	Milk Location #50	9.3 mi @ 93° SE
Milk	45	Milk Location #7	5.5 mi @ 107° ESE
Milk	46	Milk Location #16	5.9 mi @ 190° S
Milk	47	Milk Location #40	15.0 mi @ 223° SW
Food Product	48	Produce Location #1** (O'Connor)	1.3 mi @ 98° E
Food Product	49	Produce Location #2** (J. Parkhurst)	1.8 mi @ 96° ESE
Food Product	50	Produce Location #3** (Fox)	1.9 mi @ 101° ESE
Food Product	51	Produce Location #4** (C. Parkhurst)	1.5 mi @ 114° SW
Food Product	52	Produce Location #5** (C. R. Parkhurst)	2.1 mi @ 111° S
Food Product	53	Produce Location #6** (J. Lawton)	2.2 mi @ 123° SE
Food Product	54	Produce Location #7** (Mc Millen)	15.0 mi @ 223° ESE
Food Product	55	Produce Location #8** (Denman)	12.6 mi @ 225° SW

* Map - See Figures 5.1-1 and 5.1-2

** Food Product samples need not necessarily be collected from all listed locations. Collected samples will be of the highest calculated site average D/Q.



APPENDIX A

DISPERSION CALCULATION TABLES

ANNUAL X/Q

(Stack Release)

IMP UNIT #2 STACK
NO DECAY, UNDEPLETED
CORRECTED FOR OPEN TERRAIN RECIRCULATION

SECTOR	ANNUAL AVERAGE CH1/O (SEC/METER CUBED)				DISTANCE IN MILES		3.500	4.000	4.500	5.000	5.500
	.500	1.000	1.500	2.000	2.500	3.000					
S	6.850E-07	1.624E-07	6.539E-08	3.698E-08	2.490E-08	1.854E-08	1.471E-08	1.217E-08	1.037E-08	9.035E-09	8.008E-09
SSH	7.642E-07	1.840E-07	7.362E-08	4.145E-08	2.782E-08	2.065E-08	1.632E-08	1.346E-08	1.142E-08	9.920E-09	8.762E-09
SH	6.370E-07	1.530E-07	6.116E-08	3.487E-08	2.379E-08	1.794E-08	1.438E-08	1.198E-08	1.026E-08	8.964E-09	7.956E-09
HSW	3.482E-07	8.418E-08	3.366E-08	1.927E-08	1.330E-08	1.021E-08	8.346E-09	7.097E-09	6.196E-09	5.515E-09	4.978E-09
H	4.496E-07	1.068E-07	4.270E-08	2.446E-08	1.686E-08	1.291E-08	1.052E-08	8.917E-09	7.764E-09	6.892E-09	6.204E-09
HHH	6.973E-07	1.670E-07	6.625E-08	3.751E-08	2.542E-08	1.907E-08	1.521E-08	1.264E-08	1.080E-08	9.422E-09	8.353E-09
HHH	1.805E-06	4.289E-07	1.661E-07	9.123E-08	6.004E-08	4.390E-08	3.430E-08	2.802E-08	2.362E-08	2.038E-08	1.790E-08
HHH	1.783E-06	4.233E-07	1.640E-07	8.970E-08	5.872E-08	4.274E-08	3.328E-08	2.712E-08	2.283E-08	1.968E-08	1.728E-08
H	1.833E-06	4.375E-07	1.705E-07	9.422E-08	6.239E-08	4.589E-08	3.606E-08	2.960E-08	2.507E-08	2.172E-08	1.915E-08
NNE	1.955E-06	2.511E-07	9.816E-08	5.479E-08	3.673E-08	2.736E-08	2.174E-08	1.803E-08	1.540E-08	1.344E-08	1.193E-08
NE	1.230E-06	2.903E-07	1.121E-07	6.153E-08	4.051E-08	2.968E-08	2.326E-08	1.907E-08	1.614E-08	1.399E-08	1.234E-08
ENE	2.139E-06	5.088E-07	1.968E-07	1.079E-07	7.076E-08	5.147E-08	3.998E-08	3.247E-08	2.722E-08	2.337E-08	2.044E-08
E	2.289E-06	5.472E-07	2.128E-07	1.169E-07	7.672E-08	5.584E-08	4.339E-08	3.524E-08	2.954E-08	2.536E-08	2.218E-08
ESE	1.256E-06	2.980E-07	1.160E-07	6.388E-08	4.203E-08	3.064E-08	2.382E-08	1.935E-08	1.621E-08	1.391E-08	1.215E-08
SE	9.578E-07	2.268E-07	8.941E-08	4.981E-08	3.306E-08	2.425E-08	1.895E-08	1.545E-08	1.298E-08	1.116E-08	9.777E-09
SSE	5.718E-07	1.388E-07	5.566E-08	3.152E-08	2.130E-08	1.592E-08	1.267E-08	1.051E-08	8.967E-09	7.826E-09	6.944E-09

SECTOR	ANNUAL AVERAGE CH1/O (SEC/METER CUBED)				DISTANCE IN MILES		9.000	9.500	10.000	15.000	20.000
	6.000	6.500	7.000	7.500	8.000	8.500					
S	7.188E-09	6.551E-09	6.059E-09	5.631E-09	5.256E-09	4.923E-09	4.627E-09	4.361E-09	4.122E-09	2.743E-09	2.037E-09
SSH	7.838E-09	7.120E-09	6.565E-09	6.083E-09	5.662E-09	5.289E-09	4.958E-09	4.661E-09	4.395E-09	2.865E-09	2.094E-09
SH	7.147E-09	6.513E-09	6.022E-09	5.593E-09	5.216E-09	4.881E-09	4.563E-09	4.315E-09	4.073E-09	2.679E-09	1.969E-09
HSW	4.541E-09	4.197E-09	3.932E-09	3.695E-09	3.484E-09	3.294E-09	3.122E-09	2.965E-09	2.822E-09	1.968E-09	1.498E-09
H	5.646E-09	5.208E-09	4.869E-09	4.569E-09	4.302E-09	4.061E-09	3.844E-09	3.647E-09	3.468E-09	2.402E-09	1.821E-09
HHH	7.496E-09	6.829E-09	6.312E-09	5.862E-09	5.467E-09	5.117E-09	4.804E-09	4.525E-09	4.273E-09	2.817E-09	2.074E-09
HHH	1.594E-08	1.443E-08	1.327E-08	1.226E-08	1.139E-08	1.062E-08	9.946E-09	9.340E-09	8.798E-09	5.707E-09	4.158E-09
HHH	1.539E-08	1.393E-08	1.281E-08	1.184E-08	1.100E-08	1.027E-08	9.614E-09	9.033E-09	8.513E-09	5.552E-09	4.067E-09
H	1.711E-08	1.554E-08	1.432E-08	1.327E-08	1.236E-08	1.155E-08	1.083E-08	1.019E-08	9.613E-09	6.310E-09	4.634E-09
NNE	1.072E-08	9.777E-09	9.052E-09	8.421E-09	7.867E-09	7.375E-09	6.937E-09	6.544E-09	6.189E-09	4.130E-09	3.061E-09
NE	1.104E-08	1.004E-08	9.270E-09	8.607E-09	8.028E-09	7.519E-09	7.067E-09	6.664E-09	6.301E-09	4.224E-09	3.156E-09
ENE	1.814E-08	1.637E-08	1.500E-08	1.383E-08	1.282E-08	1.193E-08	1.115E-08	1.046E-08	9.838E-09	6.341E-09	4.618E-09
E	1.967E-08	1.774E-08	1.625E-08	1.497E-08	1.386E-08	1.289E-08	1.203E-08	1.127E-08	1.059E-08	6.758E-09	4.884E-09
ESE	1.877E-08	1.701E-08	1.578E-08	1.471E-08	1.375E-08	1.282E-08	1.199E-08	1.123E-08	1.055E-08	6.651E-09	4.832E-09
SE	8.681E-09	7.831E-09	7.176E-09	6.612E-09	6.122E-09	5.692E-09	5.313E-09	4.976E-09	4.675E-09	3.079E-09	2.156E-09
SSE	6.238E-09	5.688E-09	5.262E-09	4.891E-09	4.565E-09	4.276E-09	4.018E-09	3.786E-09	3.577E-09	2.370E-09	1.751E-09

ANNUAL D/Q
(Stack Release)

INP UNIT #2 STACK CORRECTED FOR OPEN TERRAIN *****		CIRCULATION *****		RELATIVE DEPOSITION PER UNIT *****		AREA (M ² -2) AT FIXED POINTS BY DOWNWIND SECTORS *****	
DIRECTION FROM SITE		DISTANCES IN MILES		DISTANCES IN MILES		DISTANCES IN MILES	
S	1.372E-08	3.951E-09	1.495E-09	7.832E-10	4.806E-10	3.247E-10	2.340E-10
SSH	1.555E-08	4.447E-09	1.696E-09	8.915E-10	5.482E-10	3.708E-10	2.672E-10
SW	1.020E-08	2.993E-09	1.177E-09	6.305E-10	3.924E-10	2.677E-10	1.938E-10
WSW	3.054E-09	9.597E-10	3.899E-10	2.135E-10	1.353E-10	9.320E-11	6.794E-11
W	3.311E-09	1.054E-09	4.347E-10	2.484E-10	1.529E-10	1.056E-10	7.717E-11
WNW	2.745E-09	2.322E-09	9.361E-10	5.085E-10	3.196E-10	2.191E-10	1.592E-10
W	2.430E-08	6.675E-09	2.550E-09	1.334E-09	8.176E-10	5.511E-10	3.960E-10
WNW	2.379E-08	6.472E-09	2.438E-09	1.265E-09	7.700E-10	5.170E-10	3.705E-10
N	2.263E-08	6.386E-09	2.458E-09	1.297E-09	7.988E-10	5.406E-10	3.896E-10
WNW	9.649E-09	2.830E-09	1.131E-09	6.097E-10	3.812E-10	2.605E-10	1.888E-10
NE	1.312E-08	3.578E-09	1.385E-09	7.294E-10	4.487E-10	3.033E-10	2.179E-10
ENE	3.910E-08	1.060E-08	4.024E-09	2.095E-09	1.279E-09	8.598E-10	6.166E-10
E	5.322E-08	1.422E-08	5.357E-09	2.772E-09	1.685E-09	1.129E-09	8.079E-10
ESE	3.471E-08	9.242E-09	3.473E-09	1.793E-09	1.088E-09	7.286E-10	5.210E-10
SE	2.708E-08	7.401E-09	2.794E-09	1.452E-09	8.850E-10	5.948E-10	4.266E-10
SSE	1.352E-08	3.870E-09	1.467E-09	7.688E-10	4.718E-10	3.187E-10	2.296E-10
S	1.372E-08	3.951E-09	1.495E-09	7.832E-10	4.806E-10	3.247E-10	2.340E-10
SSH	1.555E-08	4.447E-09	1.696E-09	8.915E-10	5.482E-10	3.708E-10	2.672E-10
SW	1.020E-08	2.993E-09	1.177E-09	6.305E-10	3.924E-10	2.677E-10	1.938E-10
WSW	3.054E-09	9.597E-10	3.899E-10	2.135E-10	1.353E-10	9.320E-11	6.794E-11
W	3.311E-09	1.054E-09	4.347E-10	2.484E-10	1.529E-10	1.056E-10	7.717E-11
WNW	2.745E-09	2.322E-09	9.361E-10	5.085E-10	3.196E-10	2.191E-10	1.592E-10
W	2.430E-08	6.675E-09	2.550E-09	1.334E-09	8.176E-10	5.511E-10	3.960E-10
WNW	2.379E-08	6.472E-09	2.438E-09	1.265E-09	7.700E-10	5.170E-10	3.705E-10
N	2.263E-08	6.386E-09	2.458E-09	1.297E-09	7.988E-10	5.406E-10	3.896E-10
WNW	9.649E-09	2.830E-09	1.131E-09	6.097E-10	3.812E-10	2.605E-10	1.888E-10
NE	1.312E-08	3.578E-09	1.385E-09	7.294E-10	4.487E-10	3.033E-10	2.179E-10
ENE	3.910E-08	1.060E-08	4.024E-09	2.095E-09	1.279E-09	8.598E-10	6.166E-10
E	5.322E-08	1.422E-08	5.357E-09	2.772E-09	1.685E-09	1.129E-09	8.079E-10
ESE	3.471E-08	9.242E-09	3.473E-09	1.793E-09	1.088E-09	7.286E-10	5.210E-10
SE	2.708E-08	7.401E-09	2.794E-09	1.452E-09	8.850E-10	5.948E-10	4.266E-10
SSE	1.352E-08	3.870E-09	1.467E-09	7.688E-10	4.718E-10	3.187E-10	2.296E-10
S	1.372E-08	3.951E-09	1.495E-09	7.832E-10	4.806E-10	3.247E-10	

GRAZING SEASON D/Q

(Stack Release)

HMP UNIT #2 STACK CORRECTED FOR OPEN TERRAIN RECIRCULATION *****												
***** RELATIVE DEPOSITION PER UNIT AREA (M ² -2) AT FIXED POINTS BY DOWNWIND SECTORS *****												
DIRECTION FROM SITE	0.50	1.00	1.50	2.00	2.50	3.00	3.50	4.00	4.50	5.00	5.50	
S	1.395E-08	3.988E-09	1.495E-09	7.789E-10	4.781E-10	3.209E-10	2.308E-10	1.740E-10	1.355E-10	1.090E-10	8.945E-11	
SSH	1.346E-08	3.901E-09	1.488E-09	7.836E-10	4.825E-10	3.268E-10	2.358E-10	1.780E-10	1.390E-10	1.115E-10	9.142E-11	
SH	8.131E-09	2.438E-09	9.605E-10	5.164E-10	3.224E-10	2.203E-10	1.598E-10	1.210E-10	9.461E-11	7.589E-11	6.214E-11	
SSH	3.393E-09	7.609E-10	3.895E-10	1.701E-10	1.077E-10	7.430E-11	5.422E-11	4.120E-11	3.229E-11	2.593E-11	2.123E-11	
H	2.629E-09	6.473E-10	3.511E-10	1.948E-10	1.241E-10	8.591E-11	6.281E-11	4.777E-11	3.744E-11	3.005E-11	2.459E-11	
HHH	6.733E-09	2.083E-09	8.342E-10	4.522E-10	2.838E-10	1.945E-10	1.413E-10	1.070E-10	8.364E-11	6.704E-11	5.482E-11	
HHH	2.346E-08	6.492E-09	2.489E-09	1.306E-09	8.018E-10	5.413E-10	3.893E-10	2.929E-10	2.281E-10	1.824E-10	1.490E-10	
HHH	3.897E-08	6.549E-09	2.470E-09	1.283E-09	7.823E-10	5.258E-10	3.772E-10	2.834E-10	2.206E-10	1.765E-10	1.443E-10	
H	2.456E-08	6.939E-09	2.668E-09	1.406E-09	8.660E-10	5.861E-10	4.223E-10	3.183E-10	2.482E-10	1.987E-10	1.625E-10	
HNE	9.594E-09	2.816E-09	1.123E-09	6.049E-10	3.783E-10	2.585E-10	1.874E-10	1.417E-10	1.107E-10	8.860E-11	7.241E-11	
NE	1.103E-08	3.067E-09	1.199E-09	6.363E-10	3.935E-10	2.668E-10	1.923E-10	1.449E-10	1.128E-10	9.012E-11	7.353E-11	
EHE	3.959E-08	1.092E-08	4.178E-09	2.190E-09	1.343E-09	9.061E-10	6.513E-10	4.899E-10	3.814E-10	3.049E-10	2.491E-10	
E	4.979E-08	1.351E-08	5.121E-09	2.664E-09	1.625E-09	1.092E-09	7.833E-10	5.883E-10	4.575E-10	3.656E-10	2.987E-10	
ESE	2.842E-08	7.668E-09	2.890E-09	1.498E-09	9.114E-10	6.115E-10	4.380E-10	3.287E-10	2.555E-10	2.042E-10	1.668E-10	
SE	2.383E-08	6.533E-09	2.451E-09	1.270E-09	7.728E-10	5.188E-10	3.719E-10	2.795E-10	2.175E-10	1.741E-10	1.424E-10	
SSE	1.376E-08	3.879E-09	1.451E-09	7.533E-10	4.593E-10	3.090E-10	2.220E-10	1.671E-10	1.304E-10	1.046E-10	8.572E-11	

DIRECTION FROM SITE	6.00	6.50	7.00	7.50	8.00	8.50	9.00	9.50	10.00	15.00	20.00	
S	7.473E-11	6.422E-11	5.670E-11	5.048E-11	4.526E-11	4.085E-11	3.707E-11	3.381E-11	3.098E-11	1.623E-11	1.032E-11	
SSH	7.629E-11	6.570E-11	5.799E-11	5.161E-11	4.622E-11	4.174E-11	3.787E-11	3.454E-11	3.164E-11	1.652E-11	1.032E-11	
SH	5.177E-11	4.476E-11	3.950E-11	3.515E-11	3.150E-11	2.841E-11	2.576E-11	2.348E-11	2.155E-11	1.119E-11	6.944E-12	
SSH	1.768E-11	1.537E-11	1.356E-11	1.206E-11	1.088E-11	9.750E-12	8.843E-12	8.061E-12	7.388E-12	3.844E-12	2.396E-12	
H	2.045E-11	1.779E-11	1.570E-11	1.396E-11	1.255E-11	1.128E-11	1.023E-11	9.320E-12	8.533E-12	4.428E-12	2.752E-12	
HHH	4.559E-11	3.945E-11	3.481E-11	3.096E-11	2.773E-11	2.500E-11	2.266E-11	2.065E-11	1.890E-11	9.781E-12	6.061E-12	
HHH	1.202E-10	1.028E-10	9.075E-11	8.073E-11	7.232E-11	6.520E-11	5.911E-11	5.385E-11	4.929E-11	2.547E-11	1.575E-11	
H	1.353E-10	1.163E-10	1.026E-10	9.125E-11	8.175E-11	7.370E-11	6.682E-11	6.088E-11	5.573E-11	2.883E-11	1.785E-11	
HHH	6.018E-11	5.197E-11	4.584E-11	4.076E-11	3.651E-11	3.291E-11	2.982E-11	2.716E-11	2.486E-11	1.282E-11	7.918E-12	
HNE	6.105E-11	5.243E-11	4.623E-11	4.110E-11	3.680E-11	3.315E-11	3.003E-11	2.734E-11	2.500E-11	1.280E-11	7.856E-12	
EHE	2.072E-10	1.776E-10	1.567E-10	1.393E-10	1.248E-10	1.125E-10	1.019E-10	9.284E-11	8.494E-11	4.374E-11	2.676E-11	
E	2.484E-10	2.124E-10	1.874E-10	1.667E-10	1.493E-10	1.345E-10	1.219E-10	1.110E-10	1.016E-10	5.224E-11	3.237E-11	
ESE	1.388E-10	1.106E-10	1.046E-10	9.302E-11	8.331E-11	7.508E-11	6.804E-11	6.197E-11	5.670E-11	2.917E-11	1.797E-11	
SE	1.187E-10	1.015E-10	8.961E-11	7.973E-11	7.144E-11	6.441E-11	5.840E-11	5.322E-11	4.872E-11	2.523E-11	1.563E-11	
SSE	7.158E-11	6.142E-11	5.422E-11	4.827E-11	4.327E-11	3.904E-11	3.542E-11	3.231E-11	2.960E-11	1.547E-11	9.657E-12	



ANNUAL X/Q

(Vent Release)

INP UNIT #3 VENT
NU DECAY, UNDEPLETED
CORRECTED FOR OPEN TERRAIN RECIRCULATION

ANNUAL AVERAGE CHI/O (SEC/METER CUBED)	500	1.000	1.500	2.000	DISTANCE IN MILES		3.500	4.000	4.500	5.000	5.500
SECTOR					2.500	3.000					
S	2.677E-07	8.468E-08	6.236E-08	5.027E-08	4.152E-08	3.501E-08	3.005E-08	2.620E-08	2.314E-08	2.068E-08	1.867E-08
SSH	1.480E-07	7.433E-08	6.024E-08	5.028E-08	4.205E-08	3.555E-08	3.054E-08	2.655E-08	2.342E-08	2.087E-08	1.878E-08
SH	1.240E-07	7.342E-08	6.914E-08	6.161E-08	5.327E-08	4.599E-08	4.002E-08	3.518E-08	3.123E-08	2.800E-08	2.531E-08
SHH	4.285E-08	2.543E-08	3.200E-08	3.350E-08	3.187E-08	2.935E-08	2.677E-08	2.439E-08	2.228E-08	2.044E-08	1.883E-08
H	4.883E-08	3.880E-08	5.176E-08	5.460E-08	5.213E-08	4.815E-08	4.405E-08	4.027E-08	3.692E-08	3.399E-08	3.144E-08
HHH	1.498E-07	1.010E-07	1.018E-07	9.343E-08	8.216E-08	7.177E-08	6.302E-08	5.581E-08	4.989E-08	4.500E-08	4.091E-08
HH	2.577E-07	1.488E-07	1.371E-07	1.218E-07	1.054E-07	9.101E-08	7.926E-08	6.975E-08	6.202E-08	5.569E-08	5.044E-08
HHH	1.926E-07	1.059E-07	9.773E-08	8.750E-08	7.620E-08	6.623E-08	5.797E-08	5.123E-08	4.572E-08	4.118E-08	3.741E-08
H	2.437E-07	1.394E-07	1.262E-07	1.115E-07	9.625E-08	8.310E-08	7.234E-08	6.363E-08	5.656E-08	5.076E-08	4.595E-08
HHH	1.084E-07	6.870E-08	6.331E-08	5.586E-08	4.802E-08	4.127E-08	3.578E-08	3.135E-08	2.777E-08	2.484E-08	2.242E-08
HH	1.577E-07	9.033E-08	7.489E-08	6.298E-08	5.274E-08	4.456E-08	3.816E-08	3.311E-08	2.910E-08	2.585E-08	2.319E-08
EHE	5.815E-07	2.733E-07	1.774E-07	1.303E-07	1.008E-07	8.083E-08	6.671E-08	5.631E-08	4.842E-08	4.228E-08	3.740E-08
E	7.166E-07	3.120E-07	1.842E-07	1.280E-07	9.604E-08	7.567E-08	6.176E-08	5.178E-08	4.432E-08	3.860E-08	3.409E-08
ESE	5.580E-07	2.316E-07	1.320E-07	8.895E-08	6.534E-08	5.075E-08	4.100E-08	3.412E-08	2.904E-08	2.518E-08	2.216E-08
SE	4.368E-07	1.939E-07	1.165E-07	8.105E-08	6.064E-08	4.764E-08	3.879E-08	3.246E-08	2.774E-08	2.414E-08	2.130E-08
SSE	1.759E-07	7.109E-08	4.949E-08	3.882E-08	3.129E-08	2.603E-08	2.213E-08	1.916E-08	1.682E-08	1.497E-08	1.347E-08

ANNUAL AVERAGE CHI/O (SEC/METER CUBED)	6.000	6.500	7.000	7.500	DISTANCE IN MILES		9.000	9.500	10.000	15.000	20.000
BEARING					8.000	8.500					
S	1.699E-08	1.564E-08	1.458E-08	1.363E-08	1.278E-08	1.202E-08	1.132E-08	1.070E-08	1.013E-08	6.743E-09	4.966E-09
SSH	1.703E-08	1.563E-08	1.452E-08	1.353E-08	1.265E-08	1.186E-08	1.114E-08	1.050E-08	9.908E-09	6.447E-09	4.663E-09
SH	2.305E-08	2.122E-08	1.978E-08	1.848E-08	1.732E-08	1.627E-08	1.532E-08	1.446E-08	1.367E-08	9.001E-09	6.553E-09
SHH	1.743E-08	1.627E-08	1.535E-08	1.450E-08	1.372E-08	1.300E-08	1.234E-08	1.173E-08	1.117E-08	7.707E-09	5.770E-09
H	2.920E-08	2.737E-08	2.592E-08	2.458E-08	2.334E-08	2.220E-08	2.114E-08	2.017E-08	1.927E-08	1.372E-08	1.054E-08
HHH	3.746E-08	3.468E-08	3.249E-08	3.051E-08	2.876E-08	2.716E-08	2.571E-08	2.438E-08	2.318E-08	1.599E-08	1.210E-08
HH	4.604E-08	4.251E-08	3.973E-08	3.725E-08	3.502E-08	3.302E-08	3.120E-08	2.956E-08	2.806E-08	1.921E-08	1.449E-08
HHH	1.423E-08	1.367E-08	1.296E-08	1.238E-08	1.182E-08	1.127E-08	1.072E-08	1.017E-08	9.62E-09	1.458E-08	1.104E-08
H	4.191E-08	3.847E-08	3.612E-08	3.384E-08	3.179E-08	2.995E-08	2.828E-08	2.674E-08	2.538E-08	1.722E-08	1.287E-08
HHH	2.038E-08	1.875E-08	1.747E-08	1.632E-08	1.529E-08	1.437E-08	1.353E-08	1.278E-08	1.209E-08	8.041E-09	5.916E-09
HH	2.098E-08	1.922E-08	1.783E-08	1.660E-08	1.550E-08	1.452E-08	1.364E-08	1.285E-08	1.213E-08	7.923E-09	5.762E-09
EHE	3.344E-08	3.032E-08	2.788E-08	2.575E-08	2.389E-08	2.224E-08	2.078E-08	1.947E-08	1.830E-08	1.160E-08	8.311E-09
E	3.044E-08	2.758E-08	2.536E-08	2.342E-08	2.173E-08	2.023E-08	1.891E-08	1.772E-08	1.666E-08	1.060E-08	7.623E-09
ESE	1.973E-08	1.784E-08	1.636E-08	1.509E-08	1.397E-08	1.299E-08	1.212E-08	1.135E-08	1.066E-08	6.732E-09	4.819E-09
SE	1.902E-08	1.722E-08	1.583E-08	1.462E-08	1.356E-08	1.262E-08	1.179E-08	1.105E-08	1.038E-08	6.605E-09	4.753E-09
SSE	1.222E-08	1.122E-08	1.044E-08	9.746E-09	9.125E-09	8.567E-09	8.065E-09	7.611E-09	7.199E-09	4.778E-09	3.518E-09

HNF UNIT CORRECTED FOR OPEN TERRAIN RECIRCULATION RELATIVE DEPOSITION PER UNIT AREA (M ² -2) AT PLACE												
DIRECTION FROM SITE	DISTANCES IN MILES											
	0.50	1.00	1.50	2.00	2.50	3.00	3.50	4.00	4.50	5.00	5.50	
S	1.064E-08	3.821E-09	1.462E-09	7.896E-10	4.955E-10	3.410E-10	2.495E-10	1.908E-10	1.507E-10	1.232E-10	1.011E-10	
SSH	4.843E-09	2.042E-09	8.856E-10	5.112E-10	3.338E-10	2.351E-10	1.741E-10	1.338E-10	1.057E-10	8.542E-11	7.030E-11	
SH	3.537E-09	1.737E-09	8.060E-10	4.798E-10	3.188E-10	2.266E-10	1.687E-10	1.299E-10	1.026E-10	8.284E-11	6.804E-11	
SHH	1.110E-09	5.889E-10	2.657E-10	1.559E-10	1.067E-10	7.612E-11	5.680E-11	4.380E-11	3.465E-11	2.798E-11	2.299E-11	
H	1.267E-09	7.594E-10	3.817E-10	2.366E-10	1.608E-10	1.158E-10	8.678E-11	6.704E-11	5.303E-11	4.278E-11	3.507E-11	
HHH	3.204E-09	1.603E-09	7.684E-10	4.621E-10	3.086E-10	2.177E-10	1.638E-10	1.261E-10	9.952E-11	8.020E-11	6.574E-11	
NH	6.029E-09	2.463E-09	1.084E-09	6.231E-10	4.054E-10	2.846E-10	2.102E-10	1.610E-10	1.269E-10	1.023E-10	8.401E-11	
NNH	4.943E-09	1.982E-09	8.513E-10	4.847E-10	3.137E-10	2.196E-10	1.620E-10	1.241E-10	9.784E-11	7.892E-11	6.493E-11	
N	6.201E-09	2.502E-09	1.097E-09	6.299E-10	4.096E-10	2.874E-10	2.122E-10	1.625E-10	1.281E-10	1.033E-10	8.481E-11	
NNE	2.232E-09	1.057E-09	5.005E-10	2.972E-10	1.969E-10	1.396E-10	1.037E-10	7.963E-11	6.278E-11	5.056E-11	4.143E-11	
NNE	3.678E-09	1.522E-09	6.912E-10	3.949E-10	2.551E-10	1.780E-10	1.308E-10	9.980E-11	7.837E-11	6.297E-11	5.156E-11	
ENE	1.946E-08	6.775E-09	2.832E-09	1.543E-09	9.673E-10	6.624E-10	4.813E-10	3.650E-10	2.858E-10	2.296E-10	1.882E-10	
E	2.753E-08	9.116E-09	3.724E-09	1.998E-09	1.231E-09	8.352E-10	6.033E-10	4.558E-10	3.562E-10	2.855E-10	2.344E-10	
ESE	2.400E-08	7.706E-09	3.108E-09	1.648E-09	1.014E-09	6.856E-10	4.942E-10	3.729E-10	2.912E-10	2.317E-10	1.916E-10	
SE	1.728E-08	5.876E-09	2.486E-09	1.303E-09	8.144E-10	5.573E-10	4.051E-10	3.076E-10	2.414E-10	1.944E-10	1.598E-10	
SSE	5.887E-09	2.133E-09	8.718E-10	4.842E-10	3.088E-10	2.144E-10	1.575E-10	1.205E-10	9.502E-11	7.679E-11	6.330E-11	

DIRECTION FROM SITE	DISTANCES IN MILES											
	6.00	6.50	7.00	7.50	8.00	8.50	9.00	9.50	10.00	15.00	20.00	
S	8.518E-11	7.450E-11	6.586E-11	5.873E-11	5.278E-11	4.774E-11	4.345E-11	3.975E-11	3.654E-11	1.983E-11	1.280E-11	
SSH	5.876E-11	5.176E-11	4.568E-11	4.066E-11	3.646E-11	3.292E-11	2.990E-11	2.710E-11	2.504E-11	1.330E-11	8.447E-12	
SH	5.671E-11	5.011E-11	4.420E-11	3.931E-11	3.523E-11	3.178E-11	2.883E-11	2.640E-11	2.409E-11	1.267E-11	7.984E-12	
SHH	1.917E-11	1.697E-11	1.498E-11	1.333E-11	1.196E-11	1.079E-11	9.797E-12	8.940E-12	8.196E-12	4.326E-12	2.733E-12	
H	2.915E-11	2.588E-11	2.283E-11	2.031E-11	1.821E-11	1.642E-11	1.490E-11	1.359E-11	1.245E-11	6.519E-12	4.093E-12	
HHH	5.468E-11	4.830E-11	4.258E-11	3.785E-11	3.390E-11	3.055E-11	2.770E-11	2.534E-11	2.311E-11	1.208E-11	7.545E-12	
NH	7.006E-11	6.149E-11	5.421E-11	4.819E-11	4.316E-11	3.891E-11	3.529E-11	3.212E-11	2.946E-11	1.554E-11	9.724E-12	
NNH	5.424E-11	4.759E-11	4.197E-11	3.733E-11	3.345E-11	3.017E-11	2.738E-11	2.497E-11	2.289E-11	1.203E-11	7.637E-12	
N	7.074E-11	6.208E-11	5.473E-11	4.865E-11	4.357E-11	3.929E-11	3.563E-11	3.249E-11	2.976E-11	1.561E-11	9.840E-12	
NNE	3.445E-11	3.034E-11	2.673E-11	2.374E-11	2.125E-11	1.914E-11	1.734E-11	1.579E-11	1.445E-11	7.495E-12	4.685E-12	
NE	4.287E-11	3.738E-11	3.286E-11	2.913E-11	2.602E-11	2.339E-11	2.114E-11	1.923E-11	1.754E-11	8.955E-12	5.550E-12	
ENE	1.570E-11	1.356E-11	1.192E-11	1.056E-11	9.430E-12	8.477E-12	7.665E-12	6.967E-12	6.363E-12	3.261E-12	2.030E-12	
E	1.956E-11	1.680E-11	1.476E-11	1.307E-11	1.166E-11	1.047E-11	9.462E-12	8.596E-12	7.845E-12	4.004E-12	2.487E-12	
ESE	1.600E-11	1.372E-11	1.205E-11	1.067E-11	9.515E-12	8.548E-12	7.726E-12	7.020E-12	6.408E-12	3.278E-12	2.041E-12	
SE	1.337E-11	1.157E-11	1.017E-11	9.018E-12	8.055E-12	7.249E-12	6.566E-12	5.979E-12	5.471E-12	2.858E-12	1.808E-12	
SSE	5.304E-11	4.643E-11	4.095E-11	3.643E-11	3.265E-11	2.948E-11	2.679E-11	2.446E-11	2.245E-11	1.200E-11	7.679E-12	

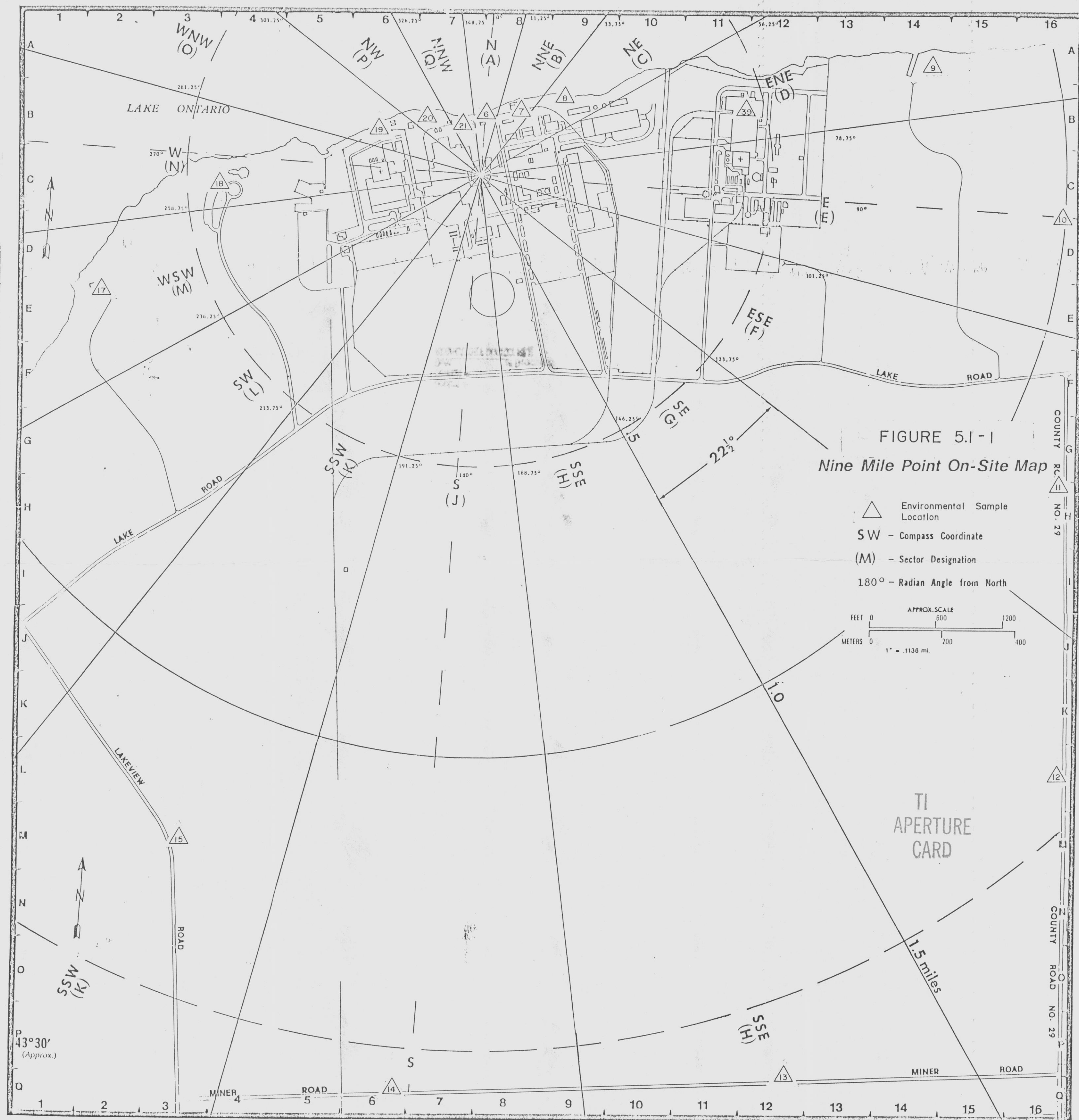
GRAZING SEASON D/Q

(Vent Release)

IMP UNIT #2 VENT
CORRECTED FOR OPEN TERRAIN RECIRCULATION

RELATIVE DEPOSITION PER UNIT AREA (M ² -2) AT FIXED POINTS BY DOWNHIND SECTORS											
DIRECTION FROM SITE	5.0	1.00	1.50	2.00	2.50	3.00	3.50	4.00	4.50	5.00	5.50
S	1.238E-08	4.281E-09	1.592E-09	8.446E-10	5.237E-10	3.579E-10	2.608E-10	1.990E-10	1.572E-10	1.275E-10	1.057E-10
SSH	4.857E-09	1.932E-09	8.147E-10	4.630E-10	2.996E-10	2.099E-10	1.550E-10	1.189E-10	9.391E-11	7.541E-11	6.253E-11
SH	3.515E-09	1.603E-09	7.164E-10	4.187E-10	2.753E-10	1.946E-10	1.444E-10	1.110E-10	8.773E-11	7.085E-11	5.826E-11
WSH	1.106E-09	5.399E-10	2.475E-10	1.473E-10	9.789E-11	6.964E-11	5.188E-11	3.997E-11	3.161E-11	2.553E-11	2.098E-11
H	1.254E-09	7.095E-10	3.501E-10	2.153E-10	1.457E-10	1.046E-10	7.831E-11	6.046E-11	4.782E-11	3.858E-11	3.163E-11
NNH	3.047E-09	1.520E-09	7.275E-10	4.380E-10	2.927E-10	2.087E-10	1.555E-10	1.197E-10	9.455E-11	7.622E-11	6.249E-11
NNH	5.990E-09	2.472E-09	1.069E-09	6.268E-10	4.082E-10	2.866E-10	2.188E-10	1.623E-10	1.279E-10	1.032E-10	8.472E-11
NNH	3.477E-09	2.195E-09	9.406E-10	5.348E-10	3.458E-10	2.419E-10	1.784E-10	1.366E-10	1.078E-10	8.697E-11	7.152E-11
N	7.206E-09	2.815E-09	1.216E-09	6.919E-10	4.474E-10	3.129E-10	2.306E-10	1.765E-10	1.390E-10	1.121E-10	9.209E-11
NNE	2.118E-09	9.561E-10	4.464E-10	2.645E-10	1.751E-10	1.241E-10	9.217E-11	7.080E-11	5.583E-11	4.497E-11	3.685E-11
NE	2.916E-09	1.273E-09	5.916E-10	3.434E-10	2.241E-10	1.573E-10	1.161E-10	8.878E-11	6.981E-11	5.612E-11	4.595E-11
ENE	1.905E-08	6.853E-09	2.889E-09	1.586E-09	9.991E-10	6.867E-10	5.002E-10	3.800E-10	2.979E-10	2.395E-10	1.965E-10
E	2.603E-08	8.833E-09	3.627E-09	1.948E-09	1.209E-09	8.229E-10	5.956E-10	4.506E-10	3.525E-10	2.831E-10	2.323E-10
ESE	1.936E-08	6.364E-09	2.574E-09	1.371E-09	8.467E-10	5.743E-10	4.148E-10	3.135E-10	2.452E-10	1.970E-10	1.617E-10
SE	1.504E-08	5.144E-09	2.088E-09	1.128E-09	7.041E-10	4.816E-10	3.501E-10	2.659E-10	2.087E-10	1.682E-10	1.384E-10
SSE	5.570E-09	1.928E-09	7.706E-10	4.222E-10	2.670E-10	1.844E-10	1.351E-10	1.032E-10	8.133E-11	6.575E-11	5.424E-11

DIRECTION FROM SITE	6.00	6.50	7.00	7.50	8.00	8.50	9.00	9.50	10.00	15.00	20.00
S	8.922E-11	7.783E-11	6.883E-11	6.140E-11	5.520E-11	4.996E-11	4.549E-11	4.164E-11	3.829E-11	2.090E-11	1.354E-11
SSH	5.233E-11	4.600E-11	4.060E-11	3.614E-11	3.241E-11	2.927E-11	2.659E-11	2.428E-11	2.228E-11	1.187E-11	7.567E-12
SH	4.864E-11	4.209E-11	3.783E-11	3.366E-11	3.017E-11	2.723E-11	2.471E-11	2.254E-11	2.066E-11	1.091E-11	6.901E-12
WSH	1.750E-11	1.548E-11	1.366E-11	1.216E-11	1.091E-11	9.844E-12	8.937E-12	8.156E-12	7.477E-12	3.950E-12	2.498E-12
H	2.631E-11	2.334E-11	2.059E-11	1.832E-11	1.642E-11	1.481E-11	1.344E-11	1.226E-11	1.123E-11	5.888E-12	3.701E-12
NNH	5.198E-11	4.594E-11	4.050E-11	3.601E-11	3.226E-11	2.908E-11	2.637E-11	2.404E-11	2.201E-11	1.150E-11	7.208E-12
NNH	7.066E-11	6.204E-11	5.469E-11	4.862E-11	4.355E-11	3.927E-11	3.561E-11	3.246E-11	2.973E-11	1.559E-11	9.823E-12
NNH	5.976E-11	5.243E-11	4.623E-11	4.113E-11	3.685E-11	3.324E-11	3.016E-11	2.751E-11	2.522E-11	1.330E-11	8.417E-12
N	7.688E-11	6.736E-11	5.937E-11	5.278E-11	4.727E-11	4.262E-11	3.866E-11	3.525E-11	3.229E-11	1.696E-11	1.070E-11
NNE	3.065E-11	2.701E-11	2.380E-11	2.116E-11	1.894E-11	1.707E-11	1.548E-11	1.410E-11	1.291E-11	6.723E-12	4.213E-12
NE	3.820E-11	3.342E-11	2.940E-11	2.607E-11	2.329E-11	2.095E-11	1.895E-11	1.723E-11	1.574E-11	8.067E-12	5.010E-12
ENE	1.640E-10	1.420E-10	1.248E-10	1.107E-10	9.884E-11	8.888E-11	8.040E-11	7.311E-11	6.688E-11	3.438E-11	2.146E-11
E	1.939E-10	1.669E-10	1.466E-10	1.299E-10	1.159E-10	1.041E-10	9.414E-11	8.555E-11	7.810E-11	4.080E-11	2.491E-11
ESE	1.351E-10	1.161E-10	1.020E-10	9.035E-11	8.063E-11	7.247E-11	6.553E-11	5.957E-11	5.441E-11	2.797E-11	1.748E-11
SE	1.158E-10	1.003E-10	8.820E-11	7.823E-11	6.991E-11	6.295E-11	5.703E-11	5.195E-11	4.755E-11	2.491E-11	1.578E-11
SSE	4.550E-11	3.974E-11	3.505E-11	3.119E-11	2.795E-11	2.525E-11	2.295E-11	2.096E-11	1.925E-11	1.033E-11	6.633E-12



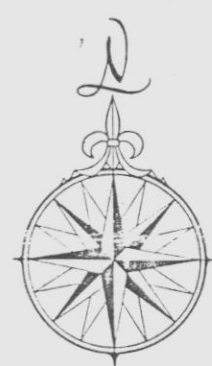
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FIGURE 5.1-2

NINE MILE POINT OFF-SITE MAP

SCALE OF MILES

LEGEND
 Interstate
 U.S. & State Highways
 County Roads
 Town Roads
 County Lines
 Town Lines
 City & Village Lines
 Railroads
 Environmental Sample Location



LAKE

ONTARIO



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 APERTURE
 CARD

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