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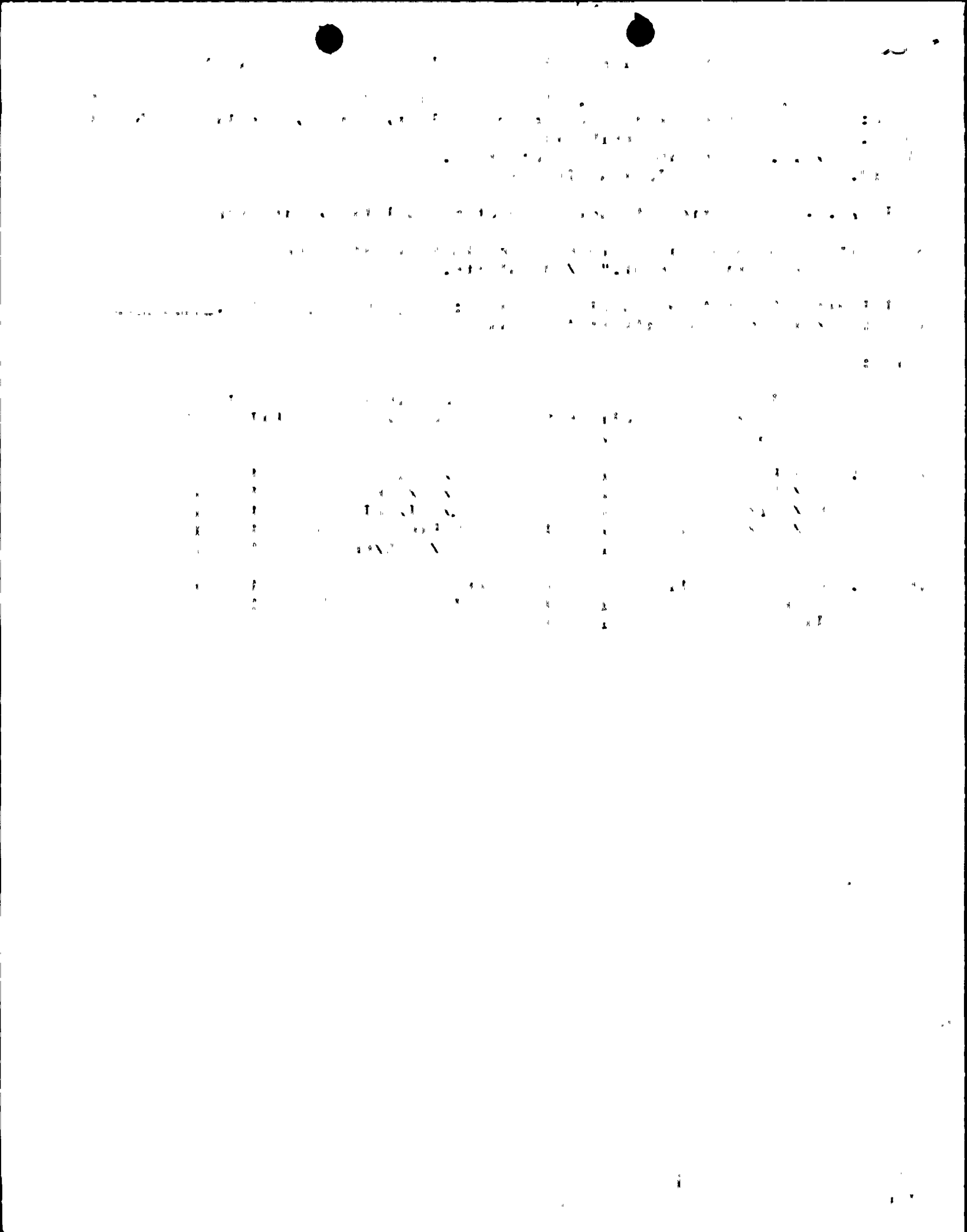

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AUG 31 1984

SERIAL: NLS-84-391

Mr. Harold R. Denton, Director
Office of Nuclear Reactor Regulation
United States Nuclear Regulatory Commission
Washington, DC 20555

SHEARON HARRIS NUCLEAR POWER PLANT
UNIT NO. 1 - DOCKET NO. 50-400
OFFSITE DOSE CALCULATION MANUAL

REFERENCE: Letter Dated July 30, 1984 (Serial: NLS-84-338)
From Mr. A. B. Cutter (CP&L) to Mr. H. R. Denton (NRC)

Dear Mr. Denton:

In accordance with a commitment in the referenced letter, Carolina Power & Light Company hereby submits a copy of the Offsite Dose Calculation Manual (ODCM) for the Shearon Harris Nuclear Power Plant. The enclosed ODCM is submitted for your review and approval.

If you have any questions, please contact Mr. Gregg A. Sinders at (919) 836-8168.

Yours very truly,

S. R. Zimmerman
Manager
Nuclear Licensing Section

GAS/mf (544GAS)
Enclosure

cc w/Enclosure:

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SHEARON HARRIS NUCLEAR POWER PLANT
OFF-SITE DOSE CALCULATION MANUAL
(ODCM)

DOCKET NO. STN 50-400

CAROLINA POWER & LIGHT COMPANY

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1.0 INTRODUCTION

The Off-Site Dose Calculation Manual (ODCM) provides the information and methodologies to be used by Shearon Harris Nuclear Power Plant (SHNPP) to assure compliance with Specifications 3.11.1, 3.11.2, 3.11.3, and 3.11.4 of the SHNPP Technical Specifications. These portions are those related to liquid and gaseous radiological effluents. They are intended to show compliance with 10CFR20, 10CFR50.36a, Appendix I of 10CFR50, and 40CFR190.

The ODCM is based on "Westinghouse Standard Technical Specifications" (NUREG 0452), "Preparation of Radiological Effluent Technical Specifications for Nuclear Power Plants" (NUREG 0133), and guidance from the United States Nuclear Regulatory Commission (NRC). Specific plant procedures for implementation of this manual are presented in the SHNPP Plant Operating Manual and other controlled documents. These procedures will be utilized by the operating staff of SHNPP to assure compliance with technical specifications.

The ODCM has been prepared as generically as possible in order to minimize the need for future revisions. However, some changes to the ODCM are expected in the future. Any such changes will be properly reviewed and approved as indicated in the Administration Control Section Specification 6.14.2 of the SHNPP Technical Specifications.

2.0 LIQUID EFFLUENT

2.1 COMPLIANCE WITH 10CFR PART 20 (LIQUIDS)

2.1.1 Batch Releases

A batch release is the discharge of liquid waste of a discrete volume. Batch releases from the SHNPP liquid radwaste system may occur from treated laundry and hot shower tanks, secondary waste treatment tank, waste monitor tanks, and waste evaporator condensate tanks. The principal sources of waste for these tanks are shown in Figure 2.1-1.

The liquid radwaste effluent streams are shown in Figure 2.1-2. A batch release represents the emptying of one tank only. No concurrent liquid batch releases (i.e., more than one tank at a time) are made from SHNPP. The liquid radwaste system discharges to the cooling tower blowdown line. Dilution flow depends primarily on the blowdown flow. If liquid effluent is diverted to the waste neutralization basin, some additional dilution may also occur at this point. The blowdown flow rate, "B" is determined by the cooling tower basin water level. This water level is adjusted depending on the conductivity of the basin water. For the purpose of calculation, the assumed value of B is 16.5 cfs (7.4E3 GPM) as presented in the SHNPP FSAR Section 11.2.3. This value is presently interpreted as the average blowdown flow rate, but may be variable. If B is less than 16.5 cfs, then the measured flow rate should be used.

The sampling and analysis frequency and the type of analyses required by the SHNPP Technical Specifications are given in Table 4.11-1 of the specifications. All applicable radiation monitoring instrument numbers are listed in Appendix D.

2.1.1.1 Prerelease

The radioactive content of each batch release will be determined prior to release in accordance with Table 4.11-1 of the SHNPP Technical Specifications. Compliance with 10CFR20 will be shown in the following manner:

a. Minimum acceptable dilution factor:

$$DF_o = \sum_i \frac{C_i}{MPC_i} \qquad (2.1\text{-}1)$$

where:

DF_o = Minimum acceptable dilution factor determined from a gamma isotopic analysis of liquid effluent to be released

C_i = Concentration of radionuclide "i" in the batch to be released, μCi/ml

MPC_i = Maximum permissible concentration of radionuclide "i" from Appendix B, Table II, Column 2 of 10CFR20, μCi/ml

$$DF_B = (10)\ (DF_o) \qquad (2.1\text{-}2)$$

where:

DF_B = Conservative dilution factor used by SHNPP to calculate maximum release rate prior to release in order to assure compliance with 10CFR20

10 = A factor of 10 less than 10CFR20 limits as specified in Appendix B, Table II, Column 2. This factor represents one layer of conservatism for all releases at SHNPP

DF_o = Minimum acceptable dilution factor per Equation 2.1-1

b. Maximum release rate:

$$MRR = \frac{B}{2\ (DF_B)} \qquad (2.1\text{-}3)$$

where:

MRR = Maximum release rate of the batch to be released, GPM

B = Cooling tower blowdown flow rate, GPM

= 7.4 E3 GPM

2 = Engineering factor to prevent spurious alarms caused by deviations in the mixtures of radionuclides which affect the monitor response

DF_B = Minimum acceptable dilution factor (DF_o) made conservative by a factor of 10 per Equation 2.1-2

c. Monitor Alarm/Trip Setpoint:

Monitor alarm/trip setpoints are determined to ensure that the concentration of radionuclides in the liquid effluent released from the site to unrestricted areas does not exceed the limits specified in 10CFR20, Appendix B, Table II, Column 2, for radionuclides other than dissolved or entrained noble gases. An MPC of 2 E-4 μCi/ml has been established for noble gases dissolved or entrained in liquid effluents, based on the assumption that Xenon-135 is the controlling radionuclide.

$$CR = \sum_i C_i \quad E_m \qquad (2.1\text{-}4)$$

where:

CR = Calculated monitor count rate above background, cps

C_i = Concentration of radionuclide "i" in the batch to be released, μCi/ml

E_m = The monitor efficiency for the mixture of radionuclides in the liquid effluent prior to dilution, cps/μCi/ml

$$SP = 2\ CR + Bkg. \qquad (2.1\text{-}5)$$

CAUTION: This setpoint must be evaluated as conforming to the test of Section "e" below.

where:

SP = Monitor alarm/trip setpoint, cps

2 = Engineering factor to prevent spurious alarms caused by deviations in the mixture of radionuclides which affect the monitor response (see determination of Equation 2.1-3)

CR = Calculated monitor count rate per Equation 2.1-4, cps

Bkg. = Background count rate due to internal contamination and the radiation levels in the area in which the monitor is installed when the detector sample chamber is filled with an uncontaminated fluid, cps

d. Calculated concentration at unrestricted area:

$$Conc_i = \frac{(C_i)\ (MRR)}{B} \qquad (2.1\text{-}6)$$

where:

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

C_i = Concentration of radionuclide "i" in the batch to be released, μCi/ml

MRR = Maximum release rate of the batch to be released (see Equation 2.1-3), GPM

B = Cooling tower blowdown flow rate, GPM

= 7.4 E3 GPM

e. 10CFR20 Prerelease Compliance Check:

Before initiating the batch release, perform one final check for compliance with 10CFR20. If the sum of the ratio of liquid concentration to MPC for all radionuclides at the unrestricted area is less than or equal to 1, then 10CFR Part 20 limits have been met. The following equation must be true:

$$\sum_i \quad Conc_i/MPC_i \quad \leq \quad 1 \qquad (2.1\text{-}7)$$

where:

$Conc_i$ = Calculated concentration of radionuclide "i" at the unrestricted area per Equation 2.1-6, μCi/ml

MPC_i = Maximum permissible concentration of radionuclide "i" from Appendix B, Table II, Column 2, of 10CFR20, μCi/ml

2.1.1.2 Postrelease

The actual concentration of each radionuclide following a batch release from a tank will be calculated to show final compliance with 10CFR20 as follows:

a. Actual concentration at unrestricted area:

$$Conc_{ik} = \frac{(C_i)\ (V_k)}{V_d} \qquad (2.1\text{-}8)$$

where:

$Conc_{ik}$ = The actual concentration of radionuclide "i" at the unrestricted area during release "k," μCi/ml

C_i = Concentration of radionuclide "i" in the batch released, μCi/ml

V_k = Actual volume of liquid effluent released, during release "k," gal (see Table 2.1-1 for waste tank volumes and pump capacities).

V_d = Actual volume of dilution water during release "k," gal

= $(B)\ (t_k)$

where:

B = Cooling tower blowdown flow rate, GPM

t_k = Duration of release "k," min

b. 10CFR20 Postrelease Compliance Check:

To show final compliance with 10CFR20, the following relationship must hold:

$$\sum_i (Conc_{ik} / MPC_i) \leq 1 \qquad (2.1\text{-}9)$$

where:

$Conc_{ik}$ = The actual concentration of radionuclide "i" during release "k" (from Equation 2.1-8), μCi/ml

MPC_i = Maximum permissible concentration of radionuclide "i" from Appendix B, Table II, Column 2, of 10CFR20, μCi/ml

2.1.2 Continuous Releases

A continuous release is the discharge of liquid wastes of a nondiscrete volume; e.g., from a volume or system that has an input flow during the continuous release. Planned continuous releases do not presently occur at SHNPP, although the potential does exist in the Normal Service Water (NSW) System and Emergency Service Water (ESW) System. The returns from the NSW System to the Circulating Water System are monitored by installed radiation monitors which are covered by Technical Specification 3.3.3.10. In addition, a monthly grab sample is taken in accordance with Technical Specification Table 4.11-1. If radioactivity is detected in either system, it will be eventually diluted by flow from the Circulating Water System. Thus, diluted effluent concentrations can be either computed with knowledge of the circulating water flow and/or monitored by periodic sampling of the Cooling Tower Basin. In the event radioactivity is detected in the Emergency Service Water System, then ESW flow, the Cooling Tower Basin, and the return flow to the auxilliary reservoir will be periodically sampled. To show compliance with 10CFR20, the sum of the concentration of radionuclide "i" in the unrestricted area due to both continuous and batch releases divided by that isotope's MPC must again be less than 1.

2.2 COMPLIANCE WITH 10CFR50

2.2.1 Cumulation of Doses

The dose contribution from the release of liquid effluents will be calculated at least once every 31 days (monthly), and a cumulative summation of these total body and any organ doses will be maintained for each calendar quarter. The dose contribution for all batch releases will be calculated using the following equation:

$$D_\tau = \sum_k \left(\sum_i (A_{i\tau}\ t_k\ C_{ik}\ F_k e^{-\lambda_i t_p}) \right) \qquad (2.2\text{-}1)$$

where:

D_τ = The cumulative dose commitment to the total body or any organ τ, from the liquid effluents releases, mrem;

t_k = The length of time of release "k" over which C_{ik} and F_k are averaged for all liquid releases, hours;

C_{ik} = The concentration of radionuclide "i" in the undiluted liquid effluent during release "k" from any liquid 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, "i" mrem-ml per hr-μCi;

λ_i = Radiological decay constant of radionuclide "i", hr^{-1};
= $0.693/ (t_{1/2})_i$

$t_{1/2i}$ = Radiological half-life of radionuclide "i", hr;

t_p = average transport time to reach the point of exposure, hr;

= 12 hours for the potable water pathway (see Appendix A, 2.a. of Regulatory Guide 1.109, Rev. 1).

F_k = The near-field average dilution factor for C_{ik} during any liquid effluent release "k." Defined as the ratio of the volume of undiluted liquid waste released to the product of the dilution volume from the site discharge structure to unrestricted receiving waters times A_F. (A_F is the site-specific applicable factor for the mixing effect of the SHNPP discharge structure as defined in NUREG 0133.

According to NUREG 0133, Section 4.3 for plants with cooling towers, the factor A_F shall be a number such that the product of the average blowdown flow to the receiving water body, in cfs and applicable factor A_F, is 1000 cfs or less, i.e.,

(Avg. Blowdown) $(A_F) \leq 1000$ cfs

Thus:

$$F_k = \frac{V_k}{V_d \times A_F} \qquad (2.2\text{-}2)$$

Where $A_F < 60$ and V_k and V_d are as defined in Equation 2.1-8. In the case of a continuous release, c_{ik} = cooling tower basin concentration and/or measured concentration in the emergency service water return to the auxilliary reservoir; and $V_k = V_d$.

The dose factor $A_{i\tau}$ (see NUREG 0133, Section 4.3.1) was calculated for an adult for each isotope "i" using the following equation:

$$A_{i\tau} = 1.14 \times 10^5 \left(\frac{730}{D_W} + 21\ BF_i \right) DF_{i\tau} \qquad (2.3\text{-}2)$$

where:

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

21 = Adult fish consumption rate (from Table E-5 of Regulatory Guide 1.109, Rev. 1,) kg/yr;

$A_{i\tau}$ = Dose factor $A_{i\tau}$ for an adult for each isotope "i" corresponding to dilution by the Cape Fear River and uptake at the Lillington Water Facility with Dw = 13.95. (Values are given in Table 2.2-1).

730 = Adult water consumption rate (from Table E-5 of Regulatory Guide 1.109) Rev. 1, liters/yr.

D_W = Dilution factor from the near field area within one-quarter mile of the release point to the potable water intake for the adult water consumption.

= 13.95 for uptake at the municipal water facility at Lillington

BF_i = Bioaccumulation factor for radionuclide "i" in fish (from Table A-1 of Regulatory Guide 1.109, Rev. 1,) pCi/kg per pCi/l.

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

Table 2.2-1 present the $A_{i\tau}$ values for an adult at SHNPP. Values of exp $(-\lambda_i t_p)$ are presented in Table 2.2-2 for each radionuclide "i". The sum of the cumulative dose from all batch releases for a quarter are compared to one-half the design objectives for total body and any organ. The sum of the cumulative doses from all batch releases for a calendar year are compared to the design objective doses. The following relationships should hold for the

SHNPP to show compliance with Technical Specification 3.11.1.2 of the Technical Specifications for SHNPP Unit 1.

For the calendar quarter,

$$D_\tau \leq 1.5 \text{ mrem total body} \qquad (2.2\text{-}4)$$

$$D_\tau \leq 5 \text{ mrem any organ} \qquad (2.2\text{-}5)$$

For the calendar year,

$$D_\tau \leq 3 \text{ mrem total body} \qquad (2.2\text{-}6)$$

$$D_\tau \leq 10 \text{ mrem any organ} \qquad (2.2\text{-}7)$$

where:

D_τ = Cumulative total dose to any organ τ or the total body from batch releases, mrem;

The quarterly limits given above represent one-half the annual design objective of 10CFR50, Appendix I, Section II.A. If any of the limits in Expressions 2.2-4 through 2.2-7 are exceeded, a special report pursuant to SHNPP Technical Specification 6.9.2 must be filed with the NRC. This report complies 10CFR 50 , Appendix I, with Section IV.A of Appendix I of 10CRF50.

2.2.2 Projection of Doses

Dose projections for this section are required at least once per 31 days (monthly) in Technical Specification 4.11.1.3.

The doses will be projected using Equation 2.2-1. When the operational conditions for the projected month are to be the same as for the current month, the source term inputs into the equation for the projection can be taken directly from the current month's data. Where possible, credit for expected operational evolutions (i.e., outages, increased power levels, major

planned liquid releases, etc.), should be taken in the dose projections. This may be accomplished by using the source-term data from similar historical operating experiences where practical.

TABLE 2.1-1

LIQUID EFFLUENT RELEASE TANKS AND PUMPS[1]

Tank	No. of Tanks	PUMP CAPACITY (gpm) Process	PUMP CAPACITY (gpm) Recirculation	Tank Volume (gal.)	Radiation Effluent Monitor Identification
Sec. Waste Sample tank	1	35	100	25,000	REM-3542
Waste Evaporator Condensate tank	2	35	100	10,000	REM-3541
Waste Monitor Tank	2	35	100	25,000	REM-3541
Laundry & Hot shower tank	2	200	---	25,000	REM-3540

[1]Reference SHNPP FSAR Tables 11.5.1-1 and 11.2.1-7

TABLE 2.2-1

$A_{i\tau}$ VALUES FOR THE ADULT FOR THE SHEARON HARRIS NUCLEAR POWER PLANT

$$A_{i\tau} = 1.14 \times 10^5 \left(\frac{730}{D_w} + 21\ BF_i\right) DF_{i\tau}$$

$$D_w = 13.95$$

(MREM/HR PER MICRO-Ci/ML)

Nuclide	Bone	Liver	T.Body	Thyroid	Kidney	Lung	GI-LLI
H-3	0.00E 0	8.50E-01	8.50E-01	8.50E-01	8.50E-01	8.50E-01	8.50E-01
C-14	3.13E 04	6.26E 03	6.26E 03	6.26E 03	6.26E 03	6.26E 03	6.26E 03
Na-24	4.17E 02	0.00E 00	0.00E 00	0.00E 00	0.00E 00	0.00E 00	0.00E 00
P-32	4.62E 07	2.87E 06	1.79E 06	0.00E 00	0.00E 00	0.00E 00	5.20E 06
Cr-51	0.00E 00	0.00E 00	1.29E 00	7.71E-01	2.84E-01	1.71E 00	3.23E 02
Mn-54	0.00E 00	4.40E 03	8.40E 02	0.00E 00	1.31E 03	0.00E 00	1.35E 04
Mn-56	0.00E 00	1.11E 02	1.97E 01	0.00E 00	1.41E 02	0.00E 00	3.54E 03
Fe-55	6.75E 02	4.66E 02	1.09E 02	0.00E 00	0.00E 00	2.60E 02	2.67E 02
Fe-59	1.06E 03	2.50E 03	9.59E 02	0.00E 00	0.00E 00	6.99E 02	8.34E 03
Co-58	0.00E 00	9.36E 01	2.10E 02	0.00E 00	0.00E 00	0.00E 00	1.90E 03
Co-60	0.00E 00	2.69E 02	5.93E 02	0.00E 00	0.00E 00	0.00E 00	5.05E 03
Ni-63	3.19E 04	2.21E 03	1.07E 03	0.00E 00	0.00E 00	0.00E 00	4.61E 02
Ni-65	1.30E 02	1.68E 01	7.68E 00	0.00E 00	0.00E 00	0.00E 00	4.27E 02
Cu-64	0.00E 00	1.05E 01	4.91E 00	0.00E 00	2.64E 01	0.00E 00	8.92E 02
Zn-65	2.32E 04	7.38E 04	3.34E 04	0.00E 00	4.94E 04	0.00E 00	4.65E 04
Zn-69	4.94E 01	9.44E 01	6.57E 00	0.00E 00	6.14E 01	0.00E 00	1.42E 01
Br-83	0.00E 00	0.00E 00	4.07E 01	0.00E 00	0.00E 00	0.00E 00	5.86E 01
Br-84	0.00E 00	0.00E 00	5.27E 01	0.00E 00	0.00E 00	0.00E 00	4.14E-04
Br-85	0.00E 00	0.00E 00	2.16E 00	0.00E 00	0.00E 00	0.00E 00	< 1.00E-15
Rb-86	0.00E 00	1.01E 05	4.71E 04	0.00E 00	0.00E 00	0.00E 00	1.99E 04
Rb-88	0.00E 00	2.90E 02	1.54E 02	0.00E 00	0.00E 00	0.00E 00	4.01E-09
Rb-89	0.00E 00	1.92E 02	1.35E 02	0.00E 00	0.00E 00	0.00E 00	1.12E-11
Sr-89	2.40E 04	0.00E 00	6.87E 02	0.00E 00	0.00E 00	0.00E 00	3.84E 03
Sr-90	5.89E 05	0.00E 00	1.45E 05	0.00E 00	0.00E 00	0.00E 00	1.70E 04
Sr-91	4.41E 02	0.00E 00	1.78E 01	0.00E 00	0.00E 00	0.00E 00	2.10E 03
Sr-92	1.67E 02	0.00E 00	7.23E 00	0.00E 00	0.00E 00	0.00E 00	3.31E 03
Y-90	6.33E-01	0.00E 00	1.70E-02	0.00E 00	0.00E 00	0.00E 00	6.71E 03
Y-91M	5.98E-03	0.00E 00	2.32E-04	0.00E 00	0.00E 00	0.00E 00	1.76E-02
Y-91	9.28E 00	0.00E 00	2.48E-01	0.00E 00	0.00E 00	0.00E 00	5.11E 03
Y-92	5.56E-02	0.00E 00	1.63E-03	0.00E 00	0.00E 00	0.00E 00	9.74E 02
Y-93	1.76E-01	0.00E 00	2.48E 00	0.00E 00	0.00E 00	0.00E 00	5.05E 02
Zr-95	4.21E-01	1.35E-01	9.14E-02	0.00E 00	2.12E-01	0.00E 00	4.28E 02
Zr-97	2.33E-02	4.69E-03	2.15E-03	0.00E 00	7.09E-03	0.00E 00	1.45E 03
Nb-95	4.47E 02	2.49E 02	1.34E 02	0.00E 00	2.46E 02	0.00E 00	1.51E 06
Mo-99	0.00E 00	1.29E 02	2.45E 01	0.00E 00	2.92E 02	0.00E 00	2.99E 02
Tc-99m	1.03E-02	2.92E-02	3.72E-01	0.00E 00	4.44E-01	1.43E-02	1.73E 01
Tc-101	1.06E-02	1.53E-02	1.50E-01	0.00E 00	2.76E-01	7.83E-03	4.60E-14
Ru-103	5.53E 00	0.00E 00	2.38E 00	0.00E 00	2.11E 01	0.00E 00	6.46E 02
Ru-105	4.60E-01	0.00E 00	1.82E-01	0.00E 00	5.95E 00	0.00E 00	2.48E 00
Ru-106	1.63E 01	0.00E 00	2.07E 00	0.00E 00	3.16E 01	0.00E 00	1.06E 03
Ag-110M	4.78E 00	4.42E 00	2.63E 00	0.00E 00	8.70E 00	0.00E 00	1.81E 03

Nuclide	Bone	Liver	T.Body	Thyroid	Kidney	Lung	GI-LLI
Te-125M	2.58E 03	9.36E 02	3.81E 02	7.77E 02	1.05E 04	0.00E 00	1.03E 04
Te-127M	6.52E 03	2.33E 03	7.95E 02	1.67E 03	2.65E 04	0.00E 00	2.19E 04
Te-127	1.06E 02	3.81E 01	2.29E 01	7.85E 01	4.32E 02	0.00E 00	8.36E 03
Te-129M	2.48E 00	2.55E 01	1.08E 01	2.35E 01	2.85E 02	0.00E 00	3.44E 02
Te-129	1.87E-01	7.01E-01	4.55E-00	1.43E-01	7.85E-02	0.00E 00	1.41E-01
Te-131M	1.67E 03	8.15E 02	6.79E 02	1.29E 03	8.26E 03	0.00E 00	8.09E 04
Te-131	1.90E 01	7.93E 00	5.99E 00	1.56E 01	8.32E 01	0.00E 00	2.69E 00
Te-132	2.43E 03	1.57E 03	1.47E 03	1.73E 03	1.51E 04	0.00E 00	7.43E 04
I-130	3.16E 01	9.33E 01	3.68E 01	7.91E 03	1.46E 02	0.00E 00	8.04E 01
I-131	1.74E 02	2.49E 02	1.43E 02	8.16E 04	4.27E 02	0.00E 00	6.57E 01
I-132	8.50E 00	2.27E 01	7.95E 00	7.95E 02	3.62E 01	0.00E 00	4.27E 00
I-133	5.94E 01	1.03E 02	3.15E 01	1.52E 04	1.80E 02	0.00E 00	9.29E 01
I-134	4.44E 00	1.21E 01	4.31E 00	2.09E 02	1.92E 01	0.00E 00	1.05E-02
I-135	1.85E 01	4.86E 01	1.79E 01	3.20E 03	7.78E 01	0.00E 00	5.48E 01
Cs-134	2.98E 05	7.10E 05	5.80E 05	0.00E 00	2.30E 05	7.62E 04	1.24E 04
Cs-136	3.12E 04	1.24E 05	8.87E 04	0.00E 00	6.86E 04	9.40E 03	1.40E 04
Cs-137	3.82E 05	5.23E 05	3.42E 05	0.00E 00	1.77E 05	5.90E 04	1.01E 04
Cs-138	2.65E 02	5.23E 02	2.59E 02	0.00E 00	3.84E 02	3.79E 01	2.23E-03
Ba-139	1.51E 00	1.07E-03	4.41E-02	0.00E 00	1.00E-03	6.08E-04	2.67E 00
Ba-140	3.15E 02	3.96E-01	2.06E 01	0.00E 00	1.35E-01	2.27E-01	6.49E 02
Ba-141	7.31E-01	5.53E-04	2.47E-02	0.00E 00	5.14E-04	3.14E-04	3.45E-10
Ba-142	3.31E-01	3.40E-04	2.08E-02	0.00E 00	2.87E-04	1.92E-04	4.66E-19
La-140	1.64E-01	8.29E-02	2.19E-02	0.00E 00	0.00E 00	0.00E 00	6.09E 03
La-142	8.42E-03	3.83E-03	9.54E-04	0.00E 00	0.00E 00	0.00E 00	2.80E 01
Ce-141	7.80E-02	5.28E-02	5.99E-03	0.00E 00	2.45E-02	0.00E 00	2.02E 02
Ce-143	1.38E-02	1.02E 01	1.13E-03	0.00E 00	4.48E-03	0.00E 00	3.80E 02
Ce-144	4.07E 00	1.70E-00	2.18E-01	0.00E-00	1.01E 00	0.00E 00	1.38E 03
Pr-143	6.05E-01	2.43E-01	3.00E-02	0.00E 00	1.40E-01	0.00E 00	2.65E 03
Pr-144	1.98E-03	8.22E-04	1.01E-04	0.00E 00	4.64E-04	0.00E 00	2.85E-10
Nd-147	4.14E-01	4.78E-01	2.86E-02	0.00E 00	2.80E-01	0.00E 00	2.30E 03
W-187	2.97E 02	2.48E 02	8.67E 01	0.00E 00	0.00E 00	0.00E 00	8.12E 04
Np-239	3.56E-02	3.50E-03	1.93E-03	0.00E 00	1.09E-02	0.00E 00	7.17E 02

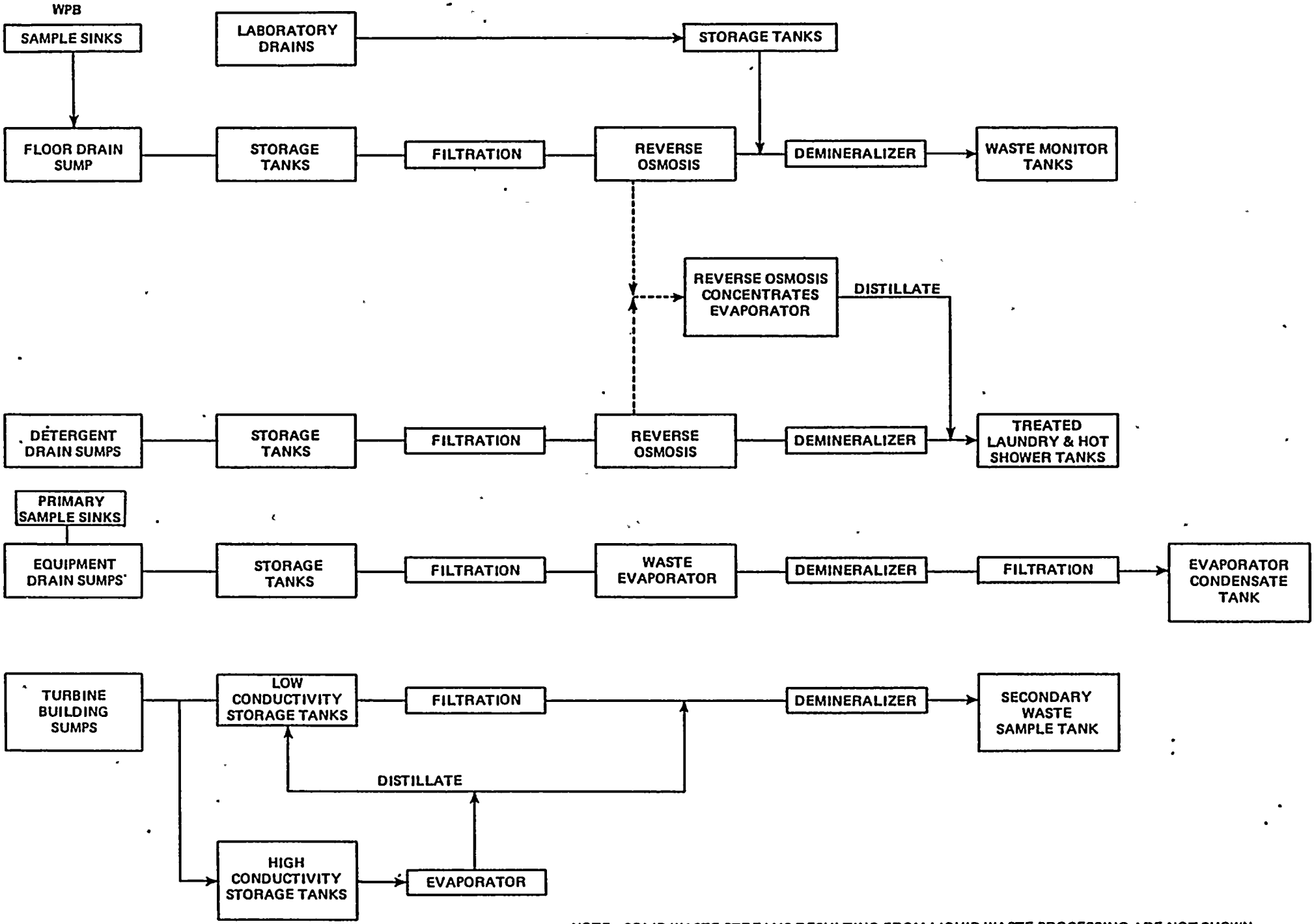
Table 2.2-2

DECAY FACTORS

Radionuclide	$\lambda_i(hr^{-1})$	$e^{-\lambda_i t_p}$*	Radionuclide	$\lambda_i(hr^{-1})$	$e^{-\lambda_i t_p}$*
H-3	6.40E-6	1.00	Zr-95	4.51E-4	9.99E-01
C-14	1.38E-8	1.00	Zr-97	4.10E-2	6.11E-01
F-18	3.79E-1	1.06E-02	Nb-95	8.21E-4	9.90E-01
Na-24	4.62E-2	5.74E-1	Mo-99	1.05E-2	8.92E-1
P-32	2.02E-3	9.76E-1	Tc-99m	1.15E-1	2.52E-1
Cr-51	1.04E-3	9.88E-1	Tc-101	2.93	5.37E-16
Mn-54	9.24E-5	9.99E-1	Ru-103	7.34E-4	9.91E-1
Mn-56	2.69E-1	3.96E-2	Ru-105	1.56E-1	1.54E-1
Fe-55	2.93E-5	1.00	Ru-106	7.84E-5	9.99E-1
Fe-59	6.47E-4	9.92E-1	Ag-110m	1.14E-4	9.99E-1
Co-58	4.08E-4	9.95E-1	Sb-124	4.79E-4	9.94E-1
Co-60	1.50E-5	1.00	Te-125m	4.98E-4	9.94E-1
Ni-63	8.24E-7	1.00	Te-127m	2.65E-4	9.97E-1
Ni-65	2.75E-1	3.69E-2	Te-127	7.37E-2	4.13E-1
Cu-64	5.46E-2	5.19E-1	Te-129m	8.59E-4	9.90E-1
Zn-65	1.18E-4	9.99E-1	Te-129	5.97E-1	7.74E-1
Zn-69	7.29E-1	1.59E-4	Te-131m	2.31E-2	7.58E-1
Br-83	2.90E-1	3.08E-2	Te-131	1.66	2.23E-9
Br-84	1.31	1.49E-7	Te-132	8.86E-3	8.99E-1
Br-85	1.4E-1	0.00	I-130	5.60E-2	5.11E-1
Rb-86	1.55E-3	9.82E-1	I-131	3.59E-3	9.58E-1
Rb-88	2.35E-0	5.66E-13	I-132	3.01E-1	2.70E-2
Rb-89	2.74	5.25E-15	I-133	3.33E-2	6.71E-1
Sr-89	5.71E-4	9.93E-1	I-134	7.90E-1	7.64E-5
Sr-90	2.78E-6	1.00	I-135	1.05E-1	2.84E-1
Sr-91	7.29E-2	4.17E-1	Cs-134	3.84E-5	1.00
Sr-92	2.56E-1	4.63E-2	Cs-136	2.20E-3	9.74E-1
Y-90	1.08E-2	8.78E-1	Cs-137	2.62E-6	1.00
Y-91m	8.36E-1	4.40E-5	Cs-138	1.29	1.89E-7
Y-91	4.94E-4	9.94E-1	Ba-139	4.99E-1	2.51E-3
Y-92	1.96E-1	9.52E-2	Ba-140	2.26E-3	9.73E-1
Y-93	6.80E-2	4.42E-1	Ba-141	2.28	1.31E-12
Ba-142	3.88	6.02E-21	Pr-143	2.12E-3	9.75E-1
La-140	1.58E-2	8.27E-1	Pr-144	2.41	2.76E-13
La-142	4.50E-1	4.52E-3	Nd-147	2.61E-3	9.69E-1
Ce-141	8.89E-4	9.89E-1	W-187	2.90E-2	7.06E-1
Ce-143	2.09E-2	7.78E-1	Np-239	1.23E-2	8.63E-1
Ce-144	1.02E-4	9.99E-1			

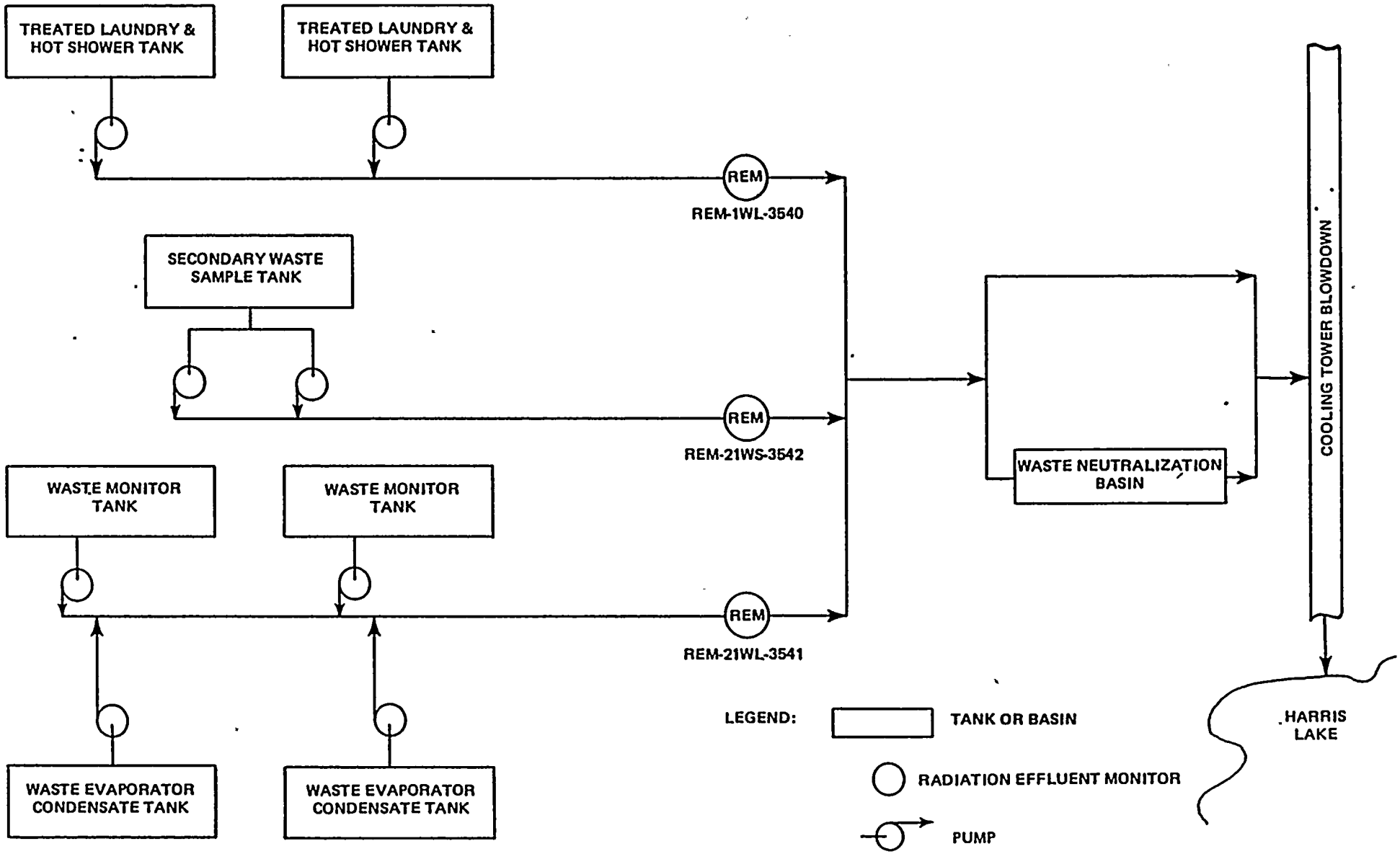
*Note: All values less than 1E-25 are reported as 0.

Figure 2.1-1 LIQUID WASTE PROCESSING FLOW DIAGRAM



NOTE: SOLID WASTE STREAMS RESULTING FROM LIQUID WASTE PROCESSING ARE NOT SHOWN

Figure 2.1-2 LIQUID EFFLUENT FLOW STREAM DIAGRAM



3.0 GASEOUS EFFLUENTS

In accordance with Carolina Power & Light's corporate ALARA policy, batch gaseous released from SHNPP will be performed considering meteorological parameters as well as operational concerns in order to minimize radiation doses to off-site populations.

Radioactivity releases through the steam generator flash tank can only occur when significant primary-to-secondary leakage exists within the steam generators. At SHNPP, steam from the flash tank can be routed to either the feedwater heaters or to the main condenser. Detection of primary-to-secondary leakage is accomplished most effectively by continuously monitoring the condenser air vacuum line. Liquid steam generator blowdown is continuously monitored. The liquid blowdown is routed to the main condenser or, if required, can be diverted to the Secondary Waste Treatment System.

3.1 MONITOR ALARM SETPOINT DETERMINATION

This procedure determines the monitor alarm setpoint that indicates if the dose rate in the unrestricted areas due to noble gas radionuclides in the gaseous effluent released from the site to areas at and beyond the site boundary exceeds 500 mrem/year to the whole body or exceeds 3000 mrem/year to the skin.

Gaseous effluent release points at SHNPP are shown in Figures 3.1, 3.2, and 3.3. The radioactivity monitors for each vent stack and for specific effluent streams are shown in Figures 3.1 and 3.2.

If two simultaneous releases out of one vent stack occur, calculate the setpoint for each type of release and use the lowest setpoint obtained.

The methodology described in Section 3.1.2 provides an alternative means to determine monitor alarm setpoints that may be used when an analysis of batch releases is performed prior to release.

3.1.1 Setpoint Based on Conservative Radionuclide Mix (Ground-level Releases)

The following setpoint calculation applies to a gaseous release via the Plant Vent Stack 1, Waste Processing Building Vent Stack 5, and the Turbine Building Vent Stack 3A (condenser air vacuum) when determining:

- Continuous release via Plant Vent Stack 1.
- Continuous release via the condenser air vacuum through Vent Stack 3A.
- Continuous mode release for containment purge via Vent Stack 1.
- Batch mode release of containment purge or pressure relief via Plant Vent Stack 1.
- Batch release of waste gas decay tanks via Vent Stack 5.

3.1.1.1 Determine the "mix" (noble gas radionuclide composition) of the gaseous effluent.

a. Determine the gaseous source terms that are representative of the "mix" of the gaseous effluent. Gaseous source terms are the noble gas activities in the effluent.

Gaseous source terms were obtained from the FSAR Table 11.3.3-1 and given in Table 3.1-1 or gaseous source terms can be obtained from analysis of the gaseous effluent.

b. Determine S_i (the fraction of the total noble gas 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 or from analysis of gaseous effluent to be released.

3.1.1.2 Determine Q_m (the maximum acceptable total release rate of all noble gas radionuclides in the gaseous effluent [μCi/sec]) based upon the whole body exposure limit of 500 mrem/year by:

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

where:

$(\overline{X/Q})$ = The highest calculated annual average relative dispersion factor for any area at or beyond the site boundary for all sectors (sec/m^3).

= 2.0E-6 sec/m^3 from Table A-1, Appendix A.

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

3.1.1.3 Determine Q_m (the maximum acceptable release rate of all gas radionuclides in the gaseous effluent [μCi/sec]) based upon the skin exposure limit of 3000 mrem/yr by:

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

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

3.1.1.4 Determine C_m, the maximum acceptable total radioactivity concentration of all noble gas radionuclides in the gaseous effluent [μCi/cc].

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

NOTE: Use the lower of the Q_m values obtained in Sections 3.1.1.2 and 3.1.1.3. This will protect both the skin and total body from being exposed to the limit.

where:

F = The maximum effluent flow rate at the point of release (cfm) based on design flow rates.

= 22,650 cfm (Turbine Bldg. Vent Stack 3A).

= 207,000 cfm (Waste Processing Bldg. Vent Stack 5).

= 103,500 cfm (Waste Processing Bldg. Vent Stack 5A).

= 390,000 cfm (Plant Vent Stack 1).

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

3.1.1.5 Determine CR, the calculated monitor count rate above background attributed to the noble gas radionuclides [cpm] by:

$$CR = (C_m)\ (E_m)$$

E_m = Obtained from the applicable effluent monitor efficiency (cpm/μCi/cc).

3.1.1.6 Determine the HSP, the monitor high alarm setpoint including background [cpm] by:

$$HSP = T_m CR + Bkg \qquad (3.1\text{-}5)$$

where:

T_m = Fraction of the radioactivity from the site that may be released via the monitored pathway to ensure that the site boundary limit is not exceeded due to simultaneous releases from several pathways.

= 0.03 for Turbine Bldg. Vent Stack 3A.

= 0.29 for Waste Processing Bldg. Vent Stack 5.

= 0.14 for Waste Processing Bldg. Vent Stack 5A.

= 0.54 for Plant Vent Stack 1.

Bkg = The background count rate (cpm) due to internal contamination and the radiation levels in the area in which the monitor is installed when the detector sample chamber is filled with uncontaminated air.

3.1.2 Alternative Setpoint Determination Method Based on Gaseous Effluent Analysis Prior to Release

The following method applies to setpoint determinations from plant vent stacks during the operational conditions listed below and when the gaseous effluent is sampled prior to release:

- Batch mode release of containment pressure relief.
- Batch release of waste gas decay tanks.

3.1.2.1 Determine the maximum allowable discharge flow rate prior to dilution.

a. Determine f, the maximum acceptable gaseous flow rate from containment or from the Waste Gas Decay Tanks (cfm), based upon the whole body exposure limit by:

$$f = \frac{0.848\ T_m}{(\overline{X/Q}) \sum_i K_i\ C_i} \qquad (3.1\text{-}6)$$

where:

T_m = Fraction of the radioactivity from the site that may be released via the monitored pathway to ensure that the site boundary limit is not exceeded due to simultaneous releases from several pathways (see Section 3.1.1.6 earlier).

$(\overline{X/Q})$ = The highest calculated annual average relative dispersion factor for any area at or beyond the site boundary for all sectors (sec/m^3) from Appendix A.

= 2.0E-6 sec/m^3 from Table A-1, Appendix A.

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

C_i = The radioactivity concentration of noble gas radionuclide "i" in the gaseous effluent ($\mu Ci/cc$) from the analysis of the gaseous effluent to be released.

0.848 = A combined numerical conversion factor consisting of the whole body dose limit of 500 mrem/yr times a conversion constant of 2.12 E-3 to convert cc/sec to cfm, times 0.80, an engineering correction factor to prevent spurious alarms.

b. Determine f based upon the skin exposure limit by:

$$f = \frac{5.09 \quad T_m}{(\overline{X/Q}) \sum_i [(L_i + 1.1 \ M_i) \quad C_i]} \qquad (3.1\text{-}7)$$

where:

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

5.09 = A combined conversion factor consisting of the skin dose limit of 3000 mrem/yr, times a conversion constant of 2.12 E-3 to convert cc/sec to cfm, times 0.80, an engineering factor to prevent spurious alarms.

c. The rate at which the noble gas activity is released from the containment during purging or pressure relief or from the Waste Gas Decay Tanks shall not exceed the smaller of the two "f" values calculated in Steps a and b above.

3.1.2.2 Determine the monitor setpoint equivalent to the maximum allowable discharge flow rate:

a. Determine C_m, the maximum radioactivity concentration of all noble gas radionuclides to be released during containment purge or pressure relief via Plant Vent Stack 1 or Waste Gas Decay Tanks discharge via the Waste Processing Bldg Vent Stack 5 after dilution by other discharges in the respective stacks (μCi/cc):

$$C_m = \frac{C_t \ f}{F} \qquad (3.1\text{-}8)$$

where:

C_t = The total radioactivity concentration of all noble gas radionuclides in the gas to be discharged from the containment or Waste Gas Decay Tanks prior to dilution (μCi/cc).

f = The maximum acceptable gaseous flow rate from containment or from the Waste Gas Decay Tanks (cfm).

F = The maximum design vent stack flow rate (see Section 3.1.1.4 earlier).

b. Determine CR, the calculated monitor count rate above background attributed to the radionuclides [cpm].

CR is obtained by using the applicable effluent monitor efficiency "E_m" (cpm/μCi/cc):

$$CR = (C_m)\ (E_m) \qquad (3.1\text{-}9)$$

c. Determine HSP, the monitor high alarm setpoint including background [cpm] by:

$$HSP = CR + Bkg \qquad (3.1\text{-}10)$$

where:

Bkg = Monitor background (cpm).

d. The monitor HSP shall be set at or below the calculated value during containment purges or releases from the Waste Gas Decay Tanks. If containment purges or pressure relief or Waste Gas Decay Tanks releases are made while other sources of noble gas activity are being released from their respective stacks, the monitor HSP shall not exceed the calculated value determined in Section 3.1.1.

TABLE 3.1-1

GASEOUS SOURCE TERMS*

	Plant Vent Release via Vent Stack 1		Condenser Air Vacuum via Vent Stack 3A		Containment Purge or Presure Relief via Vent Stack 1		Gas Decay Tanks via Vent Stack 5	
Radionuclide	A_i (Ci/yr)	S_i	A_i (Ci/yr)	S_i	A_i (Ci/yr)	S_i	A_i (Ci/yr)	S_i
Kr-83m	0.00E 00	0.00E 00	0.00E 00	0.00E 00	1.0E 00	3.78E-04	0.00E 00	0.00E 00
Kr-85m	3.0E 00	2.16E-02	2.0E 00	2.44E-02	1.2E 01	4.53E-03	0.00E 00	0.00E 00
Kr-85	0.00E 00	0.00E 00	0.00E 00	0.00E 00	4.0E 00	1.51E-03	2.1E 02	9.81E-01
Kr-87	1.0E 00	7.19E-03	0.00E 00	0.00E 00	2.0E 00	7.56E-04	0.00E 00	0.00E 00
Kr-88	5.0E 00	3.60E-02	3.0E 00	3.66E-02	1.6E 01	6.05E-03	0.00E 00	0.00E 00
Kr-89	0.00E 00	0.00E 00	0.00E 00	0.00E 00	0.00E 00	0.00E 00	0.00E 00	0.00E 00
Xe-131m	0.00E 00	0.00E 00	0.00E 00	0.00E 00	1.0E 01	3.78E-03	3.0E 00	1.40E-02
Xe-133m	2.0E 00	1.44E-02	1.0E 00	1.22E-02	4.3E 01	1.62E-02	0.00E 00	0.00E 00
Xe-133	1.2E 02	8.63E-01	7.2E 01	8.78E-01	2.5E 03	9.44E 01	1.0E 00	4.67E-03
Xe-135m	0.00E 00	0.00E 00	0.00E 00	0.00E 00	0.0E 00	0.00E-01	0.00E 00	0.00E 00
Xe-135	7.0E 00	5.04E-02	4.0E 00	4.88E-02	5.9E 01	2.23E 02	0.00E 00	0.00E 00
Xe-137	0.00E 00	0.00E 00	0.00E 00	0.00E 00	0.00E 00	0.00E 01	0.00E 00	0.00E 00
Xe-138	1.0E 00	7.19E-03	0.00E 00	0.00E 00	0.00E 00	0.00E 01	0.00E 00	0.00E 00
TOTAL	1.39E 02		8.20E 01		2.64E 03		2.14E 02	

*Source terms are based upon GALE Code (see SHNPP FSAR Table 11.3.3-1) and not actual releases. These values only apply to routine releases and should not be taken as a complete inventory of noble gases in an emergency situation.

TABLE 3.1-2

DOSE FACTORS AND CONSTANTS*

Radionuclide	Total Whole Body Dose Factor (K_i) (mrem/yr/μCi/m^3)	Total Skin Dose Factor ($L_i + 1.1\ M_i$) mrem/yr/μCi/m^3)
Kr-83m	7.56E-2**	2.12E1
Kr-85m	1.17E3	2.81E3
Kr-85	1.61E1	1.36E3
Kr-87	5.92E3	1.65E4
Kr-88	1.47E4	1.91E4
Kr-89	1.66E4	2.91E4
Kr-90	1.56E4	2.52E4
Xe-131m	9.15E1	6.48E2
Xe-133m	2.51E2	1.35E3
Xe-133	2.94E2	6.94E2
Xe-135m	3.12E3	4.41E3
Xe-135	1.81E3	3.97E3
Xe-137	1.42E3	1.39E4
Xe-138	8.83E3	1.43E4
Ar-41	8.84E3	1.29E4

*Regulatory Guide 1.109, Rev. 1, Table B-1 multiplied by (1.0 E6 pCi/μCi).

**7.56E-2 = 7.56 x 10^{-2}

3.2 COMPLIANCE WITH 10CFR20 (GASEOUS)

3.2.1 Noble Gases

The gaseous effluent monitors setpoints are utilized to show compliance with 10CFR20 for noble gases. However, because they are based upon a conservative mix of radionuclides, when using Table 3.1-1, the possibility exists that the setpoints could be exceeded and yet 10CFR20 limits may actually be met. Therefore, the following methodology has been provided in the event that if the alarm trip setpoints are exceeded, a determination may be made as to whether the actual releases have exceeded 10CFR20.

The dose rate in unrestricted areas resulting from noble gas effluents is limited to 500 mrem/year to the total body and 3000 mrem/year to the skin. Based upon NUREG 0133, the following equations are used to show compliance with 10CFR20.

$$\sum_i K_i \, (\overline{X/Q})_v \, \dot{Q}_{i_v} \leq 500 \text{ mrem/yr} \qquad (3.2\text{-}1)$$

$$\sum_i (L_i + 1.1\, M_i) \, (\overline{X/Q})_v \dot{Q}_{iv} \leq 3000 \text{ mrem/yr} \qquad (3.2\text{-}2)$$

where:

$(\overline{X/Q})_v$ = The highest annual average relative dilution for all vent stack releases for areas at or beyond the site boundary sec/m^3.

= 2.0E-6 sec/m^3 from Table A-1, Appendix A for ground level releases in the NNE sector at the site boundary.

K_i = The total body dose factor due to gamma emissions for noble gas radionuclide "i", mrem/year per $\mu Ci/m^3$.

L_i = The skin dose factor due to beta emissions for noble gas radionuclide "i," mrem/year per $\mu Ci/m^3$.

M_i = The air dose factor due to gamma emissions for noble gas radionuclide "i," mrad/year per $\mu Ci/m^3$.

1.1 = The ratio of the tissue to air absorption coefficients over the energy range of the photon of interest, mrem/mrad (reference, NUREG 0133).

$\dot{Q}_{iv}$ = The release rate of noble gas radionuclide "i" in gaseous effluents from all plant vent stacks ($\mu Ci/sec$).

The determination of limiting location for implementation of 10CFR20 for noble gases is a function of the radionuclide mix, isotopic release rate, and the meteorology.

The radionuclide mix was based upon source terms calculated using the NRC GALE Code and presented in the SHNPP FSAR Table 11.3.3-1. They are reproduced in Table 3.2-1 as a function of release point.

The X/Q values utilized in the equations for implementation of 10CFR20 is based upon the maximum long-term annual average ($\overline{X/Q}$) in the unrestricted area. Table 3.2-2 presents the distances from SHNPP to the nearest area for each of the 16 sectors as well as to the nearest residence, vegetable garden, cow, goat, and meat animal. Long-term annual average ($\overline{X/Q}$) values for the SHNPP release points to the special locations in Table 3.2-2 are presented in Appendix A. A description of their derivation is also provided in this appendix.

To select the limiting location, the highest annual average $\overline{X/Q}$ value for ground level releases is the controlling factor. Long-term annual average ($\overline{X/Q}$) values were calculated assuming no decay, undepleted transport to the site boundary, and are given in Table A-1, Appendix A . The maximum site boundary X/Q for ground level releases occurs at the NNE and SSW sectors. However, the limiting location for implementation of 10CFR20 for noble gases is considered to be the site boundary (1.33 miles) in the NNE sector due to the generally greater population density in this direction.

Values for K_i, L_i, and M_i which are to be used by SHNPP in Equations 3.2-1 and 3.2-2 to show compliance with 10CFR20, are presented in Table 3.2-3. These values were taken from Table B-1 of NRC Regulatory Guide 1.109, Revision 1. The values have been multiplied by 1.0E 6 to convert picocuries to microcuries for use in Equations 3.2-1 and 3.2-2.

3.2.2 Radioiodines and Particulates

The dose rate in unrestricted area resulting from the release of radioiodines, tritium, and particulates with half-lives $\geq$ 8 days is limited to 1500 mrem/yr to any organ. Based upon NUREG 0133, the following is used to show compliance with 10CFR20.

$$\sum_i P_{i_I} \left[(\overline{X/Q})_v \dot{Q}_{iv} \right] + (P_{i_M} + P_{i_G}) \left[(\overline{D/Q})_v \dot{Q}_{iv} \right] +$$

$$(P_{T_I} + P_{T_M}) \left[(\overline{X/Q})_v \dot{Q}_{T_v} \right] \leq 1500 \text{ mrem/yr} \qquad (3.2\text{-}3)$$

where:

$(\overline{X/Q})_v$ = The highest annual average relative dilution: 2.0 E-6 sec/m^3 for the inhalation pathway. The location is the site boundary at 1.33 miles in the NNE sector (from Table A-1, Appendix A, for ground level releases).

$(\overline{D/Q})_v$ = The highest annual average relative deposition: 3.5 E-9 m^{-2} for the milk and ground plane pathways. The location is the site boundary at 1.33 miles in the NNE sector (from Table A-4, Appendix A, for ground level releases).

P_{i_I} = Dose parameter for radionuclide "i" for the inhalation pathway, mrem/year per $\mu Ci/m^3$.

P_{i_G} = Dose parameter for radionuclide "i" for the ground plane pathway, mrem/year per μCi/sec per m^{-2}.

P_{i_M} = Dose parameter for radionuclide "i" for either the cow milk or goat milk pathway, mrem/year per μCi/sec per m^{-2}.

P_{T_I} = Dose parameter for tritium for the inhalation pathway, mrem/year per $\mu Cu/m^3$.

$\dot{Q}_{iv}$ = Release rate of radionuclide "i" from all vent stacks μCi/sec.

$\dot{Q}_{T_v}$ = Release rate for tritium from all vent stacks μCi/sec.

In the calculation to show compliance with 10CFR20, only the inhalation, ground plane, cow milk, and goat milk pathways are considered. To show compliance with 10CFR20, Equation 3.2-3 is evaluated first at the limiting site boundary. If the 1500 mrem/yr limit is exceeded at the limiting site boundary when all pathways are considered present at this site boundary but the inhalation pathway contributed < 1500 mrem/yr, then Equation 3.2-3 is evaluated at the limiting real pathway location, which is the cow milk pathway at 2.2 miles in the N sector (see Tables 3.2-2 and A-4, Appendix A).

The determination of limiting location for implementation of 10CFR20 for radioiodines and particulates is a function of the same parameters as for noble gases plus a fourth, actual receptor pathway. The radionuclide mix was again based upon the source terms calculated using the GALE Code. The mix and the source terms are presented in Table 3.2-1 as a function of release point.

The determination of the controlling site boundary location was based upon the highest site boundary D/Q value. The determination of actual receptor limiting location was based upon the milk pathway D/Q value and the P_i value for the respective milk pathway. Values for P_i were calculated for an infant for

various radionuclides for the inhalation, ground plane, cow milk, and goat milk pathways using the methodology of NUREG 0133. The P_i values are presented in Table 3.2-4. A description of the methodology used in calculating the P_i values is presented in Appendix B. The values of P_i reflect, for each radionuclide, the maximum P_i value for any organ for each individual pathway of exposure. The goat milk pathway is present near SHNPP, as is the cow milk pathway. However, the cow milk pathway P_i values were utilized in the determination of the controlling location because the product of the maximum cow milk pathway D/Q and P_i were greater than those for the goat. For the case of an infant being present at the site at the site boundary or at the real pathway location, the ground plane pathway is not considered as a reasonable exposure pathway (i.e., $P_{i_G} = 0$). However, P_{i_G} values are presented in Table 3.2-4 for completeness.

The annual average [D/Q] values at the special locations, which will be utilized in Equation 3.2-3, are obtained from the tables presented in Appendix A. The [X/Q] values which will be utilized in Equation 3.2-3 are also obtained from the tables presented in Appendix A. A description of the derivation of the X/Q and D/Q values is provided in Appendix A.

TABLE 12-1

RELEASES FROM SHEARON HARRIS NUCLEAR POWER PLANT[1]
- NORMAL OPERATION (Curies/year)

	WASTE GAS DECAY TANKS[2] VIA VENT STACK 5		BUILDING VENTILATION VIA VENT STACK 1			CONDENSER VACUUM PUMP EXHAUST VIA VENT STACK 3A	TOTAL
	SHUTDOWN	NORMAL OPERATION	CONTAINMENT	REACTOR AUXILIARY	TURBINE		
Noble Gases							
AR-83M	0	0	1.0E+00	0.	0.	0.	1.0E+00
AR-85M	0	0	1.2E+01	3.0E+00	0.	2.0E+00	1.7E+01
AR-85	3.0E+00	2.1E+02	4.0E+00	0.	0.	0.	2.2E+02
AR-87	0.	0.	2.0E+00	1.0E+00	0.	0.	3.0E+00
AR-88	0.	0.	1.6E+01	5.0E+00	0.	3.0E+00	2.4E+01
AR-89	0.	0.	0.	0.	0.	0.	0.
XE-131M	0.	3.0E+00	1.0E+01	0.	0.	0.	1.3E+01
XE-133M	0.	0.	4.3E+01	2.0E+00	0.	1.0E+00	4.6E+01
XE-133	0.	1.0E+00	2.5E+03	1.2E+02	0.	7.2E+01	2.7E+03
XE-135M	0.	0.	0.	0.	0.	0.	0.
XE-135	0.	0.	5.9E+01	7.0E+00	0	4.0E+00	7.0E+01
XE-137	0.	0.	0.	0.	0.	0.	0.
XE-138	0.	0.	0.	1.0E+00	0.	0.	1.0E+00
AR-41	-	-	-	-	-	-	2.5E+01[3]
Particulates							
I-131	0.	0.	1.3E-02	4.5E-03	3.0E-04	2.8E-02	4.6E-02
I-133	0.	0.	1.1E-02	6.7E-03	4.2E-04	4.2E-02	6.0E-02
H-3	-	-	-	-	-	-	5.8E+02[3]
C-14	-	-	-	-	-	-	8.0E+00[3]
MN-54	0.	4.5E-03	2.2E-04	1.8E-04	0.	0.	4.9E-03
FE-59	0.	1.5E-03	7.3E-05	6.0E-05	0.	0.	1.6E-03
CO-58	0.	1.5E-02	7.3E-04	6.0E-04	0.	0.	1.6E-02
CO-60	0.	7.0E-03	3.3E-04	2.7E-04	0.	0.	7.6E-03
SR-89	0.	3.3E-04	1.7E-05	1.3E-05	0.	0.	3.6E-04
SR-90	0.	6.0E-05	2.9E-06	2.4E-06	0.	0.	6.5E-05
CS-134	0.	4.5E-03	2.2E-04	1.8E-04	0.	0.	4.9E-03
CS-137	0.	7.5E-03	3.7E-04	3.0E-04	0.	0.	8.2E-03

[1] SHNPP FSAR Table 11.3.3-1. Calculations based upon GALE Code and do not reflect actual release data. These values are only for routine releases and not for a complete inventory of gases in an emergency.

[2] Waste gas decay tank releases assumed after a 90 day decay period.

[3] Calculated using guidance of NUREG-0017, "Calculation of Releases of Radioactive Materials in Gaseous and Liquid Effluents from PWRs."

TABLE 3.2-2

DISTANCE TO THE NEAREST SPECIAL LOCATIONS FOR THE SHEARON HARRIS NUCLEAR POWER PLANT (MILES)*

Sector	Exclusion Boundary	Residence	Milk Cow	Milk Goat	Garden	Meat Animal
N	1.32	2.2	2.2	4.1	2.2	2.2
NNE	1.33	1.7	4.7	3.6	1.8	1.8
NE	1.33	2.3	-	-	2.3	2.3
ENE	1.33	2.0	-	-	2.0	2.0
E	1.33	1.9	-	-	1.9	4.6
ESE	1.33	2.7	-	4.9	2.8	2.8
SE	1.33	4.2	-	-	4.3	4.3
SSE	1.33	-	-	-	-	-
S	1.36	-	-	-	-	-
SSW	1.33	4.0	-	-	4.0	4.2
SW	1.33	2.7	-	-	2.7	2.7
WSW	1.33	-	-	-	-	-
W	1.33	2.7	-	-	2.7	4.3
WNW	1.33	2.2	-	-	2.2	2.2
NW	1.26	1.7	1.7	-	1.7	1.7
NNW	1.26	1.6	-	-	1.6	1.8

*As of November 17, 1983.

Distance estimates are ± 0.1 mile except at the exclusion boundary.

TABLE 3.2-3

DOSE FACTORS FOR NOBLE GASES AND DAUGHTERS*

Radionuclide	Total Body Dose Factor K_i (mrem/yr per $\mu Ci/m^3$)	Skin Dose Factor L_i (mrem/yr per $\mu Ci/m^3$)	Gamma Air Dose Factor M_i (mrad/yr per $\mu Ci/m^3$)	Beta Air Dose Factor N_i (mrad/yr per $\mu Ci/m^3$)
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.

TABLE 3.2-4

P_i VALUES FOR AN INFANT FOR THE
SHEARON HARRIS NUCLEAR POWER PLANT*

Isotope	Inhalation	Ground Plane	Cow Milk	Goat Milk
H-3	6.47E2	0.00	2.38E3	4.86E3
P-32	2.03E6	0.00	1.60E11	1.93E11
Cr-51	1.28E4	6.67E6	4.79E6	5.65E5
Mn-54	1.00E6	1.09E9	3.89E7	4.68E6
Fe-59	1.02E6	3.92E8	3.93E8	5.11E6
Co-58	7.77E5	5.29E8	6.06E7	7.28E6
Co-60	4.51E6	4.40E9	2.10E8	2.52E7
Zn-65	6.47E5	6.89E8	1.90E10	2.29E9
Rb-86	1.90E5	1.28E7	2.22E10	2.67E9
Sr-89	2.03E6	3.16E4	1.27E10	2.66E10
Sr-90	4.09E7	0.00	1.21E11	2.55E11
Y-91	2.45E6	1.52E6	5.26E6	6.32E5
Zr-95	1.75E6	3.48E8	8.28E5	9.95E4
Nb-95	4.79E5	1.95E8	2.06E8	2.48E7
Ru-103	5.52E5	1.55E8	1.05E5	1.27E4
Ru-106	1.16E7	2.99E8	1.44E6	1.73E5
Ag-110m	3.67E6	3.14E9	1.46E10	1.75E9
Te-127m	1.31E6	1.18E5	1.04E9	1.24E8
Te-129m	1.68E6	2.86E7	1.40E9	1.68E8
Cs-134	7.03E5	2.81E9	6.79E10	2.04E11
Cs-136	1.35E5	2.13E8	5.76E9	1.73E10
Cs-137	6.12E5	1.15E9	6.02E10	1.81E11
Ba-140	1.60E6	2.94E7	2.41E8	2.89E7
Ce-141	5.17E5	1.98E7	1.37E7	1.65E6
Ce-144	9.84E6	5.84E7	1.33E8	1.60E7
I-131	1.48E7	2.46E7	1.06E12	1.27E12
I-132	1.69E5	1.78E6	1.39E2	1.64E2
I-133	3.56E6	3.54E6	9.80E9	1.18E10
I-135	6.96E5	3.67E6	2.27E7	2.68E7

*Units are mrem/yr per $\mu Ci/m^3$ for H-3 and the inhalation pathway and mrem/yr per $\mu Ci/sec$ per m^{-2} for the food and ground plane pathways.

3.3 COMPLIANCE WITH 10CFR50 (GASEOUS)

3.3.1 Noble Gases

3.3.1.1 Cumulation of Doses

Based upon NUREG 0133, the air dose in the unrestricted area due to noble gases released in gaseous effluents can be determined by the following equations:

$$D_\gamma = 3.17 \times 10^{-8} \sum_i M_i \left[(\overline{X/Q})_v \dot{Q}_{i_v} + (\overline{X/q})_v q_{i_v} \right] \quad (3.3\text{-}1)$$

$$D_\beta = 3.17 \times 10^{-8} \sum_i N_i \left[(\overline{X/Q})_v \dot{Q}_{i_v} + (\overline{X/q})_v q_{i_v} \right] \quad (3.3\text{-}2)$$

where:

D_γ = The air dose from gamma radiation, mrad.

D_β = The air dose from beta radiation, mrad.

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

N_i = The air dose factor due to beta emissions for each identified noble gas radionuclide "i," mrad/year per $\mu Ci/m^3$.

$(\overline{X/Q})_v$ = The highest annual average dilution for areas at or beyond the site area boundary for all long-term vent stack releases (> 500 hrs/year), sec/m^3.

= 2.0E-6 sec/m^3 from Table A-1, Appendix A for ground level releases in the NNE sector at the site boundary.

$(\overline{X/q})_v$ = The dilution for areas at or beyond the unrestricted area boundary for short-term, ground level, vent stack releases ($\leq$ 500 hours/year), sec/m^3. See Section 3.0 earlier or use 2.0E-6 sec/m^3 from Table A-1, Appendix A.

q_{iv} = The average release of noble gas radionuclide "i" in gaseous releases for short-term releases from all vent stacks ($\leq$ 500 hours/year), μCi.

Q_{iv} = The average release of noble gas radionuclide "i" in gaseous effluents for long-term releases from all vent stacks (> 500 hours/year), μCi.

3.17×10^{-8} = The inverse of the number of seconds in a year $(sec/year)^{-1}$.

To show compliance with 10CFR50, Expressions 3.3-1 and 3.3-2 are evaluated at the controlling location where the air doses are at a maximum.

At SHNPP the limiting location is the site boundary at 1.33 miles in the NNE sector based upon the tables presented in Appendix A (see Section 3.2.1 earlier). For this document, long-term annual average $\overline{X/Q}$ values can be used in lieu of short-term values (see Section 3.0 earlier).

The determination of the limiting location for implementation of 10CFR50 is a function of parameters such as radionuclide mix, isotopic release, and meteorology. The radionuclide mix was based upon source terms calculated using the NRC GALE Code and is presented in Table 3.2-1 as a function of release point. The only source of short-term releases from the plant vent are containment purges, containment pressure relief, and waste gas decay tank release. To select the limiting location, the highest annual average $\overline{X/Q}$ value for ground level releases is controlling.

Values for M_i and N_i, which are utilized in the calculation of the gamma air and beta air doses in Equation 3.3-1 to show compliance with 10CFR50, are presented in Table 3.2-3. These values originate from Table B-1 of the NRC Regulatory Guide 1.109, Revision 1. The values have been multiplied by 1.0E 6 to convert from picocuries to microcuries.

The following relationships should hold for SHNPP to show compliance with Technical Specification 3.11.2.2.

For the calendar quarter:

$$D_\gamma \leq 5 \text{ mrad} \qquad (3.3\text{-}3)$$

$$D_\beta \leq 10 \text{ mrad} \qquad (3.3\text{-}4)$$

For the calendar year:

$$D_\gamma \leq 10 \text{ mrad} \qquad (3.3\text{-}5)$$

$$D_\beta \leq 20 \text{ mrad} \qquad (3.3\text{-}6)$$

The quarterly limits given above represent one-half of the annual design objectives of Section II.B.1 of Appendix I of 10CFR50. If any of the limits of Equations 3.3-3 through 3.3-6 are exceeded, a special report pursuant to Technical Specification 6.9.2 must be filed with the NRC. This report complies with Section IV.A of Appendix I of 10CFR50.

3.3.1.2 Projection of Doses

Doses resulting from the release of gaseous effluents will be projected once every 31 days (monthly). The doses will be projected utilizing Equations 3.3-1 and 3.3-2. When the operational conditions are expected to be the same as for the current month, the source term inputs into the equation for the projection can be taken directly from the current month's data. Where possible, credit for expected operational evolutions (i.e., outages, increased power levels, major planned liquid releases, etc.) should be taken in the dose projections. This may be accomplished by using source term data from similar historical operating experiences where practical.

3.3.2 Radioiodine and Particulates

3.3.2.1 Cumulation of Doses

Section II.C of Appendix I of 10CFR50 limits the release of radioiodines and radioactive material in particulate form from each reactor such that estimated dose or dose commitment to an individual in an unrestricted area from all pathways of exposure is not in excess of 15 mrem to any organ. Based upon NUREG 0133, the dose to an organ of an individual from radioiodines and particulates with half-lives greater than 8 days in gaseous effluents released to unrestricted areas can be determined by the following equation:

$$D_\tau = 3.17 \times 10^{-8} \sum_i \left(R_{i_I} \left[(\overline{X/Q})_v Q_{i_v} + (\overline{X/q})_v q_{i_v}\right] + \right.$$
$$\left(R_{i_M} + R_{i_V} + R_{i_G} + R_{i_B}\right) \left[(\overline{D/Q})_v Q_{i_v} + (\overline{D/q})_v q_{i_v}\right]) + \qquad (3.3\text{-}7)$$
$$\left(R_{T_M} + R_{T_I} + R_{T_V} + R_{T_B}\right) \left[(\overline{X/Q})_v Q_{T_v} + (\overline{X/q})_v q_{T_v}\right]$$

where:

D_τ = Dose to any organ τ from tritium, radioiodines, and particulates, mrem.

3.17×10^{-8} = The inverse of the number of seconds in a year, $(\text{sec/year})^{-1}$.

$(\overline{X/Q})_v$ = The highest annual average dilution: 9.3 E-7 sec/m^3 for the inhalation pathway in the controlling location which is 2.2 miles in the N sector (from Table A-1, Appendix A, for long-term ground level vent stack releases).

$(\overline{X/q})_v$ = The dilution for areas at or beyond the site boundary for short-term, ground level, vent stack releases (< 500 hrs/yr) sec/m^3. See Section 3.0 earlier if using "real" meteorology or use 9.3 E-7 sec/m^3 from Table A-1, Appendix A, for the inhalation pathway at the controlling location.

$(\overline{D/Q})_V$ = The highest long-term (> 500 hr/yr) annual average relative deposition: 1.1 E-9 m^{-2} for the food and ground plane pathways at the controlling location which is 2.2 miles in the N sector (from Table A-4, Appendix A, for ground level vent stack releases).

$(\overline{D/q})_V$ = The relative deposition factor for short-term, ground level vent releases (≤ 500 hrs/yr), m^{-2}. See Section 3.0 earlier if using "real" meteorology or use 1.1 E-9 m^{-2} from Table A-4, Appendix A, for the food and ground plane pathways at the controlling location.

Q_{iv} = Release of radionuclide "i" in gaseous effluents for long-term releases (> 500 hrs/yr) from all vent stacks, μCi.

q_{iv} = Release of radionuclide "i" in gaseous effluents for short-term releases (≤ 500 hrs/yr) from all vent stacks, μCi.

R_{i_M} = Dose factor for an organ for radionuclide "i" for either the cow milk or goat milk pathway, mrem/yr per μCi/sec per m^{-2}.

R_{i_G} = Dose factor for an organ for radionuclide "i" for the ground plane exposure pathway, mrem/yr per μCi/sec per m^{-2}.

R_{i_I} = Dose factor for an organ for radionuclide "i" for the inhalation pathway, mrem/yr per μCi/m^3.

R_{i_V} = Dose factor for an organ for radionuclide "i" for the vegetable pathway, mrem/yr per μCi/sec per m^{-2}.

R_{i_B} = Dose factor for an organ for radionuclide "i" for the vegetable pathway, mrem/yr per $\mu Ci/sec$ per m^{-2}.

R_{T_M} = Dose factor for an organ for tritium for the milk pathway mrem/yr per $\mu Ci/m^3$.

R_{T_V} = Dose factor for an organ for tritium for the vegetable pathway, mrem/yr per $\mu Ci/m^3$.

R_{T_I} = Dose factor for an organ for tritium for the inhalation pathway, mrem/yr per $\mu Ci/m^3$.

R_{T_B} = Dose factor for an organ for tritium for the meat pathway, mrem/yr per $\mu Ci/m^3$.

Q_{Tv} = Release of tritium in gaseous effluents for long-term vent stack releases (> 500 hrs/yr), μCi.

q_{Tv} = Release of tritium in gaseous effluents for short-term vent stack releases ($\leq$ 500 hrs/yr), μCi.

To show compliance with 10CFR50, Equation 3.3-7 is evaluated at the limiting real pathway location. At SHNPP this location is 2.2 miles in the N sector. The critical receptor is an infant. Appropriate X/Q and D/Q values from tables in Appendix A are used. For this document, long-term annual average X/Q and D/Q values may be used in lieu of short-term values (see Section 3.0 earlier).

The determination of a limiting location for implementation of 10CFR50 for radioiodines and particulates is a function of:

1. Radionuclide mix and isotopic release
2. Meteorology
3. Exposure pathway
4. Receptor's age

In the determination of the limiting location, the radionuclide mix of radioiodines and particulates may be based upon the source terms calculated using the GALE Code. This mix is presented in Table 3.2-1 as a function of release point.

In the determination of the limiting location, all of the exposure pathways, as presented in Table 3.2-2 are initially evaluated. These include cow milk, goat milk, beef and vegetable ingestion, inhalation, and ground plane exposure. For conservatism, an infant was assumed to be present at all milk pathway locations, and a child was assumed to be present at all vegetable garden and beef animal locations. The ground plane exposure pathway was not considered a viable pathway for an infant. Naturally, the inhalation pathway was present everywhere an individual was present.

SHNPP Technical Specification 3.12.2 requires that a land-use census survey be conducted on an annual basis. The age groupings at the various receptor locations are also determined during this survey. Thus, depending on the results of the survey, a new limiting location and receptor age group can result. The survey ultimately determines the applicable real exposure pathways and, therefore, the appropriate R factors for inclusion in Equation 3.3-7.

For the actual determination of the limiting location, the highest D/Q locations with existing vegetable garden, cow milk, and goat milk pathways were selected from Table 3.2-2. The I-131 thyroid dose was computed at each of these locations. Based upon these calculations, it was determined that the limiting receptor pathway is the grass-cow-milk pathway.

Long-term X/Q and D/Q values for ground level releases are provided in tables in Appendix A. They may be utilized if an additional special location arises different from those presented in the special locations of Table 3.2-2. A description of the derivation of the various X/Q and D/Q values is presented in Appendix A.

Tables 3.3-1 through 3.3-19 present R_i values for the total body, GI-tract, bone, liver, kidney, thyroid, and lung organs for the ground plane, inhalation, cow milk, goat milk, vegetable, and meat ingestion pathways for the infant, child, teen, and adult age groups as appropriate to the pathways. These values were calculated using the methodology described in NUREG 0133 assuming a grazing period of eight months. A description of the methodology is presented in Appendix B.

The following relationship should hold for SHNPP to show compliance with SHNPP Technical Specification 3.11.2.3.

For the calendar quarter:

$$D_\tau \leq 7.5 \text{ mrem} \qquad (3.3\text{-}8)$$

For the calendar year:

$$D_\tau \leq 15 \text{ mrem} \qquad (3.3\text{-}9)$$

The quarterly limits given above represent one-half the annual design objectives of Section II.C of Appendix I of 10CFR50. If any of the limits of Equations 3.3-8 or 3.3-9 are exceeded, a special report pursuant to Technical Specification 6.9.2 must be filed with the NRC. This report complies with Section IV.A of Appendix I of 10CFR50.

3.3.2.2 Projection of Doses

Doses resulting from release of radioiodines and particulates will be projected once every 31 days (monthly) utilizing Equation 3.3-7. When the operational conditions for the projected month are expected to be the same as for the current month, the source term inputs into the equation for the projection can be taken directly from the current month's data. Where possible, credit for expected operational evolutions (i.e., outages, increased power levels, major planned liquid releases, etc.) should be taken in the dose projections. This may be accomplished by using source term data from similar historical operating experiences where practical.

TABLE 3.3-1

R VALUES FOR THE SHEARON HARRIS NUCLEAR POWER PLANT*

PATHWAY = Ground

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 09
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
Rb-86	8.99E 06	8.99E 06	8.99E 06	8.99E 06	8.99E 06	8.99E 06	8.99E 06	1.03E 07
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
Y-91	1.08E 06	1.08E 06	1.08E 06	1.08E 06	1.08E 06	1.08E 06	1.08E 06	1.22E 06
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
Nb-95	1.36E 08	1.36E 08	1.36E 08	1.36E 08	1.36E 08	1.36E 08	1.36E 08	1.60E 08
Ru-103	1.09E 08	1.09E 08	1.09E 08	1.09E 08	1.09E 08	1.09E 08	1.09E 08	1.27E 08
Ru-106	4.19E 08	4.19E 08	4.19E 08	4.19E 08	4.19E 08	4.19E 08	4.19E 08	5.03E 08
Ag-110M	3.48E 09	3.48E 09	3.48E 09	3.48E 09	3.48E 09	3.48E 09	3.48E 09	4.06E 09
Te-127M	9.15E 04	9.15E 04	9.15E 04	9.15E 04	9.15E 04	9.15E 04	9.15E 04	1.08E 05
Te-129M	2.00E 07	2.00E 07	2.00E 07	2.00E 07	2.00E 07	2.00E 07	2.00E 07	2.34E 07
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-132	1.24E 06	1.24E 06	1.24E 06	1.24E 06	1.24E 06	1.24E 06	1.24E 06	1.46E 06
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
I-135	2.56E 06	2.56E 06	2.56E 06	2.56E 06	2.56E 06	2.56E 06	2.56E 06	2.99E 06
Cs-134	6.82E 09	6.82E 09	6.82E 09	6.82E 09	6.82E 09	6.82E 09	6.82E 09	7.96E 09
Cs-136	1.49E 08	1.49E 08	1.49E 08	1.49E 08	1.49E 08	1.49E 08	1.49E 08	1.69E 08
Cs-137	1.03E 10	1.03E 10	1.03E 10	1.03E 10	1.03E 10	1.03E 10	1.03E 10	1.20E 10
Ba-140	2.05E 07	2.05E 07	2.05E 07	2.05E 07	2.05E 07	2.05E 07	2.05E 07	2.34E 07
Ce-141	1.36E 07	1.36E 07	1.36E 07	1.36E 07	1.36E 07	1.36E 07	1.36E 07	1.53E 07
Ce-144	6.95E 07	6.95E 07	6.95E 07	6.95E 07	6.95E 07	6.95E 07	6.95E 07	8.03E 07

*R Values in units of mrem/yr per micro-Ci/m^3 for inhalation and tritium, and in units of mrem/yr per micro-Ci/sec per m-2 for all others.

TABLE 3.3-2

R VALUES FOR THE SHEARON HARRIS NUCLEAR POWER PLANT*

PATHWAY = Veget

AGE GROUP = 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
P-32	5.91E 07	1.72E 08	1.53E 09	9.51E 07	0.00E 01	0.00E 01	0.00E 01	0.00E 01
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
Rb-86	1.03E 08	4.36E 07	0.00E 01	2.21E 08	0.00E 01	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
Y-91	1.34E 05	2.76E 09	5.01E 06	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
Nb-95	4.19E 04	4.73E 08	1.40E 05	7.79E 04	7.70E 04	0.00E 01	0.00E 01	0.00E 01
Ru-103	2.04E 06	5.53E 08	4.74E 06	0.00E 01	1.81E 07	0.00E 01	0.00E 01	0.00E 01
Ru-106	2.46E 07	1.26E 10	1.94E 08	0.00E 01	3.75E 08	0.00E 01	0.00E 01	0.00E 01
Ag-110M	6.23E 06	4.28E 09	1.13E 07	1.05E 07	2.06E 07	0.00E 01	0.00E 01	0.00E 01
Te-127M	6.12E 07	1.68E 09	5.02E 08	1.80E 08	2.04E 09	1.28E 08	0.00E 01	0.00E 01
Te-129M	4.71E 07	1.50E 09	2.98E 08	1.11E 08	1.24E 09	1.02E 08	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-132	5.21E 01	2.80E 01	5.57E 01	1.49E 02	2.37E 02	5.21E 03	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
I-135	3.91E 04	1.20E 05	4.05E 04	1.06E 05	1.70E 05	7.00E 06	0.00E 01	0.00E 01
Cs-134	8.83E 09	1.89E 08	4.54E 09	1.08E 10	3.49E 09	0.00E 01	1.16E 09	0.00E 01
Cs-136	1.19E 08	1.88E 07	4.19E 07	1.66E 08	9.21E 07	0.00E 01	1.26E 07	0.00E 01
Cs-137	5.94E 09	1.76E 08	6.63E 09	9.07E 09	3.08E 09	0.00E 01	1.02E 09	0.00E 01
Ba-140	8.40E 06	2.64E 08	1.28E 08	1.61E 05	5.47E 04	0.00E 01	9.22E 04	0.00E 01
Ce-141	1.48E 04	4.99E 08	1.93E 05	1.31E 05	6.07E 04	0.00E 01	0.00E 01	0.00E 01
Ce-144	1.69E 06	1.06E 10	3.15E 07	1.32E 07	7.80E 06	0.00E 01	0.00E 01	0.00E 01

*R Values in units of mrem/yr per micro-Ci/m^3 for inhalation and tritium, and in units of mrem/yr per micro-Ci/sec per m^{-2} for all others.

TABLE 3.3-3

R VALUES FOR THE SHEARON HARRIS NUCLEAR POWER PLANT*

PATHWAY = Veget

AGE GROUP = 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
P-32	6.80E 07	1.47E 08	1.75E 09	1.09E 08	0.00E 01	0.00E 01	0.00E 01	0.00E 01
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
Rb-86	1.30E 08	4.09E 07	0.00E 01	2.76E 08	0.00E 01	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
Y-91	2.06E 05	3.15E 09	7.68E 06	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
Nb-95	5.77E 04	4.48E 08	1.89E 05	1.05E 05	1.02E 05	0.00E 01	0.00E 01	0.00E 01
Ru-103	2.90E 06	5.66E 08	6.78E 06	0.00E 01	2.39E 07	0.00E 01	0.00E 01	0.00E 01
Ru-106	3.93E 07	1.50E 10	3.12E 08	0.00E 01	6.02E 08	0.00E 01	0.00E 01	0.00E 01
Ag-110M	9.39E 06	4.34E 09	1.63E 07	1.54E 07	2.95E 07	0.00E 01	0.00E 01	0.00E 01
Te-127M	9.44E 07	1.98E 09	7.93E 08	2.81E 08	3.22E 09	1.89E 08	0.00E 01	0.00E 01
Te-129M	6.79E 07	1.61E 09	4.29E 08	1.59E 08	1.79E 08	1.38E 08	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-132	4.72E 01	5.72E 01	5.02E 01	1.31E 02	2.07E 02	4.43E 03	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
I-135	3.49E 04	1.04E 05	3.66E 04	9.42E 04	1.49E 05	6.06E 06	0.00E 01	0.00E 01
Cs-134	7.54E 09	2.02E 08	6.90E 09	1.62E 10	5.16E 09	0.00E 01	1.97E 09	0.00E 01
Cs-136	1.13E 08	1.35E 07	4.28E 07	1.68E 08	9.16E 07	0.00E 01	1.44E 07	0.00E 01
Cs-137	4.90E 09	2.00E 08	1.06E 10	1.41E 10	4.78E 09	0.00E 01	1.86E 09	0.00E 01
Ba-140	8.88E 06	2.12E 08	1.38E 08	1.69E 05	5.72E 04	0.00E 01	1.14E 05	0.00E 01
Ce-141	2.12E 04	5.29E 08	2.77E 05	1.85E 05	8.70E 04	0.00E 01	0.00E 01	0.00E 01
Ce-144	2.71E 06	1.27E 10	5.04E 07	2.09E 07	1.25E 07	0.00E 01	0.00E 01	0.00E 01

*R Values in units of mrem/yr per micro-Ci/m^3 for inhalation and tritium, and in units of mrem/yr per micro-Ci/sec per m^{-2} for all others.

TABLE 3.3-4

R VALUES FOR THE SHEARON HARRIS NUCLEAR POWER PLANT*

PATHWAY = Veget

AGE GROUP = 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
P-32	1.42E 08	1.01E 08	3.67E 09	1.72E 08	0.00E 01	0.00E 01	0.00E 01	0.00E 01
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
Rb-86	2.81E 08	2.94E 07	0.00E 01	4.56E 08	0.00E 01	0.00E 01	0.00E 01	0.00E 01
Sr-89	1.03E 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
Y-91	4.89E 05	2.44E 09	1.83E 07	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
Nb-95	1.12E 05	2.91E 08	4.04E 05	1.57E 05	1.48E 05	0.00E 01	0.00E 01	0.00E 01
Ru-103	5.86E 06	3.94E 08	1.52E 07	0.00E 01	3.84E 07	0.00E 01	0.00E 01	0.00E 01
Ru-106	9.38E 07	1.17E 10	7.52E 08	0.00E 01	1.02E 09	0.00E 01	0.00E 01	0.00E 01
Ag-110M	1.87E 07	2.78E 09	3.46E 07	2.34E 07	4.35E 07	0.00E 01	0.00E 01	0.00E 01
Te-127M	2.26E 08	1.54E 09	1.90E 09	5.12E 08	5.42E 09	4.55E 08	0.00E 01	0.00E 01
Te-129M	1.55E 08	1.22E 09	9.98E 08	2.79E 08	2.93E 09	3.22E 08	0.00E 01	0.00E 01
I-131	8.16E 07	1.23E 07	1.43E 08	1.44E 08	2.36E 08	4.75E 10	0.00E 01	0.00E 01
I-132	7.53E 01	1.93E 02	8.91E 01	1.64E 02	2.51E 02	7.60E 03	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
I-135	5.54E 04	8.92E 04	6.50E 04	1.17E 05	1.79E 05	1.04E 07	0.00E 01	0.00E 01
Cs-134	5.40E 09	1.38E 08	1.56E 10	2.56E 10	7.93E 09	0.00E 01	2.84E 09	0.00E 01
Cs-136	1.43E 08	7.77E 06	8.04E 07	2.21E 08	1.18E 08	0.00E 01	1.76E 07	0.00E 01
Cs-137	3.52E 09	1.50E 08	2.49E 10	2.39E 10	7.78E 09	0.00E 01	2.80E 09	0.00E 01
Ba-140	1.61E 07	1.40E 08	2.76E 08	2.42E 05	7.87E 04	0.00E 01	1.44E 05	0.00E 01
Ce-141	4.75E 04	3.99E 08	6.42E 05	3.20E 05	1.40E 05	0.00E 01	0.00E 01	0.00E 01
Ce-144	6.49E 06	9.94E 09	1.22E 08	3.81E 07	2.11E 07	0.00E 01	0.00E 01	0.00E 01

*R Values in units of mrem/yr per micro-Ci/m^3 for inhalation and tritium, and in units of mrem/yr per micro-Ci/sec per m^{-2} for all others.

TABLE 3.3-5

R VALUES FOR THE SHEARON HARRIS NUCLEAR POWER PLANT*

PATHWAY = Meat

AGE GROUP = 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
P-32	1.18E 08	3.43E 08	3.05E 09	1.89E 08	0.00E 01	0.00E 01	0.00E 01	0.00E 01
Cr-51	4.27E 03	1.08E 06	0.00E 01	0.00E 01	9.42E 02	2.56E 03	5.67E 03	0.00E 01
Mn-54	1.06E 06	1.71E 07	0.00E 01	5.57E 06	1.66E 06	0.00E 01	0.00E 01	0.00E 01
Fe-59	1.43E 08	1.25E 09	1.59E 08	3.74E 08	0.00E 01	0.00E 01	1.04E 08	0.00E 01
Co-58	2.43E 07	2.20E 08	0.00E 01	1.08E 07	0.00E 01	0.00E 01	0.00E 01	0.00E 01
Co-60	1.03E 08	8.76E 08	0.00E 01	4.66E 07	0.00E 01	0.00E 01	0.00E 01	0.00E 01
Zn-65	3.58E 08	4.98E 08	2.49E 08	7.91E 08	5.29E 08	0.00E 01	0.00E 01	0.00E 01
Rb-86	1.42E 08	6.00E 07	0.00E 01	3.04E 08	0.00E 01	0.00E 01	0.00E 01	0.00E 01
Sr-89	5.23E 06	2.92E 07	1.82E 08	0.00E 01	0.00E 01	0.00E 01	0.00E 01	0.00E 01
Sr-90	2.02E 09	2.38E 08	8.22E 09	0.00E 01	0.00E 01	0.00E 01	0.00E 01	0.00E 01
Y-91	1.80E 04	3.71E 08	6.75E 05	0.00E 01	0.00E 01	0.00E 01	0.00E 01	0.00E 01
Zr-95	2.43E 05	1.14E 09	1.12E 06	3.59E 05	5.64E 05	0.00E 01	0.00E 01	0.00E 01
Nb-95	4.12E 05	4.65E 09	1.38E 06	7.66E 05	7.58E 05	0.00E 01	0.00E 01	0.00E 01
Ru-103	2.72E 07	7.38E 09	6.32E 07	0.00E 01	2.41E 08	0.00E 01	0.00E 01	0.00E 01
Ru-106	2.19E 08	1.12E 11	1.73E 09	0.00E 01	3.35E 09	0.00E 01	0.00E 01	0.00E 01
Ag-110M	2.34E 06	1.61E 09	4.27E 06	3.95E 06	7.76E 06	0.00E 01	0.00E 01	0.00E 01
Te-127M	1.00E 08	2.76E 09	8.22E 08	2.94E 08	3.34E 09	2.10E 08	0.00E 01	0.00E 01
Te-129M	1.17E 08	3.73E 09	7.40E 08	2.76E 08	3.09E 09	2.54E 08	0.00E 01	0.00E 01
I-131	5.77E 06	2.66E 06	7.04E 06	1.01E 07	1.73E 07	3.30E 09	0.00E 01	0.00E 01
I-133	1.51E-01	4.46E-01	2.85E-01	4.96E-01	8.66E-01	7.29E 01	0.00E 01	0.00E 01
I-135	6.07E-17	1.86E-16	6.28E-17	1.64E-16	2.64E-16	1.08E-14	0.00E 01	0.00E 01
Cs-134	7.81E 08	1.67E 07	4.01E 08	9.55E 08	3.09E 08	0.00E 01	1.03E 08	0.00E 01
Cs-136	2.14E 07	3.33E 06	7.53E 06	2.97E 07	1.65E 07	0.00E 01	2.27E 06	0.00E 01
Cs-137	4.99E 08	1.47E 07	5.57E 08	7.61E 08	2.58E 08	0.00E 01	8.59E 07	0.00E 01
Ba-140	1.20E 06	3.77E 07	1.83E 07	2.30E 04	7.82E 03	0.00E 01	1.32E 04	0.00E 01
Ce-141	6.46E 02	2.18E 07	8.42E 03	5.69E 03	2.65E 03	0.00E 01	0.00E 01	0.00E 01
Ce-144	4.70E 04	2.96E 08	8.75E 05	3.66E 05	2.17E 05	0.00E 01	0.00E 01	0.00E 01

*R Values in units of mrem/yr per micro-Ci/m^3 for inhalation and tritium, and in units of mrem/yr per micro-Ci/sec per m^{-2} for all others.

TABLE 3.3-6

R VALUES FOR THE SHEARON HARRIS NUCLEAR POWER PLANT*

PATHWAY = Meat

AGE GROUP = 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
P-32	9.98E 07	2.16E 08	2.58E 09	1.60E 08	0.00E 01	0.00E 01	0.00E 01	0.00E 01
Cr-51	3.42E 03	5.75E 05	0.00E 01	0.00E 01	7.49E 02	1.90E 03	4.88E 03	0.00E 01
Mn-54	8.43E 05	8.72E 06	0.00E 01	4.25E 06	1.27E 06	0.00E 01	0.00E 01	0.00E 01
Fe-59	1.15E 08	7.02E 08	1.27E 08	2.97E 08	0.00E 01	0.00E 01	9.36E 07	0.00E 01
Co-58	1.93E 07	1.15E 08	0.00E 01	8.36E 06	0.00E 01	0.00E 01	0.00E 01	0.00E 01
Co-60	8.15E 07	4.71E 08	0.00E 01	3.62E 07	0.00E 01	0.00E 01	0.00E 01	0.00E 01
Zn-65	2.83E 08	2.57E 08	1.75E 08	6.07E 08	3.89E 08	0.00E 01	0.00E 01	0.00E 01
Rb-86	1.19E 08	3.76E 07	0.00E 01	2.54E 08	0.00E 01	0.00E 01	0.00E 01	0.00E 01
Sr-89	4.40E 06	1.83E 07	1.54E 08	0.00E 01	0.00E 01	0.00E 01	0.00E 01	0.00E 01
Sr-90	1.31E 09	1.49E 08	5.32E 09	0.00E 01	0.00E 01	0.00E 01	0.00E 01	0.00E 01
Y-91	1.52E 04	2.33E 08	5.68E 05	0.00E 01	0.00E 01	0.00E 01	0.00E 01	0.00E 01
Zr-95	1.95E 05	6.53E 08	8.97E 05	2.83E 05	4.16E 05	0.00E 01	0.00E 01	0.00E 01
Nb-95	3.29E 05	2.55E 09	1.08E 06	5.97E 05	5.79E 05	0.00E 01	0.00E 01	0.00E 01
Ru-103	2.20E 07	4.30E 09	5.15E 07	0.00E 01	1.82E 08	0.00E 01	0.00E 01	0.00E 01
Ru-106	1.84E 08	7.00E 10	1.46E 09	0.00E 01	2.81E 09	0.00E 01	0.00E 01	0.00E 01
Ag-110M	1.86E 06	8.59E 08	3.23E 06	3.06E 06	5.83E 06	0.00E 01	0.00E 01	0.00E 01
Te-127M	8.25E 07	1.73E 09	6.94E 08	2.46E 08	2.81E 09	1.65E 08	0.00E 01	0.00E 01
Te-129M	9.81E 07	2.33E 09	6.20E 08	2.30E 08	2.59E 09	2.00E 08	0.00E 01	0.00E 01
I-131	4.40E 06	1.62E 06	5.85E 06	8.20E 06	1.41E 07	2.39E 09	0.00E 01	0.00E 01
I-133	1.23E-01	3.06E-01	2.39E-01	4.05E-01	7.10E-01	5.65E 01	0.00E 01	0.00E 01
I-135	4.88E-17	1.46E-16	5.11E-17	1.32E-16	2.08E-16	8.46E-15	0.00E 01	0.00E 01
Cs-134	3.48E 08	9.34E 06	3.19E 08	7.51E 08	2.39E 08	0.00E 01	9.11E 07	0.00E 01
Cs-136	1.55E 07	1.86E 06	5.87E 06	2.31E 07	1.26E 07	0.00E 01	1.98E 06	0.00E 01
Cs-137	2.14E 08	8.75E 06	4.62E 08	6.15E 08	2.09E 08	0.00E 01	8.13E 07	0.00E 01
Ba-140	9.76E 05	2.34E 07	1.51E 07	1.86E 04	6.29E 03	0.00E 01	1.25E 04	0.00E 01
Ce-141	5.42E 02	1.35E 07	7.07E 03	4.72E 03	2.22E 03	0.00E 01	0.00E 01	0.00E 01
Ce-144	3.96E 04	1.85E 08	7.37E 05	3.05E 05	1.82E 05	0.00E 01	0.00E 01	0.00E 01

*R Values in units of mrem/yr per micro-Ci/m^3 for inhalation and tritium, and in units of mrem/yr per micro-Ci/sec per m^{-2} for all others.

TABLE 3.3-7

R VALUES FOR THE SHEARON HARRIS NUCLEAR POWER PLANT*

PATHWAY = Meat

AGE GROUP = 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
P-32	1.87E 08	1.34E 08	4.86E 09	2.27E 08	0.00E 01	0.00E 01	0.00E 01	0.00E 01
Cr-51	5.33E 03	2.83E 05	0.00E 01	0.00E 01	8.09E 02	2.96E 03	5.40E 03	0.00E 01
Mn-54	1.30E 06	4.08E 06	0.00E 01	4.86E 06	1.36E 06	0.00E 01	0.00E 01	0.00E 01
Fe-59	1.82E 08	3.80E 08	2.25E 08	3.65E 08	0.00E 01	0.00E 01	1.06E 08	0.00E 01
Co-58	2.99E 07	5.70E 07	0.00E 01	9.76E 06	0.00E 01	0.00E 01	0.00E 01	0.00E 01
Co-60	1.27E 08	2.38E 08	0.00E 01	4.30E 07	0.00E 01	0.00E 01	0.00E 01	0.00E 01
Zn-65	4.35E 08	1.23E 08	2.62E 08	6.99E 08	4.40E 08	0.00E 01	0.00E 01	0.00E 01
Rb-86	2.21E 08	2.32E 07	0.00E 01	3.60E 08	0.00E 01	0.00E 01	0.00E 01	0.00E 01
Sr-89	8.31E 06	1.13E 07	2.91E 08	0.00E 01	0.00E 01	0.00E 01	0.00E 01	0.00E 01
Sr-90	1.74E 09	9.26E 07	6.87E 09	0.00E 01	0.00E 01	0.00E 01	0.00E 01	0.00E 01
Y-91	2.87E 04	1.43E 08	1.07E 06	0.00E 01	0.00E 01	0.00E 01	0.00E 01	0.00E 01
Zr-95	3.12E 05	3.65E 08	1.59E 06	3.50E 05	5.01E 05	0.00E 01	0.00E 01	0.00E 01
Nb-95	5.17E 05	1.34E 09	1.86E 06	7.23E 05	6.80E 05	0.00E 01	0.00E 01	0.00E 01
Ru-103	3.58E 07	2.41E 09	9.31E 07	0.00E 01	2.34E 08	0.00E 01	0.00E 01	0.00E 01
Ru-106	3.43E 08	4.27E 10	2.75E 09	0.00E 01	3.71E 09	0.00E 01	0.00E 01	0.00E 01
Ag-110M	2.89E 06	4.30E 08	5.36E 06	3.62E 06	6.74E 06	0.00E 01	0.00E 01	0.00E 01
Te-127M	1.55E 08	1.06E 09	1.31E 09	3.52E 08	3.73E 09	3.13E 08	0.00E 01	0.00E 01
Te-129M	1.81E 08	1.42E 09	1.17E 09	3.26E 08	3.43E 09	3.77E 08	0.00E 01	0.00E 01
I-131	6.20E 06	9.72E 05	1.09E 07	1.09E 07	1.79E 07	3.61E 09	0.00E 01	0.00E 01
I-133	2.07E-01	2.21E-01	4.43E-01	5.48E-01	9.13E-01	1.02E 02	0.00E 01	0.00E 01
I-135	7.87E-17	1.27E-16	9.25E-17	1.66E-16	2.55E-16	1.47E-14	0.00E 01	0.00E 01
Cs-134	1.95E 08	4.93E 06	5.63E 08	9.23E 08	2.86E 08	0.00E 01	1.03E 08	0.00E 01
Cs-136	1.80E 07	9.78E 05	1.01E 07	2.78E 07	1.48E 07	0.00E 01	2.21E 06	0.00E 01
Cs-137	1.20E 08	5.10E 06	8.51E 08	8.15E 08	2.65E 08	0.00E 01	9.55E 07	0.00E 01
Ba-140	1.63E 06	1.42E 07	2.80E 07	2.45E 04	7.97E 03	0.00E 01	1.46E 04	0.00E 01
Ce-141	9.86E 02	8.28E 06	1.33E 04	6.64E 03	2.91E 03	0.00E 01	0.00E 01	0.00E 01
Ce-144	7.42E 04	1.14E 08	1.39E 06	4.36E 05	2.41E 05	0.00E 01	0.00E 01	0.00E 01

*R Values in units of mrem/yr per micro-Ci/m^3 for inhalation and tritium, and in units of mrem/yr per micro-Ci/sec per m^{-2} for all others.

TABLE 3.3-8

R VALUES FOR THE SHEARON HARRIS NUCLEAR POWER PLANT*

PATHWAY = Cow Milk
AGE GROUP = 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
P-32	4.32E 08	1.26E 09	1.12E 10	6.95E 08	0.00E-01	0.00E-01	0.00E-01	0.00E-01
Cr-51	1.73E 04	4.36E 06	0.00E-01	0.00E-01	3.82E 03	1.04E 04	2.30E 04	0.00E-01
Mn-54	9.76E 05	1.57E 07	0.00E-01	5.11E 06	1.52E 06	0.00E-01	0.00E-01	0.00E-01
Fe-59	1.60E 07	1.39E 08	1.77E 07	4.17E 07	0.00E-01	0.00E-01	1.17E 07	0.00E-01
Co-58	6.28E 06	5.68E 07	0.00E-01	2.80E 06	0.00E-01	0.00E-01	0.00E-01	0.00E-01
Co-60	2.24E 07	1.91E 08	0.00E-01	1.02E 07	0.00E-01	0.00E-01	0.00E-01	0.00E-01
Zn-65	1.38E 09	1.92E 09	9.59E 08	3.05E 09	2.04E 09	0.00E-01	0.00E-01	0.00E-01
Rb-86	7.54E 08	3.19E 08	0.00E-01	1.62E 09	0.00E-01	0.00E-01	0.00E-01	0.00E-01
Sr-89	2.50E 07	1.40E 08	8.70E 08	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01
Sr-90	7.59E 09	8.94E 08	3.09E 10	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01
Y-91	1.37E 02	2.81E 06	5.11E 03	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01
Zr-95	1.22E 02	5.71E 05	5.62E 02	1.80E 02	2.83E 02	0.00E-01	0.00E-01	0.00E-01
Nb-95	1.48E 04	1.67E 08	4.95E 04	2.75E 04	2.72E 04	0.00E-01	0.00E-01	0.00E-01
Ru-103	2.63E 02	7.14E 04	6.11E 02	0.00E-01	2.33E 03	0.00E-01	0.00E-01	0.00E-01
Ru-106	1.60E 03	8.17E 05	1.26E 04	0.00E-01	2.44E 04	0.00E-01	0.00E-01	0.00E-01
Ag-110M	2.04E 07	1.40E 10	3.71E 07	3.44E 07	6.76E 07	0.00E-01	0.00E-01	0.00E-01
Te-127M	4.11E 06	1.13E 08	3.37E 07	1.21E 07	1.37E 08	8.62E 06	0.00E-01	0.00E-01
Te-129M	6.19E 06	1.97E 08	3.91E 07	1.46E 07	1.63E 08	1.34E 07	0.00E-01	0.00E-01
I-131	1.59E 08	7.32E 07	1.94E 08	2.77E 08	4.76E 08	9.09E 10	0.00E-01	0.00E-01
I-132	1.03E-01	5.51E-02	1.10E-01	2.93E-01	4.67E-01	1.03E 01	0.00E-01	0.00E-01
I-133	1.40E 06	4.13E 06	2.64E 06	4.59E 06	8.01E 06	6.75E 08	0.00E-01	0.00E-01
I-135	9.03E 03	2.76E 04	9.34E 03	2.45E 04	3.92E 04	1.61E 06	0.00E-01	0.00E-01
Cs-134	6.71E 09	1.44E 08	3.45E 09	3.21E 09	2.66E 09	0.00E-01	8.82E 08	0.00E-01
Cs-136	4.73E 08	7.46E 07	1.66E 08	6.57E 08	3.65E 08	0.00E-01	5.01E 07	0.00E-01
Cs-137	4.22E 09	1.25E 08	4.71E 09	6.44E 09	2.19E 09	0.00E-01	7.27E 08	0.00E-01
Ba-140	1.12E 06	3.53E 07	1.71E 07	2.15E 04	7.32E 03	0.00E-01	1.23E 04	0.00E-01
Ce-141	2.23E 02	7.52E 06	2.91E 03	1.97E 03	9.14E 02	0.00E-01	0.00E-01	0.00E-01
Ce-144	1.15E 04	7.26E 07	2.15E 05	8.97E 04	5.32E 04	0.00E-01	0.00E-01	0.00E-01

*R Values in units of mrem/yr per micro-Ci/m^3 for inhalation and tritium, and in units of mrem/yr per micro-Ci/sec per m^{-2} for all others.

TABLE 3.3-9

R VALUES FOR THE SHEARON HARRIS NUCLEAR POWER PLANT*

PATHWAY = Cow Milk
AGE GROUP = 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
P-32	8.00E 08	1.73E 09	2.06E 10	1.28E 09	0.00E-01	0.00E-01	0.00E-01	0.00E-01
Cr-51	3.02E 04	5.08E 06	0.00E-01	0.00E-01	6.63E 03	1.68E 04	4.32E 04	0.00E-01
Mn-54	1.69E 06	1.75E 07	0.00E-01	8.52E 06	2.54E 06	0.00E-01	0.00E-01	0.00E-01
Fe-59	2.79E 07	1.71E 08	3.10E 07	7.23E 07	0.00E-01	0.00E-01	2.28E 07	0.00E-01
Co-58	1.09E 07	6.50E 07	0.00E-01	4.72E 06	0.00E-01	0.00E-01	0.00E-01	0.00E-01
Co-60	3.88E 07	2.25E 08	0.00E-01	1.72E 07	0.00E-01	0.00E-01	0.00E-01	0.00E-01
Zn-65	2.38E 09	2.16E 09	1.47E 09	5.11E 09	3.27E 09	0.00E-01	0.00E-01	0.00E-01
Rb-86	1.39E 09	4.37E 08	0.00E-01	2.95E 09	0.00E-01	0.00E-01	0.00E-01	0.00E-01
Sr-89	4.59E 07	1.91E 08	1.60E 09	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01
Sr-90	1.08E 10	1.23E 09	4.37E 10	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01
Y-91	2.52E 02	3.85E 06	9.40E 03	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01
Zr-95	2.13E 02	7.16E 06	9.83E 02	3.10E 02	4.56E 02	0.00E-01	0.00E-01	0.00E-01
Nb-95	2.58E 04	2.00E 08	8.45E 04	4.68E 04	4.54E 04	0.00E-01	0.00E-01	0.00E-01
Ru-103	4.65E 02	9.08E 04	1.09E 03	0.00E-01	3.83E 03	0.00E-01	0.00E-01	0.00E-01
Ru-106	2.93E 03	1.11E 06	2.32E 04	0.00E-01	4.48E 04	0.00E-01	0.00E-01	0.00E-01
Ag-110M	3.53E 07	1.63E 10	6.14E 07	5.81E 07	1.11E 08	0.00E-01	0.00E-01	0.00E-01
Te-127M	7.39E 06	1.55E 08	6.22E 07	2.21E 07	2.52E 08	1.48E 07	0.00E-01	0.00E-01
Te-129M	1.13E 07	2.69E 08	7.15E 07	2.65E 07	2.99E 08	2.31E 07	0.00E-01	0.00E-01
I-131	2.65E 08	9.75E 07	3.52E 08	4.93E 08	8.48E 08	1.44E 11	0.00E-01	0.00E-01
I-132	1.83E-01	2.22E-01	1.94E-01	5.09E-01	8.02E-01	1.71E 01	0.00E-01	0.00E-01
I-133	2.49E 06	6.19E 06	4.82E 06	8.18E 06	1.43E 07	1.14E 09	0.00E-01	0.00E-01
I-135	1.58E 04	4.74E 04	1.66E 04	4.27E 04	6.75E 04	2.75E 06	0.00E-01	0.00E-01
Cs-134	6.54E 09	1.75E 08	5.99E 09	1.41E 10	4.48E 09	0.00E-01	1.71E 09	0.00E-01
Cs-136	7.48E 08	8.97E 07	2.83E 08	1.11E 09	6.07E 08	0.00E-01	9.56E 07	0.00E-01
Cs-137	3.96E 09	1.62E 08	8.54E 09	1.14E 10	3.87E 09	0.00E-01	1.50E 09	0.00E-01
Ba-140	1.99E 06	4.77E 07	3.09E 07	3.79E 04	1.28E 04	0.00E-01	2.55E 04	0.00E-01
Ce-141	4.09E 02	1.02E 07	6.33E 03	3.56E 03	1.68E 03	0.00E-01	0.00E-01	0.00E-01
Ce-144	2.12E 04	9.93E 07	3.95E 05	1.63E 05	9.76E 04	0.00E-01	0.00E-01	0.00E-01

*R Values in units of mrem/yr per micro-Ci/m^3 for inhalation and tritium, and in units of mrem/yr per micro-Ci/sec per m^{-2} for all others.

TABLE 3.3-10

R VALUES FOR THE SHEARON HARRIS NUCLEAR POWER PLANT*

PATHWAY = Cow Milk
AGE GROUP = 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
P-32	1.96E 09	1.41E 09	5.09E 10	2.38E 09	0.00E-01	0.00E-01	0.00E-01	0.00E-01
Cr-51	6.17E 04	3.27E 06	0.00E-01	0.00E-01	9.36E 03	3.42E 04	6.25E 04	0.00E-01
Mn-54	3.39E 06	1.07E 07	0.00E-01	1.27E 07	3.57E 06	0.00E-01	0.00E-01	0.00E-01
Fe-59	5.79E 07	1.21E 08	7.18E 07	1.16E 08	0.00E-01	0.00E-01	3.37E 07	0.00E-01
Co-58	2.21E 07	4.20E 07	0.00E-01	7.21E 06	0.00E-01	0.00E-01	0.00E-01	0.00E-01
Co-60	7.90E 07	1.48E 08	0.00E-01	2.68E 07	0.00E-01	0.00E-01	0.00E-01	0.00E-01
Zn-65	4.79E 09	1.35E 09	2.89E 09	7.70E 09	4.85E 09	0.00E-01	0.00E-01	0.00E-01
Rb-86	3.36E 09	3.52E 08	0.00E-01	5.47E 09	0.00E-01	0.00E-01	0.00E-01	0.00E-01
Sr-89	1.13E 08	1.54E 08	3.97E 09	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01
Sr-90	1.87E 10	9.95E 08	7.38E 10	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01
Y-91	6.21E 02	3.09E 06	2.32E 04	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01
Zr-95	4.47E 02	5.23E 05	2.28E 03	5.02E 02	7.18E 02	0.00E-01	0.00E-01	0.00E-01
Nb-95	5.31E 04	1.37E 08	1.91E 05	7.42E 04	6.98E 04	0.00E-01	0.00E-01	0.00E-01
Ru-103	9.88E 02	6.65E 04	2.57E 03	0.00E-01	6.47E 03	0.00E-01	0.00E-01	0.00E-01
Ru-106	7.14E 03	8.90E 05	5.72E 04	0.00E-01	7.72E 04	0.00E-01	0.00E-01	0.00E-01
Ag-110M	7.19E 07	1.07E 10	1.33E 08	9.00E 07	1.68E 08	0.00E-01	0.00E-01	0.00E-01
Te-127M	1.82E 07	1.24E 08	1.53E 08	4.13E 07	4.37E 08	3.66E 07	0.00E-01	0.00E-01
Te-129M	2.74E 07	2.15E 08	1.76E 08	4.92E 07	5.18E 08	5.68E 07	0.00E-01	0.00E-01
I-131	4.88E 08	7.64E 07	8.54E 08	8.59E 08	1.41E 09	2.84E 11	0.00E-01	0.00E-01
I-132	3.89E-01	9.95E-01	4.60E-01	8.45E-01	1 29E 00	3.92E 01	0.00E-01	0.00E-01
I-133	5.48E 06	5.84E 06	1.17E 07	1.45E 07	2.41E 07	2.69E 09	0.00E-01	0.00E-01
I-135	3.35E 04	5.39E 04	3.93E 04	7 07E 04	1.08E 05	6.26E 06	0.00E-01	0.00E-01
Cs-134	4.78E 09	1.22E 08	1.38E 10	2.27E 10	7.03E 09	0.00E-01	2.52E 09	0.00E-01
Cs-136	1.14E 09	6.17E 07	6.39E 08	1.76E 09	9.36E 08	0.00E-01	1.40E 08	0.00E-01
Cs-137	2.91E 09	1.23E 08	2.06E 10	1.97E 10	6.42E 09	0.00E-01	2.31E 09	0.00E-01
Ba-140	4.36E 06	3.78E 07	7.47E 07	6.54E 04	2.13E 04	0.00E-01	3.90E 04	0.00E-01
Ce-141	9.73E 02	8.17E 06	1.31E 04	6.55E 03	2.87E 03	0.00E-01	0.00E-01	0.00E-01
Ce-144	5.20E 04	7.96E 07	9.74E 05	3.05E 05	1.69E 05	0.00E-01	0.00E-01	0.00E-01

*R Values in units of mrem/yr per micro-Ci/m^3 for inhalation and tritium, and in units of mrem/yr per micro-Ci/sec per m^{-2} for all others.

TABLE 3.3-11

R VALUES FOR THE SHEARON HARRIS NUCLEAR POWER PLANT*

PATHWAY = Cow Milk
AGE GROUP = 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
P-32	4.06E 09	1.42E 09	1.05E 11	6.17E 09	0.00E-01	0.00E-01	0.00E-01	0.00E-01
Cr-51	9.77E 04	2.85E 06	0.00E-01	0.00E-01	1.39E 04	6.38E 04	1.24E 05	0.00E-01
Mn-54	5.37E 06	8.71E 06	0.00E-01	2.37E 07	5.25E 06	0.00E-01	0.00E-01	0.00E-01
Fe-59	9.23E 07	1.12E 08	1.34E 08	2.34E 08	0.00E-01	0.00E-01	6.92E 07	0.00E-01
Co-58	3.60E 07	3.59E 07	0.00E-01	1.44E 07	0.00E-01	0.00E-01	0.00E-01	0.00E-01
Co-60	1.29E 08	1.30E 08	0.00E-01	5.47E 07	0.00E-01	0.00E-01	0.00E-01	0.00E-01
Zn-65	6.14E 09	1.12E 10	3.88E 09	1.33E 10	6.45E 09	0.00E-01	0.00E-01	0.00E-01
Rb-86	6.86E 09	3.55E 08	0.00E-01	1.39E 10	0.00E-01	0.00E-01	0.00E-01	0.00E-01
Sr-89	2.17E 08	1.55E 08	7.55E 09	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01
Sr-90	2.05E 10	1.00E 09	8.04E 10	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01
Y-91	1.16E 08	3.12E 06	4.36E 04	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01
Zr-95	7.01E 02	4.92E 05	4.05E 03	9.88E 02	1.06E 03	0.00E-01	0.00E-01	0.00E-01
Nb-95	8.48E 04	1.24E 08	3.56E 05	1.47E 05	1.05E 05	0.00E-01	0.00E-01	0.00E-01
Ru-103	1.74E 03	6.33E 04	5.21E 03	0.00E-01	1.08E 04	0.00E-01	0.00E-01	0.00E-01
Ru-106	1.47E 04	8.95E 05	1.18E 05	0.00E-01	1.39E 05	0.00E-01	0.00E-01	0.00E-01
Ag-110M	1.19E 08	9.32E 09	2.46E 08	1.80E 08	2.57E 08	0.00E-01	0.00E-01	0.00E-01
Te-127M	3.75E 07	1.25E 08	3.10E 08	1.03E 08	7.64E 08	8.96E 07	0.00E-01	0.00E-01
Te-129M	5.57E 07	2.16E 08	3.62E 08	1.24E 08	9.05E 08	1.39E 08	0.00E-01	0.00E-01
I-131	9.23E 08	7.49E 07	1.78E 09	2.10E 09	2.45E 09	6.90E 11	0.00E-01	0.00E-01
I-132	6.90E-01	1.57E-00	9.55E-01	1.94E 00	2.16E 00	9.09E 01	0.00E-01	0.00E-01
I-133	1.05E 07	6.09E 06	2.47E 07	3.60E 07	4.23E 07	6.55E 09	0.00E-01	0.00E-01
I-135	5.93E 04	5.83E 04	8.17E 04	1.63E 05	1.81E 05	1.46E 07	0.00E-01	0.00E-01
Cs-134	4.19E 09	1.13E 08	2.23E 10	4.15E 10	1.07E 10	0.00E-01	4.38E 09	0.00E-01
Cs-136	1.37E 09	5.58E 07	1.25E 09	3.67E 09	1.46E 09	0.00E-01	2.99E 08	0.00E-01
Cs-137	2.72E 09	1.20E 08	3.28E 10	3.84E 10	1.03E 10	0.00E-01	4.18E 09	0.00E-01
Ba-140	7.91E 06	3.77E 07	1.54E 08	1.54E 05	3.65E 04	0.00E-01	9.43E 04	0.00E-01
Ce-141	1.87E 03	3.21E 06	2.60E 04	1.59E 04	4.90E 03	0.00E-01	0.00E-01	0.00E-01
Ce-144	7.82E 04	8.01E 07	1.40E 06	5.71E 05	2.31E 05	0.00E-01	0.00E-01	0.00E-01

*R Values in units of mrem/yr per micro-Ci/m^3 for inhalation and tritium, and in units of mrem/yr per micro-Ci/sec per m^{-2} for all others.

TABLE 3.3-12

R VALUES FOR THE SHEARON HARRIS NUCLEAR POWER PLANT*

PATHWAY = Goat Milk
AGE GROUP = 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
P-32	5.19E 08	1.51E 09	1.34E 10	8.34E 08	0.00E-01	0.00E-01	0.00E-01	0.00E-01
Cr-51	2.08E 03	5.23E 05	0.00E-01	0.00E-01	4.58E 02	1.24E 03	2.76E 03	0.00E-01
Mn-54	1.17E 05	1.88E 06	0.00E-01	6.14E 05	1.83E 05	0.00E-01	0.00E-01	0.00E-01
Fe-59	2.08E 05	1.81E 06	2.31E 05	5.42E 05	0.00E-01	0.00E-01	1.51E 05	0.00E-01
Co-58	7.54E 05	6.82E 06	0.00E-01	3.36E 05	0.00E-01	0.00E-01	0.00E-01	0.00E-01
Co-60	2.69E 06	2.29E 07	0.00E-01	1.22E 06	0.00E-01	0.00E-01	0.00E-01	0.00E-01
Zn-65	1.65E 08	2.31E 08	1.15E 08	3.66E 08	2.45E 08	0.00E-01	0.00E-01	0.00E-01
Rb-86	9.05E 07	3.83E 07	0.00E-01	1.94E 08	0.00E-01	0.00E-01	0.00E-01	0.00E-01
Sr-89	5.24E 07	2.93E 08	1.83E 09	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01
Sr-90	1.59E 10	1.88E 09	6.49E 10	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01
Y-91	1.64E 01	3.37E 05	6.13E 02	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01
Zr-95	1.46E 01	6.85E 04	6.74E 01	2.16E 01	3.39E 01	0.00E-01	0.00E-01	0.00E-01
Nb-95	1.78E 03	2.01E 07	5.94E 03	3.31E 03	3.27E 03	0.00E-01	0.00E-01	0.00E-01
Ru-103	3.16E 01	8.56E 03	7.33E 01	0.00E-01	2.80E 02	0.00E-01	0.00E-01	0.00E-01
Ru-106	1.92E 02	9.81E 04	1.52E 03	0.00E-01	2.93E 03	0.00E-01	0.00E-01	0.00E-01
Ag-110M	2.45E 06	1.68E 09	4.46E 06	4.12E 06	8.11E 06	0.00E-01	0.00E-01	0.00E-01
Te-127M	4.93E 05	1.36E 07	4.05E 06	1.45E 06	1.64E 07	1.03E 06	0.00E-01	0.00E-01
Te-129M	7.43E 05	2.36E 07	4.69E 06	1.75E 06	1.96E 07	1.61E 06	0.00E-01	0.00E-01
I-131	1.91E 08	8.78E 07	2.33E 08	3.33E 08	5.71E 08	1.09E 11	0.00E-01	0.00E-01
I-132	1.23E-01	6.61E-02	1.32E-01	3.52E-01	5.61E-01	1.23E 01	0.00E-01	0.00E-01
I-133	1.68E 06	4.95E 06	3.17E 06	5.51E 06	9.61E 06	8.10E 08	0.00E-01	0.00E-01
I-135	1.08E 04	3.32E 04	1.12E 04	2.94E 04	4.71E 04	1.94E 06	0.00E-01	0.00E-01
Cs-134	2.01E 10	4.31E 08	1.03E 10	2.46E 10	7.97E 09	0.00E-01	2.65E 09	0.00E-01
Cs-136	1.42E 09	2.24E 08	4.99E 08	1.97E 09	1.10E 09	0.00E-01	1.50E 08	0.00E-01
Cs-137	1.27E 10	3.74E 08	1.41E 10	1.93E 10	6.56E 09	0.00E-01	2.18E 09	0.00E-01
Ba-140	1.35E 05	4.23E 06	2.06E 06	2.58E 03	8.78E 02	0.00E-01	1.48E 03	0.00E-01
Ce-141	2.68E 01	9.03E 05	3.49E 02	2.36E 02	1.10E 02	0.00E-01	0.00E-01	0.00E-01
Ce-144	1.38E 03	8.71E 06	2.58E 04	1.08E 04	6.39E 03	0.00E-01	0.00E-01	0.00E-01

*R Values in units of mrem/yr per micro-Ci/m^3 for inhalation and tritium, and in units of mrem/yr per micro-Ci/sec per m-2 for all others.

TABLE 3.3-13

R VALUES FOR THE SHEARON HARRIS NUCLEAR POWER PLANT*

PATHWAY = Goat Milk
AGE GROUP = 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
P-32	9.60E 08	2.08E 09	2.48E 10	1.53E 09	0.00E-01	0.00E-01	0.00E-01	0.00E-01
Cr-51	3.63E 03	6.10E 05	0.00E-01	0.00E-01	7.95E 02	2.02E 03	5.18E 03	0.00E-01
Mn-54	2.03E 05	2.10E 06	0.00E-01	1.02E 06	3.05E 05	0.00E-01	0.00E-01	0.00E-01
Fe-59	3.63E 05	2.22E 06	4.03E 05	9.40E 05	0.00E-01	0.00E-01	2.96E 05	0.00E-01
Co-58	1.30E 06	7.80E 06	0.00E-01	5.66E 05	0.00E-01	0.00E-01	0.00E-01	0.00E-01
Co-60	4.66E 06	2.69E 07	0.00E-01	2.07E 06	0.00E-01	0.00E-01	0.00E-01	0.00E-01
Zn-65	2.86E 08	2.60E 08	1.77E 08	6.13E 08	3.93E 08	0.00E-01	0.00E-01	0.00E-01
Rb-86	1.66E 08	5.24E 07	0.00E-01	3.54E 08	0.00E-01	0.00E-01	0.00E-01	0.00E-01
Sr-89	9.65E 07	4.01E 08	3.37E 09	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01
Sr-90	2.27E 10	2.58E 09	9.18E 10	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01
Y-91	3.02E 01	4.62E 05	1.13E 03	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01
Zr-95	2.56E 01	8.59E 04	1.18E 02	3.72E 01	5.47E 01	0.00E-01	0.00E-01	0.00E-01
Nb-95	3.09E 03	2.40E 07	1.01E 04	5.62E 03	5.45E 03	0.00E-01	0.00E-01	0.00E-01
Ru-103	5.58E 01	1.09E 04	1.30E 02	0.00E-01	4.60E 02	0.00E-01	0.00E-01	0.00E-01
Ru-106	3.51E 02	1.34E 05	2.79E 03	0.00E-01	5.38E 03	0.00E-01	0.00E-01	0.00E-01
Ag-110M	4.24E 06	1.96E 09	7.37E 06	6.97E 06	1.33E 07	0.00E-01	0.00E-01	0.00E-01
Te-127M	8.87E 05	1.86E 07	7.46E 06	2.65E 06	3.02E 07	1.77E 06	0.00E-01	0.00E-01
Te-129M	1.36E 06	3.22E 07	8.58E 06	3.19E 06	3.59E 07	2.77E 06	0.00E-01	0.00E-01
I-131	3.18E 08	1.17E 08	4.22E 08	5.91E 08	1.02E 09	1.73E 11	0.00E-01	0.00E-01
I-132	2.19E-01	2.66E-01	2.33E-01	6.11E-01	9.62E-01	2.06E 01	0.00E-01	0.00E-01
I-133	2.99E 06	7.43E 06	5.79E 06	9.81E 06	1.72E 07	1.37E 09	0.00E-01	0.00E-01
I-135	1.90E 04	5.63E 04	1.99E 04	5.13E 04	8.10E 04	3.30E 06	0.00E-01	0.00E-01
Cs-134	1.96E 10	5.26E 08	1.80E 10	4.23E 10	1.34E 10	0.00E-01	5.13E 09	0.00E-01
Cs-136	2.25E 09	2.69E 07	8.50E 08	3.34E 09	1.82E 09	0.00E-01	2.87E 08	0.00E-01
Cs-137	1.19E 10	4.85E 08	2.56E 10	3.41E 10	1.16E 10	0.00E-01	4.51E 09	0.00E-01
Ba-140	2.39E 05	5.72E 06	3.71E 06	4.55E 03	1.54E 03	0.00E-01	3.06E 03	0.00E-01
Ce-141	4.91E 01	1.22E 06	6.40E 02	4.27E 02	2.01E 02	0.00E-01	0.00E-01	0.00E-01
Ce-144	2.55E 03	1.19E 07	4.74E 04	1.96E 04	1.17E 04	0.00E-01	0.00E-01	0.00E-01

*R Values in units of mrem/yr per micro-Ci/m^3 for inhalation and tritium, and in units of mrem/yr per micro-Ci/sec per m^{-2} for all others.

TABLE 3.3-14

R VALUES FOR THE SHEARON HARRIS NUCLEAR POWER PLANT*

PATHWAY = Goat Milk
AGE GROUP = 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
P-32	2.35E 09	1.69E 09	6.11E 10	2.86E 09	0.00E-01	0.00E-01	0.00E-01	0.00E-01
Cr-51	7.40E 03	3.93E 05	0.00E-01	0.00E-01	1.12E 03	4.11E 03	7.50E 03	0.00E-01
Mn-54	4.07E 05	1.28E 06	0.00E-01	1.53E 06	4.29E 05	0.00E-01	0.00E-01	0.00E-01
Fe-59	7.52E 05	1.57E 06	9.34E 05	1.51E 06	0.00E-01	0.00E-01	4.38E 05	0.00E-01
Co-58	2.65E 06	5.05E 06	0.00E-01	8.65E 05	0.00E-01	0.00E-01	0.00E-01	0.00E-01
Co-60	9.48E 06	1.78E 07	0.00E-01	3.21E 06	0.00E-01	0.00E-01	0.00E-01	0.00E-01
Zn-65	5.74E 08	1.62E 08	3.47E 08	9.24E 08	5.82E 08	0.00E-01	0.00E-01	0.00E-01
Rb-86	4.04E 08	4.22E 07	0.00E-01	6.57E 08	0.00E-01	0.00E-01	0.00E-01	0.00E-01
Sr-89	2.38E 08	3.23E 08	8.34E 09	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01
Sr-90	3.93E 10	2.09E 09	1.55E 11	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01
Y-91	7.45E 01	3.71E 05	2.79E 03	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01
Zr-95	5.36E 01	6.28E 04	2.74E 02	6.02E 01	8.62E 01	0.00E-01	0.00E-01	0.00E-01
Nb-95	6.37E 03	1.65E 07	2.29E 04	8.91E 03	8.37E 03	0.00E-01	0.00E-01	0.00E-01
Ru-103	1.19E 02	7.98E 03	3.09E 02	0.00E-01	7.77E 02	0.00E-01	0.00E-01	0.00E-01
Ru-106	8.56E 02	1.07E 05	6.86E 03	0.00E-01	9.27E 03	0.00E-01	0.00E-01	0.00E-01
Ag-110M	8.63E 06	1.28E 09	1.60E 07	1.08E 07	2.01E 07	0.00E-01	0.00E-01	0.00E-01
Te-127M	2.18E 06	1.49E 07	1.84E 07	4.95E 06	5.24E 07	4.40E 06	0.00E-01	0.00E-01
Te-129M	3.28E 06	2.58E 07	2.12E 07	5.91E 06	6.21E 07	6.82E 06	0.00E-01	0.00E-01
I-131	5.85E 08	9.17E 07	1.02E 09	1.03E 09	1.69E 09	3.41E 11	0.00E-01	0.00E-01
I-132	4.67E-01	1.19E 00	5.52E-01	1.01E 00	1.55E 00	4.71E 01	0.00E-01	0.00E-01
I-133	6.58E 06	7.00E 06	1.41E 07	1.74E 07	2.90E 07	3.23E 09	0.00E-01	0.00E-01
I-135	4.01E 04	6.47E 04	4.72E 04	8.49E 04	1.30E 05	7.52E 06	0.00E-01	0.00E-01
Cs-134	1.43E 10	3.67E 08	4.14E 10	6.80E 10	2.11E 10	0.00E-01	7.56E 09	0.00E-01
Cs-136	3.41E 09	1.85E 08	1.92E 09	5.27E 09	2.81E 09	0.00E-01	4.19E 08	0.00E-01
Cs-137	8.72E 09	3.70E 08	6.17E 10	5.91E 10	1.93E 10	0.00E-01	6.93E 09	0.00E-01
Ba-140	5.23E 05	4.54E 05	8.96E 06	7.85E 03	2.56E 03	0.00E-01	4.68E 03	0.00E-01
Ce-141	1.17E 02	9.81E 05	1.53E 03	7.36E 02	3.45E 02	0.00E-01	0.00E-01	0.00E-01
Ce-144	6.24E 03	9.55E 06	1.17E 05	3.66E 04	2.03E 04	0.00E-01	0.00E-01	0.00E-01

*R Values in units of mrem/yr per micro-Ci/m^3 for inhalation and tritium, and in units of mrem/yr per micro-Ci/sec per m-2 for all others.

TABLE 3.3-15

R VALUES FOR THE SHEARON HARRIS NUCLEAR POWER PLANT*

PATHWAY = Goat Milk

AGE GROUP = 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
P-32	4.88E 09	1.70E 09	1.26E 11	7.40E 09	0.00E-01	0.00E-01	0.00E-01	0.00E-01
Cr-51	1.17E 04	3.42E 05	0.00E-01	0.00E-01	1.67E 03	7.65E 03	1.49E 04	0.00E-01
Mn-54	6.45E 05	1.04E 06	0.00E-01	2.84E 06	6.30E 05	0.00E-01	0.00E-01	0.00E-01
Fe-59	1.20E 06	1.45E 06	1.74E 06	3.04E 06	0.00E-01	0.00E-01	9.00E 05	0.00E-01
Co-58	4.31E 06	4.31E 06	0.00E-01	1.73E 06	0.00E-01	0.00E-01	0.00E-01	0.00E-01
Co-60	1.55E 07	1.56E 07	0.00E-01	6.56E 06	0.00E-01	0.00E-01	0.00E-01	0.00E-01
Zn-65	7.36E 08	1.35E 09	4.66E 08	1.60E 09	7.74E 08	0.00E-01	0.00E-01	0.00E-01
Rb-86	8.23E 08	4.26E 07	0.00E-01	1.67E 09	0.00E-01	0.00E-01	0.00E-01	0.00E-01
Sr-89	4.55E 08	3.26E 08	1.59E 10	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01
Sr-90	4.30E 10	2.11E 09	1.69E 11	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01
Y-91	1.39E 02	3.75E 05	5.23E 03	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01
Zr-95	8.41E 01	5.90E 04	4.85E 02	1.19E 02	1.28E 02	0.00E-01	0.00E-01	0.00E-01
Nb-95	1.02E 04	1.48E 07	4.27E 04	1.76E 04	1.26E 04	0.00E-01	0.00E-01	0.00E-01
Ru-103	2.09E 02	7.60E 03	6.25E 02	0.00E-01	1.30E 03	0.00E-01	0.00E-01	0.00E-01
Ru-106	1.77E 03	1.07E 05	1.41E 04	0.00E-01	1.67E 04	0.00E-01	0.00E-01	0.00E-01
Ag-110M	1.43E 07	1.12E 09	2.95E 07	2.16E 07	3.08E 07	0.00E-01	0.00E-01	0.00E-01
Te-127M	4.51E 06	1.50E 07	3.72E 07	1.23E 07	9.16E 07	1.08E 07	0.00E-01	0.00E-01
Te-129M	6.69E 06	2.59E 07	4.34E 07	1.49E 07	1.09E 08	1.67E 07	0.00E-01	0.00E-01
I-131	1.11E 09	8.99E 07	2.14E 09	2.52E 09	2.94E 09	8.28E 11	0.00E-01	0.00E-01
I-132	8.28E-01	1.88E 00	1.15E 00	2.33E 00	2.59E 00	1.09E 02	0.00E-01	0.00E-01
I-133	1.27E 07	7.31E 06	2.97E 07	4.32E 07	5.08E 07	7.86E 09	0.00E-01	0.00E-01
I-135	7.11E 04	7.06E 04	9.81E 04	1.95E 05	2.17E 05	1.75E 07	0.00E-01	0.00E-01
Cs-134	1.26E 10	3.38E 08	6.68E 10	1.25E 11	3.21E 10	0.00E-01	1.31E 10	0.00E-01
Cs-136	4.11E 09	1.67E 08	3.75E 09	1.10E 10	4.39E 09	0.00E-01	8.98E 08	0.00E-01
Cs-137	8.17E 09	3.61E 08	9.85E 10	1.15E 11	3.10E 10	0.00E-01	1.25E 10	0.00E-01
Ba-140	9.50E 05	4.53E 06	1.84E 07	1.84E 04	4.38E 03	0.00E-01	1.13E 04	0.00E-01
Ce-141	2.24E 02	9.85E 05	3.13E 03	1.91E 03	5.88E 02	0.00E-01	0.00E-01	0.00E-01
Ce-144	9.39E 03	9.61E 06	1.67E 05	6.86E 04	2.77E 04	0.00E-01	0.00E-01	0.00E-01

*R Values in units of mrem/yr per micro-Ci/m^3 for inhalation and tritium, and in units of mrem/yr per micro-Ci/sec per m^{-2} for all others.

TABLE 3.3-16

R VALUES FOR THE SHEARON HARRIS NUCLEAR POWER PLANT*

PATHWAY = Inhal
AGE GROUP = 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
P-32	5.00E 04	8.63E 04	1.32E 06	7.70E 04	0.00E-01	0.00E-01	0.00E-01	0.00E-01
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
Rb-86	5.89E 04	1.66E 04	0.00E-01	1.35E 05	0.00E-01	0.00E-01	0.00E-01	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
Y-91	1.24E 04	3.84E 05	4.62E 05	0.00E-01	0.00E-01	0.00E-01	1.70E 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
Nb-95	4.20E 03	1.04E 05	1.41E 04	7.80E 03	7.72E 03	0.00E-01	5.04E 05	0.00E-01
Ru-103	6.57E 02	1.10E 05	1.53E 03	0.00E-01	5.82E 03	0.00E-01	5.04E 05	0.00E-01
Ru-106	8.71E 03	9.11E 05	6.90E 04	0.00E-01	1.33E 05	0.00E-01	9.35E 06	0.00E-01
Ag-110M	5.94E 03	3.02E 05	1.08E 04	9.99E 03	1.97E 04	0.00E-01	4.63E 06	0.00E-01
Te-127M	1.57E 03	1.49E 05	1.26E 04	5.76E 03	4.57E 04	3.28E 03	9.59E 05	0.00E-01
Te-129M	1.58E 03	3.83E 05	9.75E 03	4.67E 03	3.65E 04	3.44E 03	1.16E 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-132	1.16E 03	4.06E 02	1.16E 03	3.25E 03	5.18E 03	1.14E 05	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
I-135	2.56E 03	5.24E 03	2.68E 03	6.97E 03	1.11E 04	4.47E 05	0.00E-01	0.00E-01
Cs-134	7.27E 05	1.04E 04	3.72E 05	8.47E 05	2.87E 05	0.00E-01	9.75E 04	0.00E-01
Cs-136	1.10E 05	1.17E 04	3.90E 04	1.46E 05	8.55E 04	0.00E-01	1.20E 04	0.00E-01
Cs-137	4.27E 05	8.39E 03	4.78E 05	6.20E 05	2.22E 05	0.00E-01	7.51E 04	0.00E-01
Ba-140	2.56E 03	2.18E 05	3.90E 04	4.90E 01	1.67E 01	0.00E-01	1.27E 06	0.00E-01
Ce-141	1.53E 03	1.20E 05	1.99E 04	1.35E 04	6.25E 03	0.00E-01	3.61E 05	0.00E-01
Ce-144	1.84E 05	8.15E 05	3.43E 06	1.43E 06	8.47E 05	0.00E-01	7.76E 06	0.00E-01

*R Values in units of mrem/yr per micro-Ci/m^3 for inhalation and tritium, and in units of mrem/yr per micro-Ci/sec per m-2 for all others.

TABLE 3.3-17

R VALUES FOR THE SHEARON HARRIS NUCLEAR POWER PLANT*

PATHWAY = Inhal
AGE GROUP = 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
P-32	7.15E 04	9.27E 04	1.89E 06	1.09E 05	0.00E-01	0.00E-01	0.00E-01	0.00E-01
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
Rb-86	8.39E 04	1.77E 04	0.00E-01	1.90E 05	0.00E-01	0.00E-01	0.00E-01	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
Y-91	1.77E 04	4.08E 05	6.60E 05	0.00E-01	0.00E-01	0.00E-01	2.93E 06	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
Nb-95	5.66E 03	9.67E 04	1.85E 04	1.03E 04	9.99E 03	0.00E-01	7.50E 05	0.00E-01
Ru-103	8.95E 02	1.09E 05	2.10E 03	0.00E-01	7.42E 03	0.00E-01	7.82E 05	0.00E-01
Ru-106	1.24E 04	9.59E 05	9.83E 04	0.00E-01	1.90E 05	0.00E-01	1.61E 07	0.00E-01
Ag-110M	7.98E 03	2.72E 05	1.38E 04	1.31E 04	2.50E 04	0.00E-01	6.74E 06	0.00E-01
Te-127M	2.18E 03	1.59E 05	1.80E 04	8.15E 03	6.53E 04	4.38E 03	1.65E 06	0.00E-01
Te-129M	2.24E 03	4.04E 06	1.39E 04	6.57E 03	5.18E 04	4.57E 03	1.97E 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-132	1.57E 03	1.27E 03	1.59E 03	4.37E 03	6.91E 03	1.51E 05	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
I-135	3.48E 03	6.94E 03	3.69E 03	9.43E 03	1.49E 04	6.20E 05	0.00E-01	0.00E-01
Cs-134	5.48E 05	9.75E 03	5.02E 05	1.13E 06	3.75E 05	0.00E-01	1.46E 05	0.00E-01
Cs-136	1.37E 05	1.09E 04	5.14E 04	1.93E 05	1.10E 05	0.00E-01	1.77E 04	0.00E-01
Cs-137	3.11E 05	8.48E 03	6.69E 05	8.47E 05	3.04E 05	0.00E-01	1.21E 05	0.00E-01
Ba-140	3.51E 03	2.28E 05	5.46E 04	6.69E 01	2.28E 01	0.00E-01	2.03E 06	0.00E-01
Ce-141	2.16E 03	1.26E 05	2.84E 04	1.89E 04	8.87E 03	0.00E-01	6.13E 05	0.00E-01
Ce-144	2.62E 05	8.63E 05	4.88E 06	2.02E 06	1.21E 06	0.00E-01	1.33E 07	0.00E-01

*R Values in units of mrem/yr per micro-Ci/m^3 for inhalation and tritium, and in units of mrem/yr per micro-Ci/sec per m^{-2} for all others.

TABLE 3.3-18

R VALUES FOR THE SHEARON HARRIS NUCLEAR POWER PLANT*

PATHWAY = Inhal
AGE GROUP = 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
P-32	9.86E 04	4.21E 04	2.60E 06	1.14E 05	0.00E-01	0.00E-01	0.00E-01	0.00E-01
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
Rb-86	1.14E 05	7.98E 03	0.00E-01	1.98E 05	0.00E-01	0.00E-01	0.00E-01	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
Y-91	2.43E 04	1.84E 05	9.13E 05	0.00E-01	0.00E-01	0.00E-01	2.62E 06	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
Nb-95	6.54E 03	3.69E 04	2.35E 04	9.16E 03	8.61E 03	0.00E-01	6.13E 05	0.00E-01
Ru-103	1.07E 03	4.47E 04	2.79E 03	0.00E-01	7.02E 03	0.00E-01	6.61E 05	0.00E-01
Ru-106	1.69E 04	4.29E 05	1.36E 05	0.00E-01	1.84E 05	0.00E-01	1.43E 07	0.00E-01
Ag-110M	9.13E 03	1.00E 05	1.68E 04	1.14E 04	2.12E 04	0.00E-01	5.47E 06	0.00E-01
Te-127M	3.01E 03	7.13E 04	2.48E 04	8.53E 03	6.35E 04	6.06E 03	1.48E 06	0.00E-01
Te-129M	3.04E 03	1.81E 05	1.92E 04	6.84E 03	5.02E 04	6.32E 03	1.76E 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-132	1.87E 03	3.20E 03	2.11E 03	4.06E 03	6.24E 03	1.93E 05	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
I-135	4.14E 03	4.43E 03	4.91E 03	8.72E 03	1.34E 04	7.91E 05	0.00E-01	0.00E-01
Cs-134	2.24E 05	3.84E 03	6.50E 05	1.01E 06	3.30E 05	0.00E-01	1.21E 05	0.00E-01
Cs-136	1.16E 05	4.17E 03	6.50E 04	1.71E 05	9.53E 04	0.00E-01	1.45E 04	0.00E-01
Cs-137	1.28E 05	3.61E 03	9.05E 05	8.24E 05	2.82E 05	0.00E-01	1.04E 05	0.00E-01
Ba-140	4.32E 03	1.02E 05	7.39E 04	6.47E 01	2.11E 01	0.00E-01	1.74E 06	0.00E-01
Ce-141	2.89E 03	5.65E 04	3.92E 04	1.95E 04	8.53E 03	0.00E-01	5.43E 05	0.00E-01
Ce-144	3.61E 05	3.88E 05	6.76E 06	2.11E 06	1.17E 06	0.00E-01	1.19E 07	0.00E-01

*R Values in units of mrem/yr per micro-Ci/m^3 for inhalation and tritium, and in units of mrem/yr per micro-Ci/sec per m^{-2} for all others.

TABLE 3.3-19

R VALUES FOR THE SHEARON HARRIS NUCLEAR POWER PLANT*

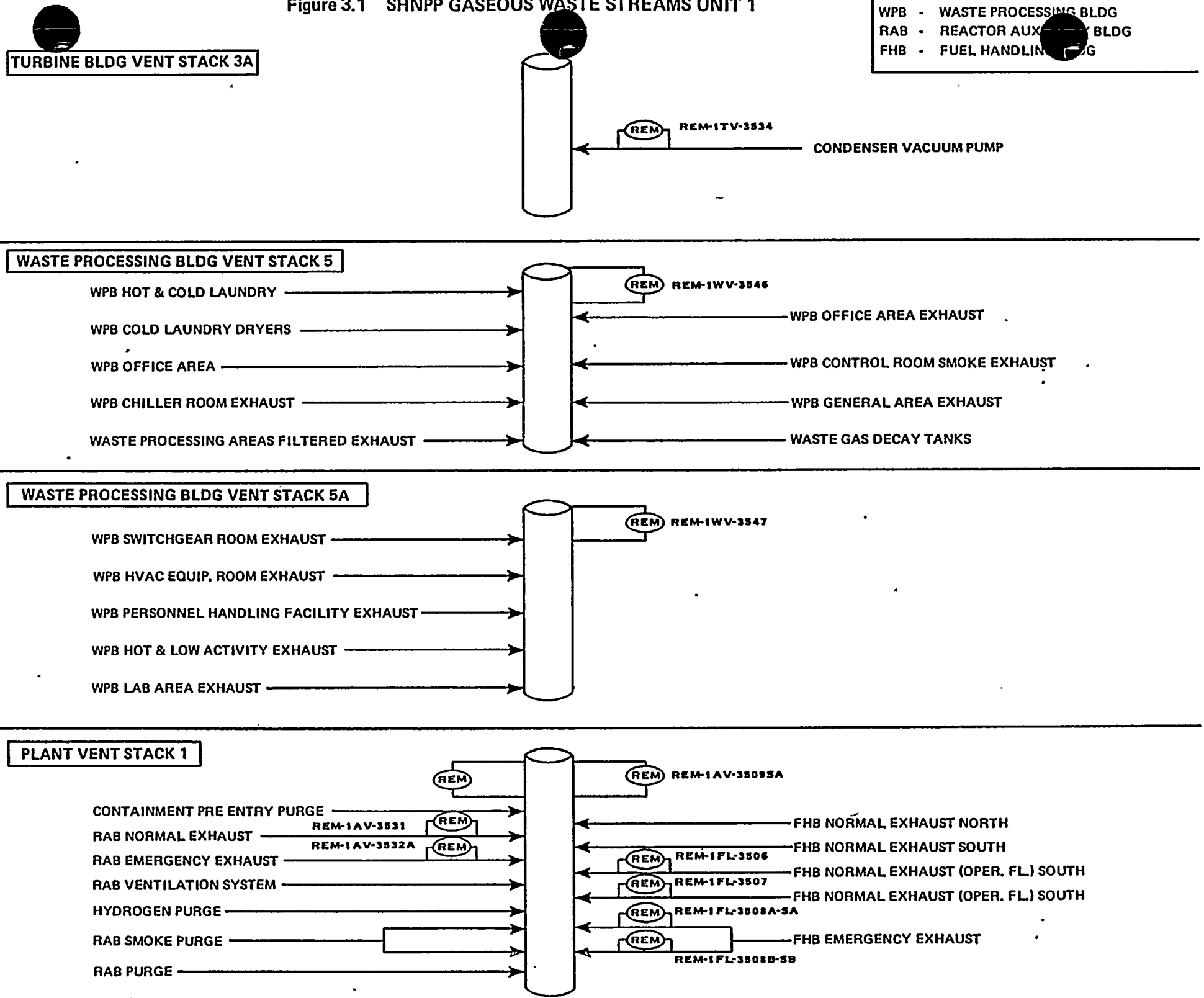
PATHWAY = Inhal
AGE GROUP = Infant

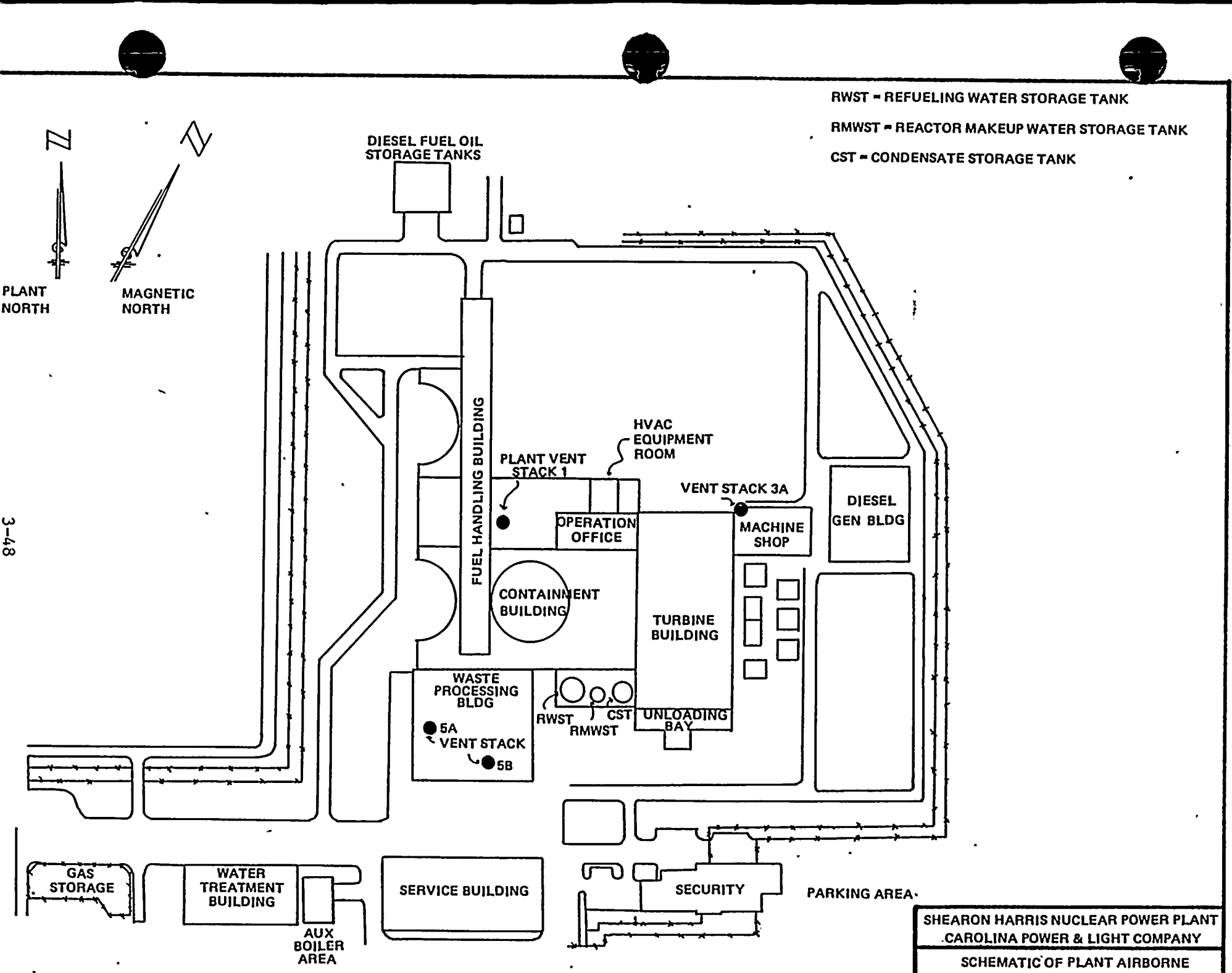
Nuclide	T.Body	GI-Tract	Bone	Liver	Kidney	Thyroid	Lung	Skin
H-3	6.46E 02	6.46E 02	0.00E-01	6.46E 02	6.46E 02	6.46E 02	6.46E 02	6.46E 02
P-32	7.73E 04	1.61E 04	2.03E 06	1.12E 05	0.00E-01	0.00E-01	0.00E-01	0.00E-01
Cr-51	8.93E 01	3.56E 02	0.00E-01	0.00E-01	1.32E 01	5.75E 01	1.28E 04	0.00E-01
Mn-54	4.98E 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
Rb-86	8.81E 04	3.03E 03	0.00E-01	1.90E 05	0.00E-01	0.00E-01	0.00E-01	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
Y-91	1.57E 04	7.02E 04	5.87E 05	0.00E-01	0.00E-01	0.00E-01	2.45E 06	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
Nb-95	3.77E 03	1.27E 04	1.57E 04	6.42E 03	4.71E 03	0.00E-01	4.78E 05	0.00E-01
Ru-103	6.78E 02	1.61E 04	2.01E 03	0.00E-01	4.24E 03	0.00E-01	5.51E 05	0.00E-01
Ru-106	1.09E 04	1.64E 05	8.67E 04	0.00E-01	1.06E 05	0.00E-01	1.15E 07	0.00E-01
Ag-110M	4.99E 03	3.30E 04	9.97E 03	7.21E 03	1.09E 04	0.00E-01	3.66E 06	0.00E-01
Te-127M	2.07E 03	2.73E 04	1.66E 04	6.89E 03	3.75E 04	4.86E 03	1.31E 06	0.00E-01
Te-129M	2.22E 03	6.89E 04	1.41E 04	6.08E 03	3.17E 04	5.47E 03	1.68E 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-132	1.26E 03	1.90E 03	1.69E 03	3.54E 03	3.94E 03	1.69E 05	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
I-135	2.77E 03	1.83E 03	3.86E 03	7.59E 03	8.46E 03	6.95E 05	0.00E-01	0.00E-01
Cs-134	7.44E 04	1.33E 03	3.96E 05	7.02E 05	1.90E 05	0.00E-01	7.95E 04	0.00E-01
Cs-136	5.28E 04	1.43E 03	4.82E 04	1.34E 05	5.63E 04	0.00E-01	1.17E 04	0.00E-01
Cs-137	4.54E 04	1.33E 03	5.48E 05	6.11E 05	1.72E 05	0.00E-01	7.12E 04	0.00E-01
Ba-140	2.89E 03	3.83E 04	5.59E 04	5.59E 01	1.34E 01	0.00E-01	1.59E 06	0.00E-01
Ce-141	1.99E 03	2.15E 04	2.77E 04	1.66E 04	5.24E 03	0.00E-01	5.16E 05	0.00E-01
Ce-144	1.76E 05	1.48E 05	3.19E 06	1.21E 06	5.37E 05	0.00E-01	9.83E 06	0.00E-01

*R Values in units of mrem/yr per micro-Ci/m^3 for inhalation and tritium, and in units of mrem/yr per micro-Ci/sec per m-2 for all others.

Figure 3.1 SHNPP GASEOUS WASTE STREAMS UNIT 1

REM - RADIATION EFFLUENT MONITOR
WPB - WASTE PROCESSING BLDG
RAB - REACTOR AUX[illegible] BLDG
FHB - FUEL HANDLIN[illegible]G

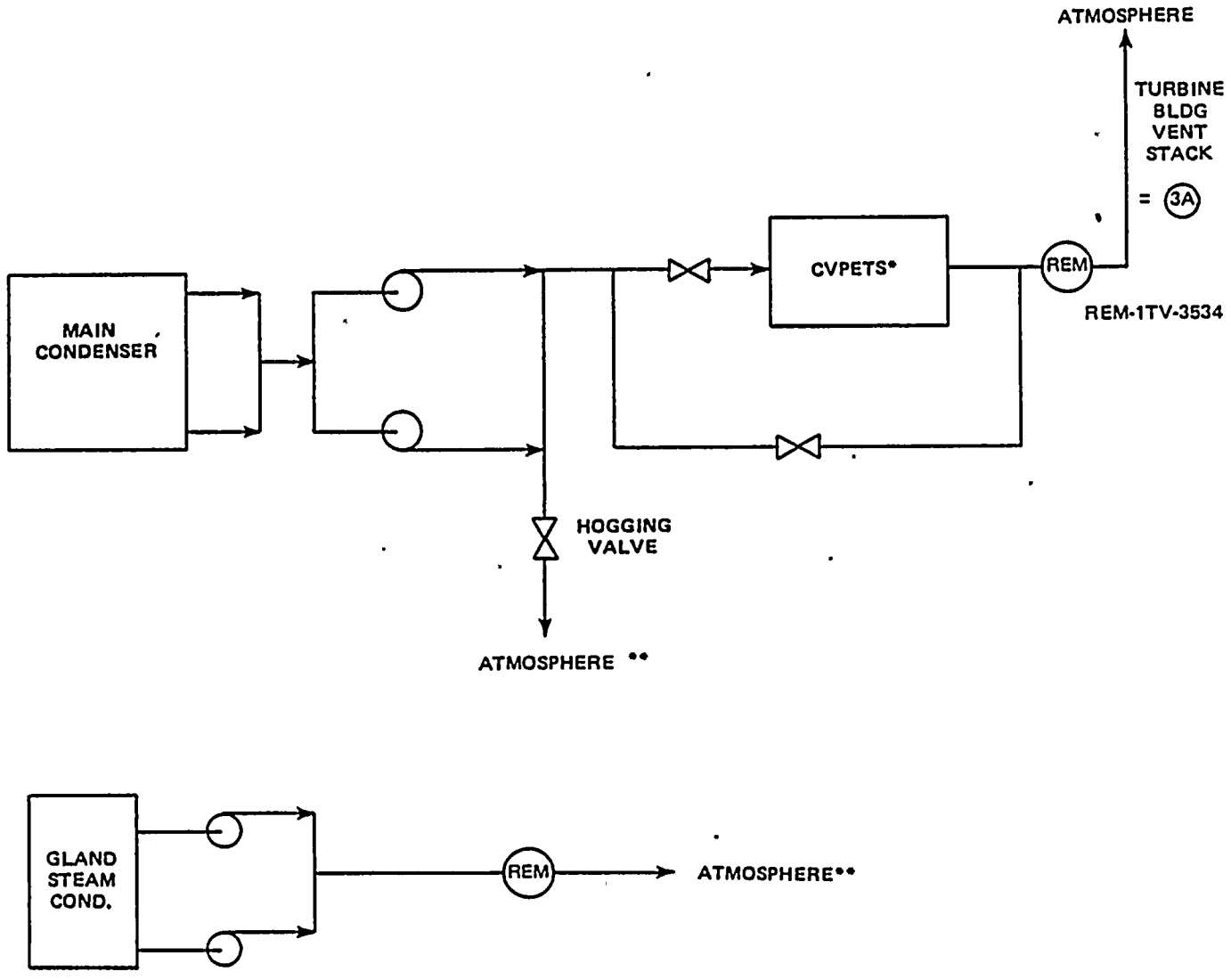




REF DWG: CAR-2165-G-002 (REV 8, OPEN)

FIGURE 3.2

Figure 3.3 SHNPP CONDENSER OFF-GAS SYSTEM



*CONDENSER VACUUM PUMP EFFLUENT TREATMENT SYSTEM

**Radiation monitoring at these points is tentative.

4.0 RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM

Table 4.1 contains the sample point description, sampling and collection frequency analysis, and analysis frequency for various exposure pathways in the vicinity of the SHNPP for the radiological monitoring program. Figure 4.1-1 shows the exclusion boundary surrounding SHNPP. Figures 4.1-2, 4.1-3, and 4.1-4 show the locations of the various sampling points and TLD locations. Figure 4.1-5 provides a legend for Figures 4.1-2 through 4.1-4.

4.1 Deviations from the Shearon Harris Nuclear Power Plant (SHNPP) Environmental Report Operating License Stage (EROL) are noted below:

4.1.1 Shoreline sediment sampling will occur at Location 41 and at Location 26 (Harris Lake Spillway). A bottom sediment is collected at location 52.

4.1.2 Locations 48, 49, 50, and 53 have been added to increase the monitoring coverage of the program.

4.1.3 Sample Location 47 has been deleted since produce is no longer available at that location.

4.1.4 Location 51 (water treatment facility at SHNPP) has been added to monitor the drinking water pathway to the plant personnel.

4.1.5 Location 42 has been changed. A milk cow no longer resides at the previous location.

4.1.6 Location 19 has been moved across the road to Olive's Dairy. Triple H Dairy has ceased operation.

4.1.7 Location 43 is Goodwin's Farm. It was incorrectly listed in the EROL as Goodman's Farm.

4.1.8 Location 22, Ragan's Dairy Farm has been deleted as a milk sampling location.

4.1.9 The sample location descriptions for Stations 1, 2, 3, 4, 7, 8, 9, 15, 19, 22, 24, 25, 26, 27, 29, 30, 31, 32, 33, 39, 43, 46 have been revised to more accurately reflect their location.

4.1.10 Air sampling Location 26 has been added to increase the monitoring coverage of the program.

4.1.11 TLD locations 10, 11, 12, and 13 have been changed.

4.1.12 SW and DW location 40 has been moved to a facility that provides electricity for the sampling apparatus.

TABLE 4.1
RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM

Exposure Pathway and/or Sample	Sample Point ID No.	Sample Point, Description Distance, and Direction	Sampling and Collection Frequency	Analysis Frequency	Analysis
1. Airborne Particulates and Radio-iodine	1	0.1 mi. S. on SR. #1134 from SR. #1011 intersection. N. sector, 2.5 mi. from site.	Continuous operating sampler with sample collection as required by dust loading, but at least once per 7 days.	Weekly Weekly Quarterly	Gross Beta[2] I-131 (charcoal canisters[3]) Gamma Isotopic[5] Composite by Location
	2	1.4 mi. S. on SR. #1134 from SR. #1011 intersection. NNE sector, 1.5 mi. from site.	Continuous operating sampler with sample collection as required by dust loading, but at least once per 7 days.	Weekly Weekly Quarterly	Gross Beta[2] I-131 (charcoal canisters[3]) Gamma Isotopic[5] Composite by Location
	3	0.9 mi. S. on SR. #1135 from U.S. #1 intersection. HE&EC. NE sector, 2.6 mi. from site.	Continuous operating sampler with sample collection as required by dust loading, but at least once per 7 days.	Weekly Weekly Quarterly	Gross Beta[2] I-131 (charcoal canister[3]) Gamma Isotopic[5] Composite by Location

TABLE 4.1 (continued)
RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM

Exposure Pathway and/or Sample	Sample Point ID No.	Sample Point, Description Distance, and Direction	Sampling and Collection Frequency	Analysis Frequency	Analysis
	4	0.7 mi. N on SR #1135 from U.S. # 1 intersection, at New Hill NNE sector, 3.5 mi. from site.	Continuous operating sampler with sample collection as required by dust loading but at least once per 7 days.	Weekly Weekly Quarterly	Gross Beta[2] I-131 (charcoal canisters[3]) Gamma Isotopic[5] Composite by Location
	5	Pittsboro. > 12 mi. WNW sector from site (Control Station)[4]	Continuous operating sampler with sample collection as required by dust loading but at least once per 7 days.	Weekly Weekly Quarterly	Gross Beta[2] I-131 (charcoal canisters[3]) Gamma Isotopic[5] Composite by Location
	26	Harris Lake Spillway. S. sector. 4.7 mi. from site.	Continuous operating sampler with sample collection as required by dust loading but at least once per 7 days.	Weekly Weekly Quarterly	Gross Beta[2] I-131 (charcoal canisters[3]) Gamma Isotopic[5] Composite by Location
2. Direct Radiation	1	0.1 mi. S on SR. #1134 from SR. # 1011 intersection. N. sector, 2.5 mi. from site.	Continuous measurement with an integrated readout at least once per quarter.	Quarterly	Gamma Dose

TABLE 4.1 (continued)
RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM

Exposure Pathway and/or Sample	Sample Point ID No.	Sample Point, Description Distance, and Direction	Sampling and Collection Frequency	Analysis Frequency	Analysis
2. Direct Radiation (continued)	2	1.4 mi. S. on SR. #1134 from SR. # 1011 intersection. NNE sector, 1.5 mi. from site.	Continuous measurement with an integrated readout at least once per quarter.	Quarterly	Gamma Dose
	3	0.9 mi. S. on SR. #1135 from U.S. #1 intersection HE&EC. NE sector, 2.2 mi. from site.	Continuous measurement with an integrated readout at least once per quarter.	Quarterly	Gamma Dose
	4	0.5 mi. S on SR # 1135 from intersection with SR 1011. NNE sector, 3.2 mi. from site.	Continuous measurement with an integrated readout at least once per quarter.	Quarterly	Gamma Dose
	5	Pittsboro. WNW sector, > 12 mi. from site (control station)[4]	Continuous measurement with an integrated readout at least once per quarter	Quarterly	Gamma Dose
	6	Intersection of SR. #1134 & SR. #1135. ENE sector, 0.9 mi. from site.	Continuous measurement with an integrated readout at least once per quarter.	Quarterly	Gamma Dose
	7	Extension of SR. #1134. E. sector, 0.8 mi from site.	Continuous measurement with an integrated readout at least once per quarter.	Quarterly	Gamma Dose

TABLE 4.1 (continued)
RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM

Exposure Pathway and/or Sample	Sample Point ID No.	Sample Point, Description Distance, and Direction	Sampling and Collection Frequency	Analysis Frequency	Analysis
2. Direct Radiation (continued)	8	Dead end of road. Extension of SR #1134. ESE sector, 0.7 mi. from site.	Continuous measurement with an integrated readout at least once per quarter.	Quarterly	Gamma Dose
	9	1 mi. S on SR. # 1130 from intersection of SR # 1127, 1115, and 1130. Holleman's Crossroads. SE sector, 2.3 mi. from site.	Continuous measurement with an integrated readout at least once per quarter.	Quarterly	Gamma Dose
	10	SR. # 1130 S of intersection of SR # 1127, 1115, and 1130. SSE section, 2.2 mi. from site.	Continuous measurement with an integrated readout at least once per quarter.	Quarterly	Gamma Dose
	11	SHNPP site. S. sector, 0.7 mi. of site.	Continuous measurement with an integrated readout at least once per quarter.	Quarterly	Gamma Dose
	12	SHNPP site. SSW sector, 0.8 mi. of site.	Continuous measurement with an integrated readout at least once per quarter	Quarterly	Gamma Dose
	13	SHNPP site. SW sector, 0.7 mi. of site.	Continuous measurement with an integrated readout at least once per quarter.	Quarterly	Gamma Dose

TABLE 4.1 (continued)
RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM

Exposure Pathway and/or Sample	Sample Point ID No.	Sample Point, Description Distance, and Direction	Sampling and Collection Frequency	Analysis Frequency	Analysis
2. Direct Radiation (continued)	14	SHNPP site. Dead end of SR 1191. W sector, 1.1 mi. from site.	Continuous measurement with an integrated readout at least once per quarter.	Quarterly	Gamma Dose
	15	SR. # 1191. W. sector, 1.8 mi. from site.	Continuous measurement with an integrated readout at least once per quarter.	Quarterly	Gamma Dose
	16	1.2 mi. E. of intersection of U.S. #1 and SR 1011. WNW sector. 1.7 mi. from site.	Continuous measurement with an integrated readout at least once per quarter.	Quarterly	Gamma Dose
	17	Intersection of U.S. #1 and Aux. Res. NW sector, 1.4 mi. from site.	Continuous measurement with an integrated readout at least once per quarter.	Quarterly	Gamma Dose
	18	0.6 mi. N. on U.S. #1 from Station 17. NNW sector, 1.3 mi. from site.	Continuous measurement with an integrated readout at least once per quarter.	Quarterly	Gamma Dose
	19	0.6 mi. E. on SR # 1142 from intersection of SR #1141. NNE sector 4.9 mi from site.	Continuous measurement with an integrated readout at least once per quarter.	Quarterly	Gamma Dose

TABLE 4.1 (continued)
RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM

Exposure Pathway and/or Sample	Sample Point ID No.	Sample Point, Description Distance, and Direction	Sampling and Collection Frequency	Analysis Frequency	Analysis
2. Direct Radiation (continued)	20	U.S. #1 at intersection SR. 1149. NE sector 4.7 mi. from site.	Continuous measurement with an integrated readout at least once per quarter.	Quarterly	Gamma Dose
	21	1.2 mi. W. on SR. # 1152 from intersection SR. # 1153. ENE sector, 4.8 mi. from site.	Continuous measurement with an integrated readout at least once per quarter.	Quarterly	Gamma Dose
	22	Formerly Ragan's Dairy on SR. # 1115. E. sector, 4.6 mi. from site.	Continuous measurement with an integrated readout at least once per quarter.	Quarterly	Gamma Dose
	23	Holloman Cemetary on SR. # 1116. ESE sector, 5.0 mi. from site.	Continuous measurement with an integrated readout at least once per quarter	Quarterly	Gamma Dose
	24	Sweet Springs Church on SR # 1116. SE sector, 4.7 mi. from site.	Continuous measurement with an integrated readout at least once per quarter.	Quarterly	Gamma Dose
	25	0.2 mi. W. on SR # 1402 from intersection of SR # 1400. SSE sector, 4.8 mi. from site.	Continuous measurement with an integrated readout at least once per quarter.	Quarterly	Gamma Dose

TABLE 4.1 (continued)
RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM

Exposure Pathway and/or Sample	Sample Point ID No.	Sample Point, Description Distance, and Direction	Sampling and Collection Frequency	Analysis Frequency	Analysis
2. Direct Radiation (continued)	26	Harris Lake Spillway. S. sector, 4.6 mi. from site.	Continuous measurement with an integrated readout at least once per quarter	Quarterly	Gamma Dose
	27	NC 42 @ Buckhorn United Methodist Church SSW sector, 4.8 mi. from site.	Continuous measurement with an integrated readout at least once per quarter.	Quarterly	Gamma Dose
	28	0.6 mi. on SR # 1924 from intersection of SR # 1916. SW sector, 4.8 mi. from site.	Continuous measurement with an integrated readout at least once per quarter.	Quarterly	Gamma Dose
	29	Chemibond Corporation on SR # 1916. WSW sector, 5.6 mi. from site.	Continuous measurement with an integrated readout at least once per quarter.	Quarterly	Gamma Dose
	30	Exit intersection of SR # 1972 and U.S. #1. W. sector, 5.1 mi. from site.	Continuous measurement with an integrated readout at least once per quarter.	Quarterly	Gamma Dose
	31	SR # 1910 from intersection of SR # 1908 and SR # 1909. WNW sector, 4.5 mi. from site.	Continuous measurement with an integrated readout at least once per quarter.	Quarterly	Gamma Dose

TABLE 4.1 (continued)
RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM

Exposure Pathway and/or Sample	Sample Point ID No.	Sample Point, Description Distance, and Direction	Sampling and Collection Frequency	Analysis Frequency	Analysis
2. Direct Radiation (continued)	32	SR # 1008. NW sector, 4.8 mi. from site.	Continuous measurement with an integrated readout at least once per quarter.	Quarterly	Gamma Dose
	33	SR # 1142. 1.7 mi. from intersection of SR 1141. NNW sector, 4.4 mi. from site.	Continuous measurement with an integrated readout at least once per quarter.	Quarterly	Gamma Dose
	34	Apex (Population Center). NE sector, 8.6 mi. from site.	Continuous measurement with an integrated readout at least once per quarter.	Quarterly	Gamma Dose
	35	Holly Springs. E. sector, 6.9 mi. from site.	Continuous measurement with an integrated readout at least once per quarter.	Quarterly	Gamma Dose
	36	SR # 1393 at intersection of SR # 1421. E. sector, 11.2 mi from site (Control Station)[4]	Continuous measurement with an integrated readout at least once per quarter.	Quarterly	Gamma Dose
	37	U.S. 401 at CP&L office, Fuquay-Varina (Population Center). ESE sector, 9.7 mi. from site.	Continuous measurement with an integrated readout at least once per quarter.	Quarterly	Gamma Dose

TABLE 4.1 (continued)
RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM

Exposure Pathway and/or Sample	Sample Point ID No.	Sample Point, Description Distance, and Direction	Sampling and Collection Frequency	Analysis Frequency	Analysis
	48	SR # 1142. 1.5 mi. from intersection of SR # 1141. N. sector, 4.5 mi. from site.	Continuous measurement with an integrated readout at least once per quarter.	Quarterly	Gamma Dose
	49	0.4 mi. S on SR # 1127 from US 1 intersection. NE sector, 2.6 mi. from site.	Continuous measurement with an integrated readout at least once per quarter.	Quarterly	Gamma Dose
	50	SR # 1127 W. from intersection SR # 1115 and 1130. ESE sector, 2.8 mi. from site.	Continuous measurement with an integrated readout at least once per quarter.	Quarterly	Gamma Dose
	53	SR # 1972 N from intersection of SR # 1910 and SR # 1972. NW sector, 5.5 miles from site.	Continuous measurement with an integrated readout at least once per quarter	Quarterly	Gamma Dose
3. Waterborne a. Surface Water	26	Spillway on Main Res. S. sector, 4.6 mi. from site.	Composite sample[5] collected over a period of $\leq$ 31 days.	Monthly Monthly Quarterly	Gross Beta Gamma Isotopic[4] Tritium
	38	Cape Fear Steam Electric Plant Intake Structure (Control Station)[3] WSW sector, 6.1 mi. from site.	Composite sample[5] collected over a period of $\leq$ 31 days.	Monthly Monthly Quarterly	Gross Beta Gamma Isotopic[4] Tritium

TABLE 4.1 (continued)
RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM

Exposure Pathway and/or Sample	Sample Point ID No.	Sample Point, Description Distance, and Direction	Sampling and Collection Frequency	Analysis Frequency	Analysis
	40	US Geological Survey gauging station. Lillington, at intersection of NC 210 and the Cape Fear River. SSE sector ~ 17 mi from site.	Composite sample[5] collected over a period of ≤ 31 days.	Monthly Monthly Quarterly	I-131 Gamma Isotopic[4] Tritium
b. Groundwater	39	On site deep well in the proximity of the diabase dikes. SSW sector, 0.7 mi. of site.	Grab sample quarterly	Quarterly Quarterly	Gamma Isotopic[4] Tritium
c. Drinking	38	Cape Fear Steam Electric Plant Intake Structure (Control Station)[3]. WSW sector, 6.1 mi. from site.	Composite sample[5] over two-week period if I-131 analysis is performed, monthly composite otherwise	I-131 On each composite when the dose[6] calculated for the consumption of the water is greater than 1 mrem per yr. Monthly Monthly Quarterly	I-131 Gross Beta Gamma Isotopic[4] Tritium
	40	US Geological Survey gauging station. Lillington, at intersection of NC 210 and the Cape Fear River. SSE sector, ~ 17 mi from site.	See Sample Point 38	See Sample Point 38	See Sample Point 38

TABLE 4.1 (continued)
RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM

Exposure Pathway and/or Sample	Sample Point ID No.	Sample Point, Description Distance, and Direction	Sampling and Collection Frequency	Analysis Frequency	Analysis
	51	SHNPP Water Treatment Building, on site.	See Sample Point 38	See Sample Point 38	See Sample Point 38
d. Sediment from Shoreline	26	Harris Lake Spillway. S. sector, 4.6 mi. from site.	Surface sediment sample semiannually	Semiannually	Gamma Isotopic[4]
	41	Shoreline of mixing zone of cooling tower blowdown line. S. sector, 3.8 mi. from site.	Surface sediment sample Semiannually	Semiannually	Gamma Isotopic[4]
e. Bottom Sediment	52	Harris Lake in the vicinity of the mixing zone of the cooling tower S. sector, 3.8 mi. from site.	Bottom sediment sample Semiannually	Semiannually	Gamma Isotopic
4. Ingestion a. Milk	42	Maple Knoll on SR # 1403. SSE sector, 7.5 mi. from site.	Grab samples semi-monthly when animals are on pasture, monthly @ other times	Each sample	I-131 & Gamma Isotopic[4]
	19	Olive's Dairy on SR # 1178. NNE sector, 5.0 mi. from site.	Grab samples semi-monthly when animals are on pasture, monthly @ other times.	Each sample	I-131 & Gamma Isotopic[4]
	43	Goodwin's Farm on SR # 1134. N. sector, 2.5 mi. from site.	Grab samples semi-monthly when animals are on pasture, monthly @ other times	Each sample	I-131 & Gamma Isotopic[4]

TABLE 4.1 (continued)
RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM

Exposure Pathway and/or Sample	Sample Point ID No.	Sample Point, Description Distance, and Direction	Sampling and Collection Frequency	Analysis Frequency	Analysis
	5	Pittsborg (Control Station)[3] > 12 mi. WNW sector of site	Grab samples semi-monthly when animals are on pasture, monthly @ other times.	Each sample	I-131 & Gamma Isotopic[4]
b. Fish	44	Site varies within the Harris impoundment.	One sample of each of the following: 1. Free swimmers 2. Bottom feeders semianually	Semiannually	Gamma Isotopic[4] on edible portion for each
	45	Site varies above Buckhorn Dam on Cape Fear River (Unaffected by site) (Control Station)[4]	One sample of each of the following: 1. Free swimmers 2. Bottom feeders semianually	Semiannually	Gamma Isotopic[4] on edible portion for each
c. Food Products	46	SR # 1182. (nursing home) NE sector, 2.3 mi. from site.	Broad leaf vegetation at time of each harvest	At time of each harvest	Gamma Isotopic[4]
	43	Goodwin's Farm on SR # 1134. N. sector, 2.3 mi from site.	Broad leaf vegetation at time of each harvest	At time of each harvest	Gamma Isotopic[4]
	5	Pittsborg. (Control Station)[3]. WNW sector, > 12 mi. from site.	Broad leaf vegetation at time of each harvest	At time of each harvest	Gamma Isotopic[4]

NOTES TO TABLE 4.1

SHNPP Radiological Environmental Monitoring Program

1. Sample locations are shown on Figures 4.1-2, 4.1-3, and 4.1-4. Figure 4.1-5 provides a legend for Figures 4.1-2 through 4.1-4.

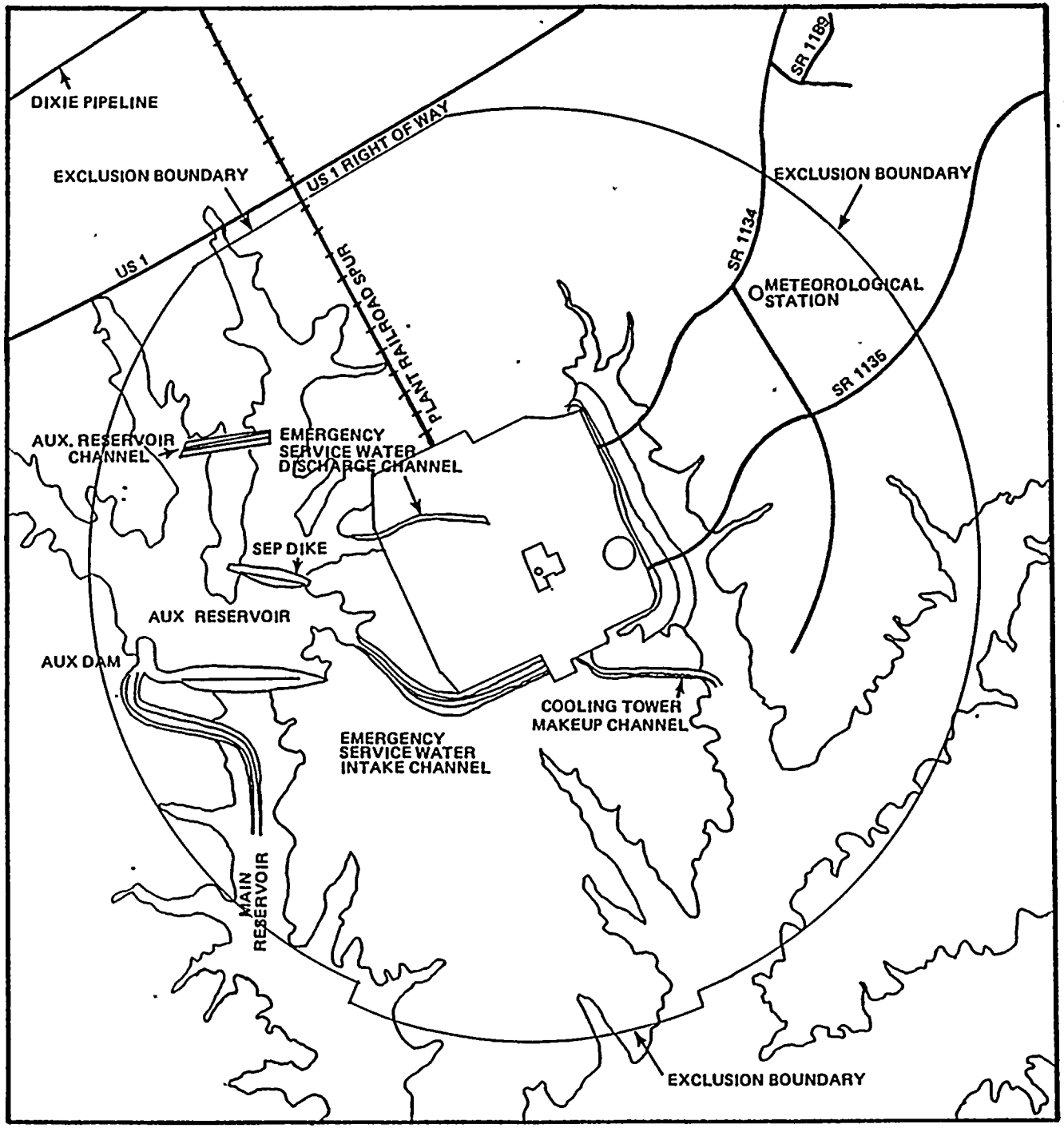
2. Particulate samples will be analyzed for gross beta radioactivity 24 hours or more following filter change to allow for radon and thorium daughter decay. If gross beta activity is greater than ten times the yearly mean of the control sample station activity, a gamma isotopic analysis will be performed on the individual samples.

3. Control sample stations (or background stations) are located in areas that are unaffected by plant operations. All other sample stations that have the potential to be affected by radioactive emissions from plant operations are considered indicator stations.

4. Gamma isotopic analysis means the identification and quantitation of gamma-emitting radionuclides that may be attributable to effluents from plant operations.

5. Composite samples will be collected with equipment (or equivalent) which is capable of collecting an aliquot at time intervals which are very short (e.g., every 2 hours) relative to the compositing period (e.g., monthly).

6. The dose will be calculated for the maximum organ and age group, using the methodology contained in Regulatory Guide 1.109, Rev. 1 and the actual parameters particular to the site.



SHEARON HARRIS NUCLEAR POWER PLANT
CAROLINA POWER & LIGHT COMPANY

SHNPP EXCLUSION BOUNDARY
FIGURE 4.1-1

N

1000 0 1000 2000 3000
SCALE IN FEET

AREA = 3535 ACRES

FIGURE 4.1-1

FIGURE 4.1-2

SHEARON HARRIS NUCLEAR POWER PLANT
RONMENTAL RADIOLOGICAL SAMPLING POINTS

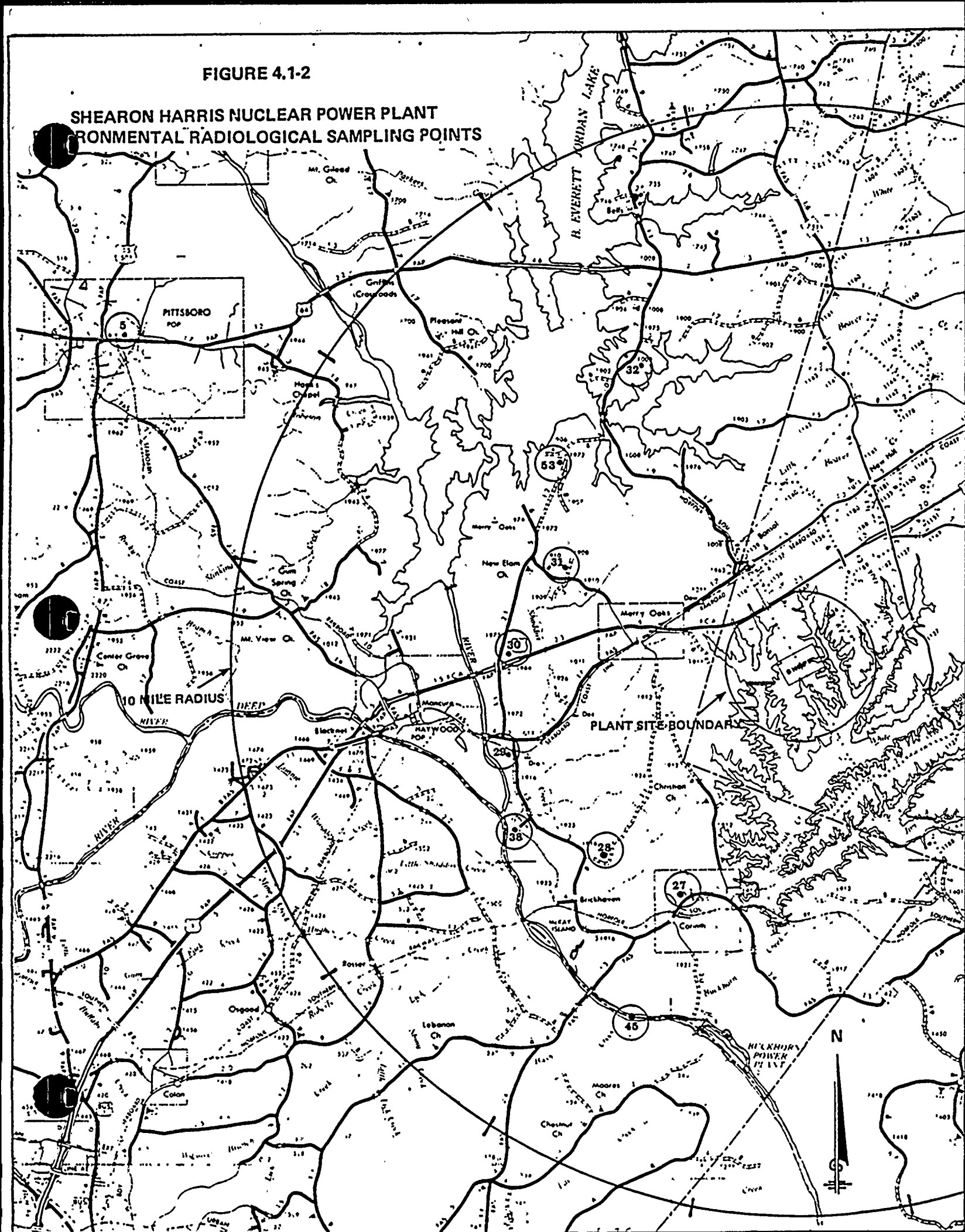


FIGURE 4.1-3

SHEARON HARRIS NUCLEAR POWER PLANT ENVIRONMENTAL RADIOLOGICAL SAMPLING POINTS

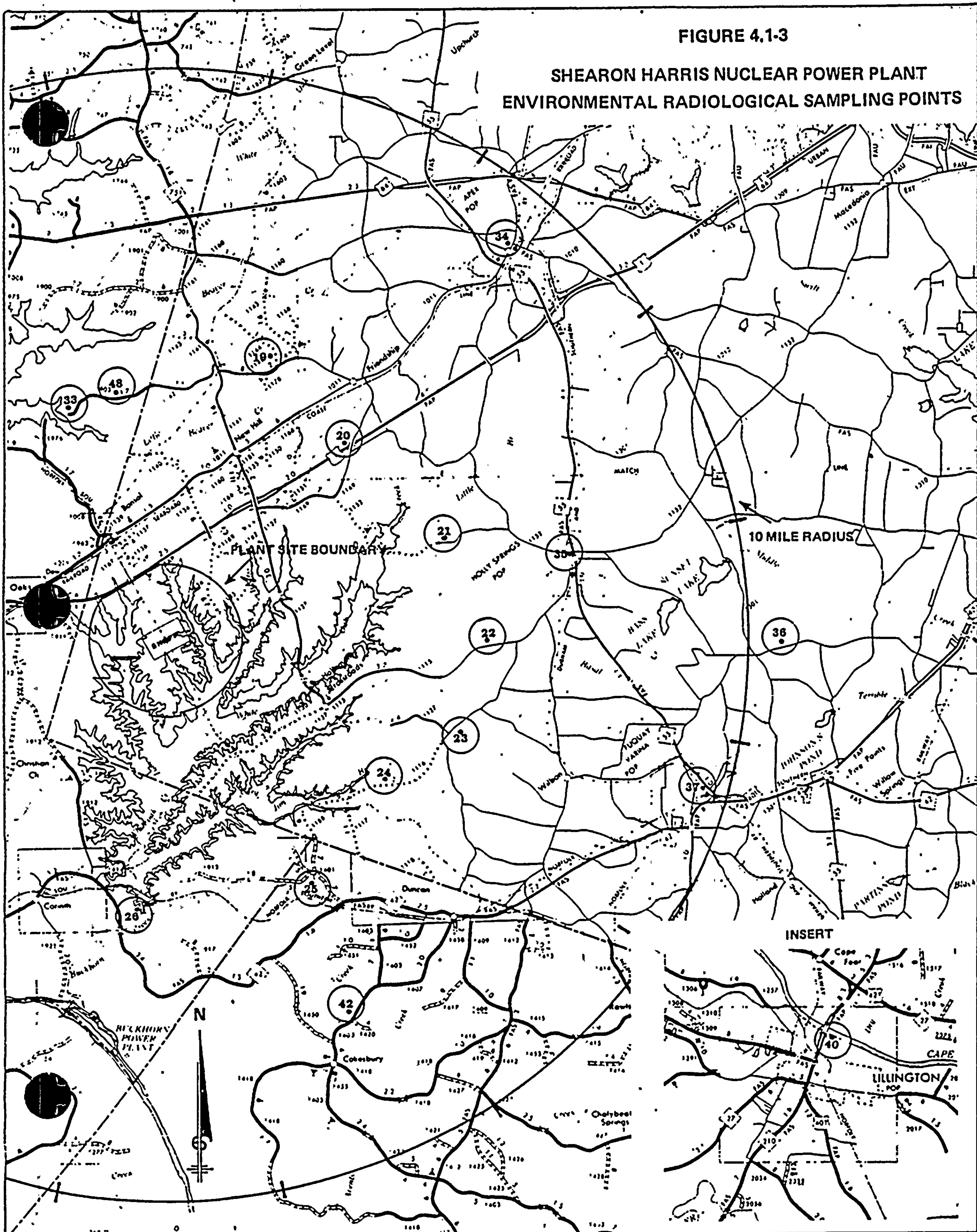


FIGURE 4.1-4

SHEARON HARRIS NUCLEAR POWER PLANT
ENVIRONMENTAL RADIOLOGICAL SAMPLING POINTS

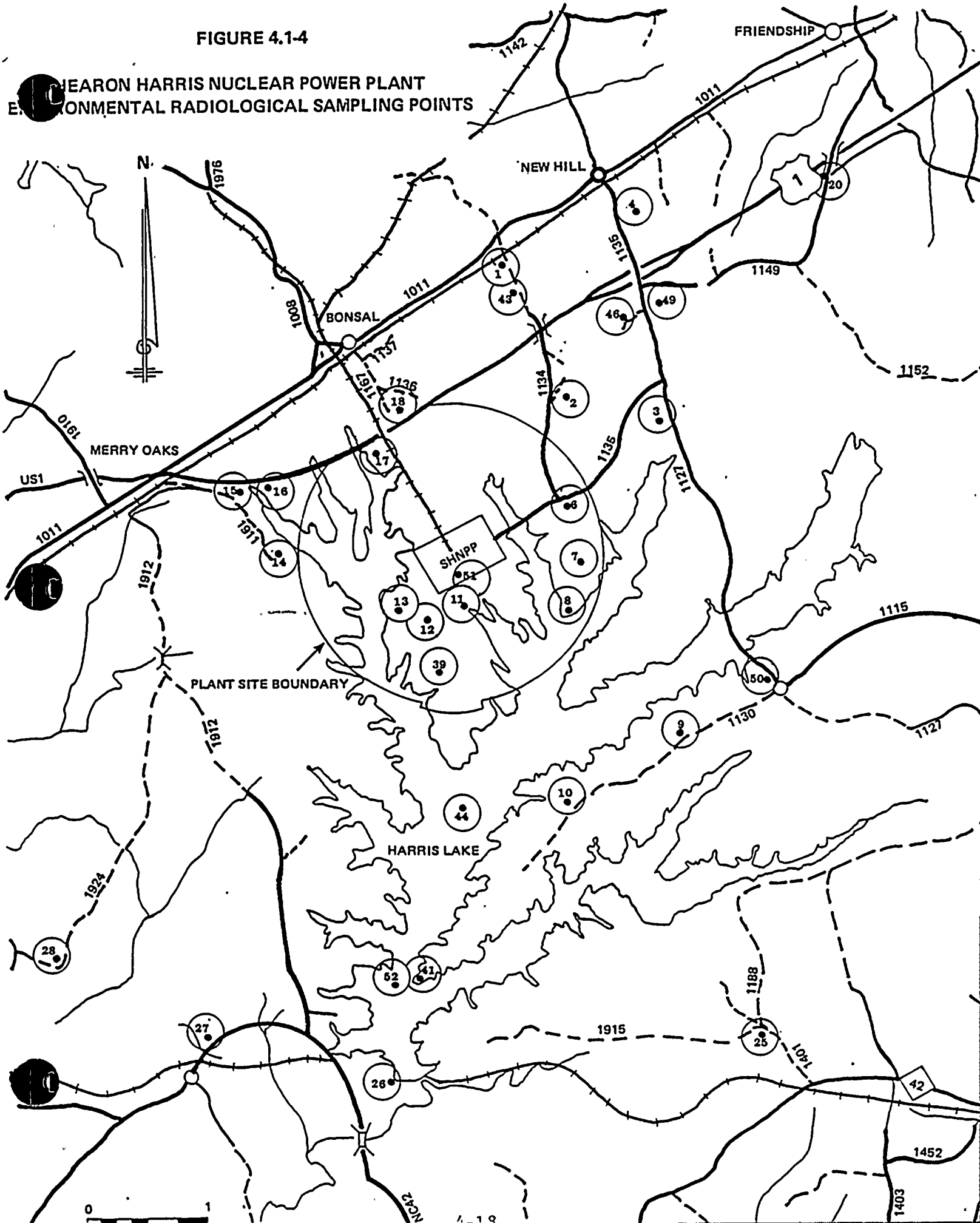


FIGURE 4.1-5
LEGEND

STATION NUMBER	SYMBOL
1	AP, AC, TL
2	AP, AC, TL
3	AP, AC, TL
4	AP, AC, TL
5	AP, AC, MK, FC, TL
6	TL
7	TL
8	TL
9	TL
10	TL
11	TL
12	TL
13	TL
14	TL
15	TL
16	TL
17	TL
18	TL
19	MK, TL
20	TL
21	TL
22	TL
23	TL
24	TL
25	TL
26	AP, AC, SW, SD, TL
27	TL
28	TL
29	TL
30	TL
31	TL
32	TL
33	TL
34	TL
35	TL
36	TL
37	TL
38	SW, DW
39	GW
40	SW, DW
41	SD
42	MK
43	MK, FC
44	FH
45	FH
46	FC
48	TL
49	TL
50	TL
51	DW
52	SD
53	TL

⊗ FIGURE 4.1-2

• FIGURE 4.1-3

○ FIGURE 4.1-4

AC	Air Cartridge
AP	Air Particulate
SD	Sediment
FC	Food Crop
FH	Fish
GW	Groundwater
MK	Milk
SW	Surface Water
DW	Drinking Water
TL	TLD

5.0 INTERLABORATORY COMPARISON STUDIES

5.1 OBJECTIVE

The objective of this program is to evaluate the total laboratory analysis process by comparing results with results obtained by a separate laboratory or laboratories for an equivalent sample.

5.2 PROGRAM

5.2.1 Environmental Sample Analyses Comparison Program

Environmental samples from the SHNPP environs are to be analyzed by the Harris Energy & Environmental Center or by a qualified contracting laboratory. These laboratories will participate at least annually in a nationally recognized interlaboratory comparison study. The results of the laboratories' performances in the study will be provided to SHNPP Environmental & Radiation Control (E&RC). The results will be included in the Annual Radiological Environmental Operating Report (see SHNPP Technical Specification 4.12.3). The results will also be provided to the NRC upon request.

5.2.2 Effluent Release Analyses Program

SHNPP E&RC will perform sample analyses for gamma-emitting radionuclides in effluent releases. The E&RC radiochemistry laboratory will participate annually in a corporate interlaboratory comparison study or an equivalent study. The results of these studies will be provided to the NRC upon request.

5.2.3 Abnormal Results

If the CP&L laboratory or vendor laboratory results lie at greater than three standard deviations from the "recognized value," an evaluation will be performed to identify any recommended remedial actions to reduce anomalous errors. Complete documentation on the evaluation will be available to SHNPP and will be provided to the NRC upon request.

6.0 TOTAL DOSE (40CFR190 CONFORMANCE)

6.1 COMPLIANCE WITH 40CFR190

Compliance with 40CFR190 as prescribed by Technical Specification 3.11 is to be demonstrated only when one or more of Technical Specifications 3.11.1.2.a, 3.11.1.2.b, 3.11.2.2.a, 3.11.2.2.b, 3.11.2.3.a, and 3.11.2.3.b is exceeded by a factor of 2. Once this occurs the Company has 30 days to submit this report pursuant to Technical Specification 6.9.2.

6.2 CALCULATIONS EVALUATING CONFORMANCE WITH 40CFR190

To perform the calculations to evaluate conformance with 40CFR190, an effort is made to develop doses that are realistic by removing assumptions that lead to overestimates of dose to a MEMBER OF THE PUBLIC (i.e., calculations for compliance with 10CFR50, App. I). To accomplish this the following calculational rules are used:

(1) Doses to a MEMBER OF THE PUBLIC via the liquid release pathway are considered to be <1 mrem/yr. (Reference, NUREG 0543).

(2) Doses to a MEMBER OF THE PUBLIC due to a milk pathway will be evaluated only as can be shown to exist. Otherwise, doses via this pathway will be estimated as <1 mrem/yr.

(3) Environmental sampling data which demonstrate that no pathway exists may be used to delete a pathway to man from a calculation.

(4) To sum numbers represented as "less than" (<), use the value of the largest number in the group.

(i.e., <5 + <1 + <1 + <3 = 5)

(5) When doses via direct radiation are added to doses via inhalation pathway, they will be calculated for the same distance in the same sector.

(6) The calculational locations for a MEMBER OF THE PUBLIC will only be at residences or places of employment.

NOTE: Additional assumptions may be used to provide situation-specific parameters, provided they are documented along with their concomitant bases.

6.3 CALCULATIONS OF TOTAL BODY DOSE

Estimates will be made for each of the following exposure pathways to the same location by age class. Only those age classes known to exist at a location are considered.

6.3.1 Direct Radiation

The component of dose to a MEMBER OF THE PUBLIC due to direct radiation will be determined by:

(1) Determining the direct radiation dose at the plant boundary in each sector, $D_{B,\Theta}$.

(2) Extrapolate that dose to the calculational location as follows:

$$D_{L,\Theta} = \frac{D_{B,\Theta}\,(4.49\ E{+}6)}{(X_{L,\Theta})^2}$$

$D_{L,\Theta}$ = dose at calculational location in sector Θ.

4.49E+6 = square of mean distance to the site boundary (~ 2120 m).

$X_{L,\Theta}$ = Distance to calculational locations in sector Θ in meters.

6.3.2 Inhalation Dose

The inhalation dose will be determined at the calculational locations for each age class at risk according to the methods outlined in Section 3.3 of this manual.

6.3.3 Ingestion Pathway

The dose via the ingestion pathway will be calculated at the consumer locations for the consumers at risk. If no milk pathway exists in a sector, the dose via this pathway will be treated as <1 mrem/yr.

6.3.4 Other Uranium Fuel Cycle Sources

The dose from other fuel cycle sources will be treated as <1 mrem/yr.

6.4 THYROID DOSE

The dose to the thyroid will be calculated for each sector as the sum of inhalation dose and milk ingestion dose (if existing). The calculational methods will be those identified in Section 3.3 of this manual.

6.5 DOSE PROJECTIONS

Dose projections are to incorporate planned plant operations such as power reduction or outages for the projected period.

APPENDIX A
METEOROLOGICAL DISPERSION FACTOR COMPUTATIONS

Carolina Power & Light Company (CP&L) has performed the assessment of the transport and dispersion of the effluent in the atmosphere as outlined in Preparation of Radiological Effluent Technical Specifications for Nuclear Power Plants, NUREG 0133 (USNRC, 1978). The methodology for this assessment was based on guidelines presented in Regulatory Guide 1.111, Revision 1 (USNRC, 1977). The results of the assessment were to provide the relative depositions flux and relative concentrations (undepleted and depleted) based on numerical models acceptable for use in Appendix I evaluations.

Regulatory Guide 1.111 presented three acceptable diffusion models for use in estimating deposition flux and concentrations. These are (1) particle-in-cell model (a variable trajectory model based on the gradient-transport theory), (2) puff-advection model (a variable trajectory model based on the statistical approach to diffusion), and (3) the constant mean wind direction model referred to here as the straight-line trajectory Gaussian diffusion model (the most widely used model based on a statistical approach). It was resolved that for operational efficiency, the straight-line described in XOQDOQ Program for the Meteorological Evaluation of Routine Effluent Releases at Nuclear Power Stations (Draft), NUREG 0324 (USNRC, September 1977) would be used for generating the required analyses of Appendix I. To provide a more realistic accounting of the variability of wind around the plant site, standard terrain/recirculation correction factors (TCF) were used.

A seven-year record of meteorological data was used from the on-site meteorological program at the Shearon Harris Plant. This data consisted of all collected parameters at both the 11.03- and 61.42-meter tower levels for the years 1976-1982. The description of the model used and the results of the computations are presented in NUREG 0324. The following tables provides the basis for the meteorological dilution factor development of the technical specifications for Appendix I and were the source of the X/Q and D/Q values utilized to show compliance with 10CFR20 and 10CFR50 for noble gases and radioiodines and particulates.

Tables A-1 through A-4	Relative undepleted concentration, relative depleted concentration, and relative deposition flux estimates for ground level releases for special locations for long-term releases.
Tables A-5 through A-12	Relative undepleted concentration, relative depleted concentration, and relative deposition flux estimates for ground level releases for standard and segmented distance locations for long-term releases.
Tables A-13 and A-14	SHNPP on-site joint wind frequency distributions for 1976-1982.

The X/Q and D/Q values which are utilized in Appendix B or showing compliance with 10CFR20 and 10CFR50 are all assumed to be ground level releases.

Future Operational Computations

The NRC "XOQDOQ" Program (Revision 1) was obtained and installed on the CP&L computer system. For routine meteorological dispersion evaluations, the "XOQDOQ" Program will be run with the appropriate physical plant data, appropriate meteorological information for the standard distances, and special locations of interest with a terrain/recirculation factor. The input to "XOQDOQ" for ground level releases are presented in Table A-15. The resulting computations will have applied the TCFs to produce a final atmospheric diffusion estimate for the site.

In general, it is concluded that the straight-line model is as reasonable a projection of concentration factors developed by a combination of the puff-advection/straight-line scheme with the results of the XOQDOQ Program, and ready evaluation of on-site meteorological data may be made.

Table A-1
Undepleted, No Decay, X/Q Values for Long-Term Ground Level Releases at Special Locations (Sec/m^3)

Carolina Power & Light Company
Release Type: Annual
Release Mode: Ground
Variable: Relative Concentrations (Sec/m^3)
Model: Straight Line

Shearon Harris Plant
Number of Observations: 58163
Period of Record: 1/1/76 - 12/31/82
Application of Terrain Correction Factors: Yes

Sector	Site Boundary	Meat Animal	Dairy Cow	Dairy Goat	Residence	Garden
NNE	2.0E-06	1.3F-06	3.6E-07	5.1E-07	1.4E-06	1.3E-06
NE	1.4E-06	6.6E-07	*	*	6.6E-06	6.6E-06
ENE	1.0E-06	5.8E-07	*	*	5.8E-06	5.8E-07
E	7.4E-07	1.6E-07	*	*	4.9E-07	4.9E-07
ESE	7.9E-07	2.8E-07	*	1.4E-07	3.0E-07	2.8E-07
SE	8.8E-07	1.8E-07	*	*	1.9E-07	1.8E-07
SSE	7.9E-07	*	*	*	*	*
S	1.3E-06	*	*	*	*	*
SSW	2.0E-06	5.3E-07	*	*	5.7E-07	5.7E-07
SW	1.8E-06	8.8E-07	*	*	8.8E-07	8.8E-07
WSW	1.9E-06	*	*	*	*	*
W	1.7E-06	3.6E-07	*	*	6.5E-07	6.5E-07
WNW	1.2E-06	6.7E-07	*	*	6.7E-07	6.7E-07
NW	1.2E-06	8.5E-07	8.5E-07	*	8.5E-07	8.5E-07
NNW	1.4E-06	9.0E-07	*	*	1.0E-06	1.0E-06
N	1.9E-06	9.3E-07	9.3E-07	4.1E-07	9.3E-07	9.3E-07

* Indicates that this point was not calculated

Table A-2

Undepleted, 2.26 Day Decay, X/Q Values for Long-Term Ground Level Releases at Special Locations (Sec/m^3)

Carolina Power & Light Company
Release Type: Annual
Release Mode: Ground
Variable: Undepleted 2.26 Day Decay Relative Concentrations (Sec/m^3)
Model: Straight Line

Shearon Harris Plant
Number of Observations: 58163
Period of Record: 1/1/76 - 12/31/82
Application of Terrain Correction Factors: Yes

Sector	Site Boundary	Meat Animal	Dairy Cow	Dairy Goat	Residence	Garden
NNE	1.9E-06	1.2E-06	3.3E-07	4.8E-07	1.3E-06	1.2E-06
NE	1.4E-06	6.4E-07	*	*	6.4E-07	6.4E-07
ENE	1.0E-06	5.7E-07	*	*	5.7E-07	5.7E-07
E	7.2E-07	1.5E-07	*	*	4.8E-07	4.8E-07
ESE	7.7E-07	2.7E-07	*	1.3E-07	2.9E-07	2.7E-07
SE	8.7E-07	1.7E-07	*	*	1.8E-07	1.7E-07
SSE	7.7E-07	*	*	*	*	*
S	1.2E-06	*	*	*	*	*
SSW	1.9E-06	*	*	*	5.3E-07	5.3E-07
SW	1.8E-06	8.4E-07	*	*	8.4E-07	8.4E-07
WSW	1.9E-06	*	*	*	*	*
W	1.6E-06	3.4E-07	*	*	6.2E-07	6.2E-07
WNW	1.2E-06	6.5E-07	*	*	6.5E-07	6.5E-07
NW	1.2E-06	8.3E-07	8.3-07	*	8.3E-07	8.3E-07
NNW	1.4E-06	8.8E-07	*	*	1.0E-06	1.0E-06
N	1.8E-06	9.0E-07	9.0E-07	3.9E-07	9.0E-07	9.0E-07

*Indicates that this point not calculated

Table A-3
Depleted, X/Q Values for Long-Term Ground Level Releases at Special Locations (Sec/m^3)

Carolina Power & Light Company
Release Type: Annual
Release Mode: Ground
Variable: Depleted Concentrations (Sec/m^3)
Model: Straight Line

Shearon Harris Plant
Number of Observations: 58163
Period of Record: 1/1/76 - 12/31/82
Application of Terrain Correction Factors: Yes

Sector	Site Boundary	Meat Animal	Dairy Cow	Dairy Goat	Residence	Garden
NNE	1.7E-06	1.0E-06	2.6E-07	3.9E-07	1.1E-06	1.0E-06
NE	1.2E-06	5.4E-07	*	*	5.4E-07	5.4E-07
ENE	8.9E-07	4.8E-07	*	*	4.8E-07	4.8E-07
E	6.3E-07	1.2E-07	*	*	4.1E-07	4.1E-07
ESE	6.7E-07	2.2E-07	*	1.0E-07	2.4E-07	2.2E-07
SE	7.5E-07	1.4E-07	*	*	1.4E-07	1.4E-07
SSE	6.5E-07	*	*	*		*
S	1.0E-06	*	*	*		*
SSW	1.7E-06	4.0E-07	*	*	4.3E-07	4.3E-07
SW	1.5E-06	7.0E-07	*	*	7.0E-07	7.0E-07
WSW	1.7E-06	*	*	*	*	*
W	1.4E-06	2.7E-07	*	*	5.1E-07	5.1E-07
WNW	1.0E-06	5.5E-07	*	*	5.5E-07	5.5E-07
NW	1.0E-06	7.1E-07	7.1E-07	*	7.1E-07	7.1E-07
NNW	1.2E-06	7.5E-07	*	*	8.8E-07	8.8E-07
N	1.6E-06	7.5E-07	7.5E-07	3.1E-07	7.5E-07	7.5E-07

*Indicates that this point not calculated.

Table A-4
Deposition, D/Q values for long Term Ground Level Releases at Special Locations (m^{-2})

Carolina Power & Light Company
Release Type: Annual
Release Mode: Ground
Variable: Deposition Rate (m^{-2})
Model: Straight Line

Shearon Harris Plant
Number of Observations: 58163
Period of Record: 1/1/76 - 12/31/82
Application of Terrain Correction Factors: Yes

Sector	Site Boundary	Meat Animal	Dairy Cow	Dairy Goat	Residence	Garden
NNE	3.5E-09	2.0E-09	3.7E-10	6.0E-10	2.2E-09	2.0E-09
NE	3.2E-09	1.2E-09	*	*	1.2E-09	1.2E-09
ENE	2.5E-09	1.2E-09	*	*	1.2E-09	1.2E-09
E	1.4E-09	1.8E-09	*	*	8.4E-10	8.4E-10
ESE	1.8E-09	4.6E-09	*	1.7E-10	4.9E-10	4.6E-10
SE	2.1E-09	2.6E-09	*	*	2.7E-10	2.6E-10
SSE	1.3E-09	*	*	*	*	*
S	1.5E-09	*	*	*	*	*
SSW	2.7E-09	4.4E-10	*	*	4.8E-10	4.8E-10
SW	2.2E-09	7.7E-10	*	*	7.7E-10	7.7E-10
WSW	2.3E-09	*	*	*	*	*
W	1.8E-09	2.2E-10	*	*	5.0E-10	5.0E-10
WNW	1.3E-09	5.8E-10	*	*	5.8E-10	5.8E-10
NW	1.5E-09	9.4E-10	9.4E-10	*	9.4E-10	9.4E-10
NNW	2.0E-09	1.2E-09	*	*	1.4E-09	1.4E-09
N	2.9E-09	1.1E-09	1.1E-09	3.8E-10	1.1E-09	1.1E-09

*Indicates that this point not calculated.

TABLE A-5

Undepleted, No Decay, X/Q Values For Long Term Ground Level Releases At Standard Distances (Sec/m^3)

Carolina Power & Light Co.
Release Type: Annual
Release Mode: Ground
Varible: Relative Concentrations (Sec/m^3)
Model: Straight Line

Shearon Harris Plant
Number of Observations: 58163
Period of Record: 1/1/76 - 12/31/82
Application of Terrain Correction Factors: Yes

ANNUAL AVERAGE CHI/Q (SEC/METER CUBED) SECTOR	DISTANCE IN MILES 0.250	0.500	0.750	1.000	1.500	2.000	2.500	3.000	3.500	4.000	4.500
S	3.975E-05	1.185E-05	5.859E-06	3.729E-06	2.047E-06	1.425E-06	1.075E-06	8.550E-07	7.046E-07	5.960E-07	5.143E-07
SSW	3.762E-05	1.129E-05	5.616E-06	3.584E-06	1.970E-06	1.368E-06	1.030E-06	8.179E-07	6.731E-07	5.687E-07	4.903E-07
SW	3.575E-05	1.063E-05	5.253E-06	3.344E-06	1.837E-06	1.281E-06	9.680E-07	7.703E-07	6.352E-07	5.376E-07	4.642E-07
WSW	3.114E-05	9.246E-06	4.558E-06	2.898E-06	1.591E-06	1.110E-06	8.399E-07	6.688E-07	5.518E-07	4.672E-07	4.035E-07
W	2.645E-05	7.846E-06	3.868E-06	2.458E-06	1.349E-06	9.421E-07	7.130E-07	5.680E-07	4.687E-07	3.970E-07	3.430E-07
WNW	2.109E-05	6.266E-06	3.098E-06	1.974E-06	1.086E-06	7.573E-07	5.724E-07	4.555E-07	3.756E-07	3.179E-07	2.745E-07
NW	1.814E-05	5.619E-06	2.807E-06	1.802E-06	9.959E-07	6.906E-07	5.199E-07	4.124E-07	3.392E-07	2.864E-07	2.468E-07
NNW	2.062E-05	6.254E-06	3.171E-06	2.054E-06	1.141E-06	7.853E-07	5.878E-07	4.642E-07	3.804E-07	3.202E-07	2.752E-07
N	2.733E-05	8.304E-06	4.232E-06	2.744E-06	1.525E-06	1.048E-06	7.838E-07	6.185E-07	5.065E-07	4.261E-07	3.660E-07
NNE	2.822E-05	8.635E-06	4.419E-06	2.870E-06	1.596E-06	1.092E-06	8.143E-07	6.411E-07	5.240E-07	4.401E-07	3.776E-07
NE	2.104E-05	6.452E-06	3.282E-06	2.116E-06	1.167E-06	7.984E-07	5.950E-07	4.683E-07	3.827E-07	3.214E-07	2.757E-07
ENE	1.554E-05	4.757E-06	2.409E-06	1.548E-06	8.518E-07	5.827E-07	4.345E-07	3.421E-07	2.797E-07	2.350E-07	2.016E-07
E	1.239E-05	3.768E-06	1.900E-06	1.220E-06	6.716E-07	4.616E-07	3.453E-07	2.726E-07	2.233E-07	1.879E-07	1.615E-07
ESE	1.181E-05	3.594E-06	1.813E-06	1.164E-06	6.403E-07	4.397E-07	3.287E-07	2.594E-07	2.124E-07	1.788E-07	1.536E-07
SE	1.318E-05	4.022E-06	2.036E-06	1.306E-06	7.180E-07	4.919E-07	3.672E-07	2.893E-07	2.367E-07	1.990E-07	1.709E-07
SSE	2.169E-05	6.528E-06	3.256E-06	2.081E-06	1.144E-06	7.911E-07	5.945E-07	4.709E-07	3.869E-07	3.265E-07	2.811E-07

ANNUAL AVERAGE CHI/Q (SEC/METER CUBED) BEARING	DISTANCE IN MILES 5.000	7.500	10.000	15.000	20.000	25.000	30.000	35.000	40.000	45.000	50.000
S	4.509E-07	2.725E-07	1.910E-07	1.162E-07	8.191E-08	6.253E-08	5.019E-08	4.171E-08	3.554E-08	3.088E-08	2.723E-08
SSW	4.295E-07	2.587E-07	1.810E-07	1.098E-07	7.722E-08	5.886E-08	4.719E-08	3.918E-08	3.336E-08	2.896E-08	2.552E-08
SW	4.072E-07	2.464E-07	1.729E-07	1.053E-07	7.423E-08	5.669E-08	4.552E-08	3.783E-08	3.225E-08	2.802E-08	2.471E-08
WSW	3.541E-07	2.145E-07	1.506E-07	9.181E-08	6.479E-08	4.950E-08	3.977E-08	3.306E-08	2.819E-08	2.450E-08	2.161E-08
W	3.010E-07	1.825E-07	1.282E-07	7.819E-08	5.520E-08	4.218E-08	3.389E-08	2.818E-08	2.403E-08	2.089E-08	1.843E-08
WNW	2.407E-07	1.456E-07	1.022E-07	6.222E-08	4.387E-08	3.350E-08	2.689E-08	2.235E-08	1.905E-08	1.655E-08	1.460E-08
NW	2.161E-07	1.299E-07	9.079E-08	5.497E-08	3.861E-08	2.940E-08	2.355E-08	1.953E-08	1.662E-08	1.442E-08	1.270E-08
NNW	2.404E-07	1.433E-07	9.952E-08	5.978E-08	4.176E-08	3.167E-08	2.529E-08	2.092E-08	1.776E-08	1.538E-08	1.352E-08
N	3.196E-07	1.902E-07	1.320E-07	7.917E-08	5.526E-08	4.187E-08	3.342E-08	2.763E-08	2.345E-08	2.029E-08	1.784E-08
NNE	3.293E-07	1.951E-07	1.350E-07	8.066E-08	5.616E-08	4.248E-08	3.385E-08	2.796E-08	2.370E-08	2.050E-08	1.800E-08
NE	2.405E-07	1.426E-07	9.872E-08	5.907E-08	4.119E-08	3.119E-08	2.488E-08	2.056E-08	1.745E-08	1.510E-08	1.327E-08
ENE	1.759E-07	1.045E-07	7.239E-08	4.338E-08	3.029E-08	2.296E-08	1.833E-08	1.516E-08	1.287E-08	1.114E-08	9.797E-09
E	1.411E-07	8.414E-08	5.848E-08	3.518E-08	2.461E-08	1.869E-08	1.494E-08	1.237E-08	1.051E-08	9.107E-09	8.013E-09
ESE	1.341E-07	7.996E-08	5.556E-08	3.341E-08	2.337E-08	1.774E-08	1.418E-08	1.174E-08	9.973E-09	8.641E-09	7.603E-09
SE	1.491E-07	8.871E-08	6.155E-08	3.695E-08	2.582E-08	1.959E-08	1.565E-08	1.295E-08	1.100E-08	9.524E-09	8.378E-09
SSE	2.460E-07	1.477E-07	1.031E-07	6.239E-08	4.382E-08	3.337E-08	2.673E-08	2.217E-08	1.887E-08	1.637E-08	1.442E-08

TABLE A-6

Undepleted, No Decay, X/Q Values For Long Term Ground Level Releases At Standard Distances (Sec/m^3)

Carolina Power & Light Co.
Release Type: Annual
Release Mode: Ground
Varible: Relative Concentrations (Sec/m^3)
Model: Straight Line

Shearon Harris Plant
Number of Observations: 58163
Period of Record: 1/1/76 - 12/31/82
Application of Terrain Correction Factors: Yes

CHI/Q (SEC/METER CUBED) FOR EACH SEGMENT

DIRECTION FROM SITE	SEGMENT BOUNDARIES IN MILES									
	.5-1	1-2	2-3	3-4	4-5	5-10	10-20	20-30	30-40	40-50
S	6.243E-06	2.144E-06	1.080E-06	7.062E-07	5.150E-07	2.759E-07	1.176E-07	6.276E-08	4.178E-08	3.091E-08
SSW	5.973E-06	2.061E-06	1.035E-06	6.747E-07	4.910E-07	2.621E-07	1.111E-07	5.909E-08	3.925E-08	2.899E-08
SW	5.600E-06	1.925E-06	9.723E-07	6.366E-07	4.648E-07	2.494E-07	1.065E-07	5.690E-08	3.790E-08	2.805E-08
WSW	4.862E-06	1.668E-06	8.436E-07	5.530E-07	4.041E-07	2.171E-07	9.287E-08	4.968E-08	3.312E-08	2.452E-08
W	4.125E-06	1.415E-06	7.161E-07	4.698E-07	3.434E-07	1.847E-07	7.908E-08	4.234E-08	2.823E-08	2.091E-08
WNW	3.302E-06	1.137E-06	5.749E-07	3.764E-07	2.748E-07	1.475E-07	6.295E-08	3.362E-08	2.239E-08	1.657E-08
NW	2.985E-06	1.039E-06	5.224E-07	3.400E-07	2.472E-07	1.317E-07	5.566E-08	2.951E-08	1.957E-08	1.444E-08
NNW	3.360E-06	1.186E-06	5.910E-07	3.814E-07	2.757E-07	1.454E-07	6.060E-08	3.181E-08	2.097E-08	1.540E-08
N	4.475E-06	1.584E-06	7.882E-07	5.079E-07	3.667E-07	1.931E-07	8.028E-08	4.206E-08	2.769E-08	2.032E-08
NNE	4.668E-06	1.655E-06	8.191E-07	5.255E-07	3.782E-07	1.982E-07	8.184E-08	4.268E-08	2.802E-08	2.052E-08
NE	3.468E-06	1.214E-06	5.985E-07	3.838E-07	2.762E-07	1.448E-07	5.993E-08	3.133E-08	2.061E-08	1.512E-08
ENE	2.548E-06	8.870E-07	4.371E-07	2.805E-07	2.020E-07	1.061E-07	4.401E-08	2.306E-08	1.519E-08	1.116E-08
E	2.013E-06	7.001E-07	3.472E-07	2.239E-07	1.618E-07	8.539E-08	3.566E-08	1.877E-08	1.239E-08	9.118E-09
ESE	1.920E-06	6.674E-07	3.306E-07	2.130E-07	1.538E-07	8.116E-08	3.387E-08	1.782E-08	1.176E-08	8.651E-09
SE	2.153E-06	7.482E-07	3.693E-07	2.374E-07	1.712E-07	9.007E-08	3.747E-08	1.967E-08	1.297E-08	9.536E-09
SSE	3.461E-06	1.195E-06	5.975E-07	3.879E-07	2.816E-07	1.497E-07	6.319E-08	3.350E-08	2.222E-08	1.639E-08

Table A-7
Undepleted, 2.26 Day Decay, X/Q Values for Long-Term Ground Level Releases at Standard Distances (Sec/m^3)

Carolina Power & Light Company
Release Type: Annual
Release Mode: Ground
Variable: Relative Concentrations (Sec/m^3)
Model: Straight Line

Shearon Harris Plant
Number of Observations: 58163
Period of Record: 1/1/76 - 12/31/82
Application of Terrain Correction Factors: Yes

ANNUAL AVERAGE CHI/Q (SEC/METER CUBED) DISTANCE IN MILES

SECTOR	0.250	0.500	0.750	1.000	1.500	2.000	2.500	3.000	3.500	4.000	4.500
S	3.957E-05	1.175E-05	5.786E-06	3.668E-06	1.997E-06	1.378E-06	1.031E-06	8.128E-07	6.640E-07	5.568E-07	4.764E-07
SSW	3.745E-05	1.119E-05	5.547E-06	3.526E-06	1.923E-06	1.324E-06	9.887E-07	7.781E-07	6.348E-07	5.318E-07	4.546E-07
SW	3.558E-05	1.054E-05	5.185E-06	3.287E-06	1.791E-06	1.237E-06	9.268E-07	7.309E-07	5.973E-07	5.011E-07	4.288E-07
WSW	3.099E-05	9.162E-06	4.498E-06	2.848E-06	1.550E-06	1.072E-06	8.036E-07	6.341E-07	5.184E-07	4.350E-07	3.723E-07
W	2.632E-05	7.774E-06	3.816E-06	2.415E-06	1.314E-06	9.092E-07	6.818E-07	5.382E-07	4.401E-07	3.694E-07	3.162E-07
WNW	2.099E-05	6.210E-06	3.057E-06	1.941E-06	1.059E-06	7.315E-07	5.480E-07	4.322E-07	3.532E-07	2.963E-07	2.536E-07
NW	1.866E-05	5.572E-06	2.773E-06	1.774E-06	9.726E-07	6.688E-07	4.993E-07	3.928E-07	3.204E-07	2.683E-07	2.293E-07
NNW	2.054E-05	6.207E-06	3.137E-06	2.025E-06	1.117E-06	7.631E-07	5.670E-07	4.444E-07	3.614E-07	3.019E-07	2.575E-07
N	2.723E-05	8.243E-06	4.187E-06	2.706E-06	1.494E-06	1.019E-06	7.568E-07	5.928E-07	4.818E-07	4.024E-07	3.431E-07
NNE	2.812E-05	8.576E-06	4.375E-06	2.833E-06	1.565E-06	1.064E-06	7.878E-07	6.159E-07	4.999E-07	4.170E-07	3.552E-07
NE	2.096E-05	6.407E-06	3.250E-06	2.088E-06	1.145E-06	7.774E-07	5.752E-07	4.495E-07	3.647E-07	3.041E-07	2.590E-07
ENE	1.549E-05	4.724E-06	2.385E-06	1.528E-06	8.350E-07	5.672E-07	4.198E-07	3.281E-07	2.662E-07	2.221E-07	1.891E-07
E	1.234E-05	3.739E-06	1.880E-06	1.203E-06	6.575E-07	4.484E-07	3.329E-07	2.607E-07	2.120E-07	1.770E-07	1.510E-07
ESE	1.177E-05	3.568E-06	1.794E-06	1.147E-06	6.270E-07	4.278E-07	3.171E-07	2.483E-07	2.018E-07	1.685E-07	1.436E-07
SE	1.313E-05	3.994E-06	2.015E-06	1.288E-06	7.036E-07	4.785E-07	3.545E-07	2.773E-07	2.251E-07	1.879E-07	1.601E-07
SSE	2.160E-05	6.475E-06	3.218E-06	2.049E-06	1.118E-06	7.669E-07	5.716E-07	4.491E-07	3.659E-07	3.062E-07	2.616E-07

ANNUAL AVERAGE CHI/Q (SEC/METER CUBED) DISTANCE IN MILES

BEARING	5.000	7.500	10.000	15.000	20.000	25.000	30.000	35.000	40.000	45.000	50.000
S	4.141E-07	2.398E-07	1.612E-07	9.056E-08	5.919E-08	4.209E-08	3.161E-08	2.467E-08	1.982E-08	1.629E-08	1.363E-08
SSW	3.948E-07	2.280E-07	1.530E-07	8.572E-08	5.593E-08	3.971E-08	2.978E-08	2.322E-08	1.863E-08	1.529E-08	1.278E-08
SW	3.728E-07	2.158E-07	1.451E-07	8.135E-08	5.306E-08	3.765E-08	2.821E-08	2.197E-08	1.761E-08	1.444E-08	1.205E-08
WSW	3.238E-07	1.876E-07	1.261E-07	7.075E-08	4.614E-08	3.274E-08	2.453E-08	1.909E-08	1.530E-08	1.254E-08	1.047E-08
W	2.750E-07	1.594E-07	1.072E-07	6.010E-08	3.918E-08	2.779E-08	2.081E-08	1.619E-08	1.297E-08	1.062E-08	8.863E-09
WNW	2.204E-07	1.276E-07	8.580E-08	4.812E-08	3.139E-08	2.228E-08	1.669E-08	1.300E-08	1.042E-08	8.542E-09	7.131E-09
NW	1.991E-07	1.149E-07	7.709E-08	4.319E-08	2.819E-08	2.003E-08	1.503E-08	1.172E-08	9.405E-09	7.720E-09	6.451E-09
NNW	2.233E-07	1.282E-07	8.582E-08	4.802E-08	3.137E-08	2.232E-08	1.678E-08	1.311E-08	1.054E-08	8.667E-09	7.255E-09
N	2.974E-07	1.707E-07	1.142E-07	6.394E-08	4.179E-08	2.976E-08	2.239E-08	1.751E-08	1.409E-08	1.160E-08	9.715E-09
NNE	3.076E-07	1.760E-07	1.177E-07	6.583E-08	4.305E-08	3.068E-08	2.311E-08	1.810E-08	1.458E-08	1.201E-08	1.008E-08
NE	2.243E-07	1.283E-07	8.575E-08	4.794E-08	3.134E-08	2.234E-08	1.682E-08	1.317E-08	1.061E-08	8.748E-09	7.340E-09
ENE	1.638E-07	9.377E-08	6.269E-08	3.506E-08	2.292E-08	1.633E-08	1.230E-08	9.629E-09	7.759E-09	6.395E-09	5.366E-09
E	1.309E-07	7.510E-08	5.026E-08	2.812E-08	1.837E-08	1.308E-08	9.833E-09	7.686E-09	6.185E-09	5.089E-09	4.264E-09
ESE	1.245E-07	7.144E-08	4.782E-08	2.676E-08	1.749E-08	1.245E-08	9.368E-09	7.327E-09	5.898E-09	4.856E-09	4.071E-09
SE	1.387E-07	7.947E-08	5.316E-08	2.974E-08	1.944E-08	1.385E-08	1.043E-08	8.161E-09	6.574E-09	5.416E-09	4.544E-09
SSE	2.270E-07	1.309E-07	8.781E-08	4.922E-08	3.216E-08	2.288E-08	1.719E-08	1.343E-08	1.080E-08	8.878E-09	7.433E-09

Table A-8
Undepleted, 2.26 Day Decay, X/Q Values for Long-Term Ground Level Releases at Standard Distances (Sec/m^3)

Carolina Power & Light Company
Release Type: Annual
Release Mode: Ground
Variable: Relative Concentrations (Sec/m^3)
Model: Straight Line

Shearon Harris Plant
Number of Observations: 58163
Period of Record: 1/1/76 - 12/31/82
Application of Terrain Correction Factors: Yes

CHI/Q (SEC/METER CUBED) FOR EACH SEGMENT

DIRECTION FROM SITE	SEGMENT BOUNDARIES IN MILES .5-1	1-2	2-3	3-4	4-5	5-10	10-20	20-30	30-40	40-50
S	6.169E-06	2.093E-06	1.036E-06	6.657E-07	4.771E-07	2.436E-07	9.232E-08	4.246E-08	2.481E-08	1.635E-08
SSW	5.903E-06	2.013E-06	9.938E-07	6.365E-07	4.554E-07	2.317E-07	8.744E-08	4.006E-08	2.334E-08	1.535E-08
SW	5.531E-06	1.877E-06	9.312E-07	5.988E-07	4.294E-07	2.193E-07	8.294E-08	3.799E-08	2.209E-08	1.449E-08
WSW	4.801E-06	1.626E-06	8.074E-07	5.197E-07	3.729E-07	1.905E-07	7.212E-08	3.303E-08	1.920E-08	1.259E-08
W	4.073E-06	1.379E-06	6.850E-07	4.412E-07	3.167E-07	1.619E-07	6.126E-08	2.803E-08	1.628E-08	1.067E-08
WNW	3.262E-06	1.109E-06	5.506E-07	3.541E-07	2.539E-07	1.297E-07	4.906E-08	2.247E-08	1.307E-08	8.576E-09
NW	2.951E-06	1.016E-06	5.019E-07	3.212E-07	2.297E-07	1.168E-07	4.406E-08	2.020E-08	1.178E-08	7.749E-09
NNW	3.325E-06	1.162E-06	5.703E-07	3.625E-07	2.580E-07	1.305E-07	4.902E-08	2.252E-08	1.318E-08	8.699E-09
N	4.430E-06	1.552E-06	7.612E-07	4.833E-07	3.438E-07	1.738E-07	6.528E-08	3.002E-08	1.760E-08	1.164E-08
NNE	4.623E-06	1.624E-06	7.927E-07	5.014E-07	3.559E-07	1.793E-07	6.723E-08	3.095E-08	1.819E-08	1.206E-08
NE	3.435E-06	1.191E-06	5.788E-07	3.658E-07	2.595E-07	1.307E-07	4.897E-08	2.253E-08	1.324E-08	8.779E-09
ENE	2.524E-06	8.699E-07	4.224E-07	2.671E-07	1.895E-07	9.553E-08	3.580E-08	1.648E-08	9.680E-09	6.418E-09
E	1.992E-06	6.857E-07	3.348E-07	2.126E-07	1.512E-07	7.645E-08	2.871E-08	1.319E-08	7.727E-09	5.108E-09
ESE	1.901E-06	6.539E-07	3.190E-07	2.024E-07	1.439E-07	7.273E-08	2.732E-08	1.256E-08	7.366E-09	4.874E-09
SE	2.132E-06	7.335E-07	3.567E-07	2.258E-07	1.604E-07	8.093E-08	3.037E-08	1.397E-08	8.204E-09	5.436E-09
SSE	3.422E-06	1.169E-06	5.747E-07	3.669E-07	2.620E-07	1.331E-07	5.021E-08	2.308E-08	1.350E-08	8.911E-09

Table A-9
Depleted, 8.0 Day Decay, X/Q Values for Long-Term Ground Level Releases at Standard Distances (Sec/m^3)

Carolina Power & Light Company
Release Type: Annual
Release Mode: Ground
Variable: Relative Concentrations (Sec/m^3)
Model: Straight Line

Shearon Harris Plant
Number of Observations: 58163
Period of Record: 1/1/76 - 12/31/82
Application of Terrain Correction Factors: Yes

ANNUAL AVERAGE CHI/Q (SEC/METER CUBED) DISTANCE IN MILES

SECTOR	0.250	0.500	0.750	1.000	1.500	2.000	2.500	3.000	3.500	4.000	4.500
S	3.757E-05	1.079E-05	5.203E-06	3.249E-06	1.726E-06	1.168E-06	8.608E-07	6.694E-07	5.405E-07	4.486E-07	3.804E-07
SSW	3.556E-05	1.028E-05	4.987E-06	3.123E-06	1.662E-06	1.122E-06	8.249E-07	6.404E-07	5.165E-07	4.282E-07	3.627E-07
SW	3.379E-05	9.686E-06	4.664E-06	2.913E-06	1.549E-06	1.050E-06	7.744E-07	6.027E-07	4.870E-07	4.044E-07	3.430E-07
WSW	2.943E-05	8.421E-06	4.047E-06	2.525E-06	1.341E-06	9.103E-07	6.718E-07	5.232E-07	4.229E-07	3.514E-07	2.981E-07
W	2.500E-05	7.146E-06	3.434E-06	2.141E-06	1.137E-06	7.722E-07	5.702E-07	4.442E-07	3.592E-07	2.985E-07	2.533E-07
WNW	1.993E-05	5.708E-06	2.750E-06	1.720E-06	9.158E-07	6.209E-07	4.579E-07	3.564E-07	2.879E-07	2.391E-07	2.028E-07
NW	1.771E-05	5.119E-06	2.493E-06	1.570E-06	8.401E-07	5.666E-07	4.163E-07	3.230E-07	2.604E-07	2.158E-07	1.827E-07
NNW	1.949E-05	5.699E-06	2.817E-06	1.791E-06	9.633E-07	6.450E-07	4.713E-07	3.641E-07	2.925E-07	2.417E-07	2.041E-07
N	2.584E-05	7.567E-06	3.760E-06	2.392E-06	1.288E-06	8.610E-07	6.286E-07	4.853E-07	3.896E-07	3.218E-07	2.716E-07
NNE	2.668E-05	7.870E-06	3.927E-06	2.503E-06	1.348E-06	8.976E-07	6.534E-07	5.034E-07	4.033E-07	3.327E-07	2.805E-07
NE	1.989E-05	5.880E-06	2.917E-06	1.845E-06	9.860E-07	6.561E-07	4.773E-07	3.676E-07	2.945E-07	2.428E-07	2.047E-07
ENE	1.469E-05	4.335E-06	2.141E-06	1.350E-06	7.193E-07	4.788E-07	3.485E-07	2.685E-07	2.152E-07	1.775E-07	1.497E-07
E	1.171E-05	3.433E-06	1.688E-06	1.063E-06	5.669E-07	3.791E-07	2.768E-07	2.138E-07	1.716E-07	1.418E-07	1.198E-07
ESE	1.117E-05	3.275E-06	1.611E-06	1.015E-06	5.405E-07	3.611E-07	2.636E-07	2.035E-07	1.633E-07	1.349E-07	1.139E-07
SE	1.246E-05	3.666E-06	1.809E-06	1.139E-06	6.063E-07	4.041E-07	2.944E-07	2.270E-07	1.821E-07	1.503E-07	1.268E-07
SSE	2.050E-05	5.948E-06	2.892E-06	1.814E-06	9.654E-07	6.493E-07	4.762E-07	3.690E-07	2.971E-07	2.460E-07	2.082E-07

ANNUAL AVERAGE CHI/Q (SEC/METER CUBED) DISTANCE IN MILES

BEARING	5.000	7.500	10.000	15.000	20.000	25.000	30.000	35.000	40.000	45.000	50.000
S	3.279E-07	1.850E-07	1.220E-07	6.700E-08	4.324E-08	3.051E-08	2.278E-08	1.769E-08	1.413E-08	1.155E-08	9.606E-09
SSW	3.125E-07	1.758E-07	1.157E-07	6.333E-08	4.080E-08	2.874E-08	2.144E-08	1.663E-08	1.328E-08	1.084E-08	9.013E-09
SW	2.959E-07	1.671E-07	1.103E-07	6.055E-08	3.907E-08	2.756E-08	2.056E-08	1.596E-08	1.275E-08	1.041E-08	8.655E-09
WSW	2.572E-07	1.454E-07	9.601E-08	5.276E-08	3.407E-08	2.403E-08	1.794E-08	1.392E-08	1.112E-08	9.085E-09	7.552E-09
W	2.186E-07	1.236E-07	8.168E-08	4.490E-08	2.899E-08	2.046E-08	1.527E-08	1.185E-08	9.466E-09	7.731E-09	6.426E-09
WNW	1.749E-07	9.879E-08	6.519E-08	3.580E-08	2.310E-08	1.629E-08	1.216E-08	9.436E-09	7.538E-09	6.157E-09	5.118E-09
NW	1.573E-07	8.836E-08	5.811E-08	3.177E-08	2.045E-08	1.440E-08	1.074E-08	8.329E-09	6.651E-09	5.432E-09	4.515E-09
NNW	1.754E-07	9.777E-08	6.399E-08	3.478E-08	2.232E-08	1.568E-08	1.168E-08	9.051E-09	7.224E-09	5.898E-09	4.902E-09
N	2.333E-07	1.299E-07	8.495E-08	4.614E-08	2.959E-08	2.079E-08	1.548E-08	1.200E-08	9.575E-09	7.818E-09	6.499E-09
NNE	2.407E-07	1.335E-07	8.706E-08	4.715E-08	3.019E-08	2.120E-08	1.577E-08	1.222E-08	9.752E-09	7.963E-09	6.620E-09
NE	1.757E-07	9.745E-08	6.360E-08	3.447E-08	2.209E-08	1.551E-08	1.155E-08	8.949E-09	7.143E-09	5.833E-09	4.849E-09
ENE	1.285E-07	7.134E-08	4.660E-08	2.528E-08	1.621E-08	1.139E-08	8.484E-09	6.577E-09	5.251E-09	4.289E-09	3.566E-09
E	1.029E-07	5.737E-08	3.756E-08	2.043E-08	1.312E-08	9.228E-09	6.875E-09	5.330E-09	4.256E-09	3.475E-09	2.889E-09
ESE	9.786E-08	5.454E-08	3.570E-08	1.942E-08	1.247E-08	8.768E-09	6.532E-09	5.064E-09	4.044E-09	3.303E-09	2.746E-09
SE	1.089E-07	6.055E-08	3.959E-08	2.150E-08	1.380E-08	9.702E-09	7.227E-09	5.603E-09	4.474E-09	3.654E-09	3.038E-09
SSE	1.792E-07	1.005E-07	6.605E-08	3.610E-08	2.324E-08	1.637E-08	1.221E-08	9.474E-09	7.568E-09	6.182E-09	5.141E-09

Table A-10
Depleted, 8.0 Day Decay, X/Q Values for Long-Term Ground Level Releases at Standard Distances (Sec/m^3)

Carolina Power & Light Company
Release Type: Annual
Release Mode: Ground
Variable: Relative Concentrations (Sec/m^3)
Model: Straight Line

Shearon Harris Plant
Number of Observations: 58163
Period of Record: 1/1/76 - 12/31/82
Application of Terrain Correction Factors: Yes

CHI/Q (SEC/METER CUBED) FOR EACH SEGMENT

DIRECTION FROM SITE	SEGMENT BOUNDARIES IN MILES .5-1	1-2	2-3	3-4	4-5	5-10	10-20	20-30	30-40	40-50
S	5.577E-06	1.817E-06	8.663E-07	5.423E-07	3.812E-07	1.888E-07	6.867E-08	3.081E-08	1.779E-08	1.160E-08
SSW	5.335E-06	1.747E-06	8.303E-07	5.183E-07	3.635E-07	1.794E-07	6.495E-08	2.904E-08	1.673E-08	1.089E-08
SW	5.002E-06	1.630E-06	7.793E-07	4.886E-07	3.437E-07	1.704E-07	6.205E-08	2.783E-08	1.605E-08	1.045E-08
WSW	4.342E-06	1.413E-06	6.760E-07	4.243E-07	2.987E-07	1.483E-07	5.406E-08	2.427E-08	1.400E-08	9.122E-09
W	3.684E-06	1.198E-06	5.737E-07	3.604E-07	2.538E-07	1.261E-07	4.601E-08	2.066E-08	1.192E-08	7.762E-09
WNW	2.949E-06	9.634E-07	4.608E-07	2.889E-07	2.033E-07	1.008E-07	3.669E-08	1.645E-08	9.491E-09	6.181E-09
NW	2.666E-06	8.808E-07	4.191E-07	2.613E-07	1.831E-07	9.024E-08	3.260E-08	1.455E-08	8.379E-09	5.453E-09
NNW	3.001E-06	1.006E-06	4.747E-07	2.936E-07	2.046E-07	1.000E-07	3.573E-08	1.585E-08	9.106E-09	5.922E-09
N	3.998E-06	1.344E-06	6.333E-07	3.911E-07	2.723E-07	1.329E-07	4.741E-08	2.101E-08	1.207E-08	7.850E-09
NNE	4.170E-06	1.404E-06	6.585E-07	4.050E-07	2.812E-07	1.367E-07	4.848E-08	2.143E-08	1.229E-08	7.995E-09
NE	3.099E-06	1.030E-06	4.811E-07	2.957E-07	2.053E-07	9.979E-08	3.544E-08	1.568E-08	9.003E-09	5.857E-09
ENE	2.277E-06	7.526E-07	3.512E-07	2.160E-07	1.500E-07	7.303E-08	2.599E-08	1.152E-08	6.617E-09	4.306E-09
E	1.798E-06	5.938E-07	2.789E-07	1.723E-07	1.200E-07	5.868E-08	2.099E-08	9.325E-09	5.362E-09	3.489E-09
ESE	1.716E-06	5.661E-07	2.655E-07	1.640E-07	1.142E-07	5.579E-08	1.995E-08	8.860E-09	5.095E-09	3.316E-09
SE	1.924E-06	6.348E-07	2.967E-07	1.828E-07	1.271E-07	6.197E-08	2.210E-08	9.805E-09	5.637E-09	3.669E-09
SSE	3.092E-06	1.013E-06	4.795E-07	2.982E-07	2.087E-07	1.027E-07	3.704E-08	1.654E-08	9.530E-09	6.207E-09

TABLE A-1

Deposition Values (D/Q) For Long Term Releases At Standard Distances (m^{-2})

Carolina Power & Light Co.
Release Type: Annual
Release Mode: Ground
Variable: Deposition (m^{-2})
Model: Straight Line

Shearon Harris Plant
Number of Observations: 58163
Period of Record: 1/1/76 - 12/31/82
Application of Terrain Correction Factors: Yes

********** RELATIVE DEPOSITION PER UNIT AREA (M**-2) AT FIXED POINTS BY DOWNWIND SECTORS **********

DIRECTION FROM SITE	DISTANCES IN MILES 0.25	0.50	0.75	1.00	1.50	2.00	2.50	3.00	3.50	4.00	4.50
S	5.630E-08	1.904E-08	9.775E-09	6.002E-09	2.992E-09	1.815E-09	1.227E-09	8.892E-10	6.761E-10	5.327E-10	4.312E-10
SSW	5.119E-08	1.731E-08	8.888E-09	5.457E-09	2.721E-09	1.650E-09	1.116E-09	8.085E-10	6.147E-10	4.843E-10	3.921E-10
SW	4.056E-08	1.372E-08	7.043E-09	4.324E-09	2.156E-09	1.308E-09	8.841E-10	6.406E-10	4.871E-10	3.838E-10	3.107E-10
WSW	3.312E-08	1.120E-08	5.750E-09	3.531E-09	1.760E-09	1.068E-09	7.218E-10	5.231E-10	3.977E-10	3.133E-10	2.537E-10
W	2.610E-08	8.824E-09	4.531E-09	2.782E-09	1.387E-09	8.412E-10	5.688E-10	4.121E-10	3.134E-10	2.469E-10	1.999E-10
WNW	2.143E-08	7.246E-09	3.720E-09	2.285E-09	1.139E-09	6.908E-10	4.670E-10	3.384E-10	2.573E-10	2.027E-10	1.641E-10
NW	2.204E-08	7.453E-09	3.827E-09	2.350E-09	1.171E-09	7.105E-10	4.803E-10	3.481E-10	2.647E-10	2.085E-10	1.688E-10
NNW	2.971E-08	1.005E-08	5.159E-09	3.168E-09	1.579E-09	9.578E-10	6.476E-10	4.693E-10	3.568E-10	2.811E-10	2.276E-10
N	4.191E-08	1.417E-08	7.277E-09	4.468E-09	2.228E-09	1.351E-09	9.135E-10	6.619E-10	5.033E-10	3.965E-10	3.210E-10
NNE	5.217E-08	1.764E-08	9.057E-09	5.562E-09	2.773E-09	1.682E-09	1.137E-09	8.239E-10	6.265E-10	4.936E-10	3.996E-10
NE	4.727E-08	1.599E-08	8.208E-09	5.040E-09	2.513E-09	1.524E-09	1.030E-09	7.466E-10	5.677E-10	4.472E-10	3.621E-10
ENE	3.723E-08	1.259E-08	6.463E-09	3.969E-09	1.979E-09	1.200E-09	8.114E-10	5.879E-10	4.471E-10	3.522E-10	2.851E-10
E	2.381E-08	8.052E-09	4.134E-09	2.538E-09	1.266E-09	7.675E-10	5.189E-10	3.760E-10	2.859E-10	2.253E-10	1.824E-10
ESE	2.600E-08	8.792E-09	4.514E-09	2.772E-09	1.382E-09	8.381E-10	5.667E-10	4.106E-10	3.122E-10	2.460E-10	1.991E-10
SE	3.124E-08	1.057E-08	5.425E-09	3.331E-09	1.661E-09	1.007E-09	6.810E-10	4.934E-10	3.752E-10	2.956E-10	2.393E-10
SSE	3.893E-08	1.317E-08	6.760E-09	4.151E-09	2.069E-09	1.255E-09	8.486E-10	6.149E-10	4.676E-10	3.684E-10	2.982E-10

DIRECTION FROM SITE	DISTANCES IN MILES 5.00	7.50	10.00	15.00	20.00	25.00	30.00	35.00	40.00	45.00	50.00
S	3.567E-10	1.748E-10	1.097E-10	5.544E-11	3.355E-11	2.250E-11	1.612E-11	1.210E-11	9.411E-12	7.518E-12	6.136E-12
SSW	3.243E-10	1.589E-10	9.972E-11	5.041E-11	3.051E-11	2.045E-11	1.466E-11	1.101E-11	8.557E-12	6.836E-12	5.579E-12
SW	2.570E-10	1.259E-10	7.902E-11	3.994E-11	2.417E-11	1.621E-11	1.161E-11	8.721E-12	6.781E-12	5.417E-12	4.421E-12
WSW	2.098E-10	1.028E-10	6.452E-11	3.261E-11	1.974E-11	1.323E-11	9.483E-12	7.121E-12	5.536E-12	4.423E-12	3.610E-12
W	1.653E-10	8.102E-11	5.084E-11	2.570E-11	1.555E-11	1.043E-11	7.472E-12	5.611E-12	4.362E-12	3.485E-12	2.844E-12
WNW	1.358E-10	6.653E-11	4.174E-11	2.110E-11	1.277E-11	8.562E-12	6.135E-12	4.607E-12	3.582E-12	2.861E-12	2.336E-12
NW	1.396E-10	6.843E-11	4.294E-11	2.170E-11	1.314E-11	8.807E-12	6.310E-12	4.738E-12	3.684E-12	2.943E-12	2.402E-12
NNW	1.883E-10	9.225E-11	5.788E-11	2.926E-11	1.771E-11	1.187E-11	8.508E-12	6.388E-12	4.967E-12	3.968E-12	3.239E-12
N	2.655E-10	1.301E-10	8.165E-11	4.127E-11	2.498E-11	1.675E-11	1.200E-11	9.011E-12	7.006E-12	5.597E-12	4.568E-12
NNE	3.305E-10	1.620E-10	1.016E-10	5.137E-11	3.109E-11	2.085E-11	1.494E-11	1.122E-11	8.721E-12	6.966E-12	5.686E-12
NE	2.995E-10	1.468E-10	9.209E-11	4.655E-11	2.817E-11	1.889E-11	1.354E-11	1.016E-11	7.902E-12	6.313E-12	5.152E-12
ENE	2.359E-10	1.156E-10	7.252E-11	3.666E-11	2.219E-11	1.488E-11	1.066E-11	8.004E-12	6.223E-12	4.971E-12	4.058E-12
E	1.509E-10	7.393E-11	4.639E-11	2.345E-11	1.419E-11	9.514E-12	6.818E-12	5.119E-12	3.980E-12	3.180E-12	2.595E-12
ESE	1.647E-10	8.072E-11	5.065E-11	2.560E-11	1.550E-11	1.039E-11	7.444E-12	5.590E-12	4.346E-12	3.472E-12	2.834E-12
SE	1.980E-10	9.701E-11	6.087E-11	3.077E-11	1.862E-11	1.248E-11	8.946E-12	6.717E-12	5.223E-12	4.172E-12	3.405E-12
SSE	2.467E-10	1.209E-10	7.585E-11	3.834E-11	2.320E-11	1.556E-11	1.115E-11	8.371E-12	6.509E-12	5.199E-12	4.244E-12

TABLE A-1

Deposition Values (D/Q) For Long Term Releases At Standard Distances (m^{-2})

Carolina Power & Light Co.
Release Type: Annual
Release Mode: Ground
Variable: Deposition (m^{-2})
Model: Straight Line

Shearon Harris Plant
Number of Observations: 58163
Period of Record: 1/1/76 - 12/31/82
Application of Terrain Correction Factors: Yes

RELATIVE DEPOSITION PER UNIT AREA (M**-2) BY DOWNWIND SECTORS

DIRECTION FROM SITE	SEGMENT BOUNDARIES IN MILES .5-1	1-2	2-3	3-4	4-5	5-10	10-20	20-30	30-40	40-50
S	1.016E-08	3.138E-09	1.249E-09	6.823E-10	4.337E-10	1.863E-10	5.776E-11	2.289E-11	1.223E-11	7.567E-12
SSW	9.235E-09	2.853E-09	1.135E-09	6.204E-10	3.943E-10	1.694E-10	5.252E-11	2.082E-11	1.112E-11	6.880E-12
SW	7.318E-09	2.261E-09	8.996E-10	4.916E-10	3.125E-10	1.342E-10	4.162E-11	1.649E-11	8.808E-12	5.452E-12
WSW	5.975E-09	1.846E-09	7.345E-10	4.014E-10	2.551E-10	1.096E-10	3.398E-11	1.347E-11	7.192E-12	4.452E-12
W	4.708E-09	1.454E-09	5.788E-10	3.163E-10	2.010E-10	8.635E-11	2.678E-11	1.061E-11	5.667E-12	3.508E-12
WNW	3.866E-09	1.194E-09	4.752E-10	2.597E-10	1.651E-10	7.090E-11	2.199E-11	8.714E-12	4.653E-12	2.880E-12
NW	3.976E-09	1.228E-09	4.888E-10	2.671E-10	1.698E-10	7.292E-11	2.261E-11	8.962E-12	4.786E-12	2.962E-12
NNW	5.360E-09	1.656E-09	6.590E-10	3.601E-10	2.289E-10	9.831E-11	3.049E-11	1.208E-11	6.452E-12	3.994E-12
N	7.561E-09	2.336E-09	9.296E-10	5.080E-10	3.229E-10	1.387E-10	4.300E-11	1.704E-11	9.102E-12	5.634E-12
NNE	9.411E-09	2.908E-09	1.157E-09	6.322E-10	4.018E-10	1.726E-10	5.352E-11	2.121E-11	1.133E-11	7.012E-12
NE	8.528E-09	2.635E-09	1.048E-09	5.729E-10	3.641E-10	1.564E-10	4.850E-11	1.922E-11	1.027E-11	6.354E-12
ENE	6.716E-09	2.075E-09	8.256E-10	4.512E-10	2.868E-10	1.232E-10	3.820E-11	1.514E-11	8.084E-12	5.004E-12
E	4.295E-09	1.327E-09	5.281E-10	2.886E-10	1.834E-10	7.878E-11	2.443E-11	9.683E-12	5.171E-12	3.200E-12
ESE	4.690E-09	1.449E-09	5.766E-10	3.151E-10	2.003E-10	8.603E-11	2.668E-11	1.057E-11	5.646E-12	3.495E-12
SE	5.636E-09	1.741E-09	6.929E-10	3.787E-10	2.407E-10	1.034E-10	3.206E-11	1.271E-11	6.785E-12	4.200E-12
SSE	7.024E-09	2.170E-09	8.635E-10	4.719E-10	2.999E-10	1.288E-10	3.995E-11	1.583E-11	8.455E-12	5.233E-12

TABLE A-13

Joint Wind Frequency Distribution By Pasquill Stability Classes At SHNPP

Period of Record: 1/1/76 - 12/31/82
Lower Monitoring Level

SITE=SHNP PERIOD=76-82 STAB=A

LOWNDDEG	LOWNDSPD								
	CALM	.75-3.5	3.5-7.5	7.5-12.5	12.5-18.5	18.5-25	>= 25	TOTAL	AVERAGE LOWNDSPD
N	0.1/ 0.00	7/ 0.01	225/ 0.39	172/ 0.30	7/ 0.01	/	/	411.1/ 0.71	7.43898
NNE	0.0/ 0.00	1/ 0.00	156/ 0.27	142/ 0.24	/	/	/	299.0/ 0.51	7.50180
NE	0.1/ 0.00	5/ 0.01	124/ 0.21	92/ 0.16	2/ 0.00	/	/	223.1/ 0.38	7.15493
ENE	0.0/ 0.00	3/ 0.01	97/ 0.17	32/ 0.06	/	/	/	132.0/ 0.23	6.45781
E	0.1/ 0.00	5/ 0.01	54/ 0.09	12/ 0.02	/	/	/	71.1/ 0.12	5.97841
ESE	0.1/ 0.00	6/ 0.01	45/ 0.08	10/ 0.02	1/ 0.00	/	/	62.1/ 0.11	5.85942
SE	0.1/ 0.00	10/ 0.02	34/ 0.06	8/ 0.01	/	/	/	52.1/ 0.09	5.35978
SSE	0.0/ 0.00	4/ 0.01	62/ 0.11	8/ 0.01	1/ 0.00	/	/	75.0/ 0.13	5.66358
S	0.1/ 0.00	6/ 0.01	92/ 0.16	34/ 0.06	4/ 0.01	/	/	136.1/ 0.23	6.69527
SSW	0.1/ 0.00	8/ 0.01	151/ 0.26	159/ 0.27	7/ 0.01	1/ 0.00	/	326.1/ 0.56	7.66362
SW	0.1/ 0.00	9/ 0.02	167/ 0.29	238/ 0.41	49/ 0.08	/	/	463.1/ 0.80	8.61974
WSW	0.1/ 0.00	10/ 0.02	167/ 0.29	207/ 0.36	56/ 0.10	4/ 0.01	/	444.1/ 0.76	8.76059
W	0.1/ 0.00	8/ 0.01	100/ 0.17	75/ 0.13	23/ 0.04	4/ 0.01	/	210.1/ 0.36	8.16850
WNW	0.1/ 0.00	6/ 0.01	82/ 0.14	162/ 0.28	45/ 0.08	9/ 0.02	/	304.1/ 0.52	9.56912
NW	0.0/ 0.00	4/ 0.01	148/ 0.25	198/ 0.34	34/ 0.06	/	/	384.0/ 0.66	8.40938
NNW	0.0/ 0.00	3/ 0.01	162/ 0.28	191/ 0.33	38/ 0.07	1/ 0.00	/	395.0/ 0.68	8.39392
TOTAL	1.0/ 0.00	95/ 0.16	1866/ 3.21	1740/ 2.99	267/ 0.46	19/ 0.03	/	3988/ 6.86	7.95048

NUMBER OF BAD RECORDS: 84

TABLE A-13 (con't)

Joint Wind Frequency Distribution By Pasquill Stability Classes At SHNPP

Period of Record: 1/1/76 - 12/31/82
Lower Monitoring Level

SITE=SHNP PERIOD=76-82 STAB=B

LOWNDSPD

LOWNDDEG	CALM	.75-3.5	3.5-7.5	7.5-12.5	12.5-18.5	18.5-25	>= 25	TOTAL	AVERAGE LOWNDSPD
N	/	7/ 0.01	165/ 0.28	74/ 0.13	6/ 0.01	/	/	252.0/ 0.43	6.91414
NNE	/	6/ 0.01	122/ 0.21	52/ 0.09	/	/	/	180.0/ 0.31	6.62402
NE	/	8/ 0.01	104/ 0.18	34/ 0.06	1/ 0.00	/	/	147.0/ 0.25	6.16130
ENE	/	8/ 0.01	102/ 0.18	13/ 0.02	/	/	/	123.0/ 0.21	5.85951
E	/	7/ 0.01	72/ 0.12	13/ 0.02	/	/	/	92.0/ 0.16	5.63753
ESE	/	9/ 0.02	65/ 0.11	4/ 0.01	/	/	/	78.0/ 0.13	5.24909
SE	/	7/ 0.01	30/ 0.05	13/ 0.02	/	/	/	50.0/ 0.09	5.87852
SSE	/	6/ 0.01	65/ 0.11	10/ 0.02	1/ 0.00	/	/	82.0/ 0.14	5.88498
S	/	10/ 0.02	101/ 0.17	37/ 0.06	4/ 0.01	/	/	152.0/ 0.26	6.55821
SSW	/	7/ 0.01	132/ 0.23	59/ 0.10	4/ 0.01	/	/	202.0/ 0.35	6.71605
SW	/	13/ 0.02	174/ 0.30	110/ 0.19	22/ 0.04	2/ 0.00	/	321.0/ 0.55	7.56686
WSW	/	12/ 0.02	139/ 0.24	120/ 0.21	19/ 0.03	2/ 0.00	1/ 0.00	293.0/ 0.50	7.83773
W	/	12/ 0.02	51/ 0.09	51/ 0.09	22/ 0.04	1/ 0.00	/	137.0/ 0.24	8.34160
WNW	/	7/ 0.01	72/ 0.12	94/ 0.16	37/ 0.06	3/ 0.01	/	213.0/ 0.37	9.11968
NW	/	12/ 0.02	106/ 0.18	122/ 0.21	20/ 0.03	1/ 0.00	/	261.0/ 0.45	8.04021
NNW	/	8/ 0.01	116/ 0.20	105/ 0.18	16/ 0.03	1/ 0.00	/	246.0/ 0.42	7.73903
TOTAL	/	139/ 0.24	1616/ 2.78	911/ 1.57	152/ 0.26	10/ 0.02	1/ 0.00	2829/ 4.86	7.22241

NUMBER OF BAD RECORDS: 87

TABLE A-13 (con't)

Joint Wind Frequency Distribution By Pasquill Stability Classes At SHNPP

Period of Record: 1/1/76 - 12/31/82
Lower Monitoring Level

SITE=SHNP PERIOD=76-82 STAB=C

LOWNDDEG	LOWNDSPD CALM	.75-3.5	3.5-7.5	7.5-12.5	12.5-18.5	18.5-25	>= 25	TOTAL	AVERAGE LOWNDSPD
N	/	17/ 0.03	208/ 0.36	98/ 0.17	5/ 0.01	/	/	328.0/ 0.56	6.57922
NNE	/	11/ 0.02	146/ 0.25	47/ 0.08	/	/	/	204.0/ 0.35	6.17697
NE	/	13/ 0.02	126/ 0.22	21/ 0.04	/	/	/	160.0/ 0.28	5.80545
ENE	/	14/ 0.02	128/ 0.22	25/ 0.04	/	/	/	167.0/ 0.29	5.58311
E	/	13/ 0.02	87/ 0.15	3/ 0.01	/	/	/	103.0/ 0.18	5.08083
ESE	/	17/ 0.03	63/ 0.11	5/ 0.01	/	/	/	85.0/ 0.15	4.90541
SE	/	9/ 0.02	66/ 0.11	6/ 0.01	/	/	/	81.0/ 0.14	5.17538
SSE	/	18/ 0.03	92/ 0.16	15/ 0.03	/	/	/	125.0/ 0.21	5.46216
S	/	22/ 0.04	122/ 0.21	23/ 0.04	1/ 0.00	/	/	168.0/ 0.29	5.50245
SSW	/	27/ 0.05	180/ 0.31	76/ 0.13	7/ 0.01	/	/	290.0/ 0.50	6.28916
SW	/	27/ 0.05	204/ 0.35	102/ 0.18	14/ 0.02	2/ 0.00	/	349.0/ 0.60	6.89606
WSW	/	18/ 0.03	184/ 0.32	111/ 0.19	18/ 0.03	3/ 0.01	/	334.0/ 0.57	7.42295
W	/	18/ 0.03	109/ 0.19	67/ 0.12	11/ 0.02	2/ 0.00	/	207.0/ 0.36	7.16838
WNW	/	11/ 0.02	104/ 0.18	64/ 0.11	32/ 0.06	2/ 0.00	/	213.0/ 0.37	8.23387
NW	/	15/ 0.03	134/ 0.23	119/ 0.20	14/ 0.02	/	/	282.0/ 0.48	7.47358
NNW	/	12/ 0.02	158/ 0.27	101/ 0.17	13/ 0.02	/	/	284.0/ 0.49	7.26539
TOTAL	/	262/ 0.45	2111/ 3.63	883/ 1.52	115/ 0.20	9/ 0.02	/	3380/ 5.81	6.61670

NUMBER OF BAD RECORDS: 100

TABLE A-13 (con't)

Joint Wind Frequency Distribution By Pasquill Stability Classes At SHNPP

Period of Record: 1/1/76 - 12/31/82
Lower Monitoring Level

SITE=SHNP PERIOD=76-82 STAB=D

LOWNDDEG	LOWNDSPD CALM	.75-3.5	3.5-7.5	7.5-12.5	12.5-18.5	18.5-25	>= 25	TOTAL	AVERAGE LOWNDSPD
N	1.5/ 0.00	221/ 0.38	1019/ 1.75	367/ 0.63	36/ 0.06	/	/	1645/ 2.83	6.03657
NNE	1.9/ 0.00	273/ 0.47	1138/ 1.96	273/ 0.47	12/ 0.02	/	/	1698/ 2.92	5.56478
NE	1.6/ 0.00	230/ 0.40	743/ 1.28	154/ 0.26	2/ 0.00	/	/	1131/ 1.94	5.33269
ENE	1.4/ 0.00	202/ 0.35	595/ 1.02	71/ 0.12	1/ 0.00	/	/	870.4/ 1.50	4.94590
E	1.3/ 0.00	185/ 0.32	410/ 0.70	29/ 0.05	3/ 0.01	/	/	628.3/ 1.08	4.52470
ESE	1.0/ 0.00	153/ 0.26	310/ 0.53	25/ 0.04	2/ 0.00	/	/	491.0/ 0.84	4.47621
SE	1.0/ 0.00	147/ 0.25	358/ 0.62	58/ 0.10	2/ 0.00	/	/	566.0/ 0.97	4.84089
SSE	1.1/ 0.00	167/ 0.29	478/ 0.82	134/ 0.23	17/ 0.03	/	/	797.1/ 1.37	5.56007
S	1.3/ 0.00	186/ 0.32	577/ 0.99	154/ 0.26	31/ 0.05	1/ 0.00	/	950.3/ 1.63	5.76856
SSW	1.9/ 0.00	273/ 0.47	767/ 1.32	269/ 0.46	42/ 0.07	1/ 0.00	/	1354/ 2.33	5.87528
SW	1.8/ 0.00	259/ 0.45	776/ 1.33	381/ 0.66	56/ 0.10	8/ 0.01	/	1482/ 2.55	6.34633
WSW	1.2/ 0.00	180/ 0.31	681/ 1.17	265/ 0.46	48/ 0.08	17/ 0.03	/	1192/ 2.05	6.49699
W	1.0/ 0.00	149/ 0.26	373/ 0.64	165/ 0.28	29/ 0.05	/	/	717.0/ 1.23	6.02672
WNW	0.9/ 0.00	135/ 0.23	352/ 0.61	236/ 0.41	72/ 0.12	4/ 0.01	/	799.9/ 1.38	6.99022
NW	0.9/ 0.00	132/ 0.23	477/ 0.82	318/ 0.55	36/ 0.06	/	/	963.9/ 1.66	6.68711
NNW	1.2/ 0.00	180/ 0.31	617/ 1.06	380/ 0.65	48/ 0.08	/	/	1226/ 2.11	6.54420
TOTAL	21.0/ 0.04	3072/ 5.28	9671/16.63	3279/ 5.64	437/ 0.75	31/ 0.05	/	16511/28.39	5.86828

NUMBER OF BAD RECORDS: 585

TABLE A-13 (con't)

Joint Wind Frequency Distribution By Pasquill Stability Classes At SHNPP

Period of Record: 1/1/76 - 12/31/82
Lower Monitoring Level

SITE=SHNP PERIOD=76-82 STAB=E

LOWNDDEG	LOWNDSPD CALM	.75-3.5	3.5-7.5	7.5-12.5	12.5-18.5	18.5-25	>= 25	TOTAL	AVERAGE LOWNDSPD
N	2.7/ 0.00	376/ 0.65	616/ 1.06	87/ 0.15	7/ 0.01	/	/	1089/ 1.87	4.57494
NNE	3.6/ 0.01	500/ 0.86	533/ 0.92	19/ 0.03	3/ 0.01	/	/	1059/ 1.82	3.77374
NE	3.0/ 0.01	428/ 0.74	335/ 0.58	29/ 0.05	/	/	/	795.0/ 1.37	3.71377
ENE	2.6/ 0.00	368/ 0.63	214/ 0.37	24/ 0.04	1/ 0.00	/	/	609.6/ 1.05	3.56109
E	2.3/ 0.00	322/ 0.55	198/ 0.34	15/ 0.03	2/ 0.00	/	/	539.3/ 0.93	3.44014
ESE	2.1/ 0.00	291/ 0.50	155/ 0.27	16/ 0.03	/	/	/	464.1/ 0.80	3.36560
SE	2.4/ 0.00	339/ 0.58	229/ 0.39	18/ 0.03	4/ 0.01	/	/	592.4/ 1.02	3.53311
SSE	3.7/ 0.01	518/ 0.89	368/ 0.63	55/ 0.09	5/ 0.01	/	/	949.7/ 1.63	3.82129
S	5.5/ 0.01	779/ 1.34	647/ 1.11	98/ 0.17	12/ 0.02	/	/	1542/ 2.65	3.97819
SSW	5.2/ 0.01	733/ 1.26	899/ 1.55	113/ 0.19	10/ 0.02	/	/	1760/ 3.03	4.20919
SW	2.9/ 0.00	402/ 0.69	619/ 1.06	165/ 0.28	12/ 0.02	3/ 0.01	/	1204/ 2.07	4.90957
WSW	1.8/ 0.00	257/ 0.44	407/ 0.70	105/ 0.18	24/ 0.04	4/ 0.01	/	798.8/ 1.37	5.15121
W	1.5/ 0.00	206/ 0.35	302/ 0.52	50/ 0.09	10/ 0.02	/	/	569.5/ 0.98	4.65715
WNW	1.4/ 0.00	195/ 0.34	282/ 0.48	76/ 0.13	2/ 0.00	1/ 0.00	/	557.4/ 0.96	4.77983
NW	1.6/ 0.00	222/ 0.38	407/ 0.70	57/ 0.10	3/ 0.01	/	/	690.6/ 1.19	4.56185
NNW	1.8/ 0.00	259/ 0.45	385/ 0.66	95/ 0.16	8/ 0.01	/	/	748.8/ 1.29	4.70378
TOTAL	44.0/ 0.08	6195/10.65	6596/11.34	1022/ 1.76	103/ 0.18	8/ 0.01	/	13968/24.02	4.20921

NUMBER OF BAD RECORDS: 325

TABLE A-13 (con't)

Joint Wind Frequency Distribution By Pasquill Stability Classes At SHNPP

Period of Record: 1/1/76 - 12/31/82
Lower Monitoring Level

SITE=SHNP PERIOD=76-82 STAB=F

LOWNDDEG	LOWNDSPD CALM	.75-3.5	3.5-7.5	7.5-12.5	12.5-18.5	18.5-25	>= 25	TOTAL	AVERAGE LOWNDSPD
N	8.2/ 0.01	429/ 0.74	211/ 0.36	2/ 0.00	/	/	/	650.2/ 1.12	3.02325
NNE	8.9/ 0.02	463/ 0.80	113/ 0.19	1/ 0.00	/	/	/	585.9/ 1.01	2.68731
NE	8.5/ 0.01	443/ 0.76	45/ 0.08	/	/	/	/	496.5/ 0.85	2.42985
ENE	7.1/ 0.01	371/ 0.64	50/ 0.09	/	/	/	/	428.1/ 0.74	2.40978
E	5.8/ 0.01	300/ 0.52	30/ 0.05	/	/	/	/	335.8/ 0.58	2.18794
ESE	5.5/ 0.01	286/ 0.49	25/ 0.04	/	/	/	/	316.5/ 0.54	2.15184
SE	6.1/ 0.01	318/ 0.55	28/ 0.05	/	/	/	/	352.1/ 0.61	2.21132
SSE	8.6/ 0.01	447/ 0.77	28/ 0.05	/	/	/	/	483.6/ 0.83	2.12694
S	10.5/ 0.02	548/ 0.94	99/ 0.17	/	/	/	/	657.5/ 1.13	2.40714
SSW	11.3/ 0.02	586/ 1.01	138/ 0.24	1/ 0.00	/	/	/	736.3/ 1.27	2.57199
SW	6.3/ 0.01	328/ 0.56	114/ 0.20	5/ 0.01	1/ 0.00	/	/	454.3/ 0.78	2.79062
WSW	4.2/ 0.01	220/ 0.38	85/ 0.15	1/ 0.00	/	/	/	310.2/ 0.53	2.82343
W	3.3/ 0.01	172/ 0.30	63/ 0.11	/	/	/	/	238.3/ 0.41	2.76382
WNW	3.0/ 0.01	157/ 0.27	69/ 0.12	/	/	/	/	229.0/ 0.39	2.77612
NW	3.2/ 0.01	168/ 0.29	65/ 0.11	/	/	/	/	236.2/ 0.41	2.71450
NNW	5.4/ 0.01	281/ 0.48	109/ 0.19	1/ 0.00	/	/	/	396.4/ 0.68	2.79306
TOTAL	106.0/ 0.18	5517/ 9.49	1272/ 2.19	11/ 0.02	1/ 0.00	/	/	6907/11.88	2.55740

NUMBER OF BAD RECORDS: 193

TABLE A-13 (con't)

Joint Wind Frequency Distribution By Pasquill Stability Classes At SHNPP

Period of Record: 1/1/76 - 12/31/82
Lower Monitoring Level

SITE=SHNP PERIOD=76-82 STAB=G

LOWNDDEG	LOWNDSPD CALM	.75-3.5	3.5-7.5	7.5-12.5	12.5-18.5	18.5-25	>= 25	TOTAL	AVERAGE LOWNDSPD
N	184.9/ 0.32	1010/ 1.74	86/ 0.15	/	/	/	/	1281/ 2.20	1.72431
NNE	169.7/ 0.29	927/ 1.59	20/ 0.03	/	/	/	/	1117/ 1.92	1.46930
NE	171.4/ 0.29	936/ 1.61	15/ 0.03	/	/	/	/	1122/ 1.93	1.49948
ENE	151.8/ 0.26	829/ 1.43	16/ 0.03	/	/	/	/	996.8/ 1.71	1.47772
E	130.9/ 0.23	715/ 1.23	6/ 0.01	/	/	/	/	851.9/ 1.46	1.34463
ESE	99.8/ 0.17	545/ 0.94	11/ 0.02	/	/	/	/	655.8/ 1.13	1.32153
SE	79.3/ 0.14	433/ 0.74	8/ 0.01	/	/	/	/	520.3/ 0.89	1.35172
SSE	72.3/ 0.12	395/ 0.68	5/ 0.01	/	/	/	/	472.3/ 0.81	1.35393
S	92.8/ 0.16	507/ 0.87	5/ 0.01	/	/	/	/	604.8/ 1.04	1.35748
SSW	87.7/ 0.15	479/ 0.82	5/ 0.01	/	/	/	/	571.7/ 0.98	1.45870
SW	70.5/ 0.12	385/ 0.66	19/ 0.03	1/ 0.00	/	/	/	475.5/ 0.82	1.63642
WSW	54.2/ 0.09	296/ 0.51	17/ 0.03	/	/	/	/	367.2/ 0.63	1.55063
W	46.9/ 0.08	256/ 0.44	10/ 0.02	/	/	/	/	312.9/ 0.54	1.50179
WNW	44.3/ 0.08	242/ 0.42	9/ 0.02	/	/	/	/	295.3/ 0.51	1.52162
NW	47.8/ 0.08	261/ 0.45	11/ 0.02	1/ 0.00	/	/	/	320.8/ 0.55	1.56182
NNW	91.6/ 0.16	500/ 0.86	23/ 0.04	/	/	/	/	614.6/ 1.06	1.55537
TOTAL	1596/ 2.74	8716/14.99	266/ 0.46	2/ 0.00	/	/	/	10580/18.19	1.48762

NUMBER OF BAD RECORDS: 590

TABLE A-13 (con't)

Joint Wind Frequency Distribution By Pasquill Stability Classes At SHNPP

Period of Record: 1/1/76 - 12/31/82
Lower Monitoring Level

SITE=SHNP PERIOD=76-82 SUMMARY OVER ALL STAB

LOWNDDEG	LOWNDSPD CALM	.75-3.5	3.5-7.5	7.5-12.5	12.5-18.5	18.5-25	>= 25	TOTAL	AVERAGE LOWNDSPD
N	152.3/ 0.26	2067/ 3.55	2530/ 4.35	800/ 1.38	61/ 0.10	/	/	5610/ 9.65	4.65481
NNE	160.7/ 0.28	2181/ 3.75	2228/ 3.83	534/ 0.92	15/ 0.03	/	/	5119/ 8.80	4.19043
NE	152.0/ 0.26	2063/ 3.55	1492/ 2.57	330/ 0.57	5/ 0.01	/	/	4042/ 6.95	3.80728
ENE	132.3/ 0.23	1795/ 3.09	1202/ 2.07	165/ 0.28	2/ 0.00	/	/	3296/ 5.67	3.50671
E	114.0/ 0.20	1547/ 2.66	857/ 1.47	72/ 0.12	5/ 0.01	/	/	2595/ 4.46	3.12460
ESE	96.3/ 0.17	1307/ 2.25	674/ 1.16	60/ 0.10	3/ 0.01	/	/	2140/ 3.68	3.06463
SE	93.1/ 0.16	1263/ 2.17	753/ 1.29	103/ 0.18	6/ 0.01	/	/	2218/ 3.81	3.32610
SSE	114.6/ 0.20	1555/ 2.67	1098/ 1.89	222/ 0.38	24/ 0.04	/	/	3014/ 5.18	3.79054
S	151.6/ 0.26	2058/ 3.54	1643/ 2.82	346/ 0.59	52/ 0.09	1/ 0.00	/	4252/ 7.31	4.00940
SSW	155.7/ 0.27	2113/ 3.63	2272/ 3.91	677/ 1.16	70/ 0.12	2/ 0.00	/	5290/ 9.09	4.53197
SW	104.8/ 0.18	1423/ 2.45	2073/ 3.56	1002/ 1.72	154/ 0.26	15/ 0.03	/	4772/ 8.20	5.50878
WSW	73.2/ 0.13	993/ 1.71	1680/ 2.89	809/ 1.39	165/ 0.28	30/ 0.05	1/ 0.00	3751/ 6.45	5.88759
W	60.5/ 0.10	821/ 1.41	1008/ 1.73	408/ 0.70	95/ 0.16	7/ 0.01	/	2400/ 4.13	5.21635
WNW	55.5/ 0.10	753/ 1.29	970/ 1.67	632/ 1.09	188/ 0.32	19/ 0.03	/	2618/ 4.50	6.11697
NW	60.0/ 0.10	814/ 1.40	1348/ 2.32	815/ 1.40	107/ 0.18	1/ 0.00	/	3145/ 5.41	5.79527
NNW	91.6/ 0.16	1243/ 2.14	1570/ 2.70	873/ 1.50	123/ 0.21	2/ 0.00	/	3903/ 6.71	5.37719
TOTAL	1768/ 3.04	23996/41.26	23398/40.23	7848/13.49	1075/ 1.85	77/ 0.13	1/ 0.00	58163/ 100	4.55808

NUMBER OF BAD RECORDS: 3205

TABLE A-14

Joint Wind Frequency Distribution By Pasquill Stability Classes At SHNPP

Period of Record: 1/1/76 - 12/31/82
Upper Monitoring Level

SITE=SHNP PERIOD=76-82 STAB=A

UPWNDDEG	UPWNDSPD CALM	.75-3.5	3.5-7.5	7.5-12.5	12.5-18.5	18.5-25	>= 25	TOTAL	AVERAGE UPWNDSPD
N	0.1/ 0.00	3/ 0.01	97/ 0.16	193/ 0.33	79/ 0.13	2/ 0.00	/	374.1/ 0.64	9.79160
NNE	0.2/ 0.00	4/ 0.01	97/ 0.16	174/ 0.30	87/ 0.15	1/ 0.00	/	363.2/ 0.62	9.90464
NE	0.1/ 0.00	3/ 0.01	48/ 0.08	123/ 0.21	35/ 0.06	4/ 0.01	/	213.1/ 0.36	9.87411
ENE	0.2/ 0.00	5/ 0.01	40/ 0.07	68/ 0.12	7/ 0.01	/	/	120.2/ 0.20	8.39030
E	0.1/ 0.00	3/ 0.01	39/ 0.07	32/ 0.05	4/ 0.01	/	/	78.1/ 0.13	7.29610
ESE	0.3/ 0.00	7/ 0.01	40/ 0.07	21/ 0.04	4/ 0.01	/	/	72.3/ 0.12	6.59426
SE	0.1/ 0.00	3/ 0.01	22/ 0.04	10/ 0.02	4/ 0.01	1/ 0.00	/	40.1/ 0.07	7.29408
SSE	0.3/ 0.00	7/ 0.01	48/ 0.08	22/ 0.04	5/ 0.01	/	/	82.3/ 0.14	7.07660
S	0.2/ 0.00	5/ 0.01	55/ 0.09	62/ 0.11	28/ 0.05	4/ 0.01	1/ 0.00	155.2/ 0.26	9.31049
SSW	0.1/ 0.00	3/ 0.01	73/ 0.12	153/ 0.26	118/ 0.20	15/ 0.03	1/ 0.00	363.1/ 0.62	11.21632
SW	0.2/ 0.00	6/ 0.01	88/ 0.15	198/ 0.34	154/ 0.26	44/ 0.07	9/ 0.02	499.2/ 0.85	11.96250
WSW	0.2/ 0.00	6/ 0.01	61/ 0.10	176/ 0.30	87/ 0.15	38/ 0.06	12/ 0.02	380.2/ 0.65	11.97532
W	0.2/ 0.00	4/ 0.01	54/ 0.09	74/ 0.13	42/ 0.07	11/ 0.02	5/ 0.01	190.2/ 0.32	10.82260
WNW	0.3/ 0.00	7/ 0.01	45/ 0.08	126/ 0.21	115/ 0.20	28/ 0.05	12/ 0.02	333.3/ 0.57	12.78223
NW	0.2/ 0.00	5/ 0.01	70/ 0.12	148/ 0.25	132/ 0.22	17/ 0.03	1/ 0.00	373.2/ 0.63	11.44957
NNW	0.1/ 0.00	2/ 0.00	84/ 0.14	148/ 0.25	95/ 0.16	13/ 0.02	/	342.1/ 0.58	10.71436
TOTAL	3.0/ 0.01	73/ 0.12	961/ 1.63	1728/ 2.94	996/ 1.69	178/ 0.30	41/ 0.07	3980/ 6.77	10.70202

NUMBER OF BAD RECORDS: 92

TABLE A-14 (Con't)

Joint Wind Frequency Distribution By Pasquill Stability Classes At SHNPP

Period of Record: 1/1/76 - 12/31/82
Upper Monitoring Level

SITE=SHNP PERIOD=76-82 STAB=B

UPWNDDEG	UPWNDSPD CALM	.75-3.5	3.5-7.5	7.5-12.5	12.5-18.5	18.5-25	>= 25	TOTAL	AVERAGE UPWNDSPD
N	/	10/ 0.02	82/ 0.14	108/ 0.18	38/ 0.06	4/ 0.01	/	242.0/ 0.41	9.03918
NNE	/	4/ 0.01	61/ 0.10	101/ 0.17	38/ 0.06	/	/	204.0/ 0.35	9.23074
NE	/	6/ 0.01	62/ 0.11	87/ 0.15	21/ 0.04	1/ 0.00	/	177.0/ 0.30	8.56576
ENE	/	5/ 0.01	57/ 0.10	54/ 0.09	4/ 0.01	/	/	120.0/ 0.20	7.63224
E	/	5/ 0.01	51/ 0.09	39/ 0.07	1/ 0.00	/	/	96.0/ 0.16	7.09442
ESE	/	9/ 0.02	42/ 0.07	18/ 0.03	2/ 0.00	/	/	71.0/ 0.12	6.44798
SE	/	5/ 0.01	28/ 0.05	18/ 0.03	1/ 0.00	/	/	52.0/ 0.09	6.82994
SSE	/	8/ 0.01	42/ 0.07	34/ 0.06	3/ 0.01	1/ 0.00	/	88.0/ 0.15	7.32428
S	/	2/ 0.00	53/ 0.09	72/ 0.12	25/ 0.04	3/ 0.01	/	155.0/ 0.26	9.32091
SSW	/	6/ 0.01	74/ 0.13	102/ 0.17	44/ 0.07	11/ 0.02	2/ 0.00	239.0/ 0.41	10.01421
SW	/	8/ 0.01	91/ 0.15	128/ 0.22	62/ 0.11	18/ 0.03	2/ 0.00	309.0/ 0.53	10.19455
WSW	/	9/ 0.02	60/ 0.10	138/ 0.23	56/ 0.10	14/ 0.02	6/ 0.01	283.0/ 0.48	10.65406
W	/	2/ 0.00	40/ 0.07	44/ 0.07	32/ 0.05	20/ 0.03	2/ 0.00	140.0/ 0.24	11.57018
WNW	/	6/ 0.01	51/ 0.09	83/ 0.14	63/ 0.11	26/ 0.04	5/ 0.01	234.0/ 0.40	11.92320
NW	/	7/ 0.01	51/ 0.09	109/ 0.19	67/ 0.11	10/ 0.02	1/ 0.00	245.0/ 0.42	10.67025
NNW	/	7/ 0.01	62/ 0.11	91/ 0.15	49/ 0.08	12/ 0.02	/	221.0/ 0.38	10.17149
TOTAL	/	99/ 0.17	907/ 1.54	1226/ 2.08	506/ 0.86	120/ 0.20	18/ 0.03	2876/ 4.89	9.70669

NUMBER OF BAD RECORDS: 40

TABLE A-14 (con't)

Joint Wind Frequency Distribution By Pasquill Stability Classes At SHNPP

Period of Record: 1/1/76 - 12/31/82
Upper Monitoring Level

SITE=SHNP PERIOD=76-82 STAB=C

UPWNDDEG	UPWNDSPD CALM	.75-3.5	3.5-7.5	7.5-12.5	12.5-18.5	18.5-25	>= 25	TOTAL	AVERAGE UPWNDSPD
N	/	15/ 0.03	121/ 0.21	116/ 0.20	49/ 0.08	10/ 0.02	/	311.0/ 0.53	8.86140
NNE	/	6/ 0.01	97/ 0.16	110/ 0.19	34/ 0.06	2/ 0.00	/	249.0/ 0.42	8.63621
NE	/	11/ 0.02	79/ 0.13	88/ 0.15	18/ 0.03	1/ 0.00	/	197.0/ 0.33	8.06577
ENE	/	7/ 0.01	82/ 0.14	64/ 0.11	6/ 0.01	/	1/ 0.00	160.0/ 0.27	7.65579
E	/	6/ 0.01	66/ 0.11	38/ 0.06	/	/	/	110.0/ 0.19	6.62648
ESE	/	12/ 0.02	54/ 0.09	19/ 0.03	2/ 0.00	/	/	87.0/ 0.15	6.10751
SE	/	5/ 0.01	51/ 0.09	21/ 0.04	/	/	/	77.0/ 0.13	6.23600
SSE	/	10/ 0.02	58/ 0.10	44/ 0.07	5/ 0.01	1/ 0.00	/	118.0/ 0.20	7.17349
S	/	13/ 0.02	91/ 0.15	76/ 0.13	15/ 0.03	3/ 0.01	/	198.0/ 0.34	7.76472
SSW	/	16/ 0.03	96/ 0.16	99/ 0.17	62/ 0.11	12/ 0.02	2/ 0.00	287.0/ 0.49	9.66680
SW	/	19/ 0.03	112/ 0.19	126/ 0.21	67/ 0.11	19/ 0.03	4/ 0.01	347.0/ 0.59	9.83956
WSW	/	19/ 0.03	109/ 0.19	136/ 0.23	51/ 0.09	14/ 0.02	3/ 0.01	332.0/ 0.56	9.34572
W	/	7/ 0.01	70/ 0.12	80/ 0.14	32/ 0.05	14/ 0.02	3/ 0.01	206.0/ 0.35	9.93621
WNW	/	12/ 0.02	58/ 0.10	76/ 0.13	44/ 0.07	22/ 0.04	4/ 0.01	216.0/ 0.37	10.92737
NW	/	13/ 0.02	82/ 0.14	118/ 0.20	69/ 0.12	6/ 0.01	2/ 0.00	290.0/ 0.49	9.85923
NNW	/	8/ 0.01	86/ 0.15	99/ 0.17	52/ 0.09	10/ 0.02	/	255.0/ 0.43	9.56059
TOTAL	/	179/ 0.30	1312/ 2.23	1310/ 2.23	506/ 0.86	114/ 0.19	19/ 0.03	3440/ 5.85	8.96520

NUMBER OF BAD RECORDS: 40

TABLE A-1[illegible] (con't)

Joint Wind Frequency Distribution By Pasquill Stability Classes At SHNPP

Period of Record: 1/1/76 - 12/31/82
Upper Monitoring Level

SITE=SHNP PERIOD=76-82 STAB=D

UPWNDDEG	UPWNDSPD CALM	.75-3.5	3.5-7.5	7.5-12.5	12.5-18.5	18.5-25	>= 25	TOTAL	AVERAGE UPWNDSPD
N	0.4/ 0.00	83/ 0.14	446/ 0.76	634/ 1.08	249/ 0.42	49/ 0.08	5/ 0.01	1466/ 2.49	9.40292
NNE	0.4/ 0.00	84/ 0.14	458/ 0.78	845/ 1.44	335/ 0.57	43/ 0.07	3/ 0.01	1768/ 3.01	9.64191
NE	0.4/ 0.00	86/ 0.15	367/ 0.62	540/ 0.92	187/ 0.32	5/ 0.01	/	1185/ 2.01	8.78455
ENE	0.4/ 0.00	84/ 0.14	339/ 0.58	422/ 0.72	79/ 0.13	5/ 0.01	/	929.4/ 1.58	7.96378
E	0.4/ 0.00	83/ 0.14	342/ 0.58	252/ 0.43	31/ 0.05	2/ 0.00	1/ 0.00	711.4/ 1.21	7.06800
ESE	0.4/ 0.00	89/ 0.15	289/ 0.49	158/ 0.27	24/ 0.04	1/ 0.00	1/ 0.00	562.4/ 0.96	6.53816
SE	0.3/ 0.00	64/ 0.11	277/ 0.47	171/ 0.29	37/ 0.06	7/ 0.01	/	556.3/ 0.95	7.20827
SSE	0.3/ 0.00	59/ 0.10	301/ 0.51	246/ 0.42	142/ 0.24	27/ 0.05	9/ 0.02	784.3/ 1.33	9.07411
S	0.4/ 0.00	77/ 0.13	325/ 0.55	389/ 0.66	158/ 0.27	43/ 0.07	5/ 0.01	997.4/ 1.70	9.26032
SSW	0.4/ 0.00	91/ 0.15	384/ 0.65	440/ 0.75	286/ 0.49	96/ 0.16	10/ 0.02	1307/ 2.22	10.12253
SW	0.5/ 0.00	107/ 0.18	483/ 0.82	503/ 0.85	263/ 0.45	85/ 0.14	25/ 0.04	1467/ 2.49	9.82418
WSW	0.4/ 0.00	86/ 0.15	404/ 0.69	452/ 0.77	164/ 0.28	35/ 0.06	19/ 0.03	1160/ 1.97	9.12122
W	0.4/ 0.00	90/ 0.15	264/ 0.45	253/ 0.43	111/ 0.19	35/ 0.06	2/ 0.00	755.4/ 1.28	8.65063
WNW	0.3/ 0.00	64/ 0.11	224/ 0.38	258/ 0.44	180/ 0.31	82/ 0.14	9/ 0.02	817.3/ 1.39	10.50333
NW	0.3/ 0.00	62/ 0.11	262/ 0.45	361/ 0.61	263/ 0.45	30/ 0.05	3/ 0.01	981.3/ 1.67	10.04301
NNW	0.3/ 0.00	74/ 0.13	348/ 0.59	411/ 0.70	227/ 0.39	41/ 0.07	/	1101/ 1.87	9.41321
TOTAL	6.0/ 0.01	1283/ 2.18	5513/ 9.37	6335/10.77	2736/ 4.65	586/ 1.00	92/ 0.16	16551/28.13	9.14077

NUMBER OF BAD RECORDS: 545

TABLE A-14 (con't)

Joint Wind Frequency Distribution By Pasquill Stability Classes At SHNPP

Period of Record: 1/1/76 - 12/31/82
Upper Monitoring Level

SITE=SHNP PERIOD=76-82 STAB=E

UPWNDDEG	UPWNDSPD CALM	.75-3.5	3.5-7.5	7.5-12.5	12.5-18.5	18.5-25	>= 25	TOTAL	AVERAGE UPWNDSPD
N	0.9/ 0.00	34/ 0.06	162/ 0.28	517/ 0.88	188/ 0.32	16/ 0.03	2/ 0.00	919.9/ 1.56	10.08484
NNE	0.8/ 0.00	31/ 0.05	179/ 0.30	562/ 0.96	144/ 0.24	5/ 0.01	/	921.8/ 1.57	9.66397
NE	0.9/ 0.00	37/ 0.06	189/ 0.32	470/ 0.80	100/ 0.17	/	/	796.9/ 1.35	9.02405
ENE	0.8/ 0.00	31/ 0.05	193/ 0.33	311/ 0.53	39/ 0.07	5/ 0.01	/	579.8/ 0.99	8.42588
E	0.9/ 0.00	37/ 0.06	247/ 0.42	274/ 0.47	43/ 0.07	/	/	601.9/ 1.02	7.87046
ESE	0.9/ 0.00	34/ 0.06	226/ 0.38	229/ 0.39	20/ 0.03	1/ 0.00	/	510.9/ 0.87	7.59238
SE	0.9/ 0.00	37/ 0.06	179/ 0.30	240/ 0.41	34/ 0.06	7/ 0.01	/	497.9/ 0.85	8.24473
SSE	0.9/ 0.00	34/ 0.06	257/ 0.44	455/ 0.77	113/ 0.19	11/ 0.02	4/ 0.01	874.9/ 1.49	9.12464
S	1.1/ 0.00	42/ 0.07	316/ 0.54	765/ 1.30	256/ 0.44	19/ 0.03	5/ 0.01	1404/ 2.39	9.75685
SSW	1.0/ 0.00	39/ 0.07	339/ 0.58	1116/ 1.90	396/ 0.67	36/ 0.06	4/ 0.01	1931/ 3.28	10.23663
SW	1.4/ 0.00	54/ 0.09	358/ 0.61	675/ 1.15	264/ 0.45	29/ 0.05	10/ 0.02	1391/ 2.37	9.77155
WSW	1.3/ 0.00	52/ 0.09	269/ 0.46	421/ 0.72	153/ 0.26	30/ 0.05	6/ 0.01	932.3/ 1.58	9.44024
W	1.2/ 0.00	47/ 0.08	156/ 0.27	282/ 0.48	117/ 0.20	10/ 0.02	/	613.2/ 1.04	9.26029
WNW	0.9/ 0.00	34/ 0.06	136/ 0.23	283/ 0.48	136/ 0.23	8/ 0.01	/	597.9/ 1.02	9.69007
NW	1.1/ 0.00	42/ 0.07	147/ 0.25	396/ 0.67	104/ 0.18	5/ 0.01	1/ 0.00	696.1/ 1.18	9.34272
NNW	1.2/ 0.00	46/ 0.08	168/ 0.29	383/ 0.65	121/ 0.21	10/ 0.02	/	729.2/ 1.24	9.34068
TOTAL	16.0/ 0.03	631/ 1.07	3521/ 5.98	7379/12.54	2228/ 3.79	192/ 0.33	32/ 0.05	13999/23.79	9.40187

NUMBER OF BAD RECORDS: 294

TABLE A-14 (con't)

Joint Wind Frequency Distribution By Pasquill Stability Classes At SHNPP

Period of Record: 1/1/76 - 12/31/82
Upper Monitoring Level

SITE=SHNP PERIOD=76-82 STAB=F

UPWNDDEG	UPWNDSPD CALM	.75-3.5	3.5-7.5	7.5-12.5	12.5-18.5	18.5-25	>= 25	TOTAL	AVERAGE UPWNDSPD
N	0.3/ 0.00	23/ 0.04	97/ 0.16	244/ 0.41	106/ 0.18	/	/	470.3/ 0.80	9.73708
NNE	0.2/ 0.00	20/ 0.03	102/ 0.17	275/ 0.47	60/ 0.10	/	/	457.2/ 0.78	9.25777
NE	0.3/ 0.00	26/ 0.04	90/ 0.15	238/ 0.40	44/ 0.07	/	/	398.3/ 0.68	8.88562
ENE	0.1/ 0.00	11/ 0.02	87/ 0.15	197/ 0.33	38/ 0.06	/	/	333.1/ 0.57	9.15721
E	0.3/ 0.00	27/ 0.05	110/ 0.19	222/ 0.38	28/ 0.05	/	/	387.3/ 0.66	8.40405
ESE	0.2/ 0.00	18/ 0.03	117/ 0.20	164/ 0.28	13/ 0.02	/	/	312.2/ 0.53	7.85143
SE	0.2/ 0.00	17/ 0.03	91/ 0.15	129/ 0.22	10/ 0.02	/	/	247.2/ 0.42	7.80228
SSE	0.2/ 0.00	19/ 0.03	122/ 0.21	250/ 0.42	16/ 0.03	/	/	407.2/ 0.69	8.47781
S	0.3/ 0.00	23/ 0.04	162/ 0.28	364/ 0.62	80/ 0.14	/	/	629.3/ 1.07	9.09853
SSW	0.3/ 0.00	23/ 0.04	183/ 0.31	542/ 0.92	136/ 0.23	1/ 0.00	/	885.3/ 1.50	9.56335
SW	0.4/ 0.00	30/ 0.05	162/ 0.28	475/ 0.81	77/ 0.13	1/ 0.00	/	745.4/ 1.27	8.96657
WSW	0.2/ 0.00	18/ 0.03	152/ 0.26	263/ 0.45	56/ 0.10	/	/	489.2/ 0.83	8.67930
W	0.3/ 0.00	23/ 0.04	98/ 0.17	169/ 0.29	47/ 0.08	/	/	337.3/ 0.57	8.73815
WNW	0.2/ 0.00	13/ 0.02	88/ 0.15	135/ 0.23	38/ 0.06	/	/	274.2/ 0.47	8.82143
NW	0.3/ 0.00	23/ 0.04	93/ 0.16	122/ 0.21	23/ 0.04	/	/	261.3/ 0.44	7.93131
NNW	0.3/ 0.00	28/ 0.05	87/ 0.15	198/ 0.34	51/ 0.09	/	/	364.3/ 0.62	8.87930
TOTAL	4.0/ 0.01	342/ 0.58	1841/ 3.13	3987/ 6.78	823/ 1.40	2/ 0.00	/	6999/11.90	8.89892

NUMBER OF BAD RECORDS: 101

TABLE A-14 (con't)

Joint Wind Frequency Distribution By Pasquill Stability Classes At SHNPP

Period of Record: 1/1/76 - 12/31/82
Upper Monitoring Level

SITE=SHNP PERIOD=76-82 STAB=G

UPWNDDEG	UPWNDSPD CALM	.75-3.5	3.5-7.5	7.5-12.5	12.5-18.5	18.5-25	>= 25	TOTAL	AVERAGE UPWNDSPD
N	1.6/ 0.00	64/ 0.11	215/ 0.37	255/ 0.43	40/ 0.07	/	/	575.6/ 0.98	7.60577
NNE	1.6/ 0.00	64/ 0.11	204/ 0.35	261/ 0.44	38/ 0.06	/	/	568.6/ 0.97	7.63306
NE	1.7/ 0.00	68/ 0.12	205/ 0.35	269/ 0.46	35/ 0.06	/	/	578.7/ 0.98	7.52196
ENE	1.8/ 0.00	71/ 0.12	186/ 0.32	194/ 0.33	50/ 0.08	/	/	502.8/ 0.85	7.59674
E	1.4/ 0.00	55/ 0.09	158/ 0.27	222/ 0.38	33/ 0.06	/	/	469.4/ 0.80	7.69111
ESE	1.8/ 0.00	71/ 0.12	171/ 0.29	190/ 0.32	12/ 0.02	/	/	445.8/ 0.76	7.01274
SE	2.0/ 0.00	81/ 0.14	197/ 0.33	205/ 0.35	14/ 0.02	/	/	499.0/ 0.85	7.03215
SSE	1.5/ 0.00	60/ 0.10	239/ 0.41	279/ 0.47	11/ 0.02	/	/	590.5/ 1.00	7.35847
S	1.7/ 0.00	68/ 0.12	278/ 0.47	342/ 0.58	41/ 0.07	/	/	730.7/ 1.24	7.75476
SSW	2.2/ 0.00	87/ 0.15	360/ 0.61	623/ 1.06	63/ 0.11	/	/	1135/ 1.93	8.11301
SW	2.3/ 0.00	90/ 0.15	397/ 0.67	582/ 0.99	32/ 0.05	/	/	1103/ 1.88	7.75107
WSW	2.4/ 0.00	94/ 0.16	490/ 0.83	594/ 1.01	72/ 0.12	/	/	1252/ 2.13	7.80968
W	2.3/ 0.00	91/ 0.15	323/ 0.55	303/ 0.52	26/ 0.04	/	/	745.3/ 1.27	6.99721
WNW	2.4/ 0.00	97/ 0.16	263/ 0.45	202/ 0.34	22/ 0.04	/	/	586.4/ 1.00	6.70545
NW	2.2/ 0.00	88/ 0.15	324/ 0.55	160/ 0.27	6/ 0.01	/	/	580.2/ 0.99	6.16247
NNW	2.1/ 0.00	84/ 0.14	259/ 0.44	247/ 0.42	31/ 0.05	/	/	623.1/ 1.06	7.15439
TOTAL	31.0/ 0.05	1233/ 2.10	4269/ 7.26	4928/ 8.38	526/ 0.89	/	/	10987/18.68	7.45160

NUMBER OF BAD RECORDS: 183

TABLE A-14 (Con't)

Joint Wind Frequency Distribution By Pasquill Stability Classes At SHNPP

Period of Record: 1/1/76 - 12/31/82
Upper Monitoring Level

SITE=SHNP PERIOD=76-82 SUMMARY OVER ALL STAB

UPWNDDEG	UPWNDSPD CALM	.75-3.5	3.5-7.5	7.5-12.5	12.5-18.5	18.5-25	>= 25	TOTAL	AVERAGE UPWNDSPD
N	3.6/ 0.01	232/ 0.39	1220/ 2.07	2067/ 3.51	749/ 1.27	81/ 0.14	7/ 0.01	4360/ 7.41	9.31995
NNE	3.3/ 0.01	213/ 0.36	1198/ 2.04	2328/ 3.96	736/ 1.25	51/ 0.09	3/ 0.01	4532/ 7.70	9.30314
NE	3.7/ 0.01	237/ 0.40	1040/ 1.77	1815/ 3.09	440/ 0.75	11/ 0.02	/	3547/ 6.03	8.65805
ENE	3.3/ 0.01	214/ 0.36	984/ 1.67	1310/ 2.23	223/ 0.38	10/ 0.02	1/ 0.00	2745/ 4.67	8.12592
E	3.4/ 0.01	216/ 0.37	1013/ 1.72	1079/ 1.83	140/ 0.24	2/ 0.00	1/ 0.00	2454/ 4.17	7.58352
ESE	3.8/ 0.01	240/ 0.41	939/ 1.60	799/ 1.36	77/ 0.13	2/ 0.00	1/ 0.00	2062/ 3.50	7.08213
SE	3.3/ 0.01	212/ 0.36	845/ 1.44	794/ 1.35	100/ 0.17	15/ 0.03	/	1969/ 3.35	7.45496
SSE	3.1/ 0.01	197/ 0.33	1067/ 1.81	1330/ 2.26	295/ 0.50	40/ 0.07	13/ 0.02	2945/ 5.01	8.47917
S	3.6/ 0.01	230/ 0.39	1280/ 2.18	2070/ 3.52	603/ 1.02	72/ 0.12	11/ 0.02	4270/ 7.26	9.07728
SSW	4.1/ 0.01	265/ 0.45	1509/ 2.56	3075/ 5.23	1105/ 1.88	171/ 0.29	19/ 0.03	6148/10.45	9.74608
SW	4.9/ 0.01	314/ 0.53	1691/ 2.87	2687/ 4.57	919/ 1.56	196/ 0.33	50/ 0.08	5862/ 9.96	9.51517
WSW	4.4/ 0.01	284/ 0.48	1545/ 2.63	2180/ 3.71	639/ 1.09	131/ 0.22	46/ 0.08	4829/ 8.21	9.12842
W	4.1/ 0.01	264/ 0.45	1005/ 1.71	1205/ 2.05	407/ 0.69	90/ 0.15	12/ 0.02	2987/ 5.08	8.73836
WNW	3.6/ 0.01	233/ 0.40	865/ 1.47	1163/ 1.98	598/ 1.02	166/ 0.28	30/ 0.05	3059/ 5.20	9.85444
NW	3.8/ 0.01	240/ 0.41	1029/ 1.75	1414/ 2.40	664/ 1.13	68/ 0.12	8/ 0.01	3427/ 5.82	9.26642
NNW	3.9/ 0.01	249/ 0.42	1094/ 1.86	1577/ 2.68	626/ 1.06	86/ 0.15	/	3636/ 6.18	9.13737
TOTAL	60.0/ 0.10	3840/ 6.53	18324/31.15	26893/45.71	8321/14.14	1192/ 2.03	202/ 0.34	58832/ 100	8.98214

NUMBER OF BAD RECORDS: 2536

TABLE A-15

SHEARON HARRIS PLANT SITE INFORMATION TO BE USED
FOR GROUND LEVEL CALCULATIONS WITH NRC "XOQDOQ" PROGRAM

Card Type	Columns	Description	Value to be Used in XOQDOQ
1	1	Print Input Data	1
	38	Calculate Annual X/Qs for Points of Interest	1
	39	Calculate Annual X/Q Averages for Site Radial Segments	1
	41	Print Out Set Distance X/Qs and D/Qs	1
	55	Calculate Annual D/Q Averages for the Set Radial Segments	1
	56	Allow Depleted X/Qs (If Decays (1), (2), or (3) is Negative)	1
	58	Calculate Annual D/Qs for Points of Interest	1
2	1-80	Title Card	N/A
3	1-5	Number of Wind Velocity Categories	7
	6-10	Number of Stability Categories	7
	11-15	Number of Distances within Terrain Data for Each Sector	5
	16-20	Total Number of Hours in Joint Wind Frequency Distribution	(1)
	21-25	Increment in % for which Plotted Results are to be Plotted	5
	26-30	Number of Titles of Receptor Types	5
	31-35	Number of Release Exit Locations	3
4	1-5	Height of the Measured Wind	11
	6-20	Half-Life (days) Used in the X/Q Calculations	101.00 226 -8.00
5	N/A	N/A	--
6	1-80	Joint Wind Frequency Distribution	(1)

TABLE A-1 (Continued)

Card Type	Columns	Description	Value to be Used in XOQDOQ
7	1-5	Wind Velocity Units Correction	200.
	6-75	Maximim Wind Speed in Each Wind Class (m/sec)	0.75 3.50 7.50 12.50 18.50 25.00 26.00
8	1-80	Distance in Meters at which Teerain Heights are Givin	(2)
9	1-80	Terrain Heights (In Meters, Above Plant Grade) Corresponding to Distances on Card Type 8	(2)
10	1-25	Number of Receptor Locations for a Particular Receptor Type	Site Boundary - 16 Dairy - 1 Meat - 14 Residence - 16 Garden - 16
11	1-16	Title Of Receptor Type for Receptor Locations	Site Boundary Dairy Meat Residence Garden
12	1-80	Receptor Direction and Distance	(See Table 1)
13	1-80	Title for Release Point whose Characteristics are Described on Card Type 14	(1)
14	1-5	Vent Average Velocity (m/sec)	20.1
	6-10	Vent Inside Diameter (m)	1.0
	11-15	Height of Vent Release Point (m)	0.000
	16-20	Height of the Vent's Building (m)	59.0
	21-25	Minimum Cross-Sectional Area for the Vent's Buiding (m^2)	1370.0
	31-35	Vent Heat Emission Rate (cal/sec)	11. 0.

TABLE A-[illegible] (Continued)

Card Type	Columns	Description	Value to be Used in XOQDOQ
15	1	Identification for Release Point	A
	2-5	Intermittent Releases	1
	6-10	Number of Intermittent Releases Per Year for the Release Point	100
	11-15	Average Number of Hours Per Intermittent Release	1

(1) Appropriate Data to be Supplied

(2) Obtained from Cross-Sectional Topographic Maps

APPENDIX B

DOSE PARAMETERS FOR RADIOIODINES, PARTICULATES, AND TRITIUM

This appendix contains the methodology which was used to calculate the dose parameters for radioiodines, particulates, and tritium to show compliance with 10CFR20 and Appendix I of 10CFR50 for gaseous effluents. These dose parameters, P_i and R_i, were calculated using the methodology outlined in NUREG 0133 along with Regulatory Guide 1.109, Revision 1. The following sections provide the specific methodology which was utilized in calculating the P_i and R_i values for the various exposure pathways.

B.1 Calculation of P_i

The dose parameter, P_i, contained in the radioiodine and particulates portion of Section 3.2 includes pathway transport parameters of the "i" radionuclide, the receptor's usage of the pathway media, and the dosimetry of the exposure. Pathway usage rates and the internal dosimetry are functions of the receptor's age; however, the youngest age group, the infant, will always receive the maximum dose under the exposure conditions for Technical Specification 3.11.2.1b. For the infant exposure, separate values of P_i may be calculated for the inhalation pathway which is combined with a W parameter based on (X/Q) and the food (milk) and ground pathway which is combined with a W parameter normally based on (D/Q) except for tritium. The following sections provide in detail the methodology which was used in calculating the P_i values for inclusion into this ODCM.

B.1.1 Inhalation Pathway

The evaluation of this pathway consists of estimating the maximum dose to the most critical organ received by an infant through inhalation by:

$$P_{i_I} = K'(BR)\, DFA_i \qquad (B.1\text{-}1)$$

where:

P_{i_I} = Dose parameter for radionuclide "i" for the inhalation pathway, mrem/yr per $\mu Ci/m^3$;

K' = A constant of unit conversion;
= 10^6 pCi/μCi;

BR = The breathing rate of the infant age group, m^3/yr;

DFA_i = The maximum organ inhalation dose factor for the infant age group for radionuclide "i," mrem/pCi.

The age group considered is the infant group. The infant's breathing rate is taken as 1400 m^3/yr from Table E-5 of Regulatory Guide 1.109, Revision 1. The inhalation dose factors for the infant, DFA_i, are presented in Table E-10 of Regulatory Guide 1.109 in units of mrem/pCi. The total body is considered as an organ in the selection of DFA_i.

The incorporation of breathing rate of an infant and the unit conversion factor results in the following equation:

$$P_{i_I} = 1.4 \times 10^9 \, DFA_i \qquad (B.1\text{-}2)$$

B.1.2 Ground Plane Pathway

The dose factor from ground plane pathway is calculated by:

$$P_{i_G} = K'K''DFG_i \, (1-e^{-\lambda_i t})/\lambda_i \qquad (B.1\text{-}3)$$

where:

P_{i_G} = Dose parameter for radionuclide "i" for the ground plane pathway, mrem/yr per μCi/sec per m^{-2};

K' = A constant of unit conversion;
= 10^6 pCi/μCi;

K'' = A constant of unit conversion;
= 8760 hr/yr;

λ_i = The radiological decay constant for radionuclide "i," sec^{-1};

t = The exposure period;
= 3.15×10^7 sec (1 year);

DFG_i = The ground plane dose conversion factor for radionuclide "i," mrem/hr per pCi/m^2.

The deposition rate onto the ground plane results in a ground plane concentration that is assumed to persist over a year with radiological decay--the only operating removal mechanism for each radionuclide. The ground plane dose conversion factors for radionuclide "i," DFG_i, are presented in Table E-6 of Regulatory Guide 1.109, Revision 1.

Resolution of the units yields:

$$P_{i_G} = 8.76 \times 10^9 \, DFG_i \, (1-e^{-\lambda_i t})/\lambda_i \qquad \text{(B.1-4)}$$

B.1.3 Milk

The dose factor from the cow/goat-milk-man pathway is calculated by:

$$P_{i_M} = \frac{K'r \, Q_F \, (U_{ap}) \, F_m}{Y_p \, (\lambda_i + \lambda_w)} \, DFL_i \, e^{-\lambda_i t_f} \qquad \text{(B.1-5)}$$

where:

P_{i_M} = Dose parameter for radionuclide "i" for the cow milk or goat milk pathway, mrem/yr per $\mu Ci/sec$ per m^{-2};

K' = A constant of unit conversion;
= 10^6 $pCi/\mu Ci$;

Q_F = The cow's or goat's consumption rate of feed, kg/day (wet weight);

U_{ap} = The infant's milk consumption rate, liters/yr;

Y_p = The agricultural productivity by unit area, kg/m^2;

F_m = The stable element transfer coefficient, pCi/liter per pCi/day;

r = Fraction of deposited activity retained on cow's or goat's feed grass;

DFL_i = The maximum organ ingestion dose factor for radionuclide "i," mrem/pCi;

λ_i = The radiological decay constant for radionuclide "i," sec^{-1};

λ_w = The decay constant for removal of activity on leaf and plant surfaces by weathering, sec^{-1};

= 5.73×10^{-7} sec^{-1} (corresponding to a 14-day half-life);

t_f = The transport time from pasture cow or goat to milk to infant, sec.

A fraction of the airborne deposition is captured by the ground plane vegetation cover. The captured material is removed from the vegetation (grass) by both radiological decay and weathering processes.

Various parameters which were utilized to determine the P_i values for the cow and goat milk pathways are provided in Table B-1. Table E-1 of Regulatory Guide 1.109, Revision 1, provides the stable element transfer coefficients, F_m; and Table E-14 of the same regulatory guide provides the ingestion dose factors, DFL_i, for the infant's organs. The organ with the maximum value of DFL_i was used in the determination of P_i for this pathway. The incorporation of the various constants of Table B-1 into Equation B.1-5 results in the following:

For radioiodines and particulates from cow's milk:

$$P_{i_M} = 2.4 \times 10^{10} \frac{rF_m}{\lambda_i + \lambda_w} DFL_i \, e^{-\lambda_i t_f} \qquad \text{(B.1-6)}$$

For radioiodines and particulates from goat's milk pathway:

$$P_{i_M} = 2.8 \times 10^{9} \frac{rF_m}{\lambda_i + \lambda_w} DFL_i \, e^{-\lambda_i t_f} \qquad \text{(B.1-7)}$$

The concentration of tritium in milk is based on its airborne concentration rather than the depostion rate and is calculated by:

$$P_{T_M} = K'K'''F_m Q_F U_{ap} DFL_T \, 0.75(0.5/H) \qquad \text{(B.1-8)}$$

where:

P_{T_M} = Dose parameter for tritium for the cow milk and goat milk pathways, mrem/yr per $\mu Ci/m^3$;

K''' = A constant of unit conversion;
= 10^3 gm/kg;

H = Absolute humidity of the atmosphere, gm/m^3;

0.75 = The fraction of total feed that is water;

0.5 = The ratio of the specific activity of the feed grass water to the atmospheric water;

DFL_T = Maximum organ ingestion dose factor for tritium, mrem/pCi.

B.2 Calculation of R_i

The radioiodine and particulate Technical Specification 3.11.2.3 is applicable to the location in the unrestricted area where the combination of existing pathways and receptor age groups indicates that the maximum potential exposure occurs. The inhalation and ground plane exposure pathways shall be considered to exist at all locations. The grass-goat-milk, the grass-cow-milk, grass-cow-meat, and vegetation pathways are considered based on their existence at the various locations. R_i values have been calculated for the adult, teen, child, and infant age groups for the ground plane, cow milk, goat milk, vegetable, and beef ingestion pathways. The methodology which was utilized to calculate these values is presented below.

B.2.1 Inhalation Pathway

The dose factor from the inhalation pathway is calculated by:

$$R_{i_I} = K' (BR)_a (DFA_i)_a \qquad (B.2\text{-}1)$$

where:

R_{i_I} = Dose factor for each identified radionuclide "i" of the organ of interest, mrem/yr per $\mu Ci/m^3$;

K' = A constant of unit conversion;
= 10^6 pCi/μCi;

$(BR)_a$ = Breathing rate of the receptor of age group a, m^3/yr;

$(DFA_i)_a$ = Organ inhalation dose factor for radionuclide "i" for the receptor of age group a, mrem/pCi.

The breathing rates $(BR)_a$ for the various age groups are tabulated below, as given in Table E-5 of Regulatory Guide 1.109, Revision 1.

Age Group (a)	Breathing Rate (m^3/yr)
Infant	1400
Child	3700
Teen	8000
Adult	8000

Inhalation dose factors $(DFA_i)_a$ for the various age groups are given in Tables E-7 through E-10 of Regulatory Guide 1.109, Revision 1.

B.2.2 Ground Plane Pathway

The ground plane pathway dose factor is calculated by:

$$R_{i_G} = I_i \, K'K''(SF)DFG_i \, (1-e^{-\lambda_i t})/\lambda_i \qquad (B.2\text{-}2)$$

where:

R_{i_G} = Dose factor for the ground plane pathway for each identified radionuclide "i" for the organ of interest, mrem/yr per μCi/sec per m^{-2};

K' = A constant of unit conversion;
= 10^6 pCi/μCi;

K'' = A constant of unit conversion;
= 8760 hr/year;

λ_i = The radiological decay constant for radionuclide "i," sec^{-1};

t = The exposure time, sec;
= 4.73×10^8 sec (15 years);

DFG_i = The ground plane dose conversion factor for radionuclide "i;" mrem/hr per pCi/m^2;

A tabulation of DFG_i values is presented in Table E-6 of Regulatory Guide 1.109, Revision 1.

SF = The shielding factor (dimensionless);

A shielding factor of 0.7 is suggested in Table E-15 of Regulatory Guide 1.109, Revision 1.

I_i = Factor to account for fractional deposition of radionuclide "i."

For radionuclides other than iodine, the factor I_i is equal to one. For radioiodines, the value of I_i may vary. However, a value of 1.0 was used in calculating the R values in Table 3.3-2. (Reference NUREG 0133)

B.2.3 Grass Cow or Goat Milk Pathway

The dose factor for the cow milk or goat milk pathway for each radionuclide for each organ is calculated by:

$$R_{i_M} = I_i K' Q_F U_{ap} F_m (DFL_i)_a e^{-\lambda_i t_f} \left\{ f_p f_s \left(\frac{r(1-e^{-\lambda_{E_i} t_e})}{Y_p \lambda_{E_i}} + \frac{B_{iv}(1-e^{-\lambda_i t_b})}{P\lambda_i} \right) + \right.$$

$$\left. (1-f_p f_s) \left(\frac{r(1-e^{-\lambda_{E_i} t_e})}{Y_s \lambda_{E_i}} + \frac{B_{iv}(1-e^{-\lambda_i t_b})}{P\lambda_i} \right) e^{-\lambda_i t_h} \right\} \quad (B.2\text{-}3)$$

where:

R_{i_M} = Dose factor for the cow milk or goat milk pathway, for each identified radionuclide "i" for the organ of interest, mrem/yr per μCi/sec per m^{-2};

K' = A constant of unit conversion;
= 10^6 pCi/μCi;

Q_F = The cow's or goat's feed consumption rate, kg/day (wet weight);

U_{ap} = The receptor's milk consumption rate for age group a, liters/yr;

Y_p = The agricultural productivity by unit area of pasture feed grass, kg/m^2;

Y_s = The agricultural productivity by unit area of stored feed, kg/m^2;

F_m = The stable element transfer coefficients, pCi/liter per pCi/day;

r = Fraction of deposited activity retained on cow's feed grass;

$(DFL_i)_a$ = The organ ingestion dose for radionuclide "i" for the receptor in age group a, mrem/pCi;

λ_{E_i} = $\lambda_i + \lambda_w$;

λ_i = The radiological decay constant for radionuclide "i," sec^{-1};

λ_w = The decay constant for removal of activity on leaf and plant surfaces by weathering, sec^{-1};

= 5.73×10^{-7} sec^{-1} (corresponding to a 14 day half-life);

t_f = The transport time from feed to cow, or goat to milk, to receptor, sec;

t_h = The transport time for harvest, to cow or goat, to consumption, sec;

t_b = Period of time that sediment is exposed to gaseous effluents, sec;

B_{iv} = Concentration factor for uptake of radionuclide "i" from the soil by the edible parts of crops, pCi/Kg (wet weight) per pCi/Kg (dry soil);

P = Effective surface density for soil, Kg (dry soil)/m^2;

f_p = Fraction of the year that the cow or goat is on pasture;

f_s = Fraction of the cow feed that is pasture grass while the cow is on pasture;

t_e = Period of pasture grass and crop exposure during the growing season, sec;

I_i = Factor to account for fractional deposition of radionuclide "i."

For radionuclides other than iodine, the factor I_i is equal to one. For radioiodines, the value of I_i may vary. However, a value of 1.0 was used in calcuating the R values in Tables 3.3-9 through 3.3-16. (Reference NUREG 0133)

Milk cattle and goats are considered to be fed from two potential sources, pasture grass and stored feeds. Following the development in Regulatory Guide 1.109, Revision 1, the value of f_s was considered unity in lieu of site-specific information. The value of f_p was 0.667 based upon an 8-month grazing period.

Table B-1 contains the appropriate parameter values and their source in Regulatory Guide 1.109, Revision 1.

The concentration of tritium in milk is based on the airborne concentration rather than the deposition. Therefore, the R_i is based on X/Q:

$$R_{T_M} = K'K'''F_m Q_F U_{ap} (DFL_i)_a \, 0.75(0.5/H) \qquad \text{(B.2-4)}$$

where:

R_{T_M} = Dose factor for the cow or goat milk pathway for tritium for the organ of interest, mrem/yr per $\mu Ci/m^3$;

K''' = A constant of unit conversion;
= 10^3 gm/kg;

H = Absolute humidity of the atmosphere, gm/m^3;

0.75 = The fraction of total feed that is water;

0.5 = The ratio of the specific activity of the feed grass water to the atmospheric water.

and other parameters and values are given above. A value of H = 8 grams/meter^3, was used in lieu of site-specific information.

B.2.4 Grass-Cow-Meat Pathway

The integrated concentration in meat follows in a similar manner to the development for the milk pathway, therefore:

$$R_{i_M} = I_i K' Q_F U_{ap} F_f (DFL_i)_a \, e^{-\lambda_i t_s} \left(f_p f_s \left\{ \frac{r(1-e^{-\lambda_{E_i} t_e})}{Y_p \lambda_{E_i}} + \frac{B_{iv}(1-e^{-\lambda_i t_b})}{P\lambda_i} \right\} + \right.$$

$$\left. (1-f_p f_s) \left\{ \frac{r(1-e^{-\lambda_{E_i} t_e})}{Y_s \lambda_{E_i}} + \frac{B_{iv}(1-e^{-\lambda_i t_b})}{P\lambda_i} \right\} e^{-\lambda_i t_h} \right) \qquad \text{(B.2-5)}$$

where:

R_{i_B} = Dose factor for the meat ingestion pathway for radionuclide "i" for any organ of interest, mrem/yr per μCi/sec per m^{-2};

F_f = The stable element transfer coefficients, pCi/Kg per pCi/day;

U_{ap} = The receptor's meat consumption rate for age group a, kg/yr;

t_s = The transport time from slaughter to consumption, sec;

t_h = The transport time from harvest to animal consumption, sec;

t_e = Period of pasture grass and crop exposure during the growing season, sec;

I_i = Factor to account for fractional deposition of radionuclide "i."

For radionuclides other than iodine, I_i is equal to one. For radioiodines, the value of I_i may vary. However, a value of 1.0 was used in calculating the R values in Tables 3.3-6 through 3.3-8.

All other terms remain the same as defined in Equation B.2-3. Table B-2 contains the values which were used in calculating R_i for the meat pathway.

The concentration of tritium in meat is based on its airborne concentration rather than the deposition. Therefore, the R_i is based on X/Q.

$$R_{T_B} = K'K'''F_m Q_F U_{ap} (DFL_i)_a \, 0.75(0.5/H) \qquad (B.2\text{-}6)$$

where:

R_{T_B} = Dose factor for the meat ingestion pathway for tritium for any organ of interest, mrem/yr per μCi/m^3.

All other terms are defined in Equations B.2-4 and B.2-5.

B.2.5 Vegetation Pathway

The integrated concentration in vegetation consumed by man follows the expression developed in the derivation of the milk factor. Man is considered to consume two types of vegetation (fresh and stored) that differ only in the time period between harvest and consumption, therefore:

$$R_{i_v} = I_i K' (DFL_i)_a \left(U_a^L f_L e^{-\lambda_i t_L} \left\{ \frac{r(1-e^{-\lambda_{E_i} t_e})}{Y_v \lambda_{E_i}} + \frac{B_{iv}(1-e^{-\lambda_i t_b})}{P\lambda_i} \right\} + \right.$$

$$\left. U_a^S f_g e^{-\lambda_i t_h} \left\{ \frac{r(1-e^{-\lambda_{E_i} t_e})}{Y_v \lambda_{E_i}} + \frac{B_{iv}(1-e^{-\lambda_i t_b})}{P\lambda_i} \right\} \right) \qquad (B.2\text{-}7)$$

where:

R_{i_V} = Dose factor for vegetable pathway for radionuclide "i" for the organ of interest, mrem/yr per μCi/sec per m^{-2};

K' = A constant of unit conversion;
= 10^6pCi/μCi;

U_a^L = The consumption rate of fresh leafy vegetation by the receptor in age group a, kg/yr;

U_a^S = The consumption rate of stored vegetation by the receptor in age group a, kg/yr;

f_L = The fraction of the annual intake of fresh leafy vegetation grown locally;

f_g = The fraction of the annual intake of stored vegetation grown locally;

t_L = The average time between harvest of leafy vegetation and its consumption, sec;

t_h = The average time between harvest of stored vegetation and its consumption, sec;

Y_v = The vegetation areal density, kg/m^2;

t_e = Period of leafy vegetable exposure during growing season, sec;

I_i = Factor to account for fractional deposition of radionuclide "i."

All other factors as defined before.

For radionuclides other than iodine, the factor I_i is equal to one. For radioiodines, the value of I_i may vary. However, a value of 1.0 was used in Tables 3.3-3 through 3.3-5.

Table B-3 presents the appropriate parameter values and their source in Regulatory Guide 1.109, Revision 1.

In lieu of site-specific data default values for f_L and f_g, 1.0 and 0.76, respectively, were used in the calculations on R_i. These values were obtained from Table E-15 of Regulatory Guide 1.109, Revision 1.

The concentration of tritium in vegetation is based on the airborne concentration rather than the deposition. Therefore, the R_i is based on X/Q:

$$R_{T_V} = K'K''' \left[U_a^L f_L + U_a^S f_g \right] (DFL_i)_a \quad 0.75(0.5/H) \qquad (B.2\text{-}8)$$

where:

R_{T_V} = Dose factor for the vegetable pathway for tritium for any organ of interest, mrem/yr per $\mu Ci/m^3$.

All other terms remain the same as those in Equations B.2-4 and B.2-7.

TABLE B-1

Parameters For Cow and Goat Milk Pathways

Parameter	Value	Reference (Reg. Guide 1.109, Rev. 1
Q_F (kg/day)	50 (cow) 6 (goat)	Table E-3 Table E-3
Y_p (kg/m^2)	0.7	Table E-15
T_f (seconds)	1.73×10^5 (2 days)	Table E-15
r	1.0 (radioiodines) 0.2 (particulates)	Table E-15 Table E-15
$(DFL_i)_a$ (mrem/pCi)	Each radionuclide	Tables E-11 to E-14
F_m (pCi/day per pCi/liter)	Each stable element	Table E-1 (cow) Table E-2 (goat)
T_b (seconds)	4.73×10^8 (15 yr)	Table E-15
Y_s (kg/m^2)	2.0	Table E-15
Y_p (kg/m^2)	0.7	Table E-15
t_h (seconds)	7.78×10^6 (90 days)	Table E-15
U_{ap} (liters/yr)	330 infant 330 child 400 teen 310 adult	Table E-5 Table E-5 Table E-5 Table E-5
t_e (seconds)	2.59×10^6 (pasture) 5.18×10^6 (stored feed)	Table E-15
B_{iv} (pCi/kg [wet weight] per pCi/kg [dry soil])	Each stable element	Table E-1
P kg (dry soil/m^2)	240	Table E-15

TABLE B-2

Parameters For The Meat Pathway

Parameter	Value	Reference (Reg. Guide 1.109, Rev. 1
r	1.0 (radioiodines) 0.2 (particulates)	Table E-15 Table E-15
F_f (pCi/kg per pCi/day)	Each stable element	Table E-1
U_{ap} (kg/yr)	0 infant 41 child 65 teen 110 adult	Table E-5 Table E-5 Table E-5 Table E-5
$(DFL_i)_a$ (mrem/pCi)	Each radionuclide	Tables E-11 to E-14
Y_p (kg/m^2)	0.7	Table E-15
Y_s (kg/m^2)	2.0	Table E-15
T_b (seconds)	4.73×10^8 (15 yr)	Table E-15
T_s (seconds)	1.73×10^6 (20 days)	Table E-15
t_h (seconds)	7.78×10^6 (90 days)	Table E-15
t_e (seconds)	2.59×10^6 (pasture) 5.18×10^6 (stored feed)	Table E-15
Q_F (kg/day)	50	Table E-3
B_{iv} (pCi/kg [wet weight] per pCi/kg [dry soil])	Each stable element	Table E-1
P (kg [dry soil/m^2])	240	Table E-15

TABLE B-3

Parameters for The Vegetable Pathway

Parameter	Value	Reference (Reg. Guide 1.109, Rev. 1
r (dimensionless)	1.0 (radioiodines) 0.2 (particulates)	Table E-1 Table E-1
$(DFL_i)_a$ (mrem/Ci)	Each radionuclide	Tables E-11 to E-14
Q_F (kg/day)	50 (cow) 6 (goat)	Table E-3 Table E-3
U_a^L (kg/yr) - Infant	0	Table E-5
- Child	26	Table E-5
- Teen	42	Table E-5
- Adult	64	Table E-5
U_a^S (kg/yr) - Infant	0	Table E-5
- Child	520	Table E-5
- Teen	630	Table E-5
- Adult	520	Table E-5
T_L (seconds)	8.6×10^4 (1 day)	Table E-15
t_h (seconds)	5.18×10^6 (60 days)	Table E-15
Y_v (kg/m^2)	2.0	Table E-15
t_e (seconds)	5.18×10^6 (60 days)	Table E-15
T_b (seconds)	4.73×10^8 (15 yr)	Table E-15
P (kg [dry soil/m^2])	240	Table E-15
B_{iv} (pCi/kg [wet weight] per pCi/kg [dry soil])	Each stable element	Table E-1

APPENDIX C
LOWER LIMIT OF DETECTION (LLD) FOR PLANT EFFLUENTS AND ENVIRONMENTAL SAMPLES

The LLD is defined as the smallest concentration of radioactive material in a sample that will yield a net count, above system background, that will be detected with 95 percent probability with only 5 percent probability of falsely concluding that a blank observation represents a "real" signal.

For a particular measurement system, which may include radiochemical separation:

$$LLD = \frac{4.66\ s_b}{E \cdot V \cdot 2.22 \times 10^6 \cdot Y \cdot \exp(-\lambda \Delta t)}$$

where:

LLD = the "a priori" lower limit of detection (as microcuries per unit mass or volume),

s_b = is the standard deviation of the background counting rate or of the counting rate of a blank sample as appropriate (as counts per minute),

E = the counting efficiency (as counts per transformation),

V = the sample size (in units of mass or volume),

2.22×10^6 = the number of disintegrations per minute per microcurie (for environmental samples the LLD should be expressed in picocuries),

Y = the fractional radiochemical yield, when applicable,

λ = the radioactive decay constant for the particular radionuclide (sec^{-1}) and,

Δt = the elapsed time between midpoint of sample collection and time of counting (sec) for plant samples,

= the elapsed time between environmental collection, or end of the sample collection period, and time of counting (sec) for environmental samples.

Typical values of E, V, Y, and Δt should be used in the calculation.

It should be recognized that the LLD is defined as an a priori (before the fact) limit representing the capability of a measurement system and not as an a posteriori (after the fact) limit for a particular measurement.

For environmental samples, analyses shall be performed in such a manner that the LLDs stated in Technical Specification 4.12.1 will be achieved under routine conditions. Occasionally, background fluctuations, unavoidable small sample sizes, the presence of interfering nuclides, or other uncontrollable circumstances may render these LLDs unachievable. In such cases, the contributing factors shall be identified and described in the Annual Radiological Environmental Operating Report pursuant to Technical Specification 6.9.1.6.

APPENDIX D

RADIOACTIVE LIQUID AND GASEOUS EFFLUENT MONITORING INSTRUMENTATION NUMBERS

	Monitor Identification
I. Liquid Effluent Monitoring Instruments	
A. Treated Laundry and Hot Shower Tank	REM-3540
B. Waste Monitor Tank	REM-3541
C. Waste Evaporator Condensate Tank	REM-3541
D. Secondary Waste Sample Tank	REM-3542
II. Gaseous Effluent Monitoring Instruments	
A. Plant Vent Stack 1	
1. Plant Vent Stack 1	REM-1AV-3509-SA
2. Reactor Auxiliary Building Normal Exhaust	REM-1AV-3531
3. Reactor Auxiliary Building Emergency Exhaust	REM-1A-3532A
4. Fuel Handling Building Normal Exhaust (South)	REM-1FL-3506
5. Fuel Handling Building Normal Exhaust (South)	REM-1FL-3507
6. Fuel Handling Building Emergency Exhaust	REM-1FL-3508A-SA
7. Fuel Handling Building Emergency Exhaust	REM-1FL-3508B-SB
B. Turbine Building Vent Stack 3A	REM-1TV-3534
C. Waste Processing Building Vent Stack 5	REM-1WV-3546
D. Waste Processing Building Vent Stack 5A	REM-1WV-3547