

SEQUOYAH NUCLEAR PLANT  
OFFSITE DOSE CALCULATION MANUAL

Revision 2

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- A. Equations and assumptions for calculating doses from noble gases are as follows:

Assumptions

1. Doses to be calculated are total body and skin.
2. Exposure pathway is submersion within a cloud of noble gases.
3. Noble gas radionuclide mix is based on the design objective source term given in Table 1.1.
4. Basic radionuclide data are given in Table 1.2.
5. All releases are treated as ground-level.
6. Meteorological data are expressed as a joint-frequency distribution of wind speed, wind direction, and atmospheric stability for the period January 1972 to December 1975 (Table 1.3).
7. Raw meteorological data consist of wind speed and direction measurements at 10m and temperature measurements at 9m and 46m.
8. Dose is to be evaluated at the offsite exposure point where maximum concentrations are expected to exist.
9. Potential maximum-exposure points (Table 1.4) considered are the nearest site boundary points in each sector.
10. A semi-infinite cloud model is used.
11. No credit is taken for shielding by residence.
12. Plume depletion and radioactive decay are considered.
13. Building wake effects on effluent dispersion are considered.
14. A sector-average dispersion equation is used.
15. The wind speed classes that are used are as follows:



<u>Number</u>	<u>Range (m/s)</u>	<u>Midpoint (m/s)</u>
1	<0.3	0.13
2	0.3-0.6	0.45
3	0.7-1.5	1.10
4	1.6-2.4	1.99
5	2.5-3.3	2.80
6	3.4-5.5	4.45
7	5.6-8.2	6.91
9	>10.9	13.00

16. The stability classes that will be used are the standard A through G classifications. The stability classes 1-7 will correspond to A=1, B=2, . . . , G=7.

17. Terrain effects are not considered.

#### Equations

To calculate the dose for any one of the 16 potential maximum-exposure points, the following equations are used.

For determining the air concentration of any radionuclide:

$$y_i = \sum_{j=1}^9 \sum_{k=1}^7 \left( \frac{2}{\pi} \right)^{1/2} \frac{f_{jk} Q_i P}{z_k u_j (2-x/n)} \exp \left( -\frac{1}{2} \frac{x^2}{u_j^2} \right) \quad (1.1)$$

where

$y_i$  = air concentration of radionuclide i,  $\mu\text{Ci}/\text{m}^3$ .

$f_{jk}$  = joint relative frequency of occurrence of winds in windspeed class j, stability class k, blowing toward this exposure point, expressed as a fraction.

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$Q_i$  = average release rate of radionuclide i,  $\mu\text{Ci/s}$ .

$p$  = fraction of radionuclide remaining in plume, Figure 1.1.

$\Sigma_{zk}$  = vertical dispersion coefficient for stability class k which includes a building wake adjustment,  $\Sigma_{zk} = \left( \sigma_{zk}^2 + cA/\pi \right)^{1/2}$ , where  $\sigma_{zk}$  is the vertical dispersion coefficient for stability class k (m), c is a building shape factor ( $c = 0.5$ ), and A is the minimum building cross-sectional area ( $1800 \text{ m}^2$ ), m.

$u_j$  = midpoint value of wind speed class interval j, m/s.

$x$  = downwind distance, m.

$n$  = number of sectors, 16.

$\lambda_i$  = radioactive decay coefficient of radionuclide i,  $\text{s}^{-1}$ .

$2\pi x/n$  = sector width at point of interest, m.

For determining the total body dose rate

$$\dot{n}_{TB} = \sum_i \chi_i \text{DFB}_i \quad (1.2)$$

where

$\dot{D}_{TB}$  = total body dose rate, mrem/y.

$\chi_i$  = air concentration of radionuclide i,  $\mu\text{Ci/m}^3$ .

$\text{DFB}_i$  = total body dose factor due to gamma radiation, mrem/y per  $\mu\text{Ci/m}^3$  (Table 1.5).

For determining the skin dose rate

$$\dot{D}_s = \sum_i \chi_i [\text{DFS}_i + 1.11 \text{DF}\gamma_i] \quad (1.3)$$

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where

$D_s$  = skin dose rate, mrem/y.

$X_1$  = air concentration of radionuclide 1,  $\mu\text{Ci}/\text{m}^3$ .

$\text{DFS}_1$  = skin dose factor due to beta radiation, mrem/y per  $\mu\text{Ci}/\text{m}^3$  (Table 1.5).

1.11 = the average ratio of tissue to air energy absorption coefficients, mrem/mrad.

$\text{DFY}_1$  = gamma-to-air dose factor for radionuclide 1, mrad/y per  $\mu\text{Ci}/\text{m}^3$  (Table 1.5).

B. Equations and assumptions for calculating doses from radioiodines and particulates are as follows:

Assumptions

1. Dose is to be calculated for the critical organ, thyroid, and the critical age group, infant.
2. Exposure pathways from iodines and particulates are milk ingestion, ground contamination, and inhalation.
3. The radioiodine and particulate mix is based on the design objective source term given in Table 1.1.
4. Basic radionuclide data are given in Table 1.2.
5. All releases are treated as ground-level.
6. Meteorological data are expressed as joint-frequency distributions (JFD's) of wind speed, wind direction, and atmospheric stability for the period January 1972 to December 1975 (Table 1.3).
7. Raw meteorological data for ground-level releases consist of wind speed and direction measurements at 10m and temperature measurements at 9m and 46m.

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8. Dose is to be evaluated at the potential offsite exposure point where maximum concentrations are expected to exist.
9. Real cow locations are not considered.
10. Potential maximum exposure points (Table 1.4) considered are the nearest site boundary points in each sector.
11. Terrain effects are not considered.
12. Building wake effects on effluent dispersion are considered.
13. Plume depletion and radioactive decay are considered for air-concentration calculations.
14. Radioactive decay is considered for ground-concentration calculations.
15. Deposition is calculated based on the curves given in Figure 1.2.
16. A milk cow obtains 100 percent of her food from pasture grass.
17. No credit is taken for shielding by residence.

#### Equations

To calculate the dose for any one of the potential maximum-exposure points, the following equations are used.

##### 1. Inhalation

Equation for calculating air concentration,  $X$ , is the same as in the Noble Gas Section, 1.1.1.A.

For determining the thyroid dose rate:

$$D_{THI} = 1 \times 10^6 \sum_1 X_i DFI_i BR \quad (1.4)$$

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where:

$D_{THI}$  = thyroid dose rate due to inhalation, mrem/y.

$X_i$  = air concentration of radionuclide i,  $\mu\text{Ci}/\text{m}^3$ .

$DFI_i$  = infant inhalation dose factor, mrem/pCi (Table 1.7).

BR = infant breathing rate,  $2400 \text{ m}^3/\text{y}$ .

$1 \times 10^6$  = pCi/ $\mu\text{Ci}$  conversion factor.

## 2. Ground Contamination

For determining the ground concentration of any nuclide:

$$G_i = 3.15 \times 10^7 \sum_{k=1}^7 \frac{f_k Q_i DR}{(2\pi x/n) \lambda_i} [1 - \exp -(\lambda_i t_b)] \quad (1.5)$$

where

$G_i$  = ground concentration of radionuclide i,  $\mu\text{Ci}/\text{m}^3$ .

k = stability class.

$f_k$  = joint relative frequency of occurrence of winds in stability class k blowing toward this exposure point, expressed as a fraction.

$Q_i$  = average release rate of radionuclide i,  $\mu\text{Ci}/\text{s}$ .

DR = relative deposition rate,  $\text{m}^{-1}$  (Figure 1.2).

x = downwind distance, m.

n = number of sectors, 16.

$2\pi x/n$  = sector width at point of interest, m.

$\lambda_i$  = radioactive decay coefficient of radionuclide i,  $\text{y}^{-1}$ .

$t_b$  = time for buildup of radionuclides on the ground, 35y.

$3.15 \times 10^7$  = s/y conversion factor.

For determining the thyroid dose rate from ground contamination:

$$D_{\text{THG}} = (8,760)(1 \times 10^6) \sum_1 G_1 \text{DFG}_1 \quad (1.6)$$

where:

$D_{\text{THG}}$  = thyroid dose rate due to ground contamination, mrem/y.

$G_1$  = ground concentration of radionuclide 1,  $\mu\text{Ci}/\text{m}^2$ .

$\text{DFG}_1$  = dose factor for standing on contaminated ground, mrem/h  
per  $\text{pCi}/\text{m}^2$  (Table 1.8).

8,760 = occupation time, h/y.

$1 \times 10^6$  =  $\text{pCi}/\mu\text{Ci}$  conversion factor.

### 3. Milk Ingestion

For determining the concentration of any nuclide (except C-14 and H-3) in and on vegetation:

$$CV_1 = 3,600 \sum_{k=1}^7 \frac{f_k Q_1 \text{DR}}{(2\pi x/n)} \left( \frac{r[1-\exp(-\lambda_{E1} t_e)]}{Y_v \lambda_{E1}} + \frac{B_{iv} [1-\exp(-\lambda_1 t_b)]}{P \lambda_1} \right) \quad (1.7)$$

where:

$CV_1$  = concentration of radionuclide 1 in and on vegetation,  
 $\mu\text{Ci}/\text{kg}$ .

$k$  = stability class.

$f_k$  = frequency of this stability class and wind direction  
combination, expressed as a fraction.

$Q_1$  = average release rate of radionuclide 1,  $\mu\text{Ci}/\text{s}$ .

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DR = relative deposition rate,  $m^{-2}$  (Figure 1.2).

x = downwind distance, m.

n = number of sectors, 16.

$2\pi x/n$  = sector width at point of interest, m.

r = fraction of deposited activity retained on vegetation  
(1.0 for iodines, 0.2 for particulates).

$\lambda_{Ei}$  = effective removal rate constant,  $\lambda_{Ei} = \lambda_i + \lambda_w$ , where  $\lambda_i$   
is the radioactive decay coefficient,  $h^{-1}$ , and  $\lambda_w$  is a  
measure of physical loss by weathering ( $\lambda_w = .0021 h^{-1}$ ),

$t_e$  = period over which deposition occurs, 720 h.

$Y_v$  = agricultural yield,  $0.7 kg/m^2$ .

$B_{iv}$  = transfer factor from soil to vegetation of radionuclide  
i (Table 1.9).

$\lambda_i$  = radioactive decay coefficient of radionuclide i,  $h^{-1}$ .

$t_b$  = time for buildup of radionuclides on the ground,  $3.07 \times 10^5$   
h (35y).

P = effective surface density of soil,  $240 kg/m^2$ .

3,600 = s/h conversion factor.

For determining the concentration of C-14 in vegetation:

$$CV_{14} = 1 \times 10^3 X_{14} (0.11/0.16) \quad (1.8)$$

where

$CV_{14}$  = concentration of C-14 in vegetation,  $\mu Ci/kg$ .

$X_{14}$  = air concentration of C-14,  $\mu Ci/m^3$ .

0.11 = fraction of total plant mass that is natural carbon.

0.16 = concentration of natural carbon in the atmosphere,  
 $g/m^3$ .

$1 \times 10^3$  = g/kg conversion factor.

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For determining the concentration of H-3 in vegetation:

$$CV_T = 1 \times 10^3 \chi_T (0.75) (0.5/H) \quad (1.9)$$

where

$CV_T$  = concentration of H-3 in vegetation,  $\mu\text{Ci/kg}$ .

$\chi_T$  = air concentration of H-3,  $\text{Ci/m}^3$ .

0.75 = fraction of total plant mass that is water.

0.5 = ratio of tritium concentration in plant water to tritium concentration in atmospheric water.

H = absolute humidity of the atmosphere,  $\text{g/m}^3$ .

$1 \times 10^3$  = g/kg conversion factor.

For determining the concentration of any nuclide in cow's milk:

$$CM_i = CV_i FM_i Q_f \exp(-\lambda_i t_f) \quad (1.10)$$

where

$CM_i$  = concentration of radionuclide i (including C-14 and H-3) in cow's milk,  $\mu\text{Ci/l}$ .

$CV_i$  = concentration of radionuclide i in and on vegetation,  $\mu\text{Ci/kg}$ .

$FM_i$  = transfer factor from feed to milk for radionuclide i, d/l (Table 1.6).

$Q_f$  = amount of feed consumed by the cow per day, kg/d.

$\lambda_i$  = radioactive decay coefficient of radionuclide i,  $\text{d}^{-1}$ .

$t_f$  = transport time of activity from feed to milk to receptor, 2 days.

For determining the thyroid dose rate from ingestion of cow's milk:

$$D_{\text{THM}} = 1 \times 10^6 \sum_i CM_i DFING_i \text{ UM} \quad (1.11)$$

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where

$D_{THM}$  = thyroid dose rate due to milk ingestion, mrem/y.

$CM_1$  = concentration of radionuclide 1 in cow's milk,  $\mu\text{Ci/l}$ .

$DFING_1$  = infant ingestion dose factor, mrem/ $\mu\text{Ci}$  (Table 1.7).

$UM$  = infant ingestion rate for milk, 330 l/y.

$1 \times 10^6$  = pCi/ $\mu\text{Ci}$  conversion factor.

#### 4. Total Thyroid Dose Rate

For determining the total thyroid dose rate from iodines and particulates:

$$D_{TH} = D_{THI} + D_{THG} + D_{THM} \quad (1.12)$$

where

$D_{TH}$  = total thyroid dose rate, mrem/y.

$D_{THI}$  = thyroid dose rate due to inhalation, mrem/y.

$D_{THG}$  = thyroid dose rate due to ground contamination, mrem/y.

$D_{THM}$  = thyroid dose rate due to milk ingestion, mrem/y.

The maximum thyroid dose rate calculated in this step will be used in step 2.

#### Step 2

The dose rate limits of interest (10CFR20) are

Total body = 500 mrem/y

Skin = 3,000 mrem/y

Maximum Organ = 1,500 mrem/y

Dividing the above limits by the appropriate dose calculated in step 1 yields a useful ratio.

$$\frac{\text{Dose limit}}{\text{Dose step 1}} = R$$

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This ratio, R, represents how far above or below the guidelines the step 1 calculation was. Multiplying the original source terms by R will give release rates that should correspond to the dose limits given above. Step 1 is redone using the adjusted source terms to ensure that this is the case. Appropriate release rate limits in  $\mu\text{Ci/s}$  for each nuclide and release point will be provided to plant personnel for use in establishing monitor setpoints using plant instruction(s).

### 1.2 Monthly Dose Calculations

Dose calculations will be performed monthly to determine compliance with specifications 3.11.2.2 and 3.11.2.3. These specifications require that the dose rate in unrestricted areas due to gaseous effluents from each reactor at the site shall be limited to the following values:

For noble gases,

1. During any calendar quarter, 5 mrad to air for gamma radiation and 10 mrad to air for beta radiation.
2. During any calendar year, 10 mrad to air for gamma radiation and 20 mrad to air for beta radiation.

For iodines and particulates,

1. During any calendar quarter, 7.5 mrem to any organ.
2. During any calendar year, 15 mrem to any organ.

This section of the ODCM describes the methodology that will be used to perform these monthly calculations.

Doses will first be calculated by a simplified conservative approach (step 1). If these exceed the specification limits, a more realistic calculation will be performed (step 2).

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### 1.2.1 Noble Gases

#### Step 1

Doses will be calculated using the methodology described in this step. If any limits are exceeded, step 2 will be performed.

Equations and assumptions for calculating doses from releases of noble gases are as follows:

#### Assumptions

1. Doses to be calculated are gamma and beta air doses.
2. The highest annual-average  $\lambda/Q$  based on licensing meteorology for ground-level releases for any offsite location will be used.
3. No credit is taken for radioactive decay.
4. For gamma doses, releases of Xe-133, Ar-41, and Kr-88 are considered.
5. For beta doses, releases of Xe-133, Kr-85, and Ar-41 are considered.
6. Dose factors are calculated using data from TVA's nuclide library.
7. The nuclides considered are expected to contribute at least 92 percent of the total dose. However, the calculations extrapolate doses assuming that only 90 percent of total dose was contributed.
8. A semi-infinite cloud model is used.
9. Building wake effects on effluent dispersion are considered.

#### Equations

For determining the gamma dose to air:

$$D_Y = \frac{(\lambda/Q)}{0.9} \sum_i Q_i DF_{Y_i} \quad (1.13)$$

where:

$D_Y$  = gamma dose to air, mrad.

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$\chi/Q$  = highest annual-average relative concentration,  $5.13 \times 10^{-6}$   
 $\text{s/m}^3$

0.9 = fraction of total gamma dose expected to be contributed  
 by these nuclides (actually 0.92).

$Q_i$  = monthly release of radionuclide i, Ci.

$DFY_i$  = gamma-to-air dose factor for radionuclide i, mrad/s per  
 $\text{Ci/m}^3$  (Table 1.5).

This equation then reduces to

$$D_Y = 5.70 \times 10^{-6} \sum_i Q_i DFY_i \quad (1.14)$$

For determining the beta dose to air:

$$D_\beta = \frac{(\chi/Q)}{0.9} \sum_i Q_i DFB_i \quad (1.15)$$

where:

$D_\beta$  = beta dose to air, mrad.

$\chi/Q$  = highest annual-average relative concentration,  $5.13 \times 10^{-6}$   
 $\text{s/m}^3$ .

0.9 = fraction of total beta dose expected to be contributed by  
 these nuclides (actually 0.94).

$Q_i$  = monthly release of radionuclide i, Ci.

$DFB_i$  = beta-to-air dose factor for radionuclide i, mrad/s per  
 $\text{Ci/m}$  (Table 1.5).

This equation then reduces to:

$$D_\beta = 5.70 \times 10^{-6} \sum_i Q_i DFB_i \quad (1.16)$$

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Step 2

This methodology is to be used if the calculations in Step 1 yield doses that exceed applicable limits.

Equations and assumptions for calculating doses to air from releases of noble gases are as follows:

Assumptions

1. Doses to be calculated are gamma and beta air doses.
2. Dose is to be evaluated at the nearest site boundary point in each sector.
3. Historical onsite meteorological data for the appropriate months from the period 1972-1975 will be used.
4. All measured radionuclide releases are considered.
5. A semi-infinite cloud model is used.
6. Radioactive decay is considered.
7. Building wake effects on effluent dispersion are considered.
8. Dose factors are calculated using data from TVA's radionuclide library.

Equations

Equations for calculating air concentration,  $\chi$ , is the same as in Section 1.1.1, step 1, part A. Air concentrations are calculated for the site boundary in each sector.

For determining the gamma dose to air

$$D_{\gamma n} = t_m \sum_i \chi_{ni} DF_i \quad (1.24)$$

where:

$D_{\gamma n}$  = gamma dose to air for sector n, mrad.

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$X_{ni}$  = air concentration of radionuclide i in sector n, Ci/m<sup>3</sup>.

$DFY_1$  = gamma-to-air dose factor for radionuclide i, mrad/s per Ci/m (Table 1.5).

$t_m$  = time period considered (1 month, but number of s/mo is variable), s.

For determining the beta dose to air:

$$D_{\beta n} = t_m \sum X_{ni} DFB_i \quad (1.25)$$

where:

$D_{\beta n}$  = beta dose to air for sector n, mrad.

$X_{ni}$  = air concentration of radionuclide i in sector n, Ci/m<sup>3</sup>.

$DFB_i$  = beta to air dose factor for radionuclide i, mrad/s per Ci/m<sup>3</sup>.

$t_m$  = time period considered (number of seconds in this month), s.

The sector having the highest total dose is then used to check compliance with specification 3.11.2.2.

### 1.2.2 Iodines and Particulates

#### Step 1

Doses will be calculated using the methodology described in this step. If any limits are exceeded, step 2 will be performed.

Equations and assumptions for calculating doses from releases of iodines and particulates are as follows:

#### Assumptions

1. Dose is to be calculated for the critical organ, thyroid, and the critical age group, infant.
2. Exposure pathway considered is milk ingestion.

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3. The highest annual-average D/Q based on licensing meteorology for ground-level releases for any real cow location will be used for I-131 doses.
4. The highest annual-average  $\chi/Q$  based on licensing meteorology for ground-level releases for any cow location will be used for C-14 doses.
5. No credit is taken for radioactive decay.
6. Releases of I-131 and C-14 are considered.
7. The radionuclides considered are expected to contribute at least 96 percent of the total dose. However, the calculations extrapolate doses assuming that only 90 percent of the total dose was contributed.
8. Releases of C-14 are based on the design source term.
9. The cow is assumed to graze on pasture grass for the whole year.

#### Equations

For determining the thyroid dose from milk ingestion of I-131:

$$DTH_{131} = \frac{Q_{131} DF_{131} D/Q}{3.15 \times 10^7} \quad (1.26)$$

where:

$DTH_{131}$  = thyroid dose from I-131, mrem.

$Q_{131}$  = monthly release of I-131, Ci.

$DF_{131}$  = I-131 milk ingestion dose factor to infant, mrem/y per Ci/m<sup>2</sup>-s.

$D/Q$  = relative deposition rate, m<sup>-2</sup>.

$3.15 \times 10^7$  = s/y.

For determining the thyroid dose from milk ingestion of C-14:

$$DTH_{14} = \frac{Q_{14} DF_{14} \chi/Q}{3.15 \times 10^7} \quad (1.27)$$

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where:

$DTH_{14}$  = thyroid dose from C-14, mrem.

$Q_{14}$  = monthly release of C-14, Ci.

$DF_{14}$  = C-14 milk ingestion dose factor, mrem/y per Ci/m<sup>3</sup>.

$\chi/Q$  = relative dispersion factor,  $1.13 \times 10^{-5}$  s/m<sup>3</sup>.

$3.15 \times 10^7$  = s/y.

For determining the total thyroid dose:

$$DTH = \frac{DTH_{131} + DTH_{14}}{0.9} \quad (1.28)$$

where:

DTH = thyroid dose, mrem.

$DTH_{131}$  = thyroid dose from release of I-131, mrem.

$DTH_{14}$  = thyroid dose from release of C-14, mrem.

0.9 = fraction of total thyroid dose expected to be contributed by these radionuclides (actually 0.96).

## Step 2

This methodology is to be used if the calculations in step 1 yield doses that exceed applicable limits.

Doses for releases of iodines and particulates shall be calculated using the methodology in Section 1.1.1, step 1, part B, with the following exceptions:

1. All measured radionuclide releases will be used.
2. Dose will be evaluated at real cow locations and will consider actual grazing information.

The receptor having the highest total dose is then used to check compliance with specification 3.11.2.3.

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### 1.3 Gaseous Radwaste Treatment System Operation

The gaseous radwaste treatment system (GRTS) described below shall be maintained and operated to keep releases ALARA.

#### 1.3.1 System Description

A flow diagram for the GRTS is given in Figure 1.3. The system consists of two waste-gas compressor packages, nine gas decay tanks, and the associated piping, valves, and instrumentation. Gaseous wastes are received from the following: degassing of the reactor coolant and purging of the volume control tank prior to a cold shutdown, displacing of cover gases caused by liquid accumulation in the tanks connected to the vent header, and boron recycle process operation.

#### 1.3.2 Dose Calculations

Doses will be calculated monthly using the methodology described in Section 1.2. These doses will be used to ensure that the GRTS is operating as designed.

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TABLE 1.1

EXPECTED ANNUAL ROUTINE RELEASES FROM ONE UNIT AT SEQUOYAH NUCLEAR PLANT (Ci/yr)

NUCLIDE	AUXILIARY BUILDING VENT	CONTAINMENT VENT	TURBINE BUILDING VENT
Kr-83m	4.4(-1)	3.3(-1)	3.0(-1)
Kr-85m	2.2(0)	2.3(0)	1.5(0)
Kr 85	2.0(0)	5.1(2)	1.2(0)
Kr 87	1.2(0)	8.1(-1)	8.2(-1)
Kr 88	4.0(0)	3.6(0)	2.7(0)
Kr 89	2.8(-2)	8.3(-3)	6.4(-2)
Xe-131m	1.7(0)	2.6(1)	1.1(0)
Xe-133m	3.7(0)	1.6(1)	2.4(0)
Xe-133	2.9(2)	2.4(3)	1.8(2)
Xe-135m	1.8(-1)	7.8(-2)	2.0(-1)
Xe-135	6.8(0)	9.9(0)	4.4(0)
Xe-137	5.6(-2)	1.8(-2)	1.2(-1)
Xe-138	5.9(-1)	2.4(-1)	6.2(-1)
Br-83	8.0(-4)	1.5(-5)	9.5(-5)
Br-84	3.5(-4)	4.9(-6)	1.7(-5)
Br-85	1.2(-5)	1.3(-7)	2.4(-7)
I-130	3.6(-4)	1.3(-5)	6.9(-5)
I-131	4.5(-2)	1.2(-2)	9.2(-3)
I-132	1.7(-2)	3.7(-4)	2.6(-3)
I-133	6.5(-2)	3.4(-3)	1.4(-2)
I-134	7.1(-3)	1.1(-4)	5.0(-4)
I-135	3.3(-2)	9.0(-4)	5.4(-3)
Rb-86	1.9(-9)	2.1(-8)	2.4(-7)
Rb-88	1.6(-2)	2.1(-2)	1.0(-4)
Cs-134	5.5(-7)	1.1(-5)	6.4(-5)
Cs-136	2.9(-7)	2.6(-6)	3.6(-5)
Cs-137	4.0(-7)	7.8(-6)	5.3(-5)
Cr-51	2.0(-8)	2.6(-7)	3.6(-7)
Mn-54	1.6(-8)	3.1(-7)	4.5(-7)
Fe-59	2.1(-8)	3.2(-7)	5.4(-7)
Co-58	5.3(-9)	8.8(-8)	9.0(-6)
Co-60	1.6(-8)	3.1(-7)	2.7(-7)
Sr-89	7.6(-9)	1.2(-7)	1.6(-7)
Sr-90	2.2(-10)	4.3(-9)	8.4(-9)
Sr-91	1.5(-8)	1.2(-8)	8.9(-8)
Y-90	3.8(-10)	4.7(-9)	8.2(-9)
Ym-91	9.1(-9)	7.4(-9)	4.1(-8)
Y-91	4.4(-8)	7.0(-7)	1.9(-6)
Y-93	3.0(-9)	2.4(-9)	3.6(-8)
Zr-95	1.3(-9)	2.1(-8)	8.4(-8)
Nb-95	1.1(-9)	2.2(-8)	8.4(-8)
Mo-99	1.0(-5)	3.0(-5)	1.4(-4)
Tc-99m	8.9(-6)	2.8(-5)	1.0(-4)
Ru-103	9.8(-10)	1.4(-8)	4.2(-8)
Ru-106	2.2(-10)	4.1(-9)	8.4(-9)
Rh-103m	1.1(-9)	1.4(-8)	2.8(-8)
Rh-106	2.2(-10)	4.1(-9)	2.7(-7)
Tc-125m	6.3(-10)	1.0(-3)	1.3(-8)
Tc-127m	6.1(-9)	1.1(-7)	2.1(-7)
Tc-127	2.0(-8)	1.2(-7)	3.3(-7)

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TABLE 1.1 (CONTINUED)

<u>NUCLIDE</u>	<u>AUXILIARY BUILDING VENT</u>	<u>CONTAINMENT VENT</u>	<u>TURBINE BUILDING VENT</u>
Te-129m	3.1(-8)	4.3(-7)	1.3(-6)
Te-129	3.6(-8)	2.8(-7)	8.3(-7)
Tc-131m	5.6(-8)	9.1(-8)	2.0(-6)
Te-131	2.2(-8)	2.0(-8)	2.7(-7)
Te-132	6.0(-7)	2.0(-6)	2.1(-5)
Ba-137m	3.8(-7)	7.3(-6)	1.5(-5)
Pa-140	4.8(-9)	4.4(-8)	2.1(-7)
La-140	3.4(-9)	4.6(-8)	1.4(-7)
Ce-141	1.5(-9)	2.1(-8)	8.4(-8)
Ce-143	9.0(-10)	1.6(-9)	2.0(-8)
Ce-144	7.2(-10)	1.4(-8)	4.2(-8)
Pr-143	1.1(-9)	1.1(-8)	4.2(-8)
Pr-144	7.7(-10)	1.4(-8)	2.8(-8)
Np-239	2.7(-8)	7.0(-8)	1.2(-6)

NUCLIDE		HALF-LIFE (DAYS)	LAMBDA (1/S)	T	C	BETA (MEV/DIS)	GAMMA (MEV/DIS)	WASH (1/S)
1 TRITIUM	101	4.45E-03	1.74E-04	2	1	5.68E-03	0.0	2.86E-07
2 C-14	604	2.04E-06	3.84E-13	2	1	5.17E-02	0.0	0.0
3 N-13	702	6.94E-03	1.16E-03	2	1	4.91E-01	1.02E-00	1.00E-02
4 C-19	804	3.36E-04	2.34E-02	2	1	1.02E-00	1.05E-00	1.00E-02
5 F-18	902	7.62E-02	1.05E-04	2	1	2.41E-01	4.88E-01	1.00E-04
6 NA-24	1104	5.33E-01	1.27E-05	5	1	5.55E-01	4.12E-00	1.00E-04
7 P-32	1504	1.42E-01	5.61E-07	5	1	6.45E-01	0.0	1.00E-04
8 AR-41	1805	7.63E-02	1.05E-04	2	1	3.63E-01	1.28E-00	0.0
9 CH-51	2405	2.78E-01	2.89E-07	5	1	3.75E-03	3.28E-02	1.00E-04
10 MN-54	2508	3.03E-02	2.65E-08	5	1	4.17E-03	4.36E-01	1.00E-04
11 MN-56	2509	1.07E-01	7.50E-05	5	1	7.93E-01	1.76E-00	1.00E-04
12 FE-59	2604	4.50E-01	1.78E-07	5	1	1.18E-01	1.19E-00	1.00E-04
13 CO-58	2706	7.13E-01	1.12E-07	5	1	2.05E-01	9.76E-01	1.00E-04
14 CO-60	2708	1.92E-02	4.18E-04	5	1	4.68E-02	2.50E-00	1.00E-04
15 ZN-69M	3007	5.75E-01	1.34E-05	5	1	0.0	4.15E-00	1.00E-04
16 ZN-69	3006	3.96E-02	2.03E-04	5	1	3.19E-01	0.0	1.00E-04
17 BR-84	3516	2.21E-02	3.63E-04	2	1	1.28E-00	1.68E-00	1.00E-04
18 BR-85	3518	2.08E-02	3.86E-03	2	2	1.04E-00	8.40E-01	1.00E-04
19 KR-85M	3611	1.83E-01	4.38E-05	1	2	2.53E-01	1.54E-01	1.00E-11
20 KR-85	3610	3.93E-03	2.04E-04	1	1	2.51E-01	2.21E-03	1.00E-11
21 KR-87	3612	5.28E-02	1.52E-04	1	1	1.32E-00	7.93E-01	1.00E-11
22 KR-88	3613	1.17E-01	6.86E-05	1	1	3.75E-01	0.0	1.00E-11
23 KR-89	3614	2.21E-03	3.63E-03	1	1	1.23E-00	2.08E-00	1.00E-11
24 RB-88	3713	1.24E-02	6.47E-04	5	1	2.06E-00	6.86E-01	1.00E-04
25 RB-89	3714	1.07E-02	7.50E-04	5	1	0.0	2.40E-00	1.00E-04
26 SR-89	3808	5.20E-01	1.54E-07	5	1	5.73E-01	1.36E-04	2.67E-07
27 SR-90	3810	1.03E-04	7.79E-10	5	1	1.46E-01	0.0	2.67E-07
28 SR-91	3811	4.03E-01	1.99E-05	5	2	6.50E-01	6.95E-01	2.67E-07
29 SR-92	3812	1.13E-01	7.10E-05	5	1	1.45E-01	1.34E-00	2.67E-07
30 SR-93	3813	5.56E-02	1.44E-03	5	1	1.61E-00	6.28E-01	2.67E-07
31 Y-90	3916	2.67E-00	3.00E-06	5	1	9.36E-01	0.0	1.00E-04
32 Y-91M	3919	3.47E-02	2.31E-04	5	1	0.0	5.56E-01	1.00E-04
33 Y-91	3918	5.88E-01	1.36E-07	5	1	6.06E-01	3.61E-03	1.00E-04
34 Y-92	3920	1.47E-01	5.46E-05	5	1	1.44E-00	2.50E-01	1.00E-04
35 Y-93	3921	4.25E-01	1.87E-05	5	1	1.17E-00	8.94E-02	1.00E-04
36 ZR-95	4014	6.50E-01	1.23E-07	5	2	1.20E-01	7.35E-01	1.00E-04
37 NB-95M	4115	3.75E-00	2.14E-06	5	1	2.65E-01	5.87E-02	1.00E-04
38 NB-95	4114	3.50E-01	2.29E-07	5	1	4.50E-02	7.64E-01	1.00E-04
39 MO-99	4209	2.75E-00	2.87E-06	5	2	3.46E-01	1.62E-01	1.00E-04
40 TC-99M	4314	2.50E-01	3.21E-05	5	1	4.65E-03	1.43E-01	1.00E-04
41 TC-99	4313	7.74E-07	1.04E-13	5	1	8.38E-02	0.0	1.00E-04
42 TC-104	4320	1.25E-02	6.42E-04	5	1	0.0	0.0	1.00E-04
43 RU-106	4407	3.67E-02	2.19E-08	5	1	1.01E-02	0.0	1.00E-04
44 TE-132	5223	3.24E-00	2.48E-06	5	1	1.00E-01	2.05E-01	1.00E-04
45 I-129	5315	6.21E-09	1.29E-15	3	1	4.02E-02	3.77E-03	5.00E-06
46 I-131	5317	8.05E-00	9.96E-07	3	2	1.44E-01	3.81E-01	5.00E-06
47 MI-131	15317	8.05E-00	9.96E-07	4	2	1.44E-01	3.81E-01	5.00E-06
48 I-132	5318	9.56E-02	8.37E-05	3	1	5.14E-01	2.33E-00	5.00E-06
49 MI-132	15318	9.56E-02	8.37E-05	4	1	5.14E-01	2.33E-00	5.00E-06
50 I-133	5319	8.75E-01	9.17E-06	3	2	4.08E-01	6.10E-01	5.00E-06
51 MI-133	15319	8.75E-01	9.17E-06	4	2	4.08E-01	6.10E-01	5.00E-06
52 I-134	5320	3.61E-02	2.22E-04	3	1	6.10E-01	2.54E-00	5.00E-06
53 MI-134	15320	3.61E-02	2.22E-04	4	1	6.10E-01	2.54E-00	5.00E-06
54 I-135	5321	2.75E-01	2.87E-05	3	2	3.68E-01	1.58E-00	5.00E-06
55 MI-135	15321	2.75E-01	2.87E-05	4	2	3.68E-01	1.58E-00	5.00E-06
56 XE-131M	5412	1.18E-01	6.80E-07	1	1	1.43E-01	2.01E-02	1.00E-11
57 XE-133M	5414	2.26E-00	3.55E-06	1	1	1.40E-01	4.16E-02	1.00E-11
58 XE-132	5413	5.27E-00	1.52E-06	1	1	1.35E-01	4.54E-02	1.00E-11
59 XE-135M	5416	1.08E-02	7.43E-04	1	1	9.50E-02	4.32E-01	1.00E-11
60 XE-135	5415	3.83E-01	2.09E-05	1	1	3.17E-01	2.47E-01	1.00E-11
61 XE-137	5417	2.71E-03	2.96E-03	1	1	1.64E-00	1.94E-01	1.00E-11
62 XE-138	5418	1.18E-02	6.80E-04	1	1	6.06E-01	1.18E-00	1.00E-11
63 CS-134	5510	7.48E-02	1.07E-04	5	1	1.57E-01	1.04E-00	1.00E-04
64 CS-135	5512	1.10E-09	7.24E-15	5	1	5.74E-02	0.0	1.00E-04
65 CS-136	5514	1.20E-01	6.17E-07	5	1	1.01E-01	2.20E-00	1.00E-04
66 CS-137	5515	1.10E-04	7.24E-10	5	1	2.52E-01	5.47E-01	1.00E-04
67 CS-138	5516	2.24E-02	3.58E-04	5	1	1.23E-00	2.30E-00	1.00E-04
68 BA-139	5615	5.78E-02	1.39E-04	5	1	6.54E-01	5.05E-02	1.00E-04
69 BA-140	5616	1.28E-01	4.27E-07	5	1	3.15E-01	1.95E-01	1.00E-04
70 LA-140	5715	1.68E-00	4.77E-06	5	1	5.40E-01	2.31E-00	1.00E-04
71 CE-144	5815	2.84E-02	2.42E-08	5	1	4.13E-02	3.24E-02	1.00E-04
72 PH-143	5912	1.38E-01	5.40E-07	5	1	3.14E-01	0.0	1.00E-04
73 PO-144	5913	1.20E-02	6.42E-04	5	1	0.0	0.0	1.00E-04

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NUCLIDE		HALF-LIFE (DAYS)	LAMBDA (1/S)	T	C	BETA (MEV/OIS)	GAMMA (MEV/OIS)	WASH (1/S)
1 TRITIUM	101	4.44E-03	1.74E-04	2	1	5.68E-03	0.0	2.86E-07
2 C-14	604	2.04E-06	3.84E-12	2	1	5.17E-02	0.0	0.0
3 A-13	702	6.94E-03	1.16E-03	2	1	4.91E-01	1.02E-00	1.00E-02
4 O-19	804	3.36E-04	2.34E-02	2	1	1.02E-00	1.05E-00	1.00E-02
5 F-18	902	7.62E-02	1.05E-04	2	1	2.41E-01	4.88E-01	1.00E-04
6 NA-24	1104	6.33E-01	1.27E-05	5	1	5.55E-01	4.12E-00	1.00E-04
7 P-32	1504	1.43E-01	5.61E-07	5	1	6.45E-01	0.0	1.00E-04
8 AR-41	1805	7.63E-02	1.05E-04	2	1	3.53E-01	1.28E-00	0.0
9 CH-51	2405	2.72E-01	2.89E-07	5	1	3.75E-03	3.28E-02	1.00E-04
10 KA-54	2508	3.03E-02	2.65E-08	5	1	4.17E-03	9.36E-01	1.00E-04
11 KA-56	2509	1.07E-01	7.50E-05	5	1	7.93E-01	1.76E-00	1.00E-04
12 FE-59	2604	4.50E-01	1.78E-07	5	1	1.18E-01	1.19E-00	1.00E-04
13 CO-58	2706	7.13E-01	1.12E-07	5	1	2.05E-01	9.76E-01	1.00E-04
14 CO-60	2708	1.92E-02	4.18E-04	5	1	9.68E-02	2.50E-00	1.00E-04
15 ZA-69M	3007	5.75E-01	1.34E-05	5	1	0.0	4.15E-00	1.00E-04
16 ZA-69	3006	3.96E-02	2.03E-04	5	1	3.19E-01	0.0	1.00E-04
17 BR-84	3516	2.21E-02	3.63E-04	2	1	1.26E-00	1.68E-00	1.00E-04
18 BR-85	3518	2.08E-02	3.86E-03	2	2	1.04E-00	8.40E-01	1.00E-04
19 KR-85M	3611	1.83E-01	4.38E-05	1	2	2.53E-01	1.54E-01	1.00E-11
20 KR-85	3610	3.93E-03	2.04E-04	1	1	2.51E-01	2.21E-03	1.00E-11
21 KR-87	3612	5.28E-02	1.52E-04	1	1	1.32E-00	7.93E-01	1.00E-11
22 KR-89	3613	1.17E-01	6.86E-05	1	1	3.75E-01	1.96E-00	1.00E-11
23 KR-89	3614	2.21E-02	3.63E-03	1	1	1.23E-00	2.08E-00	1.00E-11
24 RB-88	3713	1.24E-02	6.47E-04	5	1	2.06E-00	6.86E-01	1.00E-04
25 RB-89	3714	1.07E-02	7.50E-04	5	1	0.0	2.40E-00	1.00E-04
26 SR-89	3808	5.20E-01	1.54E-07	5	1	5.73E-01	1.36E-04	2.67E-07
27 SR-90	3810	1.03E-04	7.79E-10	5	1	1.46E-01	0.0	2.67E-07
28 SR-91	3811	4.03E-01	1.94E-05	5	2	6.50E-01	6.95E-01	2.67E-07
29 SR-92	3812	1.13E-01	7.10E-05	5	1	1.45E-01	1.34E-00	2.67E-07
30 SR-93	3813	5.56E-02	1.44E-03	5	1	1.61E-00	6.26E-01	2.67E-07
31 Y-90	3916	2.67E-00	3.00E-06	5	1	9.36E-01	0.0	1.00E-04
32 Y-91M	3919	3.47E-02	2.31E-04	5	1	0.0	5.56E-01	1.00E-04
33 Y-91	3918	5.88E-01	1.36E-07	5	1	6.06E-01	3.61E-03	1.00E-04
34 Y-92	3920	1.47E-01	5.46E-05	5	1	1.44E-00	2.50E-01	1.00E-04
35 Y-93	3921	4.25E-01	1.87E-05	5	1	1.17E-00	8.94E-02	1.00E-04
36 ZA-95	4014	6.50E-01	1.23E-07	5	2	1.20E-01	7.35E-01	1.00E-04
37 NE-95M	4115	3.75E-00	2.14E-06	5	1	2.85E-01	5.87E-02	1.00E-04
38 NE-95	4114	3.50E-01	2.24E-07	5	1	4.50E-02	7.64E-01	1.00E-04
39 MO-99	4209	2.75E-00	2.87E-06	5	2	3.46E-01	1.62E-01	1.00E-04
40 TC-99M	4314	2.50E-01	3.21E-05	5	1	4.65E-03	1.43E-01	1.00E-04
41 TC-99	4313	7.74E-07	1.04E-13	5	1	8.38E-02	0.0	1.00E-04
42 TC-104	4320	1.25E-02	6.42E-04	5	1	0.0	0.0	1.00E-04
43 RU-106	4407	3.67E-02	2.19E-08	5	1	1.01E-02	0.0	1.00E-04
44 TE-132	5223	3.24E-00	2.48E-06	5	1	1.00E-01	2.05E-01	1.00E-04
45 I-124	5315	6.21E-09	1.24E-15	3	1	4.02E-02	3.77E-03	5.00E-06
46 I-131	5317	8.05E-00	9.96E-07	3	2	1.44E-01	3.81E-01	5.00E-06
47 MI-131	15317	8.05E-00	9.96E-07	4	2	1.44E-01	3.81E-01	5.00E-06
48 I-132	5318	9.56E-02	8.37E-05	3	1	5.14E-01	2.33E-00	5.00E-06
49 MI-132	15318	9.56E-02	8.37E-05	4	1	5.14E-01	2.33E-00	5.00E-06
50 I-133	5319	8.75E-01	9.17E-06	3	2	4.08E-01	6.10E-01	5.00E-06
51 MI-133	15319	8.75E-01	9.17E-06	4	2	4.08E-01	6.10E-01	5.00E-06
52 I-134	5320	3.61E-02	2.22E-04	3	1	6.10E-01	2.54E-00	5.00E-06
53 MI-134	15320	3.61E-02	2.22E-04	4	1	6.10E-01	2.54E-00	5.00E-06
54 I-135	5321	2.75E-01	2.87E-05	3	2	3.68E-01	1.58E-00	5.00E-06
55 MI-135	15321	2.75E-01	2.87E-05	4	2	3.68E-01	1.58E-00	5.00E-06
56 XE-131M	5412	1.18E-01	6.80E-07	1	1	1.43E-01	2.01E-02	1.00E-11
57 XE-133M	5414	2.26E-00	3.55E-06	1	1	1.40E-01	4.16E-02	1.00E-11
58 XE-132	5413	5.27E-00	1.52E-06	1	1	1.35E-01	4.54E-02	1.00E-11
59 XE-135M	5416	1.08E-02	7.43E-04	1	1	9.50E-02	4.32E-01	1.00E-11
60 XE-135	5415	3.82E-01	2.09E-05	1	1	3.17E-01	2.47E-01	1.00E-11
61 XE-137	5417	2.71E-02	2.96E-03	1	1	1.64E-00	1.94E-01	1.00E-11
62 XE-138	5418	1.18E-02	6.80E-04	1	1	6.06E-01	1.18E-00	1.00E-11
63 CS-134	5510	7.48E-02	1.07E-08	5	1	1.57E-01	1.04E-00	1.00E-04
64 CS-135	5512	1.10E-09	7.24E-15	5	1	5.74E-02	0.0	1.00E-04
65 CS-136	5514	1.30E-01	6.17E-07	5	1	1.01E-01	2.20E-00	1.00E-04
66 CS-137	5515	1.10E-04	7.24E-10	5	1	2.52E-01	5.97E-01	1.00E-04
67 CS-138	5516	2.24E-02	3.54E-04	5	1	1.23E-00	2.30E-00	1.00E-04
68 BA-139	5615	5.76E-02	1.34E-04	5	1	6.54E-01	5.05E-02	1.00E-04
69 BA-140	5616	1.28E-01	6.27E-07	5	1	3.15E-01	1.95E-01	1.00E-04
70 LA-140	5715	1.68E-00	4.77E-06	5	1	5.40E-01	2.31E-00	1.00E-04
71 CE-144	5915	2.84E-02	2.42E-08	5	1	4.13E-02	3.24E-02	1.00E-04
72 PR-143	5912	1.36E-01	5.40E-07	5	1	3.14E-01	0.0	1.00E-04
73 RE-146	5919	1.38E-02	6.41E-05	5	1	0.0	0.0	1.00E-04

367

307 34



TABLE 1.3

JOINT PERCENTAGE FREQUENCIES OF WIND DIRECTION AND WIND SPEED  
FOR DIFFERENT STABILITY CLASSES \*

STABILITY CLASS A

DELTA T = -1.9 DEG. C/100M

## SEQUOYAH NUCLEAR PLANT METEOROLOGICAL FACILITY\*

JAN 1, 72 - DEC 31, 75

WIND DIRECTION	WIND SPEED (MPH)										INITIAL
	0-5-1-5	1.5-3-5	3.5-5-5	5-5-7-5	7-5-12-5	12-5-18-5	18-5-24-5	24-5-30-5	30-5-36-5	36-5-42-5	
N	0.01	0.01	0.03	0.04	0.04	0.04	0.0	0.0	0.0	0.13	
NNE	0.0	0.04	0.19	0.20	0.16	0.01	0.0	0.0	0.0	0.60	
NE	0.0	0.08	0.20	0.15	0.13	0.0	0.0	0.0	0.0	0.56	
ENE	0.0	0.03	0.03	0.01	0.0	0.0	0.0	0.0	0.0	0.07	
E	0.0	0.01	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.01	
ESE	0.0	0.01	0.01	0.0	0.0	0.01	0.0	0.0	0.0	0.03	
SE	0.0	0.01	0.02	0.0	0.0	0.0	0.0	0.0	0.0	0.03	
SSE	0.0	0.01	0.03	0.02	0.02	0.01	0.0	0.0	0.0	0.09	
S	0.0	0.01	0.04	0.06	0.05	0.01	0.0	0.0	0.0	0.17	
SSW	0.0	0.01	0.09	0.18	0.16	0.01	0.0	0.0	0.0	0.45	
SW	0.0	0.04	0.12	0.10	0.09	0.02	0.0	0.0	0.0	0.37	
WSW	0.0	0.02	0.03	0.03	0.02	0.02	0.0	0.0	0.0	0.12	
W	0.0	0.01	0.0	0.01	0.02	0.0	0.0	0.0	0.0	0.04	
WNW	0.0	0.0	0.0	0.0	0.01	0.01	0.0	0.0	0.0	0.02	
NW	0.0	0.01	0.01	0.01	0.05	0.01	0.0	0.0	0.0	0.09	
NNW	0.0	0.01	0.0	0.02	0.08	0.01	0.0	0.0	0.0	0.12	
TOTAL	0.01	0.31	0.80	0.83	0.83	0.12	0.0	0.0	0.0	2.90	

H = 0.01

367 58 STABILITY CLASS A OCCURRENCES OUT OF TOTAL 32723 VALID TEMPERATURE DIFFERENCE READINGS

334 VALID WIND DIRECTION - WIND SPEED READINGS OUT OF TOTAL 958 STABILITY CLASS A OCCURRENCES

ALL COLUMNS AND CALM TOTAL 100 PERCENT OF NET VALID READINGS

308 305  
 METEOROLOGICAL FACILITY LOCATED 0.74 MILES SW OF SEQUOYAH NUCLEAR PLANT  
 TEMPERATURE INSTRUMENTS 33 AND 150 FEET ABOVE GROUND  
 NO INSTRUMENTS 33 FEET ABOVE GROUND

TABLE 1.3 (Continued)

JOINT PERCENTAGE FREQUENCIES OF WIND DIRECTION AND WIND SPEED  
FOR DIFFERENT STABILITY CLASSES \*STABILITY CLASS B  
-1.9 < DELTA-T < -1.7 DEG. C/100M

SEQUOYAH NUCLEAR PLANT METEOROLOGICAL FACILITY\*

JAN 1, 72 - DEC 31, 75

WIND DIRECTION	WIND SPEED(MPH)										INITIAL
	0-6-1-6	1-5-3-6	3-5-5-6	5-5-7-6	7-5-12-6	12-5-18-6	18-5-26-6	2-24-5			
N	0.0	0.01	0.01	0.02	0.03	0.0	0.0	0.0	0.0	0.07	
NNE	0.0	0.05	0.23	0.20	0.13	0.01	0.0	0.0	0.0	0.67	
NE	0.0	0.08	0.29	0.09	0.06	0.0	0.0	0.0	0.0	0.52	
ENE	0.0	0.03	0.03	0.01	0.0	0.0	0.0	0.0	0.0	0.07	
E	0.0	0.02	0.01	0.0	0.0	0.0	0.0	0.0	0.0	0.03	
ESE	0.0	0.0	0.01	0.0	0.0	0.0	0.0	0.0	0.0	0.01	
SE	0.0	0.01	0.02	0.0	0.01	0.0	0.0	0.0	0.0	0.04	
SSE	0.0	0.01	0.03	0.0	0.02	0.0	0.0	0.0	0.0	0.06	
S	0.0	0.03	0.03	0.07	0.04	0.01	0.0	0.0	0.0	0.18	
SSW	0.0	0.04	0.09	0.20	0.20	0.03	0.0	0.0	0.0	0.56	
SW	0.0	0.03	0.11	0.14	0.10	0.02	0.0	0.0	0.0	0.40	
WSW	0.0	0.01	0.01	0.03	0.02	0.01	0.01	0.0	0.0	0.09	
W	0.0	0.0	0.0	0.01	0.01	0.0	0.0	0.0	0.0	0.02	
WNW	0.0	0.0	0.01	0.01	0.03	0.0	0.0	0.0	0.0	0.05	
NW	0.0	0.0	0.0	0.01	0.05	0.0	0.0	0.0	0.0	0.06	
NNW	0.0	0.02	0.02	0.02	0.06	0.01	0.0	0.0	0.0	0.12	
TOTAL	0.0	0.33	0.90	0.81	0.81	0.09	0.01	0.0	0.0	2.95	

M = 0.01

367 309 366  
269 STABILITY CLASS B OCCURRENCES OUT OF TOTAL 32723 VALID TEMPERATURE DIFFERENCE READINGS

253 VALID WIND DIRECTION - WIND SPEED READINGS OUT OF TOTAL 969 STABILITY CLASS B OCCURRENCES

ALL COLUMNS AND CALM TOTAL 100 PERCENT OF NET VALID READINGS

METEOROLOGICAL FACILITY LOCATED .74 MILES SW OF SEQUOYAH NUCLEAR PLANT  
TEMPERATURE INSTRUMENTS 33 AND 150 FEET ABOVE GROUND  
WIND INSTRUMENTS 33 FEET ABOVE GROUND

TABLE 1.3 (Continued)

JOINT PERCENTAGE FREQUENCIES OF WIND DIRECTION AND WIND SPEED  
FOR DIFFERENT STABILITY CLASSES

STABILITY CLASS C

-1.7 &lt; DELTA-T &lt; -1.5 DEG. C/100M

SEQUOYAH NUCLEAR PLANT METEOROLOGICAL FACILITY

JAN. 1, 72 - DEC 31, 75

WIND DIRECTION	0.6-1.6	1.5-3.4	3.5-5.4	5.5-7.4	7.5-12.4	12.5-18.4	18.5-24.4	24.5	TOTAL
N	0.0	0.01	0.02	0.02	0.02	0.0	0.0	0.0	0.07
NNE	0.0	0.05	0.12	0.11	0.11	0.0	0.0	0.0	0.39
NE	0.0	0.05	0.14	0.05	0.03	0.0	0.0	0.0	0.27
ENE	0.0	0.03	0.02	0.0	0.0	0.0	0.0	0.0	0.05
E	0.0	0.01	0.01	0.0	0.0	0.0	0.0	0.0	0.02
ESE	0.0	0.01	0.01	0.0	0.0	0.0	0.0	0.0	0.02
SE	0.0	0.01	0.01	0.0	0.0	0.0	0.0	0.0	0.02
SSE	0.0	0.01	0.02	0.0	0.02	0.0	0.0	0.0	0.05
S	0.0	0.03	0.04	0.06	0.05	0.0	0.0	0.0	0.18
SSW	0.0	0.01	0.11	0.14	0.13	0.02	0.0	0.0	0.41
SW	0.0	0.03	0.00	0.12	0.07	0.01	0.0	0.0	0.31
WSW	0.0	0.01	0.02	0.03	0.02	0.0	0.0	0.0	0.08
W	0.0	0.0	0.01	0.0	0.01	0.01	0.0	0.0	0.03
WNW	0.0	0.0	0.01	0.01	0.01	0.0	0.0	0.0	0.03
NW	0.0	0.0	0.0	0.02	0.03	0.01	0.0	0.0	0.06
NNW	0.0	0.0	0.02	0.02	0.05	0.0	0.0	0.0	0.09
TOTAL	0.0	0.26	0.64	0.50	0.55	0.05	0.0	0.0	2.08

LM = 0.0

684 STABILITY CLASS C OCCURRENCES OUT OF TOTAL 32723 VALID TEMPERATURE DIFFERENCE READINGS

672 VALID WIND DIRECTION - WIND SPEED READINGS OUT OF TOTAL 684 STABILITY CLASS C OCCURRENCES

ALL COLUMNS AND CALM TOTAL 100 PERCENT OF NET VALID READINGS

SEQUEYAH NUCLEAR PLANT FACILITY LOCATED .74 MILES SW OF SEQUEYAH NUCLEAR PLANT  
 TEMPERATURE INSTRUMENTS 33 AND 150 FEET ABOVE GROUND  
 WIND INSTRUMENTS 33 FEET ABOVE GROUND



TABLE 1.3 (Continued)

JOINT PERCENTAGE FREQUENCIES OF WIND DIRECTION AND WIND SPEED  
FOR DIFFERENT STABILITY CLASSESSTABILITY CLASS D  
-1.5 < DELTA-T < -0.5 DEG. C/100M

## SEQUOYAH NUCLEAR PLANT METEOROLOGICAL FACILITY

JAN 1, 72 - DEC 31, 75

WIND DIRECTION	WIND SPEED (MPH)										TOTAL
	0-6=	7-14	15-24	25-34	35-44	45-54	55-64	65-74	75-84	85-94	
N	0.01	0.24	0.22	0.16	0.17	0.07	0.0	0.0	0.0	0.0	0.80
NNE	0.06	0.73	1.03	0.84	0.70	0.07	0.0	0.0	0.0	0.0	3.51
NE	0.02	0.76	0.88	0.42	0.42	0.05	0.0	0.0	0.0	0.0	2.55
NNE	0.01	0.21	0.11	0.03	0.0	0.0	0.0	0.0	0.0	0.0	0.36
E	0.01	0.12	0.03	0.02	0.01	0.0	0.0	0.0	0.0	0.0	0.19
ESE	0.01	0.06	0.02	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.09
SE	0.0	0.12	0.08	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.20
SSE	0.0	0.15	0.15	0.05	0.06	0.01	0.0	0.0	0.0	0.0	0.43
S	0.01	0.11	0.53	0.38	0.25	0.07	0.0	0.0	0.0	0.0	1.50
SSW	0.01	0.44	1.25	0.95	0.70	0.07	0.0	0.0	0.0	0.0	3.42
SW	0.01	0.41	1.17	1.03	0.52	0.03	0.01	0.0	0.0	0.0	3.24
WSW	0.0	0.22	0.34	0.18	0.21	0.07	0.01	0.0	0.0	0.0	1.03
W	0.01	0.06	0.08	0.10	0.19	0.02	0.01	0.0	0.0	0.0	0.47
WNW	0.01	0.06	0.05	0.17	0.18	0.01	0.0	0.0	0.0	0.0	0.42
NW	0.0	0.08	0.08	0.22	0.31	0.03	0.0	0.0	0.0	0.0	0.72
NNW	0.01	0.15	0.14	0.25	0.36	0.02	0.0	0.0	0.0	0.0	0.93
SUBTOTAL	0.18	4.18	6.16	4.74	4.16	0.40	0.04	0.0	0.0	0.0	19.86

CALM = 0.05

6567 STABILITY CLASS D OCCURRENCES OUT OF TOTAL 32723 VALID TEMPERATURE DIFFERENCE READINGS

6345 VALID WIND DIRECTION - WIND SPEED READINGS OUT OF TOTAL 6567 STABILITY CLASS D OCCURRENCES

ALL COLUMNS AND CALM TOTAL 100 PERCENT OF NET VALID READINGS

METEOROLOGICAL FACILITY LOCATED .74 MILES SW OF SEQUOYAH NUCLEAR PLANT  
TEMPERATURE INSTRUMENTS 33 AND 150 FEET ABOVE GROUND  
WIND INSTRUMENTS 33 FEET ABOVE GROUND

TABLE 1.3 (Continued)

JOINT PERCENTAGE FREQUENCIES OF WIND DIRECTION AND WIND SPEED  
FOR DIFFERENT STABILITY CLASSES

STABILITY CLASS E  
-0.5 < DELTA-T < 1.5 DEG. C/100  
SEQUOYAH NUCLEAR PLANT METEOROLOGICAL FACILITY

JAN 1, 72 - DEC 31, 75

WIND DIRECTION	WIND SPEED (MPH)										TOTAL
	0-5-10	10-15	15-20	20-25	25-30	30-35	35-40	40-45	45-50	50-55	
N	0.07	0.23	1.26	0.83	0.39	0.27	0.0	0.0	0.0	0.0	2.98
NNE	0.23	0.31	2.83	2.46	1.07	0.92	0.03	0.0	0.0	0.0	7.62
N-E	0.11	0.15	1.03	0.71	0.31	0.18	0.01	0.0	0.0	0.0	2.39
ENE	0.09	0.12	0.40	0.16	0.04	0.0	0.0	0.0	0.0	0.0	0.80
E	0.10	0.14	0.24	0.05	0.01	0.01	0.0	0.0	0.0	0.0	0.45
ESE	0.07	0.09	0.11	0.01	0.01	0.01	0.01	0.0	0.0	0.0	0.24
SE	0.07	0.10	0.37	0.06	0.01	0.01	0.0	0.0	0.0	0.0	0.55
SSE	0.08	0.11	0.58	0.24	0.13	0.23	0.04	0.02	0.0	0.0	1.35
S	0.13	0.17	1.33	1.49	0.91	1.05	0.08	0.0	0.0	0.0	5.03
SSW	0.07	0.10	1.67	2.32	1.67	1.1	0.11	0.0	0.0	0.0	7.32
SW	0.13	0.17	1.59	2.07	1.30	0.99	0.10	0.0	0.0	0.0	6.22
WSW	0.10	0.13	0.87	0.55	0.35	0.40	0.06	0.0	0.0	0.0	2.36
W	0.07	0.10	0.42	0.20	0.21	0.22	0.03	0.0	0.0	0.0	1.26
WSW	0.10	0.14	0.37	0.22	0.19	0.27	0.02	0.0	0.0	0.0	1.21
W	0.07	0.10	0.50	0.37	0.43	0.30	0.02	0.0	0.0	0.0	1.80
WNW	0.11	0.15	0.80	0.60	0.57	0.40	0.01	0.0	0.0	0.0	2.61
TOTAL	2.31	14.45	12.50	7.60	6.79	5.52	0.02	0.0	0.0	0.0	44.19

LM = 0.17

3624 STABILITY CLASS E OCCURRENCES OUT OF TOTAL 32723 VALID TEMPERATURE DIFFERENCE READINGS

146 VALID WIND DIRECTION - WIND SPEED READINGS OUT OF TOTAL 14624 STABILITY CLASS E OCCURRENCES

ALL COLUMNS AND CALM TOTAL 100 PERCENT OF NET VALID READINGS

METEOROLOGICAL FACILITY LOCATED 0.74 MILES SW OF SEQUOYAH NUCLEAR PLANT  
TEMPERATURE INSTRUMENTS 33 AND 150 FEET ABOVE GROUND  
WIND INSTRUMENTS 33 FEET ABOVE GROUND

TABLE 1.3 (Continued)

### MINUTE PERCENTAGE FREQUENCIES OF WIND DIRECTION AND WIND SPEED

STABILITY CLASS F

1.5- DELTA-Y = 4.0 DEG. C/100M.

SEFQUNYAH NUCLEAR PLANT METEOROLOGICAL FACILITY\*

JAN 1, 72 - DEC 31, 75

WIND DIRECTION		WIND SPEED (MPH)										TOTAL	
		0-6=1-6	1-5=3-4	3-5=5-6	5-6=7-6	7-6=12-6	12-5=10-4	10-5=24-6	2-24-5			TOTAL	
N	.011	0.21	1.37	0.44	0.04	0.0	0.0	0.0	0.0	0.0	2.06		
NNE	.018	0.35	3.61	0.04	0.05	0.0	0.0	0.0	0.0	0.0	4.85		
NE	.011	0.21	1.15	0.20	0.01	0.0	0.0	0.0	0.0	0.0	1.65		
ENE	.008	0.16	0.39	0.03	0.0	0.0	0.0	0.0	0.0	0.0	0.58		
E	.010	0.20	0.22	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.42		
ESE	.007	0.13	0.10	0.02	0.0	0.0	0.0	0.0	0.0	0.0	0.33		
SE	.007	0.14	0.23	0.02	0.0	0.0	0.0	0.0	0.0	0.0	0.39		
SSE	.005	0.15	0.37	0.07	0.03	0.01	0.0	0.0	0.0	0.0	0.63		
S	.001	0.17	0.77	0.30	0.10	0.06	0.0	0.0	0.0	0.0	1.40		
SSW	.006	0.12	1.13	0.71	0.26	0.11	0.0	0.0	0.0	0.0	2.33		
SW	.005	0.10	0.99	0.86	0.27	0.13	0.0	0.0	0.0	0.0	2.35		
WSW	.005	0.09	0.46	0.19	0.04	0.01	0.0	0.0	0.0	0.0	0.79		
W	.004	0.07	0.20	0.07	0.01	0.0	0.0	0.0	0.0	0.0	0.35		
WNW	.005	0.10	0.24	0.07	0.01	0.0	0.0	0.0	0.0	0.0	0.42		
NW	.003	0.05	0.29	0.15	0.05	0.01	0.0	0.0	0.0	0.0	0.55		
NNW	.005	0.09	0.52	0.34	0.05	0.01	0.0	0.0	0.0	0.0	1.01		
TOTAL		2.34	12.12	4.39	0.92	0.34	0.0	0.0	0.0	0.0	20.11		

 $\Delta L_M = 0.12$ 

32723 VALID TEMPERATURE DIFFERENCE READINGS

WIND DIRECTION - WIND SPEED READINGS OUT OF TOTAL 6542 STABILITY CLASS F OCCURRENCES

ALL COLUMNS AND CALM TOTAL 100 PERCENT OF NET VALID READINGS.

313 METEOROLOGICAL FACILITY LOCATED .74 MILES SW OF SEQUOYAH NUCLEAR PLANT  
TEMPERATURE INSTRUMENTS 33 AND 150 FEET ABOVE GROUND  
150 INSTRUMENTS 33 FEET ABOVE GROUND

TABLE 1.3 (Continued)

JOINT PERCENTAGE FREQUENCIES OF WIND DIRECTION AND WIND SPEED  
FOR DIFFERENT STABILITY CLASSES

STABILITY CLASS G

DELTA T &gt; 4.0 DEG. C/100M

## SECUDYAH NUCLEAR PLANT METEOROLOGICAL FACILITY

JAN 1, 72 - DEC 31, 75

WIND DIRECTION	WIND SPEED (MPH)										TOTAL
	0-6=1-6	1-5=7-6	3-5=5-6	5-5=7-6	7-5=12-6	12-5=18-6	18-5=24-6	2-24-5	5-24-5	0-0	
N	0.06	0.33	0.09	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.48
NNE	0.10	1.03	0.20	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.33
N E	0.09	0.74	0.12	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.95
E NE	0.13	0.42	0.02	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.57
E	0.14	0.18	0.01	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.33
ESE	0.11	0.08	0.01	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.20
SE	0.09	0.08	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.17
SSE	0.16	0.21	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.37
S	0.11	0.39	0.04	0.01	0.0	0.0	0.0	0.0	0.0	0.0	0.55
SSW	0.06	0.48	0.32	0.02	0.01	0.0	0.0	0.0	0.0	0.0	0.89
SW	0.03	0.44	0.42	0.06	0.0	0.0	0.0	0.0	0.0	0.0	0.95
WSW	0.01	0.11	0.07	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.19
W	0.03	0.08	0.02	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.13
WNW	0.01	0.03	0.01	0.0	0.01	0.0	0.0	0.0	0.0	0.0	0.06
NW	0.02	0.06	0.03	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.11
NNW	0.02	0.00	0.03	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.13
UBTOTAL	1.17	4.74	1.39	0.09	0.02	0.0	0.0	0.0	0.0	0.0	7.41

LM = 0.06

2379 STABILITY CLASS G OCCURRENCES OUT OF TOTAL 32723 VALID TEMPERATURE DIFFERENCE READINGS

2379 VALID WIND DIRECTION - WIND SPEED READINGS OUT OF TOTAL 2379 STABILITY CLASS G OCCURRENCES

ALL COLUMNS AND CALM TOTAL 100 PERCENT OF NET VALID READINGS

314 511

METEOROLOGICAL FACILITY LOCATED 7.4 MILES SW OF SECUDYAH NUCLEAR PLANT  
TEMPERATURE INSTRUMENTS 33 AND 150 FEET ABOVE GROUND  
WIND INSTRUMENTS 33 FEET ABOVE GROUND

TABLE 1.3 (Continued)

PERCENT OCCURRENCE OF WIND-SEELED  
FOR ALL WIND DIRECTIONS

## SEQUOYAH NUCLEAR PLANT METEOROLOGICAL FACILITY\*

JAN 1, 72 - DEC 31, 75

WIND DIRECTION	WIND SPEED (MPH)										TOTAL
	0-5	5-10	10-15	15-20	20-25	25-30	30-35	35-40	40-45	45-50	
N	0.51	3.20	1.63	0.67	0.50	0.0	0.0	0.0	0.0	0.0	6.59
NE	0.02	0.30	5.05	2.46	2.18	0.13	0.0	0.0	0.0	0.0	10.92
E	0.40	3.06	2.59	1.01	0.03	0.06	0.0	0.0	0.0	0.0	8.83
SE	0.7	1.50	0.39	0.09	0.0	0.01	0.0	0.0	0.0	0.0	2.49
S	0.50	0.0	0.11	0.03	0.02	0.01	0.0	0.0	0.0	0.0	1.47
SW	0.33	0.45	0.07	0.02	0.01	0.0	0.0	0.0	0.0	0.0	0.90
W	0.34	0.62	0.19	0.01	0.02	0.0	0.0	0.0	0.0	0.0	1.30
WNW	0.41	1.36	0.55	0.23	0.36	0.06	0.02	0.0	0.0	0.0	2.99
NW	0.47	2.09	2.49	1.50	1.53	0.14	0.0	0.0	0.0	0.0	9.10
NNW	0.29	3.79	6.91	3.44	2.84	0.24	0.0	0.0	0.0	0.0	15.51
NNE	0.30	3.55	4.79	3.02	1.93	0.20	0.02	0.0	0.0	0.0	13.81
ESE	0.24	1.60	1.19	0.66	0.69	0.16	0.02	0.0	0.0	0.0	4.66
ENE	0.21	0.78	0.97	0.35	0.44	0.06	0.01	0.0	0.0	0.0	2.32
ENE	0.27	0.70	0.36	0.34	0.51	0.03	0.0	0.0	0.0	0.0	2.21
ENE	0.18	0.93	0.63	0.74	0.83	0.07	0.0	0.0	0.0	0.0	3.30
ENE	0.27	1.55	1.23	0.93	0.99	0.04	0.0	0.0	0.0	0.0	5.01
TOTAL	6.04	36.24	26.65	15.50	13.76	1.21	0.07	0.0	0.0	0.0	99.55

0.43

\* VALID WIND DIRECTION - WIND SPEED READINGS OUT OF 35040 TOTAL HOURS - 92.29 PERCENT

\* COLUMNS AND CALM TOTAL 100 PERCENT OF NET VALID READINGS

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METEOROLOGICAL FACILITY LOCATED 0.74 MILES SW OF SEQUOYAH NUCLEAR PLANT  
D. INSTRUMENTS 33 FEET ABOVE GROUND

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TABLE 1.4

SEQUOYAH NUCLEAR LANT LAND SITE BOUNDARY DATA<sup>1</sup>

<u>Sector</u>	<u>Distance (m)</u>	<u><math>\chi/Q^2</math></u>	<u><math>D/Q^3</math></u>
N	950	5.13(-6)	1.29(-8)
NNE	2,260	1.94(-6)	5.28(-9)
NE	1,910	2.33(-6)	6.33(-9)
ENE	1,680	1.12(-6)	2.64(-9)
E	1,570	7.11(-7)	1.46(-9)
ESE	1,460	7.92(-7)	1.58(-9)
SE	1,460	9.17(-7)	2.71(-9)
SSE	1,550	1.34(-6)	3.23(-9)
S	1,570	2.37(-6)	4.18(-9)
SSW	1,840	4.51(-6)	9.26(-9)
SW	2,470	1.38(-6)	2.63(-9)
WSW	910	2.93(-6)	3.86(-9)
W	670	3.63(-6)	3.74(-9)
WNW	660	2.49(-6)	2.44(-9)
NW	660	2.85(-6)	3.67(-9)
NNW	730	3.96(-6)	6.59(-9)

1. All release points treated as ground level.

2.  $s/Q^3$ .

3.  $Q^{-2}$ .

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TABLE 1.5

## DOSE FACTORS FOR SUBMERSION IN NOBLE GASES

	<u>DFB<sup>1</sup></u>	<u>DFY<sup>2</sup></u>	<u>DFS<sup>1</sup></u>	<u>DFE<sup>2</sup></u>
Kr-85m	1.17(+3) <sup>3</sup>	1.21(+3)	1.46(+3)	3.86(+3)
Kr-85	1.61(+1)	1.69(+1)	1.34(+3)	3.83(+3)
Kr-87	5.92(+3)	6.05(+3)	9.73(+3)	2.01(+4)
Kr-88	1.47(+4)	1.50(+4)	2.37(+3)	5.72(+3)
Kr-89	1.66(+4)	1.59(+4)	1.01(+4)	1.88(+4)
Xe-131m	9.15(+1)	1.53(+2)	4.76(+2)	2.18(+3)
Xe-133m	2.51(+2)	3.17(+2)	9.94(+2)	2.90(+3)
Xe-133	2.94(+2)	3.46(+2)	3.06(+2)	2.06(+3)
Xe-135m	3.12(+3)	3.30(+3)	7.11(+2)	1.45(+3)
Xe-135	1.81(+3)	1.88(+3)	1.86(+3)	4.84(+3)
Xe-137	1.42(+3)	1.48(+3)	1.22(+4)	2.50(+4)
Xe-138	8.83(+3)	9.00(+3)	4.13(+3)	9.25(+3)
Ar-41	8.84(+3)	9.76(+3)	2.69(+3)	5.54(+3)

1. mrem/y per  $\mu\text{Ci}/\text{m}^3$ .2. mrad/y per  $\mu\text{Ci}/\text{m}^3$ .3.  $1.17(+3) = 1.17 \times 10^3$ .

TABLE 1.6

STABLE ELEMENT TRANSFER DATA

<u>Element</u>	<u>B<sub>fv</sub></u> <u>Veg/Soil</u>	<u>F<sub>m</sub> (Cow)</u> <u>Milk (d/l)</u>
H	4.8E 00	1.0E-02
C	5.5E 00	1.2E-02
Na	5.2E-02	4.0E-02
P	1.1E 00	2.5E-02
Cr	2.5E-04	2.2E-03
Mn	2.9E-02	2.5E-04
Fe	6.6E-04	1.2E-03
Co	9.4E-03	1.0E-03
Ni	1.9E-02	6.7E-03
Cu	1.2E-01	1.4E-02
Zn	4.0E-01	3.9E-02
Rb	1.3E-01	3.0E-02
Sr	1.7E-02	8.0E-04
Y	2.6E-03	1.0E-05
Zr	1.7E 04	5.0E-06
Nb	9.4E-03	2.5E-03
Mo	1.2E-01	7.5E-03
Tc	2.5E-01	2.5E-02
Ru	5.0E-02	1.0E-06
Rh	1.3E 01	1.0E-02
Ag	1.5E-01	5.0E-02
Te	1.3E 00	1.0E-03
I	2.0E-02	6.0E-03
Cs	1.0E-02	1.2E-02
Ba	5.0E-03	4.0E-04
La	2.5E-03	5.0E-06
Ce	2.5E-03	1.0E-04
Pr	2.5E-03	5.0E-06
Nd	2.4E-03	5.0E-06
W	1.8E-02	5.0E-04
Np	2.5E-03	5.0E-06



TABLE 1.7

INTERNAL DOSE FACTORS - INFANT THYROID

<u>Radionuclide</u>	<u>Inhalation (mrem/pCi)</u>	<u>Ingestion (mrem/pCi)</u>
H-3	4.62(-7)	3.08(-7)
C-14	3.79(-6)	5.06(-6)
Cr-51	4.11(-8)	9.20(-5)
Te-132	1.9 <sup>a</sup> (-7)	1.52(-5)
I-131	1.06(-2)	1.39(-2)
I-132	1.21(-4)	1.58(-4)
I-133	2.54(-3)	3.31(-3)
I-134	3.18(-5)	4.15(-5)
I-135	4.97(-4)	6.49(-4)

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TABLE 1.8

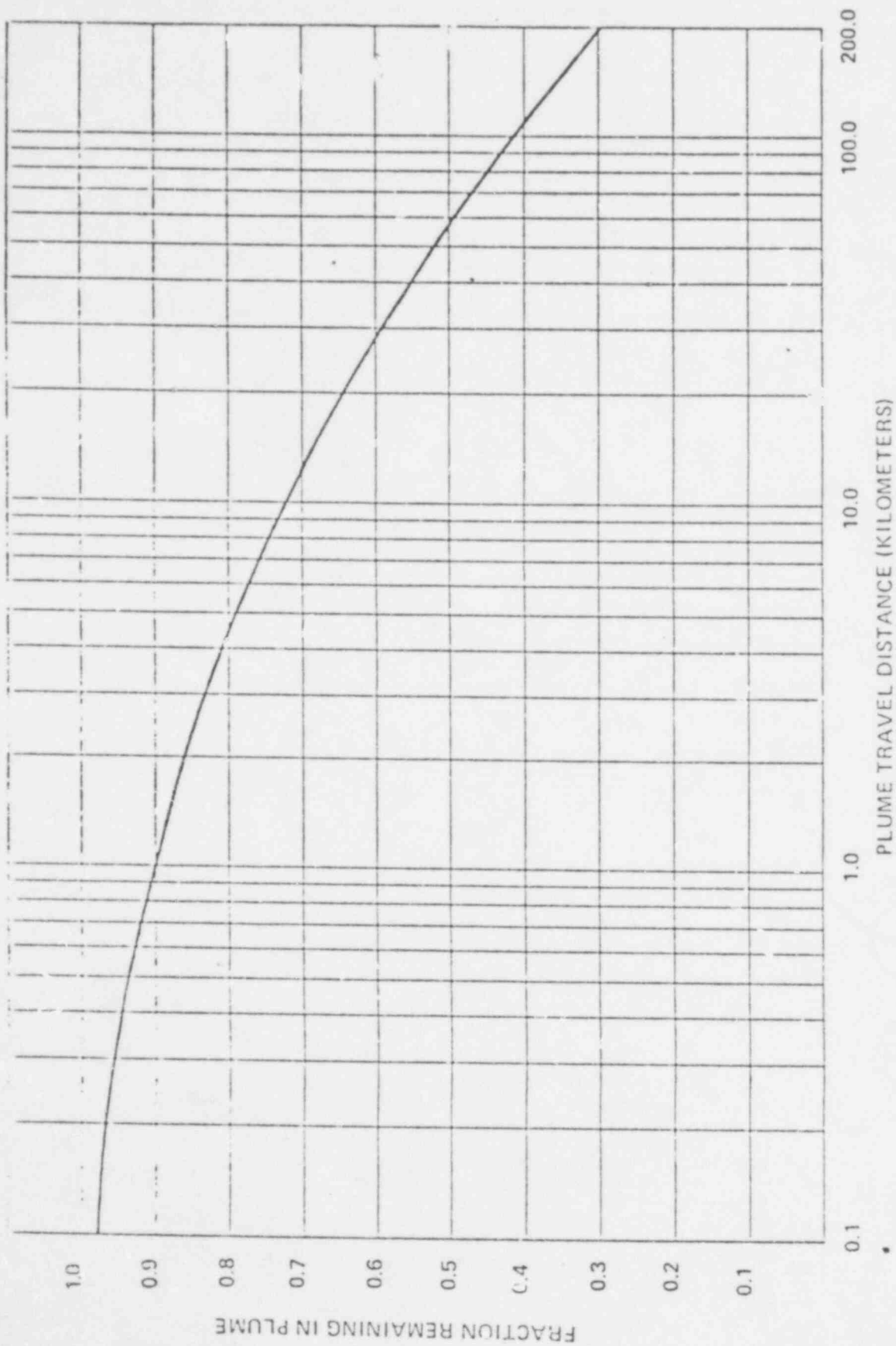
EXTERNAL DOSE FACTORS FOR STANDING ON CONTAMINATED GROUND  
(mrem/hr per  $\mu\text{Ci}/\text{m}^2$ )

Element	Total Body	Skin
H-3	0.0	0.0
C-14	0.0	0.0
NA-24	2.50E-08	2.90E-08
P-32	0.0	0.0
Cr-51	2.20E-10	2.60E-10
Mn-54	5.80E-09	6.80E-09
Mn-56	1.10E-08	1.30E-08
Fe-55	0.0	0.0
Fe-59	8.00E-09	9.40E-09
Co-58	7.00E-09	8.20E-09
Co-60	1.70E-08	2.00E-08
Ni-63	0.0	0.0
Nr-65	3.70E-09	4.30E-09
Cu-64	1.90E-10	1.70E-10
Zn-65	2.20E-10	4.60E-10
Zn-69	0.0	0.0
Br-83	6.40E-11	9.30E-11
Br-84	1.40E-10	1.40E-10
Br-88	1.40E-10	1.40E-10
Rb-86	6.80E-11	7.40E-11
Rb-88	3.90E-10	4.40E-10
Rb-89	1.40E-10	1.40E-10
Sr-89	9.90E-11	6.60E-11
Sr-91	2.90E-10	1.00E-10
Sr-92	1.40E-10	1.40E-10
Y-90	2.90E-10	2.90E-10
Y-91M	4.80E-10	4.80E-10
Y-91	2.90E-10	2.90E-10
Y-92	1.40E-10	1.40E-10
Y-93	5.00E-10	7.00E-10
Zr-95	9.90E-11	9.90E-11
Zr-97	9.90E-11	9.90E-11
Nb-95	9.90E-11	6.60E-11
Mo-99	2.90E-10	2.90E-10
Tc-99M	2.90E-10	1.40E-10
Tc-101	2.90E-10	3.30E-10
Ru-103	3.30E-10	4.40E-10
Ru-105	4.40E-10	5.00E-10
Ru-106	1.40E-10	1.40E-10
Ag-110M	1.40E-10	2.10E-10
Te-125M	3.30E-10	4.40E-10
Te-127M	1.40E-10	1.40E-10
Te-127	1.40E-10	1.40E-10
Te-129M	1.40E-10	1.40E-10
Te-129	1.40E-10	1.40E-10
Te-131M	9.90E-11	9.90E-11
Te-131	9.90E-11	9.90E-11
Te-132	2.90E-10	2.90E-10
I-130	1.40E-10	1.40E-10
I-131	2.90E-10	3.30E-10
I-132	1.40E-10	1.40E-10
I-133	1.40E-10	1.40E-10
I-134	1.40E-10	1.40E-10
I-135	1.40E-10	1.40E-10
Cs-134	1.40E-10	1.40E-10
Cs-136	1.40E-10	1.40E-10
Cs-137	1.40E-10	1.40E-10
Cs-138	4.40E-10	4.40E-10
Ba-139	1.40E-10	1.40E-10
Ba-140	1.40E-10	1.40E-10
Ba-141	1.40E-10	1.40E-10
Ba-142	1.40E-10	1.40E-10
La-140	1.40E-10	1.40E-10
La-142	1.40E-10	1.40E-10
Ce-141	1.40E-10	1.40E-10
Ce-143	1.40E-10	1.40E-10
Ce-144	3.30E-10	3.30E-10
Pr-143	1.40E-10	1.40E-10
Pr-144	2.00E-10	2.30E-10
Nd-147	1.00E-09	1.20E-09
M-187	3.70E-09	3.60E-09
Np-239	9.50E-10	1.10E-09

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FIGURE 1.1

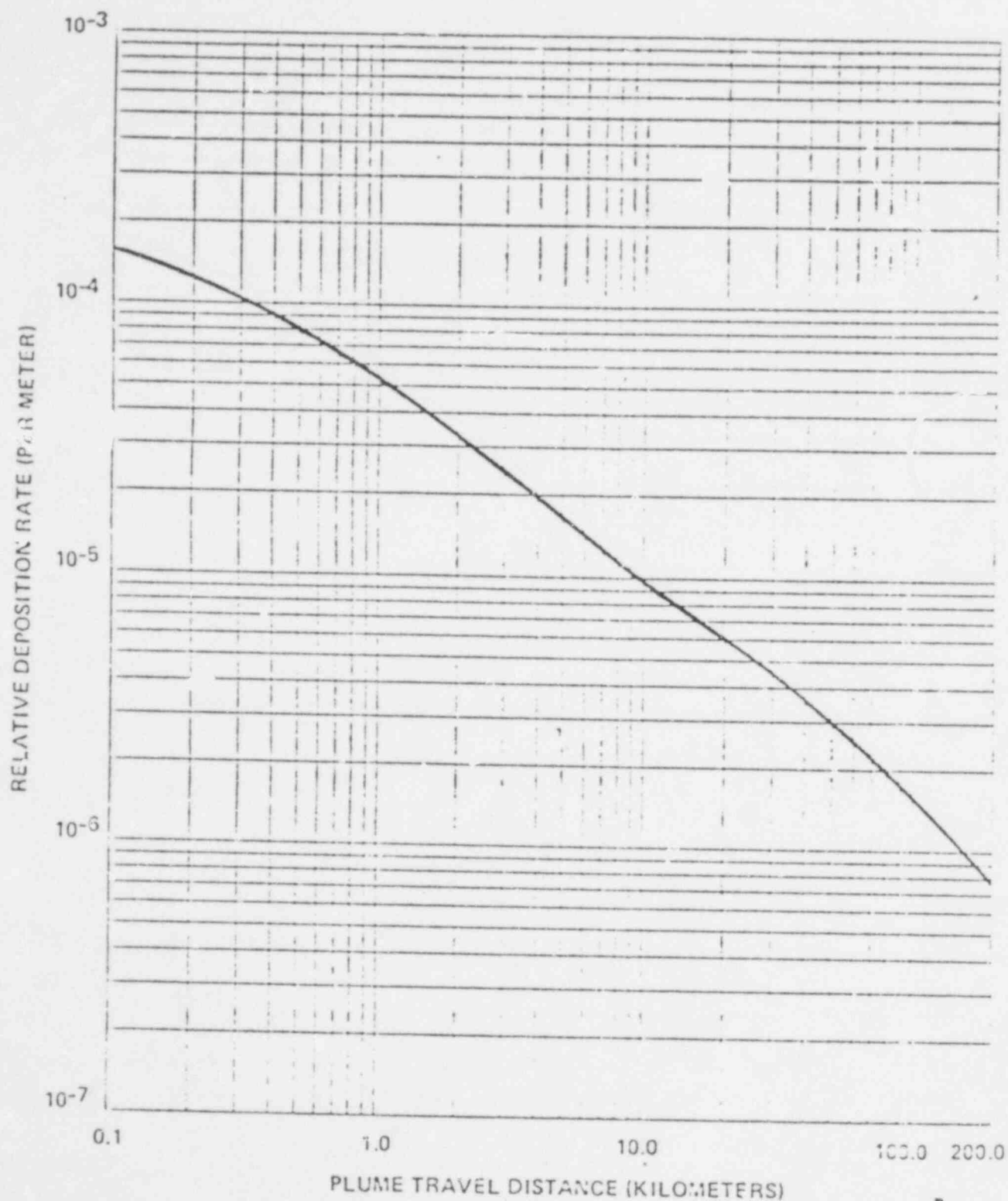


Plume Depletion Effect for Ground Level Releases (All Atmospheric Stability Classes)

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FIGURE 1.2



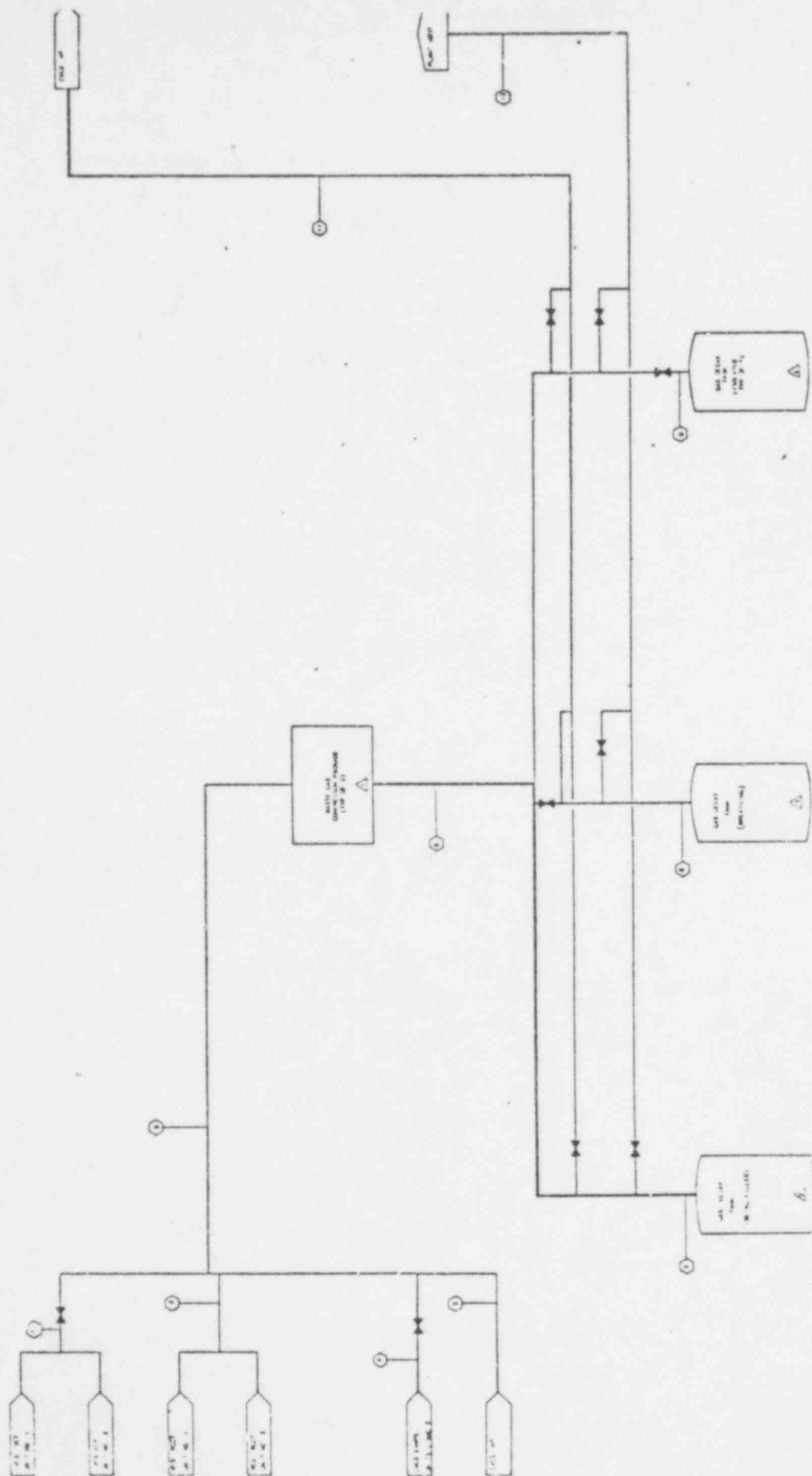
Relative Deposition for Ground Level Releases (All Atmospheric Stability Classes)

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FIGURE 1-3

GASEOUS RADWASTE TREATMENT SYSTEM PROCESS FLOW DIAGRAM



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## 2. Liquid Effluents

### 2.1 Concentration

#### 2.1.1 RETS Requirement

Specification 3.11.1.1 of the Radiological Effluent Technical Specifications (RETS) requires that the concentration of radioactive material released at any time from the site to unrestricted areas (see Figure 2.1.1-1) shall be limited to the Maximum Permissible Concentration (MPC, attached as Appendix I) specified in 10CFR20, Appendix B, Table II, Column 2 for nuclides other than dissolved or entrained noble gases. For dissolved or entrained noble gases, the concentration shall be limited to  $2 \times 10^{-4}$   $\mu\text{Ci/ml}$  total activity. To ensure compliance, the following approach will be used for each release.

#### 2.1.2 Prerelease Analysis

Prior to release a grab sample will be analyzed for each release point for the concentration of each radionuclide.

$$C_j = \sum_{i=1}^n C_i \quad (2.1)$$

where:

$C_j$  = total concentration in the liquid effluent at release point j,  $\mu\text{Ci/ml}$ .

$C_i$  = concentration of radionuclide i,  $\mu\text{Ci/ml}$ .

#### 2.1.3 MPC-Sum of the Ratios

The sum of the ratios ( $R_j$ ) for each release point will be calculated by the following relationship.

$$R_j = \frac{C_A}{MPC_A} + \frac{C_B}{MPC_B} + \dots + \frac{C_i}{MPC_i} + \dots + \frac{C_n}{MPC_n} \quad (2.2)$$

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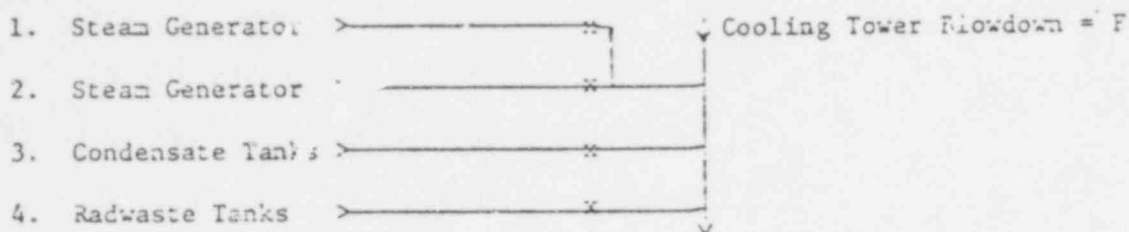
where:

$C_1$  = undiluted effluent concentration of radionuclide i, as determined in Section 2.1.2,  $\mu\text{Ci/ml}$ .

$\text{MPC}_1$  = the MPC of radionuclide i, as specified in Section 2.1.1,  $\mu\text{Ci/ml}$ .

$R_j$  = the sum of the ratios for release point j.

There are 4 possible liquid release points into cooling tower blowdown.



The sum of the ratios at the diffuser pond must be  $\leq 1$  due to the releases from any or all of the above sources. The following relationship will assure this criterion is met:

$$f_1(R_1-1) + f_2(R_2-1) + f_3(R_3-1) + f_4(R_4-1) \leq F \quad (2.3)$$

where:

$f_1, f_2, f_3, f_4$  = the effluent flow rate (gallons/minute) at the respective release point determined by plant personnel.

$R_1, R_2, R_3, R_4$  = the sum of the ratios of the respective release point as determined by Equation 2.2.

$F$  = minimum dilution flow rate for pre-release analysis  
 (cooling tower blowdown, gallons/minute) = 15,000  
 gal/min.

## 2.2 Instrument Setpoints

### 2.2.1 Setpoint Determination

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The respective alarm/trip setpoints at each release point will be set such that the sum of the ratios at each point, as calculated by Equation 2.2, will not be exceeded. The  $R_j$  is directly related to the total concentration calculated by Equation 2.1. An increase in the concentration would indicate an increase in the respective  $R_j$ . A large increase would cause the limits specified in Section 2.1.1 to be exceeded. The minimum alarm/trip setpoint value is equal to the release concentration, but for ease of operation it may be desired that the setpoint(s) be set above the effluent concentration ( $C_j$ ). That is,

$$S_j = b_j \times C_j \quad (2.4)$$

or

$$b_j = \frac{S_j}{C_j}$$

where:

$S_j$  = desired alarm/trip setpoint at release point  $j$ .

$b_j$  = scaling factor to prevent alarms/trips due to variations in the effluent concentrations at release point  $j$ .

$C_j$  = total concentration in the liquid effluent at release point  $j$  specified by Equation 2.1,  $\mu\text{Ci/ml}$ .

The  $R_j$  used in Equation 2.3 must also be scaled by the corresponding scale factor. Equation 2.3 and the corresponding alarm/trip setpoints become

$$f_1 [(b_1 \times R_1) - 1] + f_2 [(b_2 \times R_2) - 1] + f_3 [(b_3 \times R_3) - 1] + f_4 [(b_4 \times R_4) - 1] < F \quad (2.5)$$

$$b_1 = \frac{S_1}{C_1} \quad (2.6)$$

$$b_2 = \frac{S_2}{C_2} \quad (2.7)$$

$$b_3 = \frac{S_3}{C_3} \quad (2.8)$$

$$b_4 = \frac{S_4}{C_4} \quad (2.9)$$

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For example, for 2 release points and minimum dilution flow this becomes,

$$f_1 \left[ \left( \frac{S_1}{C_1} \times R_1 \right) - 1 \right] + f_2 \left[ \left( \frac{S_2}{C_2} \times R_2 \right) - 1 \right] < 15,000 \quad (2.10)$$

### 2.2.2 Post-Release Analysis

A post-release analysis will be done using actual release data to ensure that the limits specified in Section 2.1.1 were not exceeded.

A composite list of concentrations ( $C_i$ ), by isotope, will be used with the actual liquid radwaste ( $f$ ) and dilution ( $F$ ) flow rates (or volumes) during the release. The data will be substituted into Equation 2.3 to demonstrate compliance with the limits in Section 2.1.1. This data and setpoints will be recorded in auditable records by plant personnel.

## 2.3 Dose

### 2.3.1 RETS Requirement

Specification 3.11.1.2 of the Radiological Effluent Technical Specification (RETS) requires that the dose or dose commitment to an individual from radioactive materials in liquid effluents released to unrestricted areas from each reactor (see Figure 2.2.1-1) shall be limited:

- a. During any calendar quarter to  $\leq 1.5$  mrem to the total body and to  $\leq 5$  mrem to any organ, and
- b. During any calendar year to  $\leq 3$  mrem to the total body and to  $\leq 10$  mrem to any organ.

To ensure compliance, cumulative dose calculations will be performed at least once per month according to the following methodology.

### 2.3.2 Monthly Analysis

Principal radionuclides will be used to conservatively estimate the monthly contribution to the cumulative dose. If the projected dose exceeds the above limits, the methodology in Section 2.3.2 will be implemented.

The following radionuclides contribute more than 98 percent of the total estimated dose from design source terms. (Table 11.2.7, SQNP FSAR source terms).

	Percent of Total Body Dose		Percent of Critical Organ Dose (Thyroid)	
	Ingestion	Fish	Ingestion	Fish
H-3	51.2	.1	13.4	.1
I-131	.4	-	60.2	7.8
I-133	.1	-	12.3	.2
Cs-134	22.4	47.0	5.8	43.2
Cs-137	<u>25.1</u>	<u>52.8</u>	<u>6.5</u>	<u>48.6</u>
	99.2	99.9	98.2	99.9

A conservative calculation of the monthly dose will be done according to the following procedure. First, the monthly operating report containing the release data will be obtained and the activities released of each of the above 5 radionuclides will be noted. This information will then be used in the following calculations.

#### 2.3.2.1 Water Ingestion

The dose to an individual from ingestion of water is described by the following equation.

$$D_j = \frac{1}{.95} \sum_{i=1}^5 (DCF)_{ij} \times I_i \text{ rem} \quad (2.11)$$

where:

$D_j$  = dose for the  $j^{\text{th}}$  organ from 5 radionuclides, rem.

$j$  = the organ of interest (thyroid or total body).

.95 = conservative correction factor, considering only 5 radionuclides.

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$DCF_{ij}$  = adult ingestion dose commitment factor for the  $j^{th}$  organ from the  $i^{th}$  radionuclide rem/ $\mu$ Ci, see attached as Table 2.1.

$I_i$  = monthly activity ingested of the  $i^{th}$  radionuclide,  $\mu$ Ci.

$I_i$  is described by

$$I_i = \frac{365 A_i V}{12 U d}, \mu\text{Ci} \quad (2.12)$$

where:

365 = days per year

$A_i$  = activity released of  $i^{th}$  radionuclide during the month,  $\mu$ Ci.

$V$  = average rate of water consumption (730 ml/d ICRP 23, p. 358)

12 = months per year

$U$  = total cooling tower blowdown during releases, ml.

$d$  = diffuser pipe dilution (5).

The dose equation then becomes

$$D_j = \frac{4.67 \times 10^6}{U} \sum_{i=1}^5 (DCF)_{ij} \times A_i \text{ mrem} \quad (2.13)$$

#### 2.3.2.2 Fish Ingestion

The dose to an individual from the consumption of fish is described by Equation 2.13. In this case the activity ingested of the  $j^{th}$  radionuclide ( $I_i$ ) is described by

$$I_i = \frac{A_i B_i M}{U d}, \mu\text{Ci} \quad (2.14)$$

where:

$A_i$  = activity released of  $i^{th}$  radionuclide during the month,  $\mu$ Ci

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$B_i$  = fish concentration factor of  $i^{\text{th}}$  radionuclide  $\frac{\mu\text{Ci/gm}}{\mu\text{Ci/ml}}$ , see  
 , attached as Table 2.1.

$M$  = amount of fish eaten monthly ( $1.9 \times 10^3$  gm)

$U$  = total cooling tower blowdown during releases, ml

$d$  = diffuser pipe dilution (5)

The dose equation then becomes

$$Dg = \frac{4 \times 10^5}{1} \sum_{i=1}^5 A_i \times B_i \times DCF_i \text{ mrem} \quad (2.15)$$

If these calculated monthly doses exceed limits specified in Section 2.3.1, then a more accurate and complete calculation will be done as described in Section 2.3.3. An annual check will be made to ensure that the monthly dose estimates account for at least 95 percent of the dose calculated by the method described in Section 2.3.3. If less than 95 percent of the dose has been estimated, a new list of principal isotopes will be prepared.

### 2.3.3 Annual Analysis

A complete analysis utilizing the total source release will be done at least annually (monthly if necessary). This analysis will replace previous estimates calculated in Section 2.3.2 and consists of the following approach. The dose to the  $j^{\text{th}}$  organ from  $m$  radionuclides,  $D_j$ , is described by

$$D_j = \sum_{i=1}^m D_{ij}, \text{ rem} \quad (2.16)$$

$$= \sum_{i=1}^m (DCF)_{ij} \times I_i, \text{ rem} \quad (2.17)$$

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where:

$D_{ij}$  = dose to the  $j^{\text{th}}$  organ from the  $i^{\text{th}}$  radionuclide, rem.

$j$  = the organ of interest (bone, GI tract, thyroid, or total body).

$(DCF)_{ij}$  = adult ingestion dose commitment factor for the  $j^{\text{th}}$  organ from the  $i^{\text{th}}$  radionuclide, rem/ $\mu\text{Ci}$ , see Table 2.1.

$I_i$  = activity ingested of the  $i^{\text{th}}$  radionuclide,  $\mu\text{Ci}$ .

$I_i$  for water ingestion is described by

$$I_i = \frac{A_i V n}{U d}, \mu\text{Ci} \quad (2.18)$$

and for fish ingestion  $I_i$  is described by

$$I_i = \frac{A_i B_i M}{U d}, \mu\text{Ci} \quad (2.19)$$

where

$A_i$  = activity released of  $j^{\text{th}}$  radionuclide during the release period,  $\mu\text{Ci}$ .

$V$  = average rate of water consumption (730 ml/d).

$n$  = number of days during the release period (d).

$U$  = cooling tower blowdown during the release period, ml.

$d$  = credit for diffuser pipe dilution (5).

$B_i$  = fish concentration factor of the  $i^{\text{th}}$  radionuclide,  $\frac{\mu\text{Ci/gm}}{\mu\text{Ci/ml}}$

$M$  = amount of fish eaten monthly ( $1.9 \times 10^3$  gm)

#### 2.4 Operability of Liquid Radwaste Equipment

Specification 3.11.1.3 of the Radiological Effluent Technical Specifications requires that the liquid radwaste system shall be used to reduce

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the radioactive materials in liquid wastes prior to their discharge when the projected dose due to liquid effluent releases to unrestricted areas (see Figure 2.1.1-1) when averaged over 31 days would exceed 0.06 mrem to the total body or 0.21 mrem to any organ. Doses will be projected monthly to assure compliance.

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TABLE 2.1

## DOSE COMMITMENT AND FISH CONCENTRATION FACTORS

NUCLIDE	RADIOLOGICAL HALF-LIFE (DAYS)	BIOLOGICAL HALF-LIFE (DAYS)	EFFECTIVE HALF-LIFE (DAYS)	HUMAN DOSE COMMITMENT FACTORS (REM/UCI)				FISH CONCENTRATION FACT, STABLE RADIOLOGICAL		BIOLOGICAL HALF-LIFE (DAYS)
				BONE	GI TRACT	THYROID	TOTAL BODY			
H-3	4.44E-03	1.00E-01	9.98E-02	9.77E-05	9.77E-05	9.77E-05	9.77E-05	1.00E-00	1.00E-00	0.0
C-14	2.04E-06	1.00E-01	1.00E-01	2.45E-03	5.70E-04	5.70E-04	5.70E-04	4.55E-03	4.55E-03	0.0
HA-24	6.37E-01	1.10E-01	5.92E-01	1.73E-03	5.32E-02	1.73E-03	1.73E-03	1.00E-02	1.00E-02	0.0
P-32	1.43E-01	2.57E-02	1.35E-01	1.95E-01	1.24E-01	1.47E-03	1.47E-03	1.00E-05	1.00E-05	0.0
K-40	4.60E+11	5.80E-01	5.80E-01	3.45E-02	0.0	3.45E-02	3.45E-02	2.50E-03	2.50E-03	0.0
CR-51	2.70E-01	6.16E-02	2.66E-01	3.21E-06	1.71E-03	3.59E-06	3.21E-06	2.00E-02	2.00E-02	0.0
MN-54	3.03E-02	1.70E-01	1.61E-01	8.83E-04	2.43E-02	8.83E-04	8.83E-04	4.00E-02	4.00E-02	0.0
MN-56	1.07E-01	1.70E-01	1.05E-01	2.04E-05	4.68E-03	2.04E-05	2.04E-05	4.00E-02	4.00E-02	0.0
FE-55	9.50E-02	8.00E-02	4.74E-02	3.83E-04	1.13E-03	2.74E-04	2.74E-04	1.00E-02	1.00E-02	0.0
FE-59	4.56E-01	8.00E-02	4.31E-01	3.32E-03	5.54E-02	3.81E-03	3.81E-03	1.00E-02	1.30E-02	0.0
CO-58	7.13E-01	9.50E-00	8.38E-00	1.59E-03	3.29E-02	1.69E-03	1.69E-03	5.00E-01	2.00E-01	1.00E-02
CO-60	1.92E-03	9.50E-00	9.45E-00	4.73E-03	8.58E-02	4.73E-03	4.73E-03	5.00E-01	4.75E-01	1.00E-02
NI-63	1.07E-01	6.67E-02	1.07E-01	5.38E-04	3.16E-03	3.27E-05	3.27E-05	1.00E-02	1.00E-02	0.0
ZN-65	2.45E-02	9.33E-02	1.94E-02	3.01E-03	1.69E-02	7.13E-03	7.13E-03	2.00E-03	1.42E-03	1.00E-02
ZN-69M	5.75E-01	9.33E-02	5.75E-01	1.55E-04	2.91E-03	3.64E-05	3.64E-05	2.00E-03	1.14E-01	1.00E-02
ZN-69	3.96E-02	9.33E-02	3.96E-02	1.03E-05	9.97E-04	1.37E-06	1.37E-06	2.00E-03	7.92E-01	1.00E-02
BR-83	1.00E-01	8.00E-00	9.88E-02	3.55E-05	1.30E-03	3.55E-05	3.55E-05	4.20E-02	4.20E-02	0.0
BR-84	2.21E-02	8.00E-00	2.20E-02	6.04E-05	4.53E-03	6.04E-05	6.04E-05	4.20E-02	4.20E-02	0.0
BR-85	2.66E-03	8.00E-00	2.06E-03	5.17E-07	7.24E-05	5.17E-07	5.17E-07	4.20E-02	4.20E-02	0.0
KA-83M	7.75E-02	1.00E-00	7.15E-02	0.0	1.46E-04	0.0	0.0	1.00E-00	1.00E-00	0.0
KR-85M	1.83E-01	1.00E-00	1.55E-01	0.0	3.30E-03	0.0	0.0	1.00E-00	1.00E-00	0.0
KR-85	3.93E-03	1.00E-00	1.00E-00	0.0	4.62E-02	0.0	0.0	1.00E-00	1.00E-00	0.0
RB-88	1.24E-02	4.50E-01	1.24E-02	3.34E-05	3.69E-03	3.34E-05	3.34E-05	2.00E-03	2.00E-03	0.0
RB-89	1.07E-02	4.50E-01	1.07E-02	2.86E-05	1.76E-03	2.86E-05	2.86E-05	2.00E-03	2.00E-03	0.0
SR-89	5.27E-01	1.30E-04	2.5E-01	1.39E-01	1.04E-01	9.22E-03	9.22E-03	3.00E-01	1.04E-01	1.00E-02
SR-90	1.01E-01	1.30E-04	5.66E-03	1.17E-01	3.58E-02	1.76E-00	1.76E-00	3.00E-01	2.97E-01	1.00E-02
SR-91	4.03E-01	1.30E-04	4.03E-01	1.72E-03	2.06E-02	1.92E-04	1.92E-04	3.00E-01	1.20E-01	1.00E-02
SR-92	1.13E-01	1.30E-04	1.13E-01	9.17E-04	1.35E-03	6.89E-05	6.89E-05	3.00E-01	3.39E-02	1.00E-02
SR-93	5.56E-03	1.30E-04	5.56E-03	6.39E-05	1.89E-03	5.90E-06	8.90E-06	3.00E-01	1.67E-03	1.00E-02
Y-90	2.67E-00	1.40E-04	2.67E-00	9.62E-06	1.25E-01	2.57E-07	2.57E-07	2.50E-01	2.50E-01	0.0
Y-91M	3.47E-02	1.40E-04	3.47E-02	2.12E-08	5.06E-04	1.72E-09	1.72E-09	2.50E-01	2.50E-01	0.0
Y-91	5.85E-01	1.40E-04	5.85E-01	1.37E-04	1.10E-01	3.66E-06	3.66E-06	2.50E-01	2.50E-01	0.0
Y-92	1.47E-01	1.40E-04	1.47E-01	8.49E-07	1.27E-02	2.47E-08	2.47E-08	2.50E-01	2.50E-01	0.0
Y-93	4.29E-01	1.40E-04	4.29E-01	1.97E-06	3.51E-02	5.51E-08	5.51E-08	2.50E-01	2.50E-01	0.0
ZR-95	6.55E-01	4.50E-02	5.72E-01	2.54E-05	4.28E-02	6.38E-06	6.38E-06	3.33E-00	3.33E-00	0.0
ZR-97	7.08E-01	4.50E-02	7.07E-01	1.64E-06	4.79E-02	1.55E-07	1.55E-07	3.33E-00	3.33E-00	0.0
NB-95M	3.71E-00	7.60E-02	3.73E-00	5.46E-07	3.55E-02	2.88E-07	2.88E-07	3.00E-04	3.00E-04	0.0
NB-95	3.57E-01	7.60E-02	3.35E-01	5.12E-06	3.01E-02	1.83E-06	1.83E-06	3.00E-04	3.00E-04	0.0
NB-97	5.00E-02	7.60E-02	5.00E-02	4.90E-08	2.10E-03	4.60E-09	4.60E-09	3.00E-04	3.00E-04	0.0
PD-99	2.70E-00	5.30E-00	1.77E-00	8.47E-04	5.93E-02	8.47E-04	8.47E-04	1.00E-01	1.00E-01	0.0
TC-99M	2.52E-01	1.00E-00	2.01E-01	2.44E-07	6.09E-04	9.37E-06	9.37E-06	1.50E-01	1.50E-01	0.0
TC-99	7.74E-07	1.00E-00	1.00E-00	1.27E-04	1.89E-02	5.06E-05	5.06E-05	1.50E-01	1.50E-01	0.0
TC-101	9.93E-03	1.00E-00	9.93E-03	2.57E-07	7.99E-04	3.60E-06	3.60E-06	1.50E-01	1.50E-01	0.0
RU-103	3.70E-01	7.30E-00	6.16E-00	1.64E-04	2.55E-02	7.98E-05	7.98E-05	1.00E-01	1.00E-01	0.0
RU-106	3.68E-02	7.30E-00	7.16E-00	2.69E-03	2.67E-01	3.50E-04	3.50E-04	1.00E-01	1.00E-01	0.0

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TABLE 2.1 (Continued)

## DOSE COMMITMENT AND FISH CONCENTRATION FACTORS

NUCLIDE	RADIOLOGICAL HALF-LIFE (DAYS)	BIOLOGICAL HALF-LIFE (DAYS)	EFFECTIVE HALF-LIFE (DAYS)	HUMAN DOSE COMMITMENT FACTORS (REM/UCI)				FISH CONCENTRATION FACT, STABLE		BIOLOGICAL HALF-LIFE (DAYS)	
				BONE	GI TRACT	THYROID	TOTAL BODY	CONCENTRATION FACT, STABLE	RADIOLOGICAL		
RH-103H	3.56E-02	1.30E 00	3.94E-02	1.67E-07	1.21E-04	4.79E-08	4.69E-08	1.00E 01	1.00E 01	0.0	0.0
AG-110M	2.53E-02	5.00E 00	4.90E 00	1.33E-04	9.27E-02	8.78E-05	8.78E-05	2.00E 00	2.00E 00	0.0	0.0
TE-125M	5.00E-01	1.50E 01	1.19E 01	2.52E-03	2.25E-02	8.15E-04	4.55E-04	4.00E 02	4.00E 02	0.0	0.0
TE-127M	1.07E-02	1.50E 01	1.32E 01	8.91E-03	1.56E-02	2.37E-03	1.12E-03	4.00E 02	4.00E 02	0.0	0.0
TE-127	3.92E-01	1.50E 01	3.02E-01	1.13E-04	6.76E-03	8.36E-05	2.44E-05	4.00E 02	4.00E 02	0.0	0.0
TE-129M	3.41E-01	1.50E 01	1.04E 01	1.14E-02	4.96E-02	3.96E-03	1.84E-03	4.00E 02	4.00E 02	0.0	0.0
TE-129	4.77E-02	1.50E 01	4.75E-02	3.00E-05	1.77E-03	2.32E-05	7.37E-06	4.00E 02	4.00E 02	0.0	0.0
TE-131M	1.25E-00	1.50E 01	1.15E 00	7.15E-04	3.61E-02	6.17E-04	4.89E-04	4.00E 02	4.00E 02	0.0	0.0
TE-131	1.72E-02	1.50E 01	1.72E-02	1.42E-05	1.79E-03	1.61E-05	6.44E-06	4.00E 02	4.00E 02	0.0	0.0
TE-132	3.24E-00	1.50E 01	2.66E 00	2.44E-03	2.21E-02	1.80E-03	1.50E-03	4.00E 02	4.00E 02	0.0	0.0
TE-134	2.92E-02	1.50E 01	2.91E-02	2.10E-05	8.93E-05	2.00E-05	1.57E-05	4.00E 02	4.00E 02	0.0	0.0
I-127	6.21E-09	1.38E 02	1.38E 02	3.10E-03	0.0	9.61E 00	1.24E-02	5.00E 01	5.00E 01	1.00E 00	1.00E 00
I-131	8.05E-00	1.38E 02	7.61E 00	4.06E-03	4.44E-02	2.01E 00	3.52E-03	5.00E 01	4.45E 01	1.00E 00	1.00E 00
I-132	9.42E-02	1.38E 02	9.41E-02	1.97E-04	4.25E-03	7.51E-02	1.57E-04	5.00E 01	4.30E 00	1.00E 00	1.00E 00
I-133	6.46E-01	1.38E 02	8.41E-01	1.36E-03	3.78E-02	4.69E-01	7.51E-04	5.00E 01	2.29E 01	1.00E 00	1.00E 00
I-134	3.61E-02	1.38E 02	3.61E-02	7.84E-05	3.40E-03	2.94E-02	7.47E-05	5.00E 01	1.74E 00	1.00E 00	1.00E 00
I-135	2.78E-01	1.38E 02	2.77E-01	3.78E-04	1.17E-02	1.47E-01	3.98E-04	5.00E 01	1.09E 01	1.00E 00	1.00E 00
YE-133M	2.20E-00	1.00E 00	6.93E-01	0.0	2.45E-02	0.0	0.0	1.00E 00	1.00E 00	0.0	0.0
XE-133	5.27E-00	1.00E 00	8.41E-01	0.0	2.58E-02	0.0	0.0	1.00E 00	1.00E 00	0.0	0.0
XE-135M	1.08E-02	1.00E 00	1.07E-02	0.0	3.29E-04	0.0	0.0	1.00E 00	1.00E 00	0.0	0.0
XF-135	3.83E-01	1.00E 00	2.77E-01	0.0	1.00E-02	0.0	0.0	1.00E 00	1.00E 00	0.0	0.0
CS-134	7.47E-02	7.00E 01	6.40E 01	5.45E-02	7.67E-02	1.20E-01	1.20E-01	2.00E 03	2.00E 03	1.00E 00	1.00E 00
CS-135	1.10E-09	1.15E 02	1.15E 02	1.78E-02	0.0	8.06E-03	8.06E-03	2.00E 03	2.00E 03	1.00E 00	1.00E 00
CS-136	1.37E-01	7.00E 01	1.15E 01	5.80E-03	8.77E-02	2.03E-02	2.03E-02	2.00E 03	1.86E 03	1.00E 00	1.00E 00
CS-137	1.10E-04	7.00E 01	6.96E 01	7.87E-02	6.40E-02	7.28E-02	7.28E-02	2.00E 03	2.00E 03	1.00E 00	1.00E 00
CS-138	2.24E-02	7.00E 01	2.24E-02	9.94E-06	2.61E-03	5.72E-05	5.72E-05	2.00E 03	4.38E 01	1.00E 00	1.00E 00
BA-139	5.76E-02	6.50E 01	5.75E-02	1.05E-04	3.34E-03	3.07E-06	3.07E-06	4.00E 00	4.30E 00	0.0	0.0
BA-140	1.28E-01	6.50E 01	1.07E 01	1.61E-02	6.03E-02	1.23E-03	1.23E-03	4.00E 00	4.00E 00	0.0	0.0
LA-140	1.68E-00	5.00E 02	1.67E 00	1.80E-06	8.55E-02	3.09E-07	3.09E-07	2.50E 01	2.50E 01	0.0	0.0
LA-141	1.63E-01	5.00E 01	1.62E-01	3.90E-07	9.60E-03	2.03E-03	2.03E-03	2.50E 01	2.50E 01	0.0	0.0
CE-141	3.25E-01	5.63E 02	3.07E 01	9.32E-06	3.75E-02	7.72E-07	7.72E-07	2.50E 01	2.50E 01	0.0	0.0
CE-143	1.35E-00	5.63E 02	1.38E 00	5.63E-06	5.08E-02	3.56E-08	3.56E-08	2.50E 01	2.50E 01	0.0	0.0
CE-144	2.94E-02	5.63E 02	1.89E 02	4.90E-04	1.87E-02	2.64E-05	2.64E-05	2.50E 01	2.50E 01	0.0	0.0
PR-143	1.30E-01	7.50E 02	1.34E 01	9.25E-06	5.60E-02	4.60E-07	4.60E-07	2.50E 01	2.50E 01	0.0	0.0
PR-144	1.20E-02	7.50E 02	1.20E-02	3.04E-08	1.95E-03	1.54E-07	1.54E-07	2.50E 01	2.50E 01	0.0	0.0
ND-147	1.11E-01	6.56E 02	1.09E 01	6.37E-06	5.06E-02	4.25E-07	4.25E-07	2.50E 01	2.50E 01	0.0	0.0
PM-147	9.57E-02	6.56E 02	3.89E 02	7.60E-05	1.33E-02	2.89E-06	2.89E-06	2.50E 01	2.50E 01	0.0	0.0
PM-149	2.21E-00	6.56E 02	2.20E 00	1.54E-06	4.86E-02	8.87E-08	8.87E-08	2.50E 01	2.50E 01	0.0	0.0
PM-151	1.16E-00	6.56E 02	1.16E 00	6.74E-07	3.17E-02	5.91E-09	5.91E-09	2.50E 01	2.50E 01	0.0	0.0
SM-151	3.18E-04	6.56E 02	6.43E 02	6.07E-05	4.37E-03	1.56E-06	1.56E-06	2.50E 01	2.50E 01	0.0	0.0
SM-153	1.95E-00	6.56E 02	1.94E 00	1.03E-06	3.58E-02	6.66E-08	6.66E-08	2.50E 01	2.50E 01	0.0	0.0
SM-155	3.92E-01	6.56E 02	3.92E-01	4.63E-07	5.86E-03	5.33E-08	5.33E-08	2.50E 01	2.50E 01	0.0	0.0
EU-155	6.61E-02	6.35E 02	3.24E 02	5.75E-05	1.35E-02	3.35E-06	3.35E-06	2.50E 01	2.50E 01	0.0	0.0
EU-156	1.54E-01	6.35E 02	1.50E 01	1.31E-05	1.02E-01	1.65E-06	1.65E-06	2.50E 01	2.50E 01	0.0	0.0
W-187	9.90E-01	1.00E 00	4.99E-01	8.70E-05	2.54E-02	2.70E-05	2.70E-05	1.20E 03	1.20E 03	0.0	0.0
NP-239	2.35E 00	3.90E 04	2.35E 00	1.45E-06	3.10E-02	7.74E-08	7.74E-08	1.00E 01	1.00E 01	0.0	0.0

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### 3.0 Radiological Environmental Monitoring

#### 3.1 Monitoring Program

An environmental radiological monitoring program shall be conducted in accordance with Technical Specification 3.12.1. The monitoring program described in Tables 3.1-1, 3.1-2 and 3.1-3, and in Figures 3.1-1, 3.1-2, 3.1-3, and 3.1-4 shall be conducted. Results of this program shall be reported in accordance with Technical Specifications 6.9.1.6 and 6.9.1.7.

The atmospheric environmental radiological monitoring program shall consist of 12 monitoring stations from which samples of air particulates, atmospheric radioiodine, rainwater, and heavy particle fallout shall be collected.

The terrestrial monitoring program shall consist of the collection of milk, soil, ground water, drinking water, and food crops. In addition, direct gamma radiation levels will be measured in the vicinity of the plant.

The reservoir sampling program shall consist of the collection of samples of surface water, sediment, and fish.

Deviations are permitted from the required sampling schedule if specimens are unobtainable due to hazardous conditions, sample unavailability, or to malfunction of sampling equipment. If the latter, every effort shall be made to complete corrective action prior to the end of the next sampling period.

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### 3.2 Detection Capabilities

Analytical techniques shall be such that the detection capabilities listed in Table 3.2-1 are achieved.

TABLE 3.1-1

RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM

<u>Exposure Pathway and/or Sample</u>	<u>Sample Locations*</u>	<u>Sampling and Collection Frequency</u>	<u>Type and Frequency of Analysis</u>
1. AIRBORNE			
a. Particulates	2 samples from locations (in different sectors) at or near the site boundary (LM 1 and 2)	Continuous sampler operation with sample collection weekly	Gross beta weekly, gamma isotopic analysis if gross beta >10 times mean of control sample. Composite quarterly (by location) for gamma scan.
	8 samples from communities approximately 6-10 miles distance from the plant (PM 1-8)		
	2 samples from control locations greater than 10 miles from the plant (RM 1 and 2)		
b. Radioiodine	Samples from same locations as air particulates	Continuous sampler operation with filter collection weekly	<sup>131</sup> I weekly
c. Fallout	Samples from same locations as air particulates	Heavy particulate fallout collected continuously on gummed acetate paper with paper collection monthly	Gross beta monthly
d. Rainwater	Samples from same locations as air particulates	Rainwater collected con- tinuously with composite samples analyzed monthly	Gamma scan monthly

\*Sample locations are shown on Figures 3.1-1, 3.1-2, 3.1-3, and 3.1-4.

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TABLE 3.1-1 (Continued)

RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM

<u>Exposure Pathway and/or Sample</u>	<u>Sample Locations*</u>	<u>Sampling and Collection Frequency</u>	<u>Type and Frequency of Analysis</u>
e. Soil	Samples from same locations as air particulates	Once per 3 years	Gamma scan, $^{89,90}\text{Sr}$ once each 3 years
2. DIRECT RADIATION	2 or more dosimeters placed at 10 of the air particulate sampling stations (PM 1-8 and RM 1 and 2)	Quarterly	Gamma dose quarterly
	2 or more dosimeters placed at each of at least 3 other locations (in different sectors) at or near the site boundary (Figure 3.1-2)		
367 335 WATERBORNE			
a. Surface (Figure 3.1-4)	TRM 497.0 TRM 481.4 TRM 473.2	Collected by automatic sequential-type sampler* with composite sampler taken monthly	Gamma scan monthly. Composite for tritium quarterly
b. Ground (Figure 3.1-2)	1 sample adjacent to plant (location W-6)	Quarterly	Gamma scan and tritium quarterly
	1 sample from ground water source upgradient		

\*\*Samples shall be collected by collecting an aliquot at intervals not exceeding 2 hours.

\*Sample locations are shown on Figures 3.1-1, 3.1-2, 3.1-3, and 3.1-4.

# RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM

<u>Exposure Pathway and/or Sample</u>	<u>Sample Location*</u>	<u>Sampling and Collection Frequency</u>	<u>Type and Frequency of Analysis</u>
c. Drinking (Table 3.1-3) (Figure 3.1-4)	1 sample at the first potable surface water supply downstream from the plant (TRM 473.0)	Collected by automatic sequential-type sampler* with composite sample taken monthly	Gross beta and gamma scan monthly. Composite for tritium, $^{89,90}\text{Sr}$ quarterly
	1 sample at the next 2 downstream potable surface water supplies (greater than 10 miles downstream) (TRM 470.5 and 466.3)	Monthly grab sample	
	2 samples at control locations (Little Soddy Creek Mile 0.5 and TRM 503.8)	Monthly grab sample	
d. Sediment	TRM 496.5 TRM 483.4 TRM 480.5 TRM 472.8	Semiannually	Gamma scan semiannually
4. INGESTION			
a. Milk (Figure 3.1-3)	1 sample from milk producing animals in each of 1-3 areas indicated by the cow census where doses are calculated to be highest. If samples are not available from an area	Semimonthly when animals are on pasture, monthly at other times	$^{131}\text{I}$ analysis semi-monthly on collection. Gamma scan, $^{89,90}\text{Sr}$ monthly

\*Sample locations are shown on Figures 3.1-1, 3.1-2, 3.1-3, and 3.1-4.

\*\*Samples shall be collected by collecting aliquot at intervals not exceeding 2 hours.



TABLE 3.1-1

RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM

<u>Exposure Pathway and/or Sample</u>	<u>Sample Locations*</u>	<u>Sampling and Collection Frequency</u>	<u>Type and Frequency of Analysis</u>
	doses to that area will be estimated by projecting the doses from concentrations detected in milk from other sectors or by sampling vegetation where milk is not available.		
	At least 1 sample from a control location.		
b. Fish	1 sample each from Nickajack, Chickamauga, and Watts Bar Reservoirs	Semiannually. One sample of each of the following species: Channel Catfish White Crappie Smallmouth Buffalo	Gamma scan on edible portion
c. Food Products	1 sample each of principal food products grown at private gardens and/or farms in the immediate vicinity of the plant. Selection of locations to be based on the land use census.	Annually at time of harvest. The types of foods available for sampling will vary. Following is a list of typical foods which may be available: Cabbage and/or lettuce Corn Green Beans Potatoes Tomatoes	Gamma scan on edible portion

\*Sample locations are shown on Figures 3.1-1, 3.1-2, 3.1-3, and 3.1-4.

TABLE 3.1-2

Atmospheric and Terrestrial Monitoring Station LocationsSequoyah Nuclear Plant

<u>Sample Station</u>	<u>Location Approximate Distance and Direction from Plant</u>
LM-1 S	1/4 mile SW
LM-2 S	1/4 mile N
PM-1 S (Northwoods)	10 miles WSW
PM-2 S (Hamilton County Park)	3-3/4 miles WSW
PM-3 S (Daisy)	5-1/2 miles WNW
PM-4 S (Sale Creek)	10-1/2 miles N
I S (Georgetown)	9 miles ENE
LM-6 S (Work)	5 miles NE
PM-7 S (Harrison Bay)	3-1/2 miles SE
PM-8 S (Harrison)	8-1/2 miles SSW
RM-1 S (Chattanooga, Riverside)	16 miles WSW
RM-2 S (Dayton) (Identical with RM-2 WB, Watts Bar Nuclear Plant)	17-1/2 miles NNE
Farm L	2-3/4 miles NNE
Farm M	3-1/2 miles NNE
Farm J	1-1/4 miles W
Farm C (control)	16 miles NE
Farm D (control)	43 miles NE
Farm S (control)	12 miles NNE

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TABLE 3.1-3

PUBLIC WATER SUPPLIES SAMPLED IN ENVIRONMENTAL MONITORING PROGRAM

<u>Water Supply</u>	<u>Distance from Site<sup>a</sup></u>	<u>Source</u>	<u>Sampling Frequency</u>
Chattanooga (C. F. Industries)	11.5	Tennessee River (mile 473.0)	Monthly <sup>b</sup>
Chattanooga (E. I. DuPont and Company)	14.0	Tennessee River (mile 470.5)	Monthly
Chattanooga	19.0	Tennessee River (mile 465.3)	Monthly
Daisy-Soddy-Falling Water Utility District	8.2	Little Soddy Creek	Monthly
Dayton	19.3	Tennessee River (mile 503.8)	Monthly

a. River mile distance from TRM 484.5 except for supplies that take water from a source other than the Tennessee River which are shown as radial distance from Sequoyah Nuclear Plant

b. Sample collected by an automatic sequential-type water sampler with composite sample taken monthly.

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Table 3.2-1

## DETECTION CAPABILITIES FOR ENVIRONMENTAL SAMPLE ANALYSIS

## A. Specific Analyses

## NOMINAL LOWER LIMIT OF DETECTION (LLD)\*

	Air Particulates pCi/m <sup>3</sup>	Charcoal pCi/m <sup>3</sup>	Fallout mCi/Km <sup>2</sup>	Water pCi/l	Vegetation and grain pCi/g, dry	Soil and Sediment pCi/g, dry	Fish, clam flesh, plankton, pCi/g, dry	Clam shells pCi/g, dry	Foods, meat, poultry, pCi/Kgm, wet	Milk pCi/l
Total α					0.01				1.5	
Gross α	0.005		0.05	2.0	0.05	0.35	0.1	0.7	25	
Gross β	0.01			2.4	0.20	0.70	0.1	0.7		
<sup>137</sup> I				330						0.5
<sup>137</sup> I		0.01								10
<sup>90</sup> Sr	0.005			10	0.25	1.5	0.5	5.0	40	
<sup>90</sup> Sr	0.001			2	0.05	0.3	0.1	1.0	8	

## B. Gamma Analyses

## NOMINAL LOWER LIMIT OF DETECTION (LLD)

	Air particulates pCi/m <sup>3</sup>		Water and milk pCi/l		Vegetation and grain pCi/g, dry		Soil and sediment pCi/g, dry		Fish pCi/g, dry		Clam flesh and plankton pCi/g, dry		Clam shells pCi/g, dry		Foods, tomatoes potatoes, etc.) pCi/Kgm, wet		Meat and poultry pCi/Kgm, wet	
	NaI* Ge(Li)**		NaI Ge(Li)		NaI Ge(Li)		NaI Ge(Li)		NaI Ge(Li)		NaI Ge(Li)		NaI Ge(Li)		NaI Ge(Li)		NaI Ge(Li)	
<sup>137</sup> Cs	0.03		38		0.55		0.35		0.35				0.35		38		90	
<sup>137</sup> Cs		0.02		33		0.06		0.06		0.06		0.35		0.06		33		40
<sup>51</sup> Cr	0.07	0.03	60	44	1.10	0.4	0.60	0.10	0.60	0.10	0.56	0.60	0.10	60	44	200	90	
<sup>131</sup> I	0.01	0.01	15	8	0.35	0.1	0.20	0.02	0.20	0.02	0.07	0.20	0.02	15	8	50	20	
<sup>106</sup> Ru	0.04		40		0.65		0.45		0.45			0.45		40		150		
<sup>106</sup> Ru		0.03		40		0.51		0.11		0.11		0.74		0.11		40		90
<sup>137</sup> Cs	0.01	0.02	10	26	0.20	0.33	0.12	0.08	0.12	0.08	0.48	0.12	0.08	10	26	40	50	
<sup>137</sup> Cs		0.01	10	5	0.20	0.06	0.12	0.02	0.12	0.02	0.08	0.12	0.02	10	5	40	15	
<sup>95</sup> Zr-Nb	0.1		10		0.20		0.12		0.12			0.12		10		40		
<sup>95</sup> Zr		0.01		10		0.11		0.01		0.01		0.15		0.03		10		20
<sup>95</sup> Nb		0.01		5		0.05		0.01		0.01		0.07		0.01		5		15
<sup>58</sup> Co	0.02	0.01	15	5	0.23	0.05	0.20	0.01	0.20	0.01	0.07	0.20	0.01	15	5	55	15	
<sup>54</sup> Mn	0.02	0.01	10	5	0.20	0.05	0.15	0.01	0.15	0.01	0.08	0.15	0.01	10	5	40	15	
<sup>65</sup> Zn	0.02	0.01	15	9	0.25	0.11	0.23	0.02	0.23	0.02	0.17	0.23	0.02	15	9	70	20	
<sup>60</sup> Co	0.01	0.01	10	5	0.17	0.06	0.11	0.01	0.11	0.01	0.08	0.11	0.01	10	5	30	15	
<sup>40</sup> K	0.10		150		2.50		0.90		0.90			0.90		150		400		
<sup>140</sup> Ba-La	0.02		15		0.68		0.15		0.15			0.15		15		50		
<sup>140</sup> Ba		0.02		25		0.34		0.07		0.07		0.30		0.07		25		50
<sup>140</sup> La		0.01		7		0.08		0.02		0.02		0.10		0.02		7		15

TABLE 3.2-1 (Continued)

TABLE NOTATIONS

- \* The NaI(Tl) LLD values are calculated by the method developed by Pasternak and Harley as described in HASL-300 and Nucl. Instr. Methods, 533-40 (1971). These LLD values are expected to vary depending on the activities of the components in the samples. These figures do not represent the LLD values achievable on a given sample. Water is counted in a 3.5-L Marinelli beaker. Vegetation, fish, soil, and sediment are counted in a 1-pint container as dry weight. The average dry weight is 120 grams for vegetation and 400-500 grams for soil sediment and fish. Meat and poultry are counted in a 1-pint container as dry weight, then corrected to wet weight using an average moisture content of 70%. Average dry weight is 250 grams. Air particulates are counted in a well crystal. The counting system consists of a multi-channel analyzer and either a 4" x 5" well NaI(Tl) crystal. The counting time is 4000 seconds. All calculations are performed by the least-squares computer program ALPHA-M. The assumption is made that the samples are analyzed within one week of the collection date.
- \*\* The Ge(Li) LLD values are calculated by the methods developed by Pasternak and Harley as described in HASL-300. These LLD values are expected to vary depending on the activities of the components in the samples. These figures do not represent the LLD values achievable on given samples. Water is counted in either a 0.5-L or 3.5-L Marinelli beaker. Solid samples such as soil, sediment, and clam shells are counted in a 0.5-L Marinelli beaker as dry weight. The average dry weight is 400-500 grams. Air filters and very small volume samples are counted in petrie dishes centered in the detector endcap. The counting system consists of a ND-4420 multichannel analyzer and either a 6%, 14%, or 18% Ge(Li) detector. The counting time is normally 8 hours. All spectral analysis is performed using the software provided with the ND-4420. The assumption is made that all samples are analyzed within one week of the collection date.
- a. All LLD values for isotopic separations are calculated by the method developed by Pasternak and Harley as described in HASL-300. Factors such as sample size, decay times, chemical yield, and counting efficiency may vary for a given sample; these variations may change the LLD value for the given sample. The assumption is made that all samples are analyzed within one week of the collection date.

The LLD is the smallest concentration of radioactive material in a sample that will be detected with 95% probability with 5% probability of falsely concluding that a blank observation represents a "real" signal.

TABLE 3.2-1 (Continued)

TABLE NOTATION

For a particular measurement system (which may include radiochemical separation):

$$LLD = \frac{4.66 s_b}{E \cdot V \cdot 2.22 \cdot y \cdot \exp(-\lambda \Delta t)}$$

where

LLD is the lower limit of detection as defined above (as pCi 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 is the counting efficiency (as counts per transformation)

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

2.22 is the number of transformation per minute per picocurie

Y is the fractional radiochemical yield (when applicable)

$\lambda$  is the radioactive decay constant for the particular radionuclide

$\Delta t$  is the elapsed time between sample collection (or end of the sample collection period) and time of counting

The value of  $s_b$  used in the calculation of the LLD for a detection system shall be based on the actual observed variance of the background counting rate or of the counting rate of the blank samples (as appropriate) rather than on an unverified theoretically predicted variance.

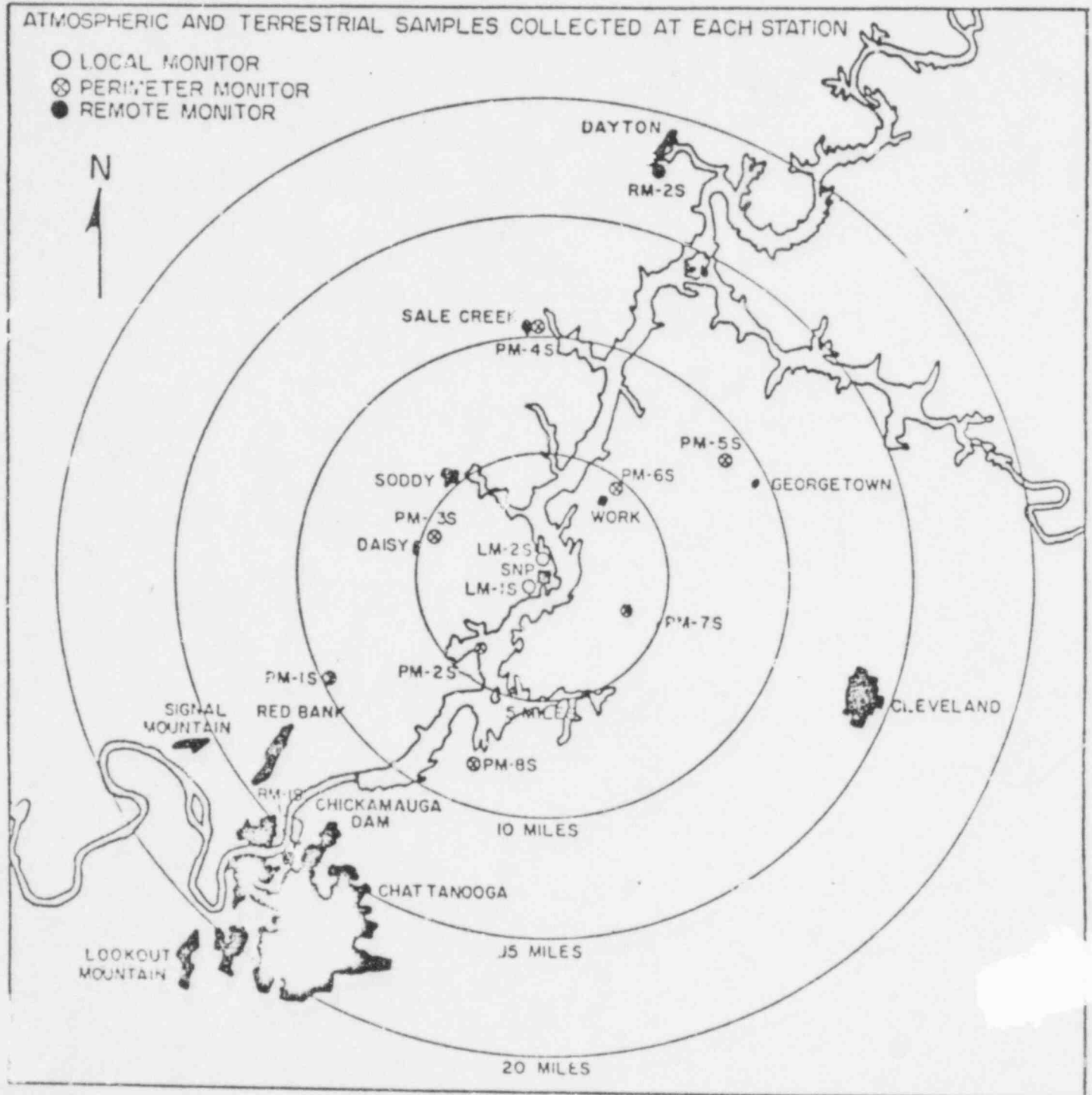
- b. The LLD values listed in this table may change slightly after routine evaluation of background, sample size, counting times, etc.. The most recently calculated values will be included in the Annual Radiological Environmental Operating Report.

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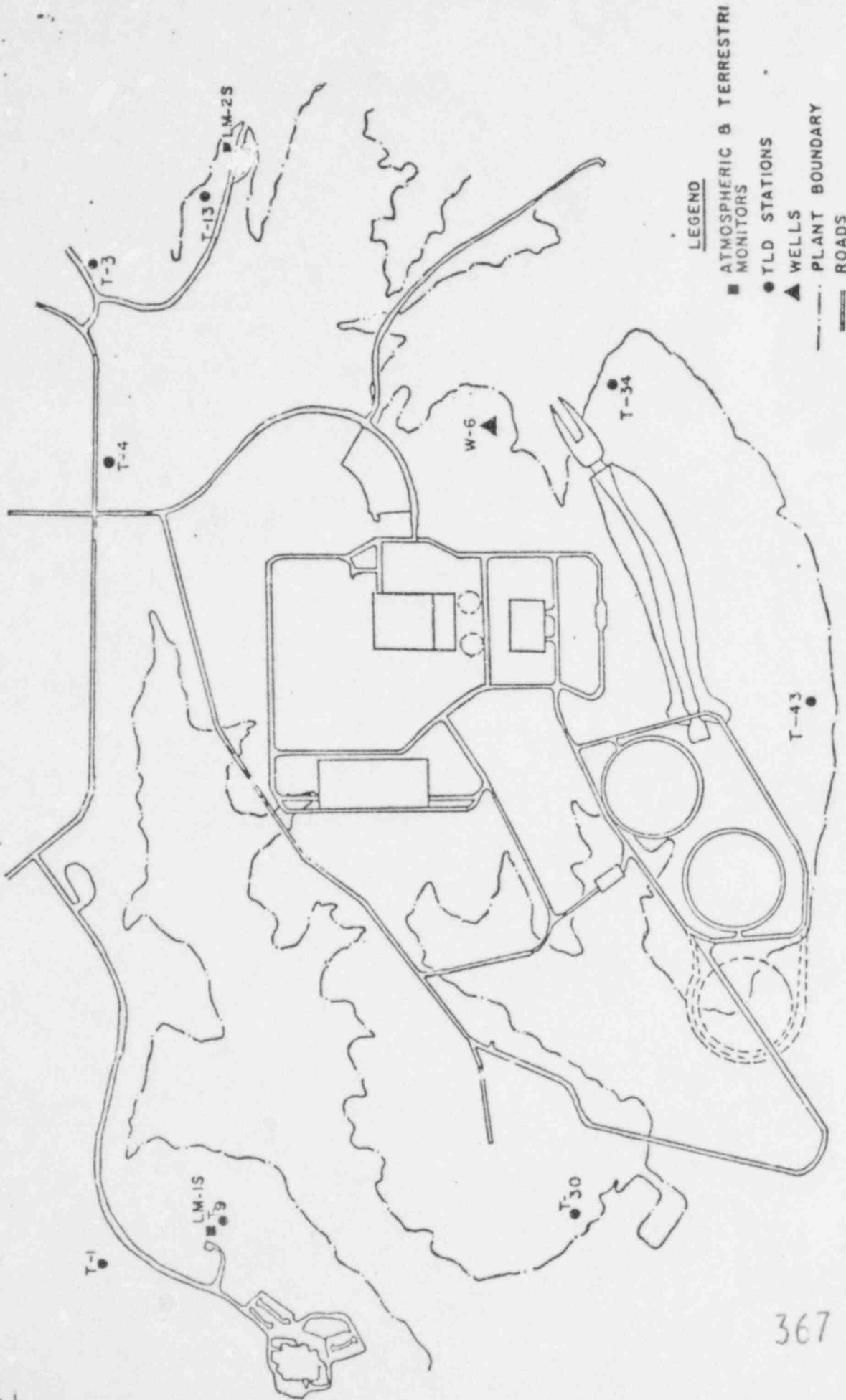
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Figure 3.1-1

# ATMOSPHERIC AND TERRESTRIAL MONITORING NETWORK







SEQUOYAH NUCLEAR PLANT  
SITE MONITORING STATIONS

Figure 3.1.1-2

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Figure 3.1-3  
LOCAL MONITORING STATIONS  
SEQUOYAH NUCLEAR PLANT

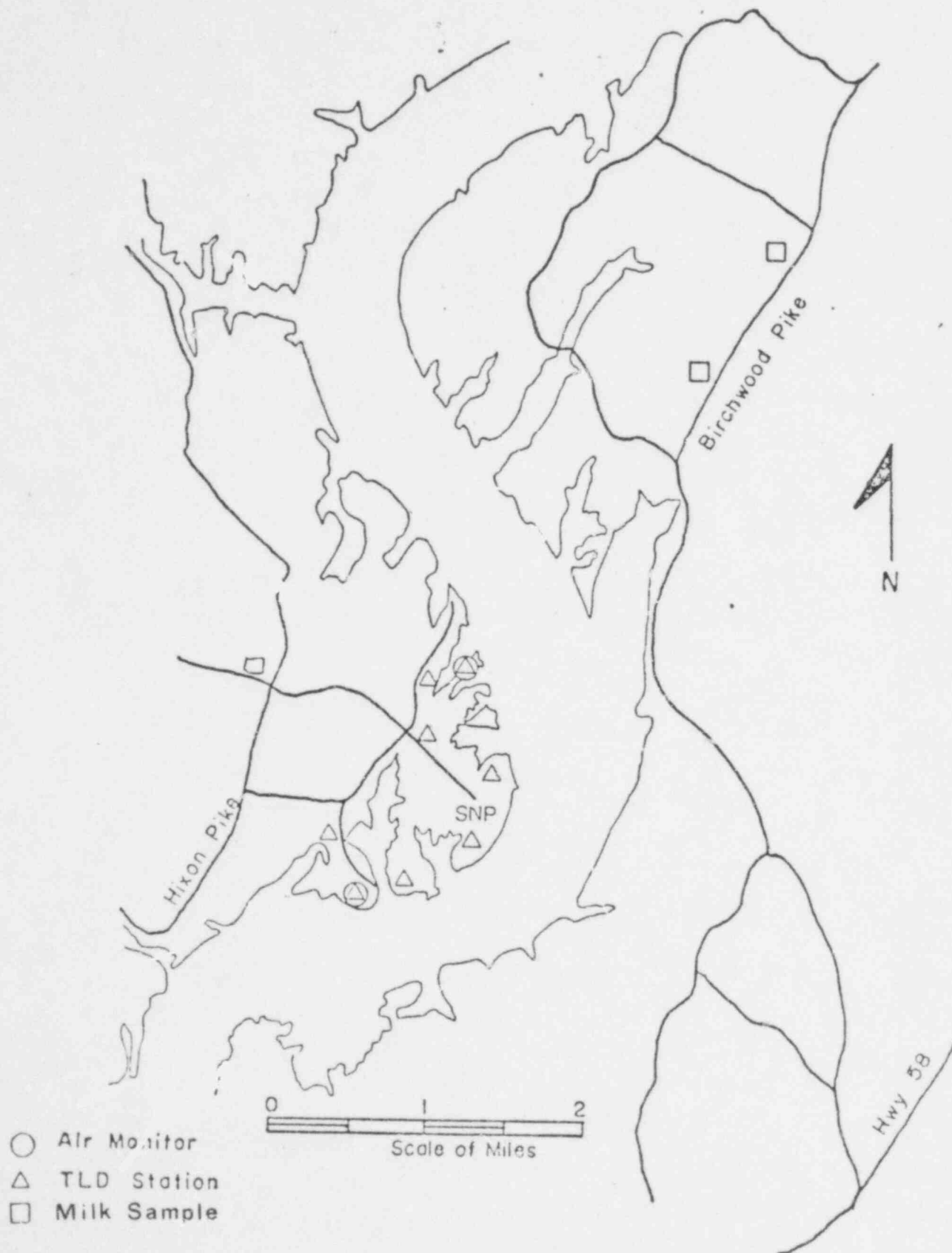
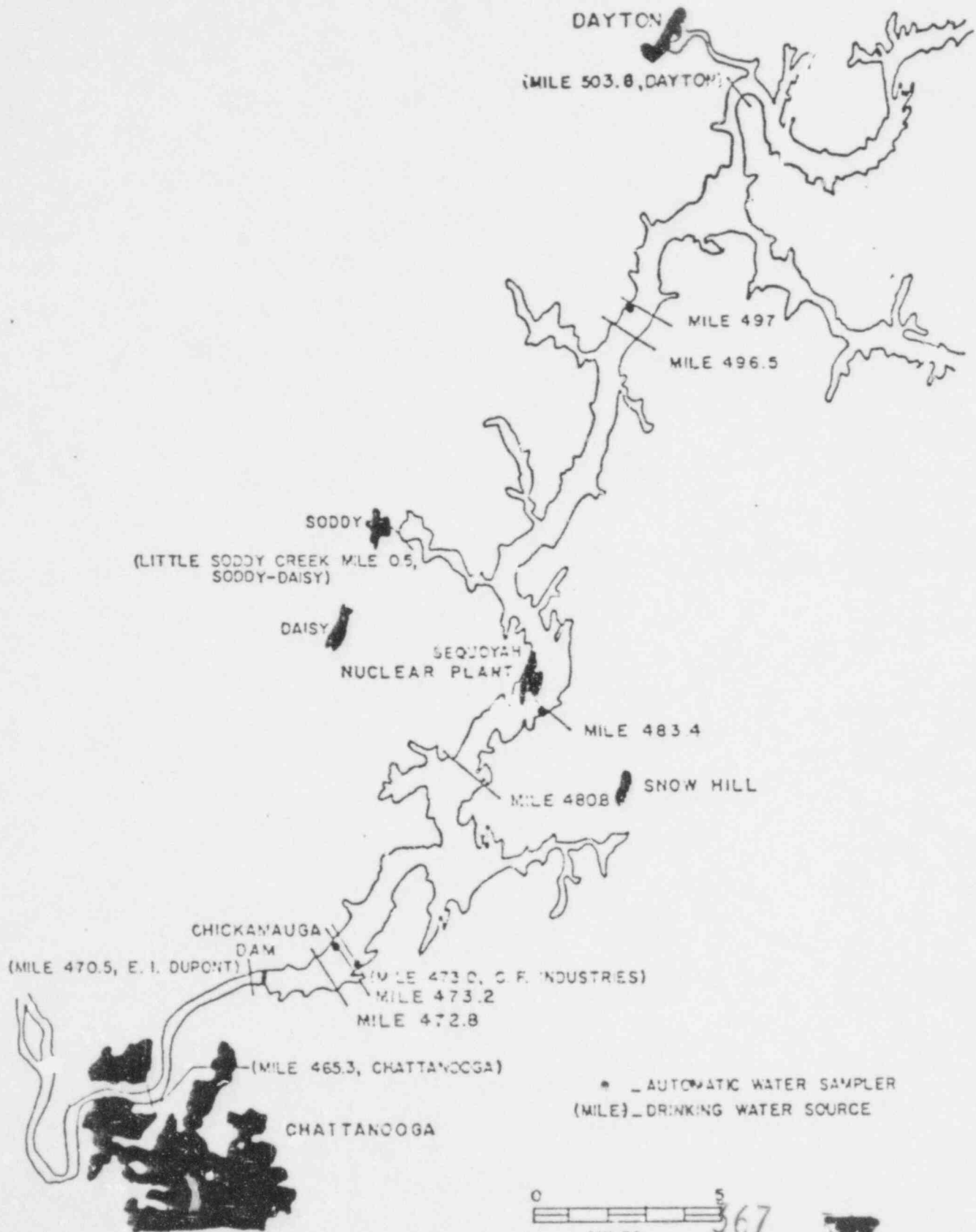


Figure 3.1-4  
RESERVOIR MONITORING NETWORK  
SEQUOYAH NUCLEAR PLANT



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