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SUBJECT: Forwards Revs 17, 18 & 19 of offsite dose calculation manual for Mcguire, Oconee & Catawba nuclear stations, respectively. Revs include minor changes described in justification for revs pages effective 880101.

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February 16, 1988

U. S. Nuclear Regulatory Commission
Attention: Document Control Desk
Washington, D. C. 20555

Subject: Oconee Nuclear Station
Docket Nos. 50-269, -270, -287
McGuire Nuclear Station
Docket Nos. 50-369, -370
Catawba Nuclear Station
Docket Nos. 50-413, -414
Offsite Dose Calculation Manual

Dear Sir:

Please find enclosed ten copies each of Revisions 17, 18 and 19 of the Offsite Dose Calculation Manual for McGuire, Oconee and Catawba Nuclear Stations, respectively.

These revisions include minor changes which are described in the Justification For Revision pages and do not reduce the accuracy or reliability of dose calculations or setpoint determinations. These revisions have been reviewed and approved by the appropriate station managers as indicated on the following cover sheets and are effective January 1, 1988.

According to Technical Specification requirements, revisions to the Offsite Dose Calculation Manual are to be submitted in the Semi-Annual Radioactive Effluent Release Report. As a matter of convenience, we are submitting these revisions prior to submittal of the Semi-Annual Radioactive Effluent Release Report for the period January-June 1988. Please advise if there are questions concerning this matter.

Very truly yours,

Hal B. Tucker

Hal B. Tucker

WHM/1396/sbn

Enclosure

A009
1/1

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PLEASE NOTE

REVISIONS 17, 18, AND 19

TO THE SYSTEM OFFSITE DOSE

CALCULATION MANUAL ARE ENCLOSED.

TO ENSURE THE PROPER SEQUENCE OF

COVER LETERS, PLEASE UPDATE YOUR

MANUAL IN ORDER OF REVISIONS.

Jim Stewart
Radwaste Engineering
(704) 373-5444

December 22, 1987

Subject: Offsite Dose Calculation Manual
Revision 18

The General Office Radwaste Engineering Staff is transmitting to you this date, Revision 18 of the Offsite Dose Calculation Manual. As this revision only affects Oconee Nuclear Station, the approval of other station managers is not required. Please update your copy No. 29, and discard the affected pages.

REMOVE THESE PAGES		INSERT THESE PAGES	
A-3	Rev. 11	A-3	Rev. 18
A-6	Rev. 15	A-6	Rev. 18
A-8	Rev. 15	A-8	Rev. 18
A-16	Rev. 15	A-16	Rev. 18
A-17	Rev. 15	A-17	Rev. 18
A-18	Rev. 15	A-18	Rev. 18
A-19	Rev. 15	A-19	Rev. 18
A-20	Rev. 15	A-20	Rev. 18
A-21	Rev. 15	A-21	Rev. 18
A-22	Rev. 15	A-22	Rev. 18
A-23	Rev. 15	A-23	Rev. 18
A-24	Rev. 15	A-24	Rev. 18
A-25	Rev. 15	A-25	Rev. 18
Table A5.0-2	Rev. 15	Table A5.0-2	Rev. 18

NOTE: As this letter, with it's attachments, contains "LOEP" information, please insert this letter in front of the December 21, 1987.

Approval Date: 12/17/87

Effective Date: 1/1/88

Mary L. Birch
Mary L. Birch
System Radwaste Engineer

Approval Date: 12/21/87

Effective Date: 1/1/88

M. S. Tuckman
M. S. Tuckman, Manager
Oconee Nuclear Station

If you have any questions concerning Revision 18, please call Jim Stewart at (704) 373-5444.

James M. Stewart, Jr.
James M. Stewart, Jr.
Production Health Physicist
Radwaste Engineering

Enclosure

JUSTIFICATIONS FOR REVISION 18

Section A2.1.1 Page A-3	Corrected typo error
Pages A-6, A-8 and Pages A-16 thru A-24	Updated sections using 1986 Effluent Release Data (latest complete year available) and 1987 Land Use Census Data. Also changed water consumption units from kg/yr to l/yr in liquid equations.
Page A-25	Added paragraph to list the dates the Land Use Census was preformed.
Table A5.0-2	Deleted sample point due to stoppage in cow's milk production. Other sample points are still available to meet Tech. Spec. requirements.

A2.0 RELEASE RATE CALCULATION

Generic release rate calculations are presented in Section 1.0; these calculations will be used to calculate release rates from Oconee Nuclear Station.

A2.1 LIQUID RELEASE RATE CALCULATIONS

There are two potential release points at Oconee, the liquid radwaste effluent line to the Keowee Hydroelectric Unit Tailrace and the #3 Chemical Treatment Pond effluent line to the Keowee River.

A2.1.1 Liquid Radwaste Effluent Line To The Keowee Hydroelectric Unit Tailrace

To simplify calculations for the liquid radwaste effluent line, it is assumed that no activity above background is present in the #3 Chemical Treatment Pond effluent. This assumption shall be confirmed by radiation monitoring measurements on the pond's inputs and by periodic analysis of the composite sample collected at the #3 Chemical Treatment Pond discharge. For the liquid radwaste effluent line the following calculation shall be performed to determine a discharge flow, in gpm:

$$f \leq F \div [\sigma \sum_{i=1}^{n} \frac{C_i}{MPC_i}]$$

where:

f = the undiluted effluent flow, in gpm.

C_i = the concentration of radionuclide, 'i', in undiluted effluent as determined by laboratory analyses, in μCi/ml.

MPC_i = the concentration of radionuclide, 'i', from 10CFR20, Appendix B, Table II, Column 2. If radionuclide, 'i', is a dissolved noble gas, the MPC_i = 2.0E-4 μCi/ml.

F = the dilution flow available, in gpm

typical flow rates are:

17054 gpm (based on a leakage rate of 38 cfs, the minimum flow available)

2.9E+6 gpm (based on one hydro unit operating at 50% power, 6600 cfs)

σ = the recirculation factor at equilibrium is 1.0. (See Section 1.1)

$\tilde{Q}_i$ = The release rate of radionuclides, i, in gaseous effluent from all release points at the site, in μCi/sec.

$\overline{X/Q}$ = 4.1E-7 sec/m^3. The highest calculated annual average relative concentration for any area at or beyond the unrestricted area boundary. The location is the S sector @ 3.5 miles for semi-elevated releases.

W = The highest calculated annual average dispersion parameter for estimating the dose to an individual at a controlling location in the unrestricted area where the total inhalation, food and ground plane pathway dose is determined to be a maximum based on operational source term data, land use surveys, and NUREG 0133 guidance:

W = 3.0E-8 sec/m^3, for the inhalation pathway. The location is the WNW @ 4.5 miles for semi-elevated releases.

W = 9.2E-10 m^{-2}, for the food and ground plane pathways. The location is the WNW @ 4.5 miles for semi-elevated releases.

$\tilde{Q}_i = k_1 C_i f \div k_2 = 4.72E{+}2\ C_i f$

where:

C_i = the concentration of radionuclide, i, in undiluted gaseous effluent, in μCi/ml.

f = the undiluted effluent flow, in cfm

k_1 = conversion factor, 2.83E+04 ml/ft^3

k_2 = conversion factor, 6.0E+01 sec/min

$\tilde{Q}_i$ = The release rate of radionuclides, i, in gaseous effluent from all release points at the site, in µCi/sec.

$\overline{X/Q}$ = 9.2E-6 sec/m^3. The highest calculated annual average relative concentration for any area at or beyond the unrestricted area boundary. The location is the S sector @ 1.0 miles for ground-level releases.

W = The highest calculated annual average dispersion parameter for estimating the dose to an individual at a controlling location in the unrestricted area where the total inhalation, food and ground plane pathway dose is determined to be a maximum based on operational and design basis source term data, land use surveys, and NUREG 0133 guidance:

W = 9.1E-7 sec/m^3, for the inhalation pathway. The location is the S sector @ 1.75 miles for ground-level releases.

W = 3.5E-9 m^{-2}, for the food and ground plane pathways. The location is the W sector @ 1.75 miles for ground-level releases.

$$\tilde{Q}_i = k_1 C_i f \div k_2 = 4.72E{+}2\ C_i f$$

where:

C_i = the concentration of radionuclide, i, in undiluted gaseous effluent, in µCi/ml.

f = the undiluted effluent flow, in cfm

k_1 = conversion factor, 2.83E+04 ml/ft^3

k_2 = conversion factor, 6.0E+01 sec/min

A4.3 SIMPLIFIED DOSE ESTIMATES

A4.3.1 Liquid Effluents

For dose estimates, a simplified calculation based on the assumptions presented in Section A4.2.1 and operational source term data is presented below. Updated operational source term data shall be used to revise these calculations as necessary.

$$D_{WB} = 6.84E{+}05 \sum_{\ell=1}^{m} (F_\ell)(T_\ell)\,(C_{Cs\text{-}134} + 0.59\, C_{Cs\text{-}137})$$

where:

$6.84E{+}05 = 1.14E{+}05\,(U_{aw}/D_w + U_{af}\,BF_i)\,DF_{ai\tau}\ (1.18)$

where:

$1.14E{+}05 = 10^6 pCi/\mu Ci \times 10^3 ml/kg \div 8760\ hr/yr$

U_{aw} = 730 kg/yr, adult water consumption

D_w = 27.5, dilution factor from the near field area to the potable water intake.

U_{af} = 21 kg/yr, adult fish consumption

BF_i = 2.00E+03, bioaccumulation factor for Cesium (Table 3.1-1)

$DF_{ai\tau}$ = 1.21E-04, adult, total body, ingestion dose factor (Table 3.1-2)

1.18 = factor derived from the assumption that 85% of dose is from Cs-134 and Cs-137 or 100% ÷ 85% = 1.18

where:

$$F_\ell = \frac{f\sigma}{F + f}$$

f = liquid radwaste flow, in gpm

σ = recirculation factor at equilibrium, 1.0

F = dilution flow, in gpm

and where:

T_ℓ = the length of time, in hours, over which $C_{Cs\text{-}134}$, $C_{Cs\text{-}137}$, and F_ℓ are averaged

$C_{Cs\text{-}134}$ = the average concentration of Cs-134 in undiluted effluent, in μCi/ml, during the time period considered.

$C_{Cs\text{-}137}$ = the average concentration of Cs-137 in undiluted effluent, in μCi/ml, during the time period considered.

0.59 = the ratio of the adult total body ingestion dose factors for Cs-134 and Cs-137 or 7.14E-05 ÷ 1.21E-04 = 0.59

A4.3.2 Gaseous Effluents From Semi-Elevated Release Points

Meteorological data for Unit Vent releases is provided in Tables A4.0-1 and A4.0-2.

A4.3.2.1 Noble Gases

For dose estimates, simplified dose calculations based on the assumptions in A4.2.2.1 and operational source term data are presented below. Updated operational source term data shall be used to revise those calculations as necessary. These calculations further assume that the annual average dispersion parameter is used and that Xenon-133 contributes 69% of the gamma air dose and 80% of the beta air dose for semi-elevated releases.

$$D_\gamma = 4.59E-12 \ [\ \tilde{Q}\ ]_{Xe-133} \ (1.45)$$

$$D_\beta = 1.36E-11 \ [\ \tilde{Q}\ ]_{Xe-133} \ (1.25)$$

where:

4.59E-12 = (3.17E-8) (353) ($\overline{X/Q}$), derived from equation presented in Section 3.1.2.1.

1.36E-11 = (3.17E-8) (1050) ($\overline{X/Q}$), derived from equation presented in Section 3.1.2.1.

$[\ \tilde{Q}\ ]_{Xe-133}$ = the total Xenon-133 activity released in μCi

$\overline{X/Q}$ = 4.1E-07 sec/m^3, as defined in Section A2.2.2

1.45 = factor derived from the assumption that 69% of the Gamma Air dose is contributed by Xe-133

1.25 = factor derived from the assumption that 80% of the Beta-Air dose is contributed by Xe-133

A4.3.2.2 Radioiodines, Particulates, and Other Radionuclides with T 1/2 > 8 Days

For dose estimates, simplified dose calculations based on the assumptions in A4.2.2.2 and operational source term data are presented below. Updated operational source term data shall be used to revise these calculations as necessary. These calculations further assume that the annual average dispersion/deposition parameter is used and that 99% of the dose results from Iodine-131 ingested by the maximally exposed individual via the cow milk pathway at the semi-elevated release controlling location. The simplified dose estimate for exposure to the thyroid of an infant is:

$$D = 1.53E{+}04\ W\ (\tilde{Q})_{I-131}\ (1.01)$$

where:

W = 9.2E-10 ($\overline{D/Q}$) for food and ground plane pathway, in m^{-2} from Table A4.0-2 for the controlling location (WNW @ 4.5 miles).

$(\tilde{Q})_{I-131}$ = the total Iodine-131 activity released in μCi.

1.53E+04 = (3.17E-08) (R_i^C [$\overline{D/Q}$]) with the appropriate substitutions for the cow milk pathway factor, R_i^C [$\overline{D/Q}$], for Iodine-131. See Section 3.1.2.2.

1.01 = factor derived from the assumption that 99% of the total inhalation, food and ground plane pathway dose to the maximally exposed individual is contributed by I-131 via the cow milk pathway.

A4.3.3 Gaseous Effluents From Ground-Level Release Points

Meteorological data for Hot Machine Shop Building Ventilation exhaust, Radwaste Facility exhaust, and Auxiliary Building releases is provided in Tables A4.0-3 and A4.0-4.

A4.3.3.1 Noble Gases

For dose estimates, simplified dose calculations based on the assumptions in A4.2.2.1 and operational and design basis source term data are presented below. These calculations further assume that the annual average dispersion parameter is used and that Xenon-133 contributes 56% of the gamma air dose and 73% of the beta air dose for ground-level releases.

$$D_\gamma = 1.03E{-}10\ [\ \tilde{Q}\ ]_{Xe-133}\ (1.79)$$

$$D_\beta = 3.06E{-}10\ [\ \tilde{Q}\ ]_{Xe-133}\ (1.37)$$

where:

1.03E-10 = (3.17E-8) (353) ($\overline{X/Q}$), derived from equation presented in Section 3.1.2.1.

3.06E-10 = (3.17E-8) (1050) ($\overline{X/Q}$), derived from equation presented in Section 3.1.2.1.

$[\tilde{Q}]_{Xe-133}$ = the total Xenon-133 activity released in μCi

$\overline{X/Q}$ = 9.2E-06 sec/m^3, as defined in Section A2.3.2

1.79 = factor derived from the assumption that 56% of the Gamma Air dose is contributed by Xe-133

1.37 = factor derived from the assumption that 73% of the Beta-Air dose is contributed by Xe-133

A4.3.3.2 Radioiodines, Particulates, and Other Radionuclides with T 1/2 > 8 Days

For dose estimates, simplified dose calculations based on the assumptions in A4.2.2.2 and operational and design basis source term data are presented below. These calculations further assume that the annual average dispersion/deposition parameters are used and that 99% of the dose is from I-131 ingested by the maximally exposed individual via the cow milk pathway at the ground-level release controlling location. The simplified dose estimate for exposure to the infant thyroid is:

$$D = 1.53E{+}04\ W\ (\tilde{Q})_{I-131}\ (1.01)$$

where:

W = 3.50E-09 ($\overline{D/Q}$) for food and ground plane pathway, in m^{-2} from Table A4.0-4 for the controlling location (W @ 1.75 miles).

$(\tilde{Q})_{I-131}$ = the total I-131 activity released from Oconee ground-level release points in μCi.

1.53E+04 = (3.17E-08) ($R_i^C[\overline{D/Q}]$) with the appropriate substitutions for

the infant-cow milk garden pathway, ($R_i^C[\overline{D/Q}]$), for

I-131. See Section 3.1.2.2.

1.01 = factor derived from the assumption that 99% of the total inhalation, food and ground plane pathway dose to the maximally exposed individual is contributed by I-131 via the cow milk pathway.

A4.4 FUEL CYCLE CALCULATIONS

As discussed in Section 3.3.5, more than one nuclear power station site may contribute to the doses to be considered in accordance with 40CFR190. The fuel cycle dose assessments for Oconee Nuclear Station only include liquid and gaseous dose contributions from Oconee Nuclear Station since no other uranium fuel cycle facility contributes significantly to Oconee's maximum exposed individual. For this dose assessment, the total body and maximum organ dose contributions to the maximum exposed individual from Oconee's liquid and gaseous releases are estimated using the following calculations:

$D_{WB}(T) \quad D_T = D_{WB}(l_o) + D_{WB}(g_e) + D_{WB}(g_g)$

$D_{MO}(T) \quad D_T = D_{MO}(l_o) + D_{MO}(g_e) + D_{MO}(g_g)$

where:

$D_{WB}(T)$ = Total estimated fuel cycle whole body dose commitment resulting from the combined liquid and gaseous effluents from Oconee during the calendar year of interest, in mrem.

$D_{MO}(T)$ = Total estimated fuel cycle maximum organ dose commitment resulting from the combined liquid and gaseous effluents from Oconee during the calendar year of interest, in mrem.

A4.4.1 LIQUID EFFLUENTS

Liquid pathway dose estimates are based on values and assumptions presented in Section A.4.3.1. Station operational source terms shall be used to update these simplified calculations as necessary.

Based on operational history, the Oconee fuel cycle maximum exposed individual whole body dose resulting from Oconee's liquid effluent releases ($D_{WB}(l_o)$) is estimated using the simplified dose calculation given below:

$$D_{WB}(l_o) = (6.84E+05) \ (F_{\ell}) \ (T_{\ell}) \ (C_{Cs-134} + 0.59\ C_{Cs-137})$$

where:

$$6.84E+05 = 1.14E+05 \ (U_{aw} / D_w + U_{af} \times BF_i) \ (DF_{ait}) \ (1.18)$$

where:

$$1.14E+05 = (1.0E-06 \text{ pCi/uCi} \times 1.0E+03 \text{ ml/kg}) / (8760 \text{ hr/yr})$$

U_{aw} = 730 ℓ/yr, Adult water consumption

D_w = 27.5, Dilution factor from the near field area to the nearest potable water intake

U_{af} = 21 kg/yr, Adult fish consumption

BF_i = 2.00E+03, Bioaccumulation factor for Cesium (Table 3.1-1)

DF_{ait} = 1.21E-04, Adult total body ingestion dose factor for Cs-134 (Table 3.1-2)

1.18 = Factor derived from the assumption that 85% of the dose is derived from Cs-134 and Cs-137 or 100% / 85% = 1.18

where:

$F_\ell = (f)\ (\sigma)\ /\ (F + f)$

where:

f = Oconee's liquid radwaste flow, in gpm

F = Oconee's dilution flow, in gpm

σ = 1.0, the recirculation factor at equilibrium

where:

T_ℓ = 8760 hours, the time period of time over which C_{Cs-134}, C_{Cs-137} and F_ℓ are averaged.

C_{Cs-134} = The average concentration of Cs-134 in Oconee's undiluted effluent, in uCi/ml, during the calendar year of interest.

C_{Cs-137} = The average concentration of Cs-137 in Oconee's undiluted effluent, in uCi/ml, during the calendar year of interest.

0.59 = The ratio of the adult total body ingestion dose factors for Cs-134 and Cs-137 or 7.14E-05 / 1.21E-04 = 0.59

Based on operational history, the Oconee fuel cycle maximum exposed individual maximum organ dose (Teen-Liver) resulting from Oconee's liquid effluent releases ($D_{MO}(l_o)$) is estimated using the simplified dose calculation given below:

$$D_{MO}(l_o) = (\ 7.98E{+}05\ )\ (\ F_\ell\ )\ (\ T_\ell\ )\ (\ C_{Cs-134} + 0.76\ C_{Cs-137}\ )$$

where:

$$7.98E{+}05 = 1.14E{+}05\ (\ U_{aw}\ /\ D_w + U_{af} \times BF_i\ )\ (\ DF_{ait}\ )\ (\ 1.11\ )$$

where:

1.14E+05 = (1.0E+06 pCi/uCi x 1.0E+03 ml/kg) / (8760 hr/yr)

U_{aw} = 510 ℓ/yr, Teen water consumption

D_w = 27.5, Dilution factor from the near field area to the nearest potable water intake

U_{af} = 16 kg/yr, Teen fish consumption

BF_i = 2.00E+03, Bioaccumulation factor for Cesium (Table 3.1-1)

DF_{ait} = 1.97E-04, Teen liver ingestion dose factor for Cs-134 (Table 3.1-2)

1.11 = Factor derived from the assumption that 90% of the dose is derived from Cs-134 and Cs-137 or 100% / 90% = 1.11

where:

$F_{\ell} = (f)\ (\sigma)\ /\ (F + f)$

where:

f = Oconee's liquid radwaste flow, in gpm

F = Oconee's dilution flow, in gpm

σ = 1.0, the recirculation factor at equilibrium

where:

T_{ℓ} = 8760 hours, the time period of time over which C_{Cs-134} , C_{Cs-137} and F_{ℓ} are averaged.

C_{Cs-134} = The average concentration of Cs-134 in Oconee's undiluted effluent, in uCi/ml, during the calendar year of interest.

C_{Cs-137} = The average concentration of Cs-137 in Oconee's undiluted effluent, in uCi/ml, during the calendar year of interest.

0.76 = The ratio of the teen-liver ingestion dose factors for Cs-134 and Cs-137 or 1.49E-04 / 1.97E-04 = 0.76

A4.4.2 GASEOUS EFFLUENTS FROM SEMI-ELEVATED RELEASE POINTS

Airborne effluent pathway dose estimates are based on the values and assumptions presented in Section A4.3.2. Station operational source term data shall be used to update these calculations as necessary.

Based on operational history, the Oconee fuel cycle maximum exposed individual whole body dose resulting from Oconee's semi-elevated gaseous effluent releases ($D_{WB}(g_e)$) is estimated using the simplified dose calculation given below:

$$D_{WB}(g_e) = (\ 9.32E\text{-}06\ )\ (\ w\ )\ (\ \tilde{Q}_{Xe-133}\ )\ (S_F)\ (\ 1.54\ )$$

where:

w = 4.10E-07 = $(\overline{X/Q})$ for the plume immersion factor pathway factor, in sec/m^3, as defined in Section A2.2.2.

$\tilde{Q}_{Xe-133}$ = The total Xe-133 activity released from Oconee during the calendar year of interest, in uCi.

9.32E-06 = (3.17E-08) ($K_i[\overline{X/Q}]$), with appropriate substitutions for whole body exposure in a semi-infinite cloud of Xe-133. See Section 1.2.1.

S_F = 0.7 = External radiation shielding factor for individuals.

1.54 = The factor derived from the conservative assumption (based on historical data) that 65% of the whole body dose to the maximally exposed individual is contributed by Xe-133.

Based on operational history, the Oconee fuel cycle maximum exposed individual maximum organ dose (Teen-liver) resulting from Oconee's semi-elevated gaseous effluent releases ($D_{MO}(g_e)$) is conservatively estimated using the simplified dose calculation for the Infant thyroid given below:

$$D_{MO}(g_e) = (1.53E+04) (w) (\tilde{Q}_{I-131}) (1.01)$$

where:

w = 9.2E-10, $\overline{D/Q}$ for the food and ground plane pathway, in m^{-2}, from Table A4.0-2 for the semi-elevated release controlling location (WNW @ 4.5 miles).

$\tilde{Q}_{I-131}$ = The total I-131 activity released from Oconee during the calendar year of interest, in uCi.

1.53E+04 = (3.17E-08) ($R_i^C[\overline{D/Q}]$) with appropriate substitutions for the Infant-grass-cow-milk pathway, $R_i^C[\overline{D/Q}]$) for I-131. See Section 3.1.2.2.

1.01 = The factor derived from the assumption (based on historical data) that 99% of the total inhalation, food and ground plane pathway dose to a maximally exposed individual is contributed by I-131 via the cow-milk pathway.

A4.4.3 GASEOUS EFFLUENTS FROM GROUND-LEVEL RELEASE POINTS

Airborne effluent pathway dose estimates are based on the values and assumptions presented in Section A4.3.2. Station operational source term data shall be used to update these calculations as necessary.

Based on design basis source term data and operational history, the Oconee fuel cycle maximum exposed individual whole body dose resulting from Oconee's ground-level gaseous effluent releases ($D_{WB}(g_g)$) is estimated using the simplified dose calculation given below:

$$D_{WB}(g_g) = (9.32E-06) (w) (\tilde{Q}_{Xe-133}) (S_F) (2.00)$$

where:

w = 9.2E-06 = ($\overline{X/Q}$) for the plume immersion pathway, in sec/m^3, as defined in Section A2.3.2.

$\tilde{Q}_{Xe-133}$ = The total Xe-133 activity released from Oconee during the calendar year of interest, in uCi.

9.32E-06 = (3.17E-08) ($K_i[\overline{X/Q}]$), with appropriate substitutions for whole body exposure in a semi-infinite cloud of Xe-133. See Section 1.2.1.

S_F = 0.7 = External radiation shielding factor for individuals.

2.00 = The factor derived from the conservative assumption (based on historical data) that 50% of the whole body dose to the maximally exposed individual is contributed by Xe-133.

Based on design basis source term data and operational history, the Oconee fuel cycle maximum exposed individual maximum organ dose (Teen-liver) resulting from Oconee's ground-level gaseous effluent releases ($D_{MO}(g_g)$) is conservatively estimated using the simplified dose calculation for the infant thyroid given below:

$$D_{MO}(g_g) = (1.53E+04) (w) (\tilde{Q}_{I-131}) (1.01)$$

where:

w = 3.50E-09 $\overline{D/Q}$ for the food and ground plane pathway, in m^{-2}, from Table A4.0-4 for the ground-level release controlling location (W @ 1.75 miles).

$(\tilde{Q})_{I-131}$ = The total I-131 activity released from Oconee ground-level release points during the calendar year of interest, in uCi.

1.53E+04 = (3.17E-08) ($R_i^C[\overline{D/Q}]$) with appropriate substitutions for the infant-cow milk pathway factor,

$R_i^C[\overline{D/Q}]$ for I-131. See Section 3.1.2.2.

1.01 = factor derived from the assumption that 99% of the total inhalation, food and ground plane pathway dose to the maximally exposed individual is contributed by I-131 via the cow milk pathway.

A5.0 RADIOLOGICAL ENVIRONMENTAL MONITORING

The radiological environmental monitoring program shall be conducted in accordance with Technical Specification 4.11.

The monitoring program locations and analyses are given in Tables A5.0-1 through A5.0-3 and Figure A5.0-1.

Site specific characteristics make ground water sampling, special low-level I-131 analyses on drinking water, and food product sampling unnecessary. Ground water recharge is from precipitation and the ground water gradient is toward the effluent discharge area; therefore, contamination of ground water from liquid effluents is highly improbable. Special low level I-131 analyses in drinking water will not be performed routinely since the expected I-131 dose from this pathway is less than 1 mrem/year. Food products will not be sampled since lake water irrigation of crops is not practiced in the vicinity.

The laboratory performing the radiological environmental analyses shall participate in an interlaboratory comparison program which has been approved by the NRC. This program is the Environmental Protection Agency's (EPA's) Environmental Radioactivity Laboratory Intercomparison Studies (Crosscheck) Program, our participation code is CP.

The dates of the land-use census that was used to identify the controlling receptor locations was 07/07/87 - 08/03/87.

TABLE A 5.0-2
(1 OF 1)
OCONEE RADIOLOGICAL MONITORING PROGRAM SAMPLING LOCATIONS
(OTHER SAMPLING LOCATIONS)

CODE:

W - Weekly (≤ 7 days)
SM - Semimonthly (≤ 15 days)
M - Monthly (≤ 31 days)
SA - Semiannually (≤ 184 days)

	SAMPLING LOCATION DESCRIPTION	Air Radioiodines and Particulates	Surface Water	Drinking Water	Shoreline Sediment	Milk	Fish	Broadleaf Vegetation
028	Site Boundary (0.5 miles S)							M
060	New Greenville Water Intake Rd. (2.5 miles NNE)	W		M			SA	M
061	Old Hwy. 183 (1.5 miles SSW)	W						
062	Lake Keowee/Hydro Intake (0.7 mile ENE) (CONTROL)		M					
063	Lake Hartwell - Hwy 183 Bridge (0.8 mile ESE) (000.7)		M		SA		SA	
064	Seneca (6.7 miles SW) (004.1) (CONTROL)			M				
065	Clemson (8.1 miles SSE) (006.1)			M				
066	Anderson (19.0 miles SSE) (012) (CONTROL FOR MILK ONLY)			M		SM		
067	Lawrence Ramsey Bridge, Hwy 27 (4.2 miles SSE) (005.2)				SA		SA	
068	High Falls County Park (2.0 miles W) (CONTROL)				SA			
069	Powell Residence (4.5 miles WNW) (002.1)					SM		
071	Clemson Dairy (10.3 miles SSE) (006.3)					SM		
072	Hwy 130 (1.7 miles S)	W						
073	Tamassee Dar School (9.0 miles NNW) (CONTROL)	W						M
074	Keowee Key Resort (1.7 miles NNW)	W						
075	Willimon Residence (6.0 miles NE) DELETED					SM		