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DUKE POWER

April 17, 1996

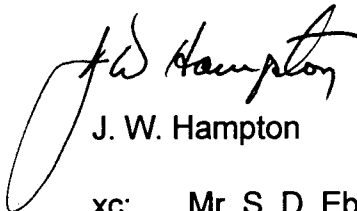
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Annual Radiological Environmental Operating Report

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Pursuant to Oconee Nuclear Station Technical Specification 6.6.1.5, please find enclosed the Oconee Nuclear Site Annual Radiological Environmental Operating Report for 1995.

Very truly yours,



J. W. Hampton

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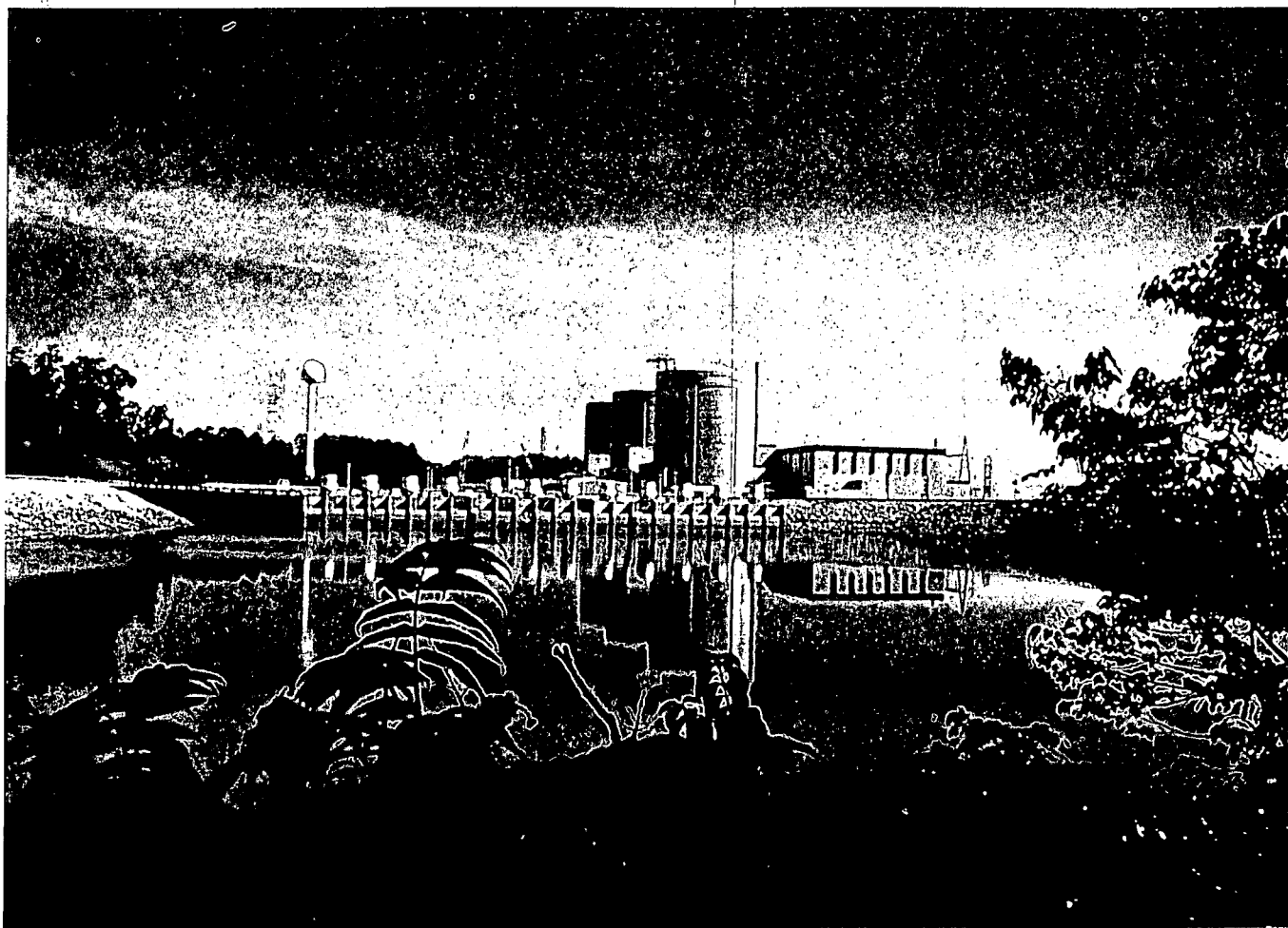
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**Oconee Nuclear Station
Units 1, 2 & 3**



**Annual
Radiological Environmental
Operating Report
1995**

**ANNUAL RADIOLOGICAL
ENVIRONMENTAL OPERATING REPORT**

for

**DUKE POWER COMPANY
OCONEE NUCLEAR STATION
Units 1, 2, and 3**

January 1 - December 31

1995

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LIST OF ACRONYMS

Acronyms and their interpretations used in this report (displayed alphabetically)

ACRONYM	DEFINITION
BW	BiWeekly
C	Control
CL	Critical Level
DEHNR	Department of Environmental Health and Natural Resources
DHEC	Department of Health and Environmental Control
EPA	Environmental Protection Agency
FSAR	Final Safety Analysis Report
LLD	Lower Limit of Detection
M	Monthly
MDA	Minimum Detectable Activity
mrem	millirem
NIST	National Institute of Standards and Technology
NRC	Nuclear Regulatory Commission
ODCM	Offsite Dose Calculation Manual
ONS	Oconee Nuclear Station
pCi/kg	picocurie per kilogram
pCi/l	picocurie per liter
pCi/m ³	picocurie per cubic meter
Q	Quarterly
REMP	Radiological Environmental Monitoring Program
SA	Semiannually
SLCs	Selected Licensee Commitments
SM	Semimonthly
TECH SPECS	Technical Specifications
TLD	Thermoluminescent Dosimeter
uCi/ml	microcurie per milliliter
W	Weekly

1.0 EXECUTIVE SUMMARY

This Annual Radiological Environmental Operating Report describes the Oconee Nuclear Station Radiological Environmental Monitoring Program (REMP), and the program results for the calendar year 1995.

Included are the identification of sampling locations, descriptions of environmental sampling and analysis procedures, comparisons of present environmental radioactivity levels and pre-operational environmental data, comparisons of doses calculated from environmental measurements and effluent data, analysis of trends in environmental radiological data as potentially affected by station operations, and a summary of environmental radiological sampling results. Quality assurance practices, sampling deviations, unavailable samples, and program changes are also discussed.

Sampling activities were conducted as prescribed by Selected Licensee Commitments (SLC's). Required analyses were performed and detection capabilities were met for all samples as required by SLC's. Supplemental analyses were performed for some media for additional information. One-thousand thirty-four samples were analyzed comprising 8000 test results in order to compile data for the 1995 report. Based on the annual land use census, the current number of sampling sites for Oconee Nuclear Station is sufficient.

Concentrations observed in the environment in 1995 for station related radionuclides were within the ranges of concentrations observed in the past. Inspection of data showed that radioactivity concentrations in surface water, drinking water, shoreline sediment, and fish are higher than the activities reported for samples collected prior to the operation of the station. Measured concentrations were not higher than expected, and all positively identified measurements were within limits as specified in SLC's. Additionally, environmental radiological monitoring data is consistent with effluents introduced into the environment by plant operations. The total body dose estimated to the maximum exposed member of the public as calculated by environmental sampling data, excluding TLD results, was $2.12\text{E-}01$ mrem for 1995. It is therefore concluded that station operations has had no significant radiological impact on the health and safety of the public or the environment.

2.0 INTRODUCTION

2.1 SITE DESCRIPTION AND SAMPLE LOCATIONS

Oconee Nuclear Station (ONS) is located in Oconee County, South Carolina, approximately 8 miles northeast of Seneca, South Carolina, on the shore of Lake Keowee. This lake was formed by damming the Keowee and Little Rivers in that location. Immediately to the south is the U.S. Government Hartwell Project. The Keowee Hydroelectric Plant near the station joins Lake Keowee and the upper reaches of Lake Hartwell. To the north, the Jocassee Hydroelectric Plant joins Lake Jocassee and Lake Keowee. Jocassee is a pumped storage plant.

ONS consists of three pressurized water reactor units with a combined generating capacity of 2658 megawatts. Unit 1 began commercial operation 7/15/73. Unit 2 began commercial operation 9/09/74, and Unit 3 on 12/16/74.

Site specific locations for the Radiological Environmental Monitoring Program are defined in the Duke Power Company Offsite Dose Calculation Manual (ODCM). Figure 2.1-1 is a map depicting the Thermoluminescent Dosimeter (TLD) monitoring locations and the sampling locations. The samples obtained from the locations include Airborne Radioiodine and Particulates, Drinking Water, Surface Water, Milk, Broadleaf Vegetation, Shoreline Sediment and Fish. Table 2.1-A lists the specific samples required for each location. Figure 2.1-2 is a map showing the TLD locations and sampling locations within a 1 mile radius of the site. Table 2.1-B lists the locations of all the TLDs.

2.2 SCOPE AND REQUIREMENTS OF ENVIRONMENTAL MONITORING PROGRAM

An environmental monitoring program has been in effect at Oconee Nuclear Station since 1969, four years prior to operation of Unit 1 in 1973. The preoperational program provides data on the existing environmental radioactivity levels for the site and vicinity which may be used to determine whether increases in environmental levels are attributable to the station. The operational program provides surveillance and backup support of detailed effluent monitoring which is necessary to evaluate the significance, if any, of the contributions to the existing environmental radioactivity levels that result from station operation.

This monitoring program is based on NRC guidance as reflected in Selected Licensee Commitments Manual, with regard to sample media, sampling locations, sampling frequency, and analytical sensitivity requirements. Indicator and control locations were established for comparison purposes to distinguish radioactivity of station origin from natural or other "man-made" environmental radioactivity. The environmental monitoring program also verifies projected and anticipated radionuclide concentrations in the environment and related exposures from releases of radionuclides from Oconee Nuclear Station. This program satisfies the

requirements of Section IV.B.2 of Appendix I to 10CFR50 and provides surveillance of all appropriate critical exposure pathways to man and protects vital interests of the company, public, and state and federal agencies concerned with the environment. Reporting levels for radioactivity found in environmental samples are listed in Table 2.2-A. Table 2.2-B lists the REMP analysis and frequency schedule.

The Annual Land Use Census, required by Selected Licensee Commitments, is performed to ensure that changes in the use of areas at or beyond the site boundary are identified and that modifications to the Radiological Environmental Monitoring Program are made if required by changes in land use. This census satisfies the requirements of Section IV.B.3 of Appendix I to 10CFR50. Results are shown in Table 3.9.

Participation in an approved Interlaboratory Comparison Program as required by Selected Licensee Commitments provides for independent checks on the precision and accuracy of measurements of radioactive material in REMP sample matrices. Such checks are performed as part of the quality assurance program for environmental monitoring in order to demonstrate that the results are valid for the purposes of Section IV.B.2 of Appendix I to 10CFR50. A summary of the results obtained as part of this comparison program are in Section 5 of this annual report.

2.3 STATISTICAL AND CALCULATIONAL METHODOLOGY

2.3.1 ESTIMATION OF THE MEAN VALUE

There was one (1) basic statistical calculation performed on the raw data resulting from the environmental sample analysis program. The calculation involved the determination of the mean value for the indicator and the control samples for each sample medium. The mean is a widely used statistic. This value was used in the reduction of the data generated by the sampling and analysis of the various media in the Environmental Monitoring Program. The following equation was used to estimate the mean (reference 6.8):

$$\bar{x} = \frac{\sum_{i=1}^N x_i}{N}$$

Where:

\bar{x} = estimate of the mean,

i = individual sample,

N = total number of samples with a net activity (or concentration)

x_i = net activity (or concentration) for sample i .

NOTE: "Net activity (or concentration)" is the activity (or concentration) determined to be present in the sample. No "Minimum Detectable Activity",

"Lower Limit of Detection", "Less Than Level", or negative activities or concentrations are included in the calculation of the mean.

2.3.2 LOWER LEVEL OF DETECTION, MINIMUM DETECTABLE ACTIVITY, AND CRITICAL LEVEL

The Lower Level of Detection (LLD), Minimum Detectable Activity (MDA), and Critical Level (CL) are used throughout the Environmental Monitoring Program.

LLD - The LLD, as defined in the Selected Licensee Commitments Manual is the smallest concentration of radioactive material in a sample that will yield a net count, above the system background, that will be detected with 95% probability with only 5% probability of falsely concluding that a blank observation represents a "real" signal. The LLD is an *a priori* lower limit of detection. The actual LLD is dependent upon the standard deviation of the background counting rate, the counting efficiency, the sample size (mass or volume), the radiochemical yield, and the radioactive decay of the sample between sample collection and counting. The "required" LLD's for each sample medium and selected radionuclides are given in the Selected Licensee Commitments and are listed in Table 2.2-C.

MDA - The MDA may be thought of as an "actual" LLD for a particular sample measurement remembering that the MDA is calculated using a sample background instead of a system background.

CL - The CL is defined as the net count rate which must be exceeded before a sample is considered to contain any measurable activity above the background.

2.3.3 TREND IDENTIFICATION

One of the purposes of an environmental monitoring program is to determine if there is a buildup of radionuclides in the environment due to the operation of the nuclear station. This is traditionally done by looking at historical data (including preoperational data) and determining if a trend exists. Trends, if they exist, may be either positive or negative. Since nuclear reactor operations do not remove radioactivity from the surrounding environment, a negative trend in a particular radionuclide's concentration in an environmental medium does not indicate that reactor operations are removing radioactivity from the environment but that reactor operations are not adding that radionuclide to the environment in quantities exceeding the preoperational level and that the normal removal processes (radioactive decay, deposition, resuspension, etc.) are influencing the concentration.

In many cases, visual inspection of tabular or graphical presentations of data may be sufficient to determine if a trend exists. In other cases, it may not be so obvious.

Therefore, it is desirable to obtain a single numerical value from the data which will permit a meaningful interpretation of the relationship existing between the variations in the data. If it is assumed that a linear relationship exists between the time after startup of the reactor and the amount of radionuclides in a particular environmental medium, the least squares regression method may be used to define the linear relationship. To determine if the data actually correlate to the straight line assumption, the theoretical variance is compared to the actual variance. The numerical value that summarizes this comparison is known as the correlation coefficient.

This correlation coefficient, symbolized by "r", is a determination of how closely the data fit a straight line and may be calculated from the following equation (reference 6.8):

$$r = \frac{N\sum XY - \sum X \sum Y}{[(N\sum X^2 - (\sum X)^2)(N\sum Y^2 - (\sum Y)^2)]^{\frac{1}{2}}}$$

Where:

- r = correlation coefficient for the data set of X and Y,
- X = the year or point in time,
- Y = the radionuclide concentration associated with X,
- N = number of observations.

The range of values as calculated by the correlation coefficient lies between positive one (+1) and negative one (-1). Zero (0) represents no indication of either a positive or negative trend. A positive (+) correlation coefficient indicates an increasing trend, and conversely, a negative (-) correlation coefficient indicates a decreasing trend. The absolute value of the correlation coefficient indicates the strength of the probability of a trend.

Identifying a trend by using the correlation coefficient is only useful for the time periods where the discharge from the nuclear plant is relatively stable and no other sources of radioactivity are present. Substantial increases or decreases in the amount of a particular radionuclide's release from the nuclear plant will greatly affect the resulting environmental levels; therefore, a knowledge of the release of a radionuclide from the nuclear plant is necessary to completely interpret the trends, or lack of trends, determined from the environmental data. Other factors that may affect environmental levels of radionuclides include prevailing weather conditions (periods of drought or heavier than normal precipitation), construction in or around either the nuclear plant or the sampling location, addition or deletion of other sources of radioactive materials (such as the Chernobyl accident), etc.. Some of these factors may be obvious while others are sometimes unknown to the plant personnel. Specific discussion of correlation coefficient results are discussed in Section 3, "Radiological Environmental Monitoring Program - Discussion, Interpretation, and Trending of Results".

The change in the method of calculating the mean (using only net positive results incorporated in 1987) will also affect the apparent trends.

Because of the above considerations, how trends are identified will depend not only on the least squares regression method, but will include some judgment by plant personnel on the factors affecting environmental levels.

2.3.4 TEST STATISTIC

In some cases, we would not expect to observe a buildup of radionuclides in the environment, but instead would expect to see a measurable increase in levels over a short duration. This is the case for direct radiation measurements, where the radiation level is measured over a finite period and may be dependent upon whether plant discharges were occurring at that time or not. In this case, the correlation coefficient is not a sufficient indicator of whether effluents are having an impact on the environment, since there is no bioaccumulation. Another test is needed to give us a meaningful interpretation of the data.

The statistic that compares the means from two sets of measurements to determine if there is a statistically significant difference is called the test statistic, or t-statistic, and is calculated as follows (reference 6.7):

$$t = \frac{\bar{X}_1 - \bar{X}_2}{S_p \sqrt{\frac{1}{n_1} + \frac{1}{n_2}}}$$

Where:

\bar{X}_1 = the mean value of the first set of measurements

\bar{X}_2 = the mean value of the second set of measurements

S_p = the common variance of the two sets of measurements

$$S_p = \sqrt{S_p^2}$$

Where:

$$S_p^2 = \frac{(n_1 - 1)s_1^2 + (n_2 - 1)s_2^2}{n_1 + n_2 - 2}$$

n_1 = the number of measurements in the first data set

n_2 = the number of measurements in the second data set

s_1 = the sample variance of the first data set

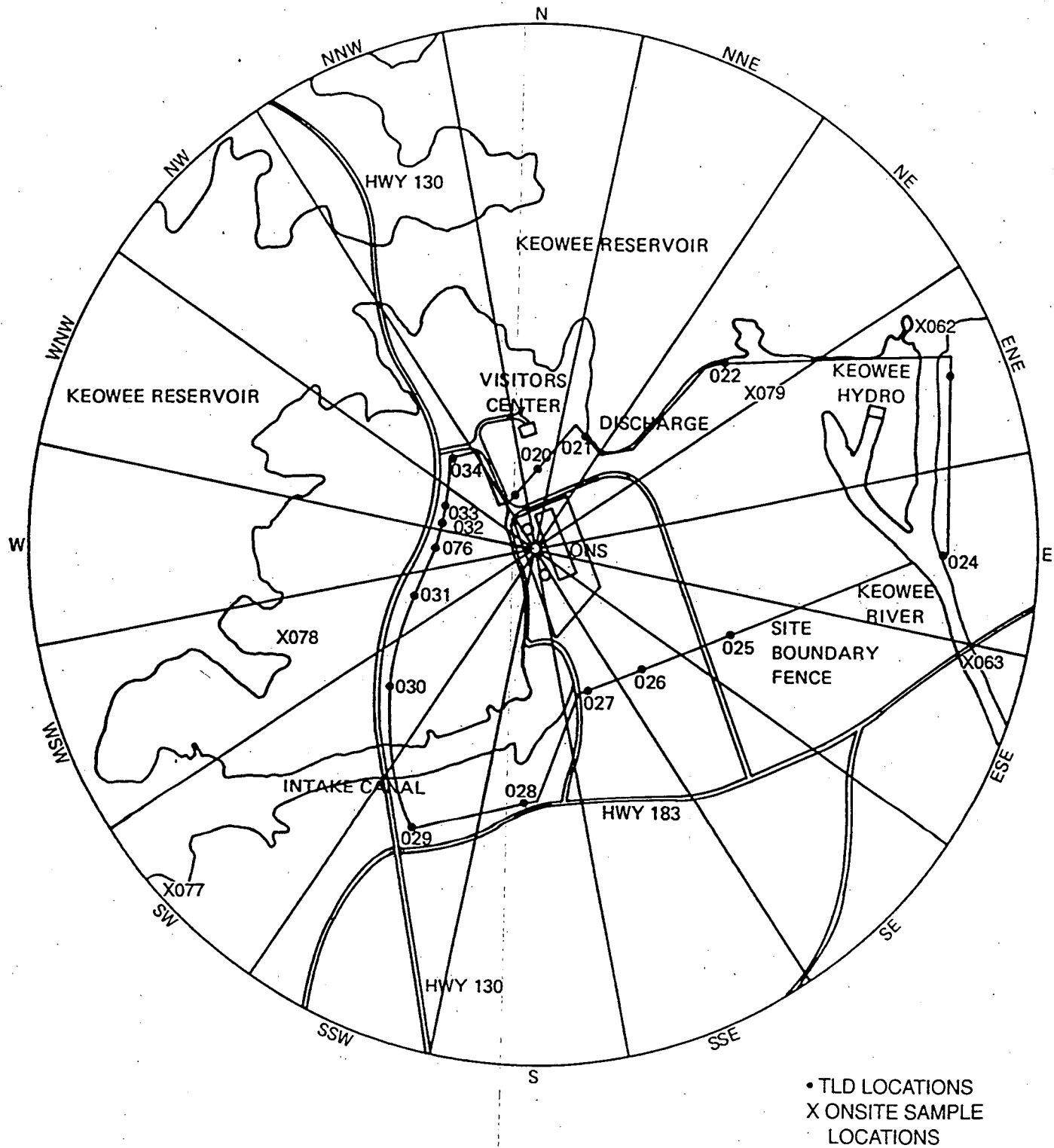
s_2 = the sample variance of the second data set

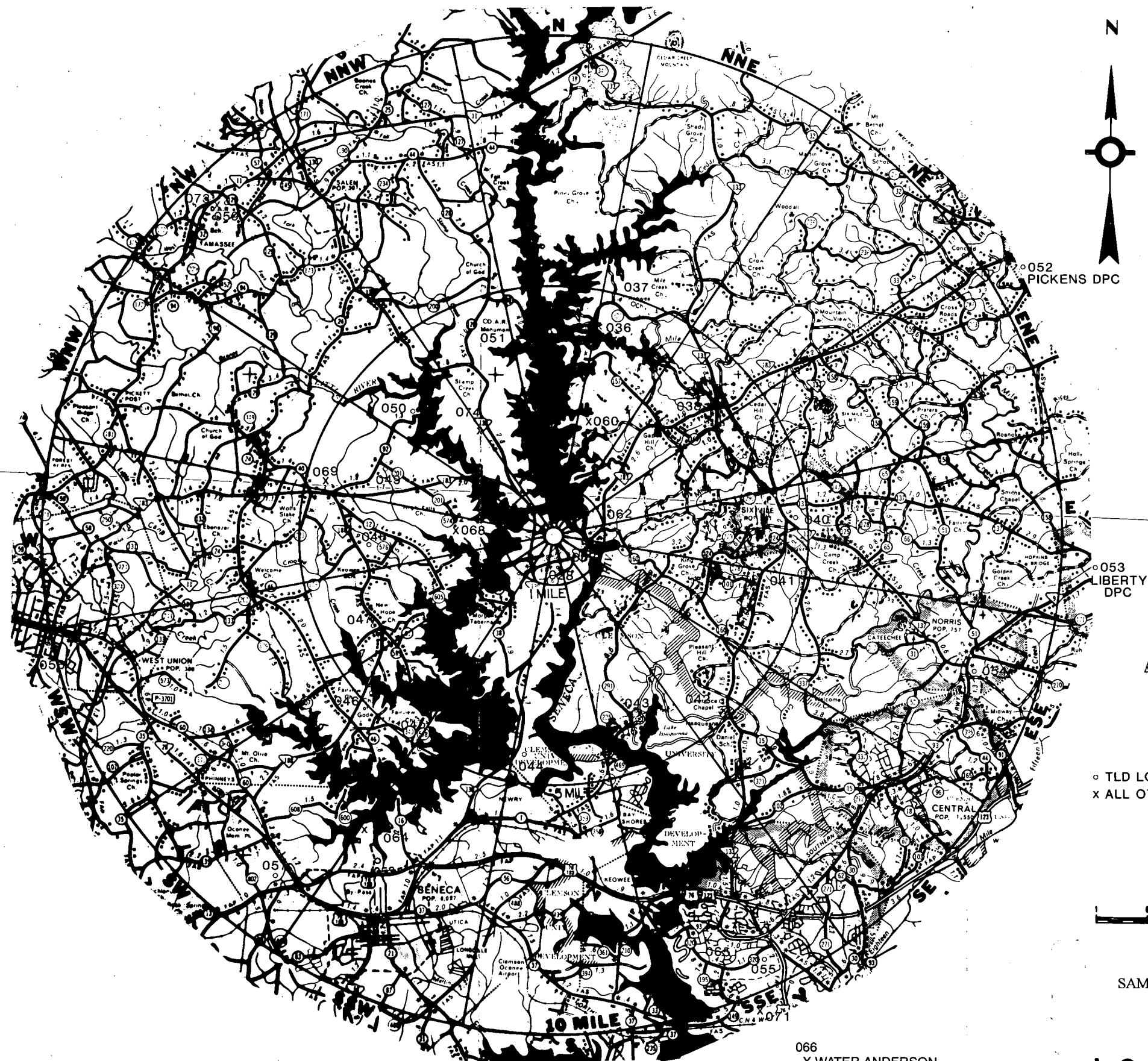
The calculated value of the test statistic is then compared to expected values of the test statistic tabulated based on the number of measurements taken and the degree of confidence required for the results. The calculated value of the test statistic will be compared to the expected value at the 95% confidence level. A positive value occurs (the two sets of data are significantly different) when the absolute value of the calculated test statistic exceeds the absolute value of the expected tabulated value.

Due to the existence of naturally occurring differences in background radiation levels over time (as a result of solar cycles and other meteorological phenomena) and systematic errors due to instrument variability, ratios of measurements can be used to calculate the t-statistic instead of individual measurements. By using ratios, biases associated with the measurement process are minimized and allow us to more accurately compare results from one year to the next. Specifically, in the case of TLD measurements, the inner ring of TLD results is ratioed with the outer ring of TLD measurements in a given year and the ratio for one year is compared to the ratio for another year.

As with other environmental samples, outside factors may affect the results observed and the resulting trends identified. Therefore, the significance of trends will be based in part on judgment of plant personnel familiar with the factors affecting environmental levels, as well as the statistical results.

**FIGURE 2.1-1
SAMPLING LOCATIONS MAP (SITE BOUNDARY)**





ANSTEC
APERTURE
CARD

**Also Available on
Aperture Card**

- o TLD LOCATIONS
- x ALL OTHER LOCATIONS

SCALE OF MILES

FIGURE 2.1-2
SAMPLING LOCATIONS MAP
(TEN MILE RADIUS)

066
X WATER ANDERSON
19 MILES SSE

080
X MILK
19 MILES SSE

9604250161-01

TABLE 2.1-A

OCONEE RADIOLOGICAL MONITORING PROGRAM SAMPLING LOCATIONS

TABLE 2.1-1 CODES			
W	Weekly	SM	Semimonthly
BW	BiWeekly	Q	Quarterly
M	Monthly	SA	Semiannually
C	Control		

Site #	Location Description	Air Rad. & Particulate	Surface Water	Drinking Water	Shoreline Sediment	Fish	Milk	Broadleaf Vegetation
028	Site Boundary (0.5 mi S)							M(a)
060	Greenville Water Intake Road (2.6 mi NNE)*	W		M		SA		M(a)
062 C	Lake Keowee Hydro Intake (0.8 mi ENE)		M					
063	Lake Hartwell Hwy 183 Bridge (0.8 mi ESE) [000.7]		M		SA	SA		
064 C	Seneca (6.7 mi SW) [004.1]			M				
066	Anderson (19.0 mi SSE) [012]			M				
067	Lawrence Ramsey Bridge Hwy 27 (4.2 mi SSE) [005.2]				SA	SA		
068 C	High Falls County Park (2.0 mi W)				SA			
069	Orr Dairy (4.5 mi WNW) [002.1]						SM	
071	Clemson Dairy (10.3 mi SSE) [006.3]						SM	
073 C	Tamassee DAR School (9.2 mi NW)	W						M(a)
074	Keowee Key Resort (2.3 mi NNW)	W						
077	Skimmer Wall (1.0 mi SW)	W						M(a)
078	Recreation Site (0.6 mi WSW)	W						
079	Keowee Dam (0.5 mi NE)	W						M(a)
080C	Martin Dairy (19.0 mi SSE)						SM	

(a) When Available

*Control for Fish Only

[] Location Numbers prior to 1984

TABLE 2.1-B

OCONEE RADIOLOGICAL MONITORING PROGRAM SAMPLING LOCATIONS

(TLD SITES)

Site #	Location Description		Site #	Location Description	
020	SITE BOUNDARY	0.1 miles N	040	MICROWAVE TOWER, SIX MILE	4.5 miles E
021	SITE BOUNDARY	0.3 miles NNE	041	JCT HWY 101 & 133	4.0 miles ESE
022	SITE BOUNDARY	0.5 miles NE	042	LAWRENCE CHAPEL CHURCH, HWY 133	5.0 miles SE
023	SITE BOUNDARY	0.9 miles ENE	043	HWY 291 AT ISSAQUEENA PARK ENTRANCE	4.0 miles SSE
024	SITE BOUNDARY	0.8 miles E	044	HWY 130 AT LITTLE RIVER DAM	4.0 miles S
025	SITE BOUNDARY	0.4 miles ESE	045	TERMINUS OF HWY 588 AT CROOKED CREEK	5.0 miles SSW
026	SITE BOUNDARY	0.3 miles SE	046	HWY 188 AT CROOKED CREEK BRIDGE	4.5 miles SW
027	SITE BOUNDARY	0.4 miles SSE	047	NEW HOPE CHURCH, HWY 188	4.0 miles WSW
028	SITE BOUNDARY	0.5 miles S	048	JCT HWY 175 & 188	4.0 miles W
029	SITE BOUNDARY	0.6 miles SSW	049	JCT HWY 201 & 92	4.0 miles WNW
030	SITE BOUNDARY	0.4 miles SW	050	STAMP CREEK LANDING - END OF HWY 92	4.0 miles NW
031	SITE BOUNDARY	0.3 miles WSW	051	HWY 128, 1 MILE N OF HWY 130	4.5 miles NNW
076	SITE BOUNDARY	0.2 miles W	052	DPC BRANCH OFFICE - PICKENS	12.0 miles ENE
032	SITE BOUNDARY	0.2 miles WNW	053	DPC BRANCH OFFICE - LIBERTY	11.0 miles E
033	SITE BOUNDARY	0.2 miles WNW	054	POST OFFICE - HWY 93 NORRIS	9.5 miles ESE
034	SITE BOUNDARY	0.2 miles NW	055	CLEMSON METEOROLOGY PLOT	9.5 miles SSE
035	SITE BOUNDARY	0.2 miles NNW	056	WATER TOWER - SENECA	8.4 miles SSW
036	MILE CREEK LANDING	4.0 miles N	057C	OCONEE MEMORIAL HOSPITAL BRANCH ROAD	9.0 miles SW
037	KEOWEE CHURCH, HWY 327	4.5 miles NNE	058	SUBSTATION - WALHALLA	9.4 miles WSW
038	DURHAM CONVENIENCE MART, JCT HWY 183 & 133	4.0 miles NE	059	TAMASSEE DAR SCHOOL	9.2 miles NW
039	HWY 133, 1 MILE EAST OF JCT HWY 183 & 133	4.0 miles ENE			

TABLE 2.2-A

**REPORTING LEVELS FOR RADIOACTIVITY
CONCENTRATIONS IN ENVIRONMENTAL SAMPLES**

Analysis	Water (pCi/liter)	Air Particulates or Gases (pCi/m ³)	Fish (pCi/kg-wet)	Milk (pCi/liter)	Broadleaf Vegetation (pCi/kg-wet)
H3	20,000 ^(a)				
Mn54	1,000		30,000		
Fe59	400		10,000		
Co58	1,000		30,000		
Co60	300		10,000		
Zn65	300		20,000		
Zr-Nb-95	400				
I131	2 ^(b)	1		3	100
Cs134	30	10	1,000	60	1,000
Cs137	50	20	2,000	70	2,000
Ba-La-140	200			300	

(a) For drinking water samples. This is 40CFR Part 141 value.

(b) If low-level I-131 analyses are performed.

TABLE 2.2-B

REMP ANALYSIS FREQUENCY

SAMPLE MEDIUM	ANALYSIS SCHEDULE	GAMMA ISOTOPIC	TRITIUM	LOW LEVEL I-131	GROSS BETA	TLD
Air Radioiodine and Particulates	Weekly	X				
Direct Radiation	Quarterly					X
	Monthly	X				
Surface Water	Quarterly Composite		X			
Drinking Water	Monthly	X		X	X	
	Quarterly Composite		X			
Shoreline Sediment	Semiannually	X				
Milk	Semimonthly	X		X		
Fish	Semiannually	X				
Broadleaf Vegetation	Monthly (when available)	X				

TABLE 2.2-C

**LOWER LIMIT OF DETECTION (LLD)
CAPABILITIES FOR ENVIRONMENTAL SAMPLE ANALYSIS**

Analysis	Water (pCi/liter)	Air Particulates or Gases (pCi/m ³)	Fish (pCi/kg-wet)	Milk (pCi/liter)	Broadleaf Vegetation (pCi/kg-wet)	Sediment (pCi/kg-dry)
Gross Beta	4					
H3	2000					
Mn54	15		130			
Fe59	30		260			
Co58, 60	15		130			
Zn65	30		260			
Zr95	30					
Nb95	15					
I131	15 ^(a)	0.07		1	60	
Cs134	15	0.05	130	15	60	150
Cs137	18	0.06	150	18	80	180
Ba-La-140	15			15		

(a) LLD for low-level I-131 analyses is 1 pCi/liter

3.0 RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM - DISCUSSION, INTERPRETATION AND TRENDING OF RESULTS

Data from the 1995 environmental monitoring program was compared to preoperational and historical data whenever comparable. Comparisons from preoperational through the present were possible for fish samples and direct gamma radiation as measured by TLD. Analysis results for other sample media were not directly comparable to preoperational and earlier operational sample results because of either significant changes in the analysis methods or changes in the reporting of the results.

Trend analysis was performed for the radionuclides that have required LLDs listed in Selected Licensee Commitment 16.11-6. These radionuclides are collectively referred to as "Selected Licensee Commitments radionuclides" and include H-3, Mn-54, Fe-59, Co-58, Co-60, Zn-65, Zr-95, Nb-95, I-131, Cs-134, Cs-137, Ba-140, and La-140. Drinking water gross beta results are routinely trended. Trending is also performed for other radionuclides that are detected and could have been the result of station effluents.

Trending was performed using visual inspection and statistical analysis of data. Trend methods included comparing annual mean concentrations of any plant related detected radionuclide to the previous year's concentration. Factors evaluated included the frequency of detection and the concentration in terms of the percent of the radionuclide's reporting level. The highest annual mean concentration of any effluent related radionuclide detected since the change in analysis techniques in 1988 was used for the estimation of the linear regression correlation coefficient. Any zero concentrations used in tables or graphs represent activity measurements less than detectable levels. Graphs of individual sample results were plotted for any detected radionuclide that is the result of station effluents.

Data presented in Sections 3.1 - 3.8 support the conclusion that there was no significant increase in radionuclides in the environment around ONS due to station operations in 1995. Similarly, there was no significant increase in ambient background radiation levels in the surrounding areas.

Appendix B contains tables summarizing 1995 sample results. These tables include results of Selected Licensee Commitments radionuclides only. Any other radionuclides that were detected, as well as Selected Licensee Commitments radionuclides, are summarized in this section.

3.1 AIRBORNE RADIOIODINE AND PARTICULATES

Gamma spectroscopy was performed on 312 fiber filters and charcoal cartridges collected during 1995. Table 3.1-A summarizes the results. Cs-137 was detected in six of the cartridges but not their corresponding particulate filters. Both indicator and control location cartridges had detectable Cs-137. This has occurred in the past. An investigation, performed in 1990, lead to the conclusion that the Cs-137 activity detected was not attributed by station effluents but is an active constituent of the charcoal.

TABLE 3.1-A
AIRBORNE RADIOIODINE CARTRIDGES MEAN ANNUAL CONCENTRATIONS
(pCi/m³)

Isotope	1994	1995		1995	
	Highest Mean	Highest Mean	%Reporting Level	Control Mean	%Reporting Level
Cs-137	1.50E-3(1/53)	7.37E-3(2/52)	0.04%	5.63E-3(2/52)	0.03%

Value in parenthesis is the fraction of detectable measurements.

Visual inspection of tabular data taken from previous environmental report summaries and the 1995 summary did not reveal any increasing trends. Table 3.1-B summarizes the data used and the results of the linear regression analysis. I-131 has a decreasing trend based on the linear regression analysis.

K-40 and Be-7 are the naturally occurring radionuclides that were observed in the air samples.

TABLE 3.1-B
AIRBORNE RADIOIODINE TREND ANALYSIS OF MEAN ANNUAL CONCENTRATIONS (pCi/m3)

YEAR	CARTRIDGE I-131
	INDICATOR
1979	7.54E-03
1980	3.07E-03
1981	6.31E-03
1982	2.87E-03
1983	1.48E-03
1984	8.11E-04
1985	7.71E-04
1986	9.33E-04
1987	4.29E-03
1988	0.00E+00
1989	4.99E-04
1990	0.00E+00
1991	0.00E+00
1992	0.00E+00
1993	0.00E+00
1994	1.03E-02
1995	0.00E+00
Correlation Coefficient	-2.86E-01
Type Trend	Decreasing

3.2 DRINKING WATER

Gross beta analysis and gamma spectroscopy were performed on 39 monthly drinking water samples. These samples were composited to form 15 quarterly period samples for Tritium analysis.

Table 3.2-A summarizes the gross beta analysis and Tritium analysis results.

TABLE 3.2-A
DRINKING WATER MEAN ANNUAL CONCENTRATIONS (pCi/liter)

Isotope	1994 Highest Mean	1995		1995	
		Highest Mean	%Reporting Level	Control Mean	%Reporting Level
H-3	---(0/5)---	2.48E2(4/5)	1.24%	---(0/5)---	
Gross Beta	1.9E0(8/13)	5.1E0(9/13)	NS	2.9E0(9/13)	NS

Value in parenthesis is the fraction of detectable measurements. NS = none specified by Selected Licensee Commitments.

Visual inspection of tabular data summarizing activity observed from the preoperational period through 1995 did not show any significant increasing trends. Linear regression analysis data and results are contained in Table 3.2-B. Total Beta results had a positive correlation coefficient, indicating the possibility of an increasing trend. Review of the data in the table shows that the differences in the activities are very small (range from 1.81 to 5.10 pCi/liter), and that no trends are apparent. No beta emitting radionuclide other than Tritium has been detected in drinking water since the change of analysis techniques in 1988. Tritium results had a negative correlation coefficient, indicating the possibility of a decreasing trend. The possibility of a decreasing trend is probably due to the change in sampling locations described in the following.

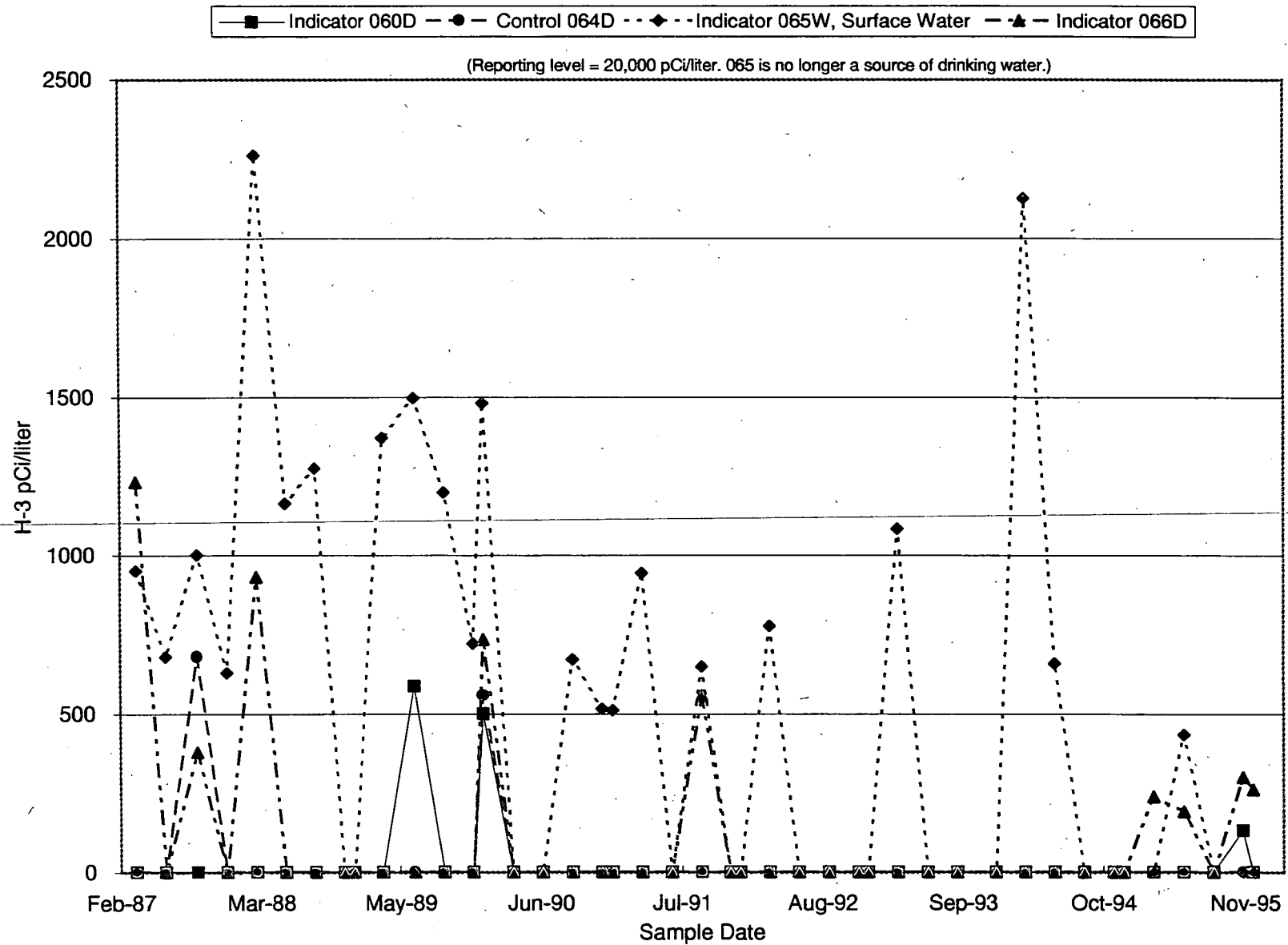
A previous drinking water location, Clemson Water Plant, location number 065, is still monitored though not required by Selected Licensee Commitments. The plant was closed 7/01/89. The raw water that supplied the plant continues to be sampled and analyzed for Tritium and gamma emitting radionuclides. The results are used in evaluation of activity detected in the nearest downstream drinking water supply, Anderson Drinking Water Plant, location number 066. The Clemson site was typically the high mean location when the plant was in operation. Figure 3.2 shows the Tritium levels at the Clemson site and drinking water sites. Sample analysis results from location 065 raw water are not included in the tables summarizing drinking water results.

K-40 was observed in drinking water samples in addition to the Total Beta and Tritium results listed in the tables.

TABLE 3.2-B
DRINKING WATER TREND ANALYSIS OF MEAN ANNUAL CONCENTRATIONS (pCi/liter)

YEAR	H-3	Gross Beta
	INDICATOR	INDICATOR
1974	4.40E+02	
1975	1.80E+03	
1976	2.20E+03	
1977	1.20E+03	
1978	1.05E+03	
1979	5.78E+02	1.83E+00
1980	6.60E+02	1.86E+00
1981	8.30E+02	1.98E+00
1982	6.43E+02	2.04E+00
1983	9.37E+02	1.85E+00
1984	7.65E+02	1.87E+00
1985	8.56E+02	2.14E+00
1986	1.24E+03	1.93E+00
1987	8.15E+02	2.00E+00
1988	1.57E+03	2.00E+00
1989	1.35E+03	2.30E+00
1990	0.00E+00	3.00E+00
1991	5.58E+02	1.81E+00
1992	0.00E+00	3.23E+00
1993	0.00E+00	2.10E+00
1994	0.00E+00	1.90E+00
1995	2.48E+02	5.10E+00
Correlation Coefficient	-5.73E-01	5.50E-01
Type Trend	Decreasing	Increasing

Oconee Nuclear Station Radiological Environmental Monitoring H-3 in Drinking Water Samples



3.3 SURFACE WATER

Gamma spectroscopy was performed on 26 monthly surface water samples. These samples were composited to form 10 quarterly samples for Tritium analysis.

Only Tritium was detected in the samples. Table 3.3-A summarizes the results of the analyses. The indicator location is near the liquid effluent release point and differences between the indicator and control samples are expected. Comparison of 1994 and 1995 highest mean annual concentrations show there is no significant change in concentrations.

TABLE 3.3-A
SURFACE WATER MEAN ANNUAL CONCENTRATIONS (pCi/liter)

Isotope	1994 Highest Mean	1995		1995	
		Highest Mean	%Reporting Level	Control Mean	%Reporting Level
H-3	5.75E3(5/5)	6.65E3(5/5)	33.3%*	---	(0/5)---

Value in parenthesis is the fraction of detectable measurements.

* Reporting Level used is for Drinking Water. None specified for Surface Water.

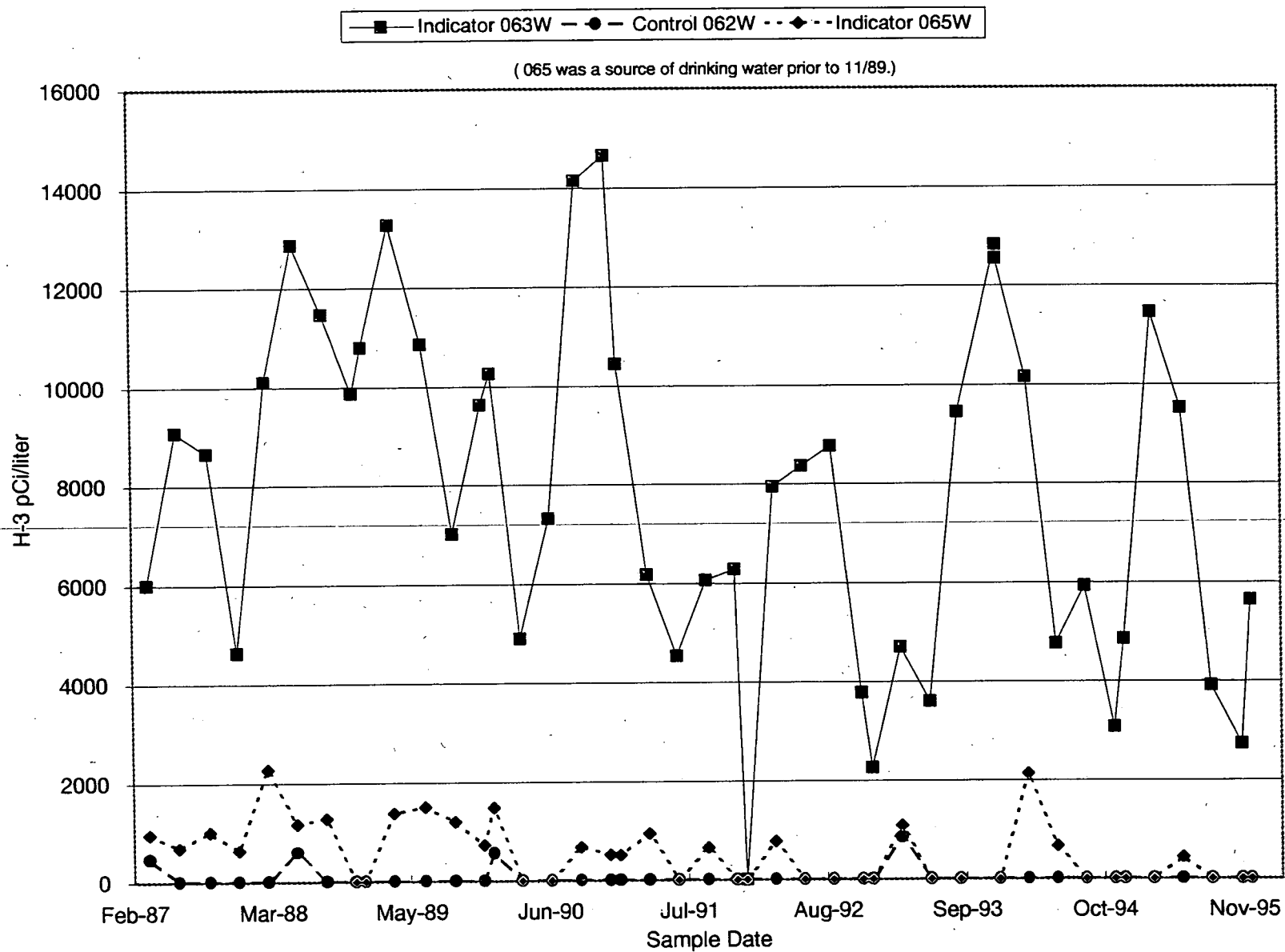
Visual inspection of tabular data covering the preoperational period through 1995 did not reveal any significant increasing trends. Figure 3.3 shows Tritium levels in surface water. Linear regression analysis was applied to the highest indicator location mean for Tritium from the preoperational period through 1995, and for the past seventeen years for the remaining radionuclides. The data used and the results are in Table 3.3-B. Co-58 had a positive correlation coefficient, indicating the possibility of an increasing trend. However, Co-58 has not been detected in samples since 1992.

K-40 was observed in surface water samples in addition to the radionuclides listed in the tables.

TABLE 3.3-B
SURFACE WATER TREND ANALYSIS OF MEAN ANNUAL CONCENTRATIONS (pCi/liter)

YEAR	H-3 INDICATOR	Co-58 INDICATOR	Co-60 INDICATOR	Cs-137 INDICATOR
1972	4.80E+02			
1974	1.55E+03			
1975	2.90E+04			
1976	2.95E+04			
1977	2.90E+03			
1978	8.00E+02			
1979	4.67E+03	1.33E+00	2.60E+00	2.82E+00
1980	4.93E+03	1.56E+00	2.30E+00	5.40E+00
1981	7.21E+03	1.10E+00	6.10E-01	3.90E+00
1982	6.13E+03	6.14E-01	1.99E+00	4.85E+00
1983	8.40E+03	6.99E-01	3.02E+00	6.83E-01
1984	9.93E+03	9.40E-01	6.30E-01	4.83E-01
1985	1.05E+04	2.15E-01	6.27E-01	9.90E-01
1986	1.26E+04	2.85E+00	9.21E-01	5.49E-01
1987	7.08E+03	5.10E+01	3.40E+00	0.00E+00
1988	1.10E+04	6.20E+00	5.00E+00	3.50E+00
1989	1.02E+04	5.30E+00	3.00E+00	3.40E+00
1990	1.03E+04	1.70E+00	1.60E+00	0.00E+00
1991	5.76E+03	5.37E+00	0.00E+00	0.00E+00
1992	6.22E+03	2.49E+00	0.00E+00	0.00E+00
1993	8.62E+03	0.00E+00	0.00E+00	0.00E+00
1994	5.75E+03	0.00E+00	0.00E+00	0.00E+00
1995	6.65E+03	0.00E+00	0.00E+00	0.00E+00
Correlation Coefficient	-9.86E-02	1.61E-02	-4.17E-01	-6.67E-01
Type Trend	Decreasing	Increasing	Decreasing	Decreasing

Oconee Nuclear Station Radiological Environmental Monitoring H-3 in Surface Water Samples



3.4 MILK

Gamma spectroscopy and low level iodine analysis was performed on 78 milk samples collected in 1995. Cs-137 was detected in one of the indicator location samples and one of the control location samples. Cs-137 in milk is not unusual. It is a constituent of fallout and has been observed in samples from indicator and control locations in previous years. Naturally occurring K-40 was also observed in milk samples.

TABLE 3.4-A
MILK MEAN ANNUAL CONCENTRATIONS (pCi/liter)

Isotope	1994 Highest Mean	1995		1995	
		Highest Mean	%Reporting Level	Control Mean	%Reporting Level
Cs-137	---(0/26)---	2.3E0	(1/26) 3.3%	2.0E0	(1/26) 2.9%

Value in parenthesis is the fraction of detectable measurements.

Visual inspections of tabular data taken from previous environmental report summaries and the 1995 summary did not reveal any increasing trends. Linear regression analysis data and results are found in Table 3.4-B.

TABLE 3.4-B
MILK TREND ANALYSIS OF MEAN ANNUAL CONCENTRATIONS (pCi/liter)

YEAR	Cs-137
	INDICATOR
1979	7.25E+00
1980	3.58E+00
1981	5.52E+00
1982	2.71E+00
1983	5.04E+00
1984	2.30E+00
1985	2.38E+00
1986	2.79E+00
1987	4.90E+00
1988	3.90E+00
1989	4.70E+00
1990	6.40E+00
1991	4.99E+00
1992	6.63E+00
1993	0.00E+00
1994	0.00E+00
1995	2.30E+00
Correlation Coefficient	-3.51E-01
Type Trend	Decreasing

3.5 BROADLEAF VEGETATION

Gamma spectroscopy was performed on 60 broadleaf vegetation samples during 1995. Cs-137 was reported in indicator and control location samples. The frequency of detection and the average concentration were higher for control location samples. It is not unusual for Cs-137 to be present in vegetation. It is a constituent of nuclear weapons test fallout and has been observed in samples from indicator and control locations in previous years. The sample results are summarized in Table 3.5-A. Concentrations that were detected are below reporting levels.

TABLE 3.5-A
BROADLEAF VEGETATION MEAN ANNUAL CONCENTRATIONS (pCi/kg, wet)

Isotope	1994 Highest Mean	1995		1995	
		Highest Mean	%Reporting Level	Control Mean	%Reporting Level
Cs-137	---(0/14)---	4.3E1	(2/12) 2.2%	1.58E2	(11/12) 7.9%

Value in parenthesis is the fraction of detectable measurements.

Visual inspection of tabular data taken from previous environmental report summaries and the 1995 summary did not reveal any increasing trends. Linear regression analysis data and results are given in Table 3.5-B. Cs-137 has a positive correlation coefficient. There is no indication that the Cs-137 is due to ONS operations based on the low concentration observed and the absence of other radionuclides.

K-40 and Be-7 were observed in broadleaf vegetation samples in addition to those listed in the table.

TABLE 3.5-B
BROADLEAF VEGETATION TREND ANALYSIS OF MEAN ANNUAL CONCENTRATIONS (pCi/kg)

YEAR	Cs-137
	INDICATOR
1979	5.04E+01
1980	2.80E+01
1981	2.99E+01
1982	2.42E+01
1983	7.44E+00
1984	1.37E+01
1985	1.62E+01
1986	2.90E+01
1987	2.70E+01
1988	2.40E+01
1989	0.00E+00
1990	2.73E+02
1991	2.22E+01
1992	0.00E+00
1993	0.00E+00
1994	0.00E+00
1995	4.30E+01
Correlation Coefficient	4.77E-02
Type Trend	Increasing

3.6 SHORELINE SEDIMENT

Gamma spectroscopy was performed on twelve sediment samples. Table 3.6-A summarizes the radionuclides that were detected. The 1994 and 1995 highest annual means are similar in the radionuclides detected and their concentrations.

TABLE 3.6-A
SHORELINE SEDIMENT MEAN ANNUAL CONCENTRATIONS (pCi/kg, dry)

Isotope	1994 Highest Mean	1995		1995	
		Highest Mean	%Reporting Level	Control Mean	%Reporting Level
Mn-54	5.3E1(2/4)	1.43E2(2/4)	NS	---	(0/4)---
Co-58	7.0E1(1/4)	3.9E1(1/4)	NS	---	(0/4)---
Co-60	1.49E2(2/4)	2.4E1(1/4)	NS	---	(0/4)---
Cs-134	6.7E1(3/4)	1.1E1(1/4)	NS	---	(0/4)---
Cs-137	2.38E2(3/4)	5.2E1(2/4)	NS	2.1E1(1/4)	NS

Value in parenthesis is the fraction of detectable measurements. NS = none specified by Selected Licensee Commitments.

Visual inspection of tabular data from previous environmental report summaries and the 1995 summary indicated increases in shoreline sediment concentrations have occurred since station operations began. Linear regression analysis data and results are found in Table 3.6-B. Positive correlation coefficients resulted for Mn-54, Sb-125, and Ag-110m, indicating possible increasing trends. Neither Sb-125 nor Ag-110m were detected in 1995.

Graphs of individual sample results can be found in Figures 3.6-1 through 3.6-5. The period plotted begins when shoreline sediment sampling was initiated in 1984. Co-58, Co-60, Cs-134 and Cs-137 were graphed because they were detected in 1995 samples. None of these radionuclides have positive trends based on linear regression analysis data. Fluctuations in the graphed results are large and no trends are apparent.

Previous environmental reports (reference 6.5) have addressed the fluctuations in shoreline sediment sample results. Some of these are attributed to differences in the actual point of sampling due to periods of drought. Samples are collected at the edge of the water. Reduced lake levels caused some samples to be taken at points that are normally submerged and where sediment deposition is expected to be greater. The graphs also show Ag-110m and Sb-125 were not detectable until after 1986 and that an increase in the number of samples with detectable Co-58 and Co-60 also occurred after 1986. This activity may be due to the Reactor Coolant Pump failure and associated fuel damage that occurred on Unit 3 in 1986.

Mn-54 was detected in 1995 samples and has a positive correlation coefficient. Activity reported as Mn-54 may be contributed by the presence of Ac-228. Ac-228 emits a photon very close to the energy of the single counting line used to identify Mn-54. Mn-54 has been reported in samples from both indicator and control locations in the past. Co-58, Co-60 and Mn-54 are forms of crud (activated corrosion products). A review of indicator shoreline sediment sample results since 1984 showed that over 50% of the samples with Mn-54 did not contain either Co-58 or Co-60. This is also the case with the three elevated points in the graph (Figure 3.6-5). Two of the samples did not contain either cobalt isotope or any other plant related radionuclide. The third sample contained Cs-137. A review of liquid effluent release reports showed there have been no increases in the amounts of Mn-54 released. It is concluded that Ac-228 is the major contributor to the activity reported as Mn-54 based on the absence of other corrosion products.

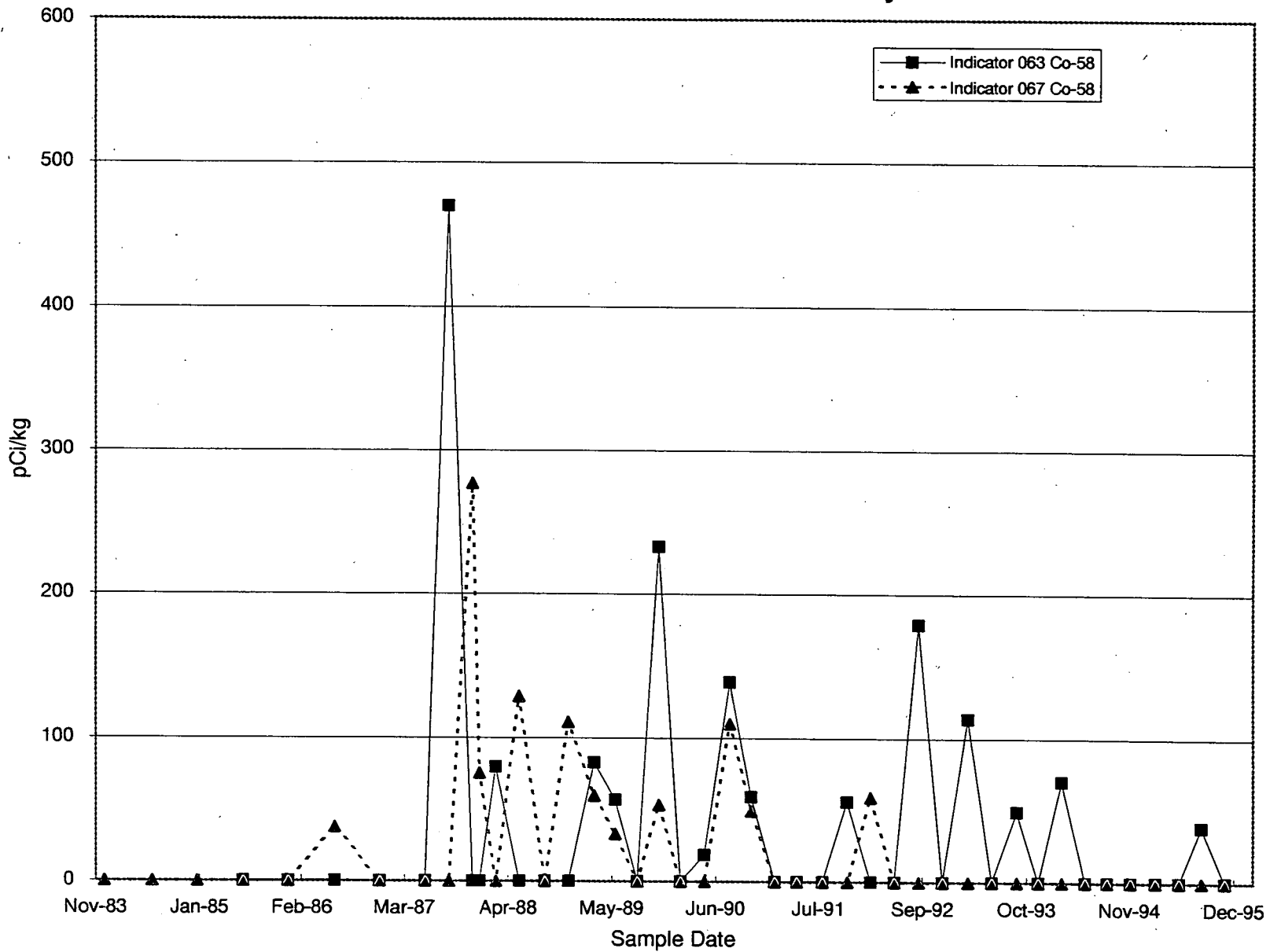
The 1995 doses from shoreline sediments were low and well within any dose limits.

K-40 and Be-7 were observed in shoreline sediment samples in addition to the radionuclides listed in the tables.

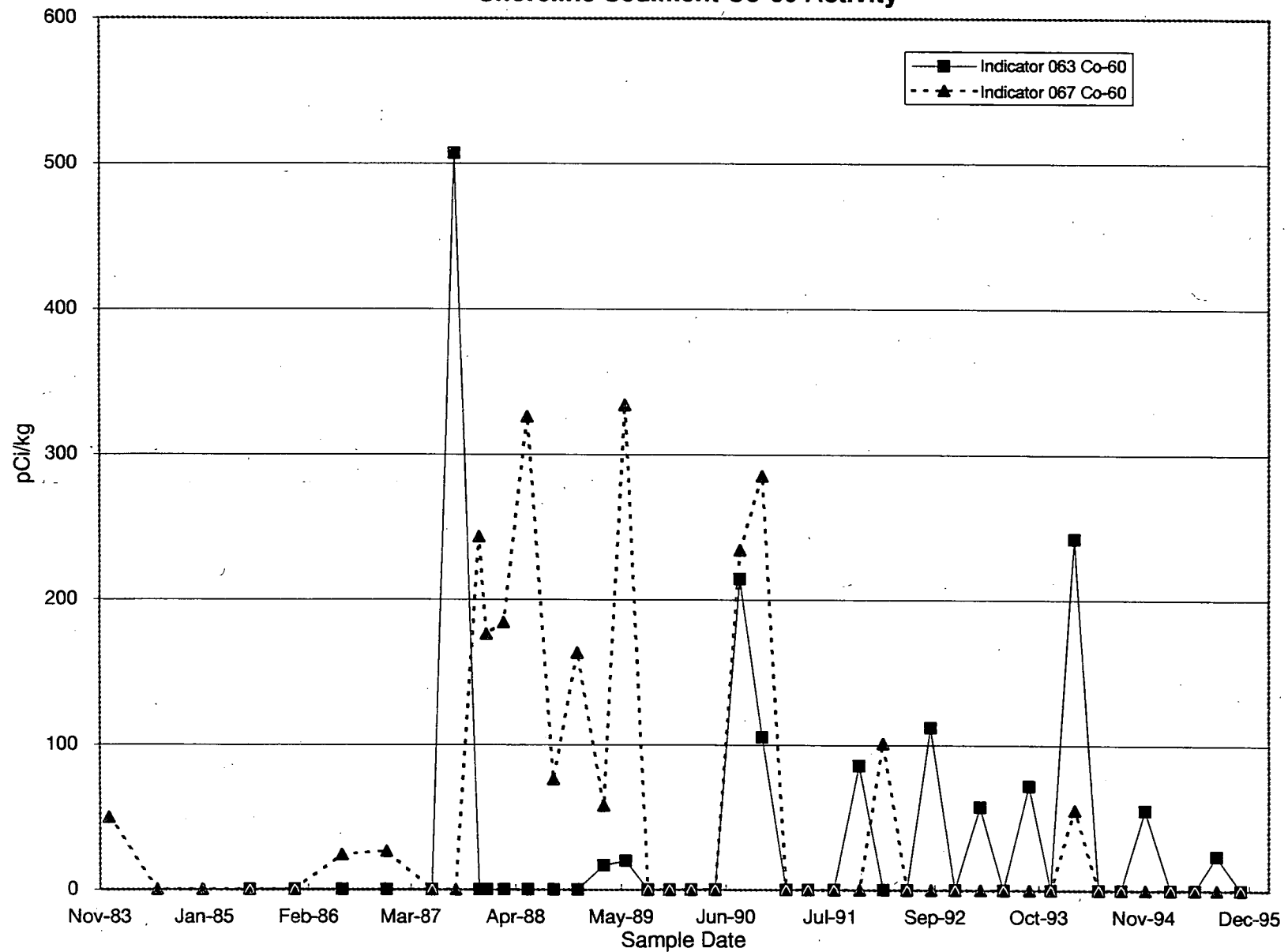
TABLE 3.6-B
SHORELINE SEDIMENT TREND ANALYSIS OF MEAN ANNUAL CONCENTRATIONS (pCi/kg)

YEAR	Mn-54	Co-58	Co-60	Cs-134	Cs-137	Ag-110m	Sb-125
	INDICATOR	INDICATOR	INDICATOR	INDICATOR	INDICATOR	INDICATOR	INDICATOR
1984	1.10E+01	1.09E+01	1.19E+01	7.77E+01	5.16E+01	0.00E+00	0.00E+00
1985	9.39E+00	1.27E+00	4.79E+00	7.63E+01	9.47E+01	0.00E+00	0.00E+00
1986	2.53E+01	2.28E+00	2.63E+01	1.19E+02	5.87E+02	0.00E+00	0.00E+00
1987	5.40E+01	4.70E+02	5.07E+02	1.01E+02	6.22E+02	3.46E+02	0.00E+00
1988	3.30E+01	1.20E+02	1.87E+02	6.60E+01	7.59E+02	1.62E+02	3.67E+02
1989	2.30E+01	1.24E+02	1.96E+02	5.40E+01	8.48E+02	5.50E+01	1.86E+02
1990	3.40E+01	8.00E+01	2.59E+02	4.50E+01	5.36E+02	1.71E+02	9.00E+01
1991	3.26E+01	5.60E+01	8.57E+01	6.91E+01	1.24E+02	1.10E+02	1.78E+02
1992	8.79E+01	1.79E+02	1.12E+02	5.60E+01	3.31E+02	1.69E+02	2.08E+02
1993	8.20E+01	8.20E+01	6.50E+01	3.20E+01	1.36E+02	5.63E+01	1.11E+02
1994	5.30E+01	7.00E+01	1.49E+02	6.70E+01	2.38E+02	1.04E+02	1.29E+02
1995	1.43E+02	3.90E+01	2.40E+01	1.10E+01	5.20E+01	0.00E+00	0.00E+00
Correlation Coefficient	7.88E-01	-2.03E-02	-4.54E-02	-7.23E-01	-2.40E-01	4.92E-02	2.52E-01
Type Trend	Increasing	Decreasing	Decreasing	Decreasing	Decreasing	Increasing	Increasing

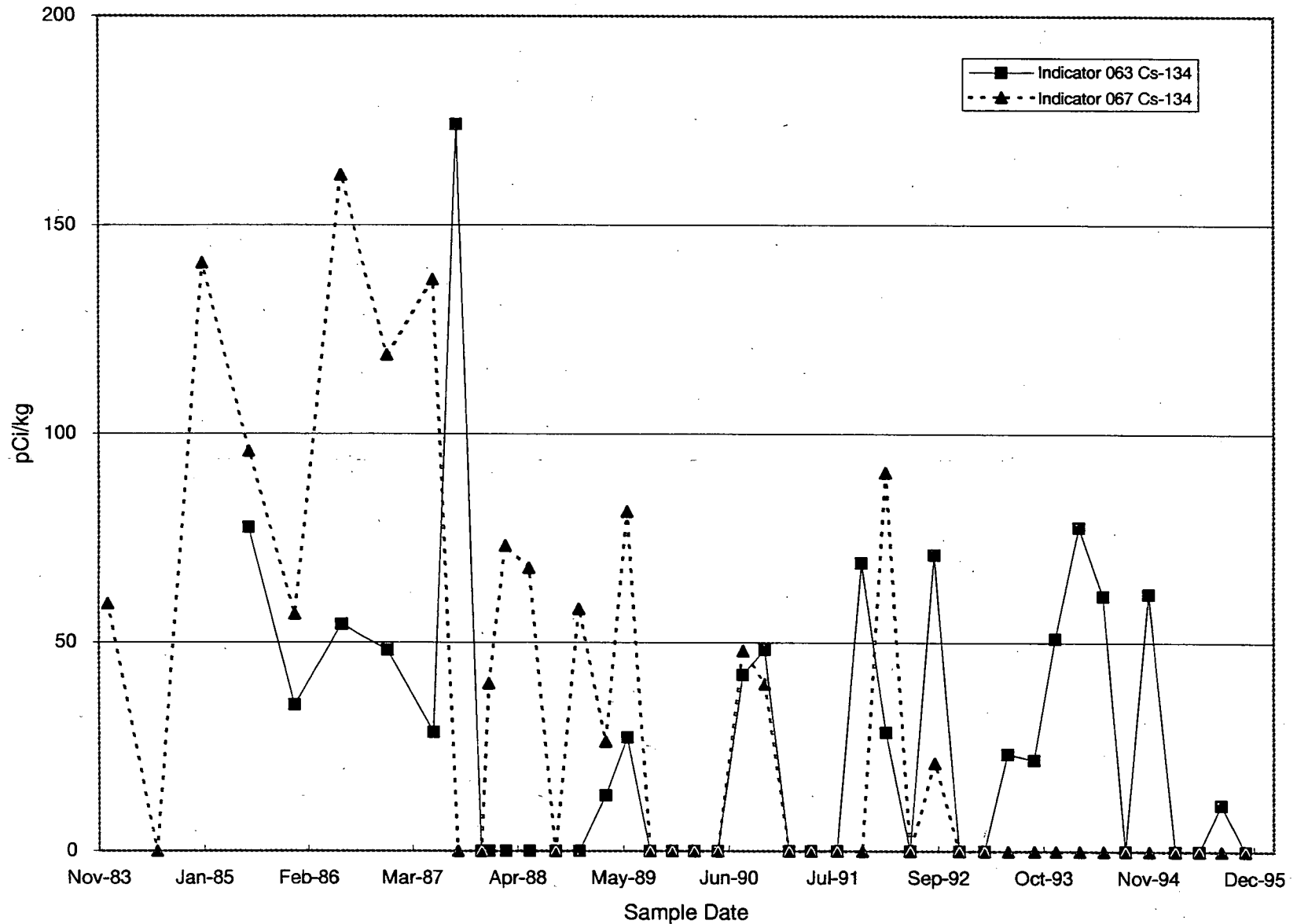
Oconee Nuclear Station Radiological Environmental Monitoring Shoreline Sediment Co-58 Activity



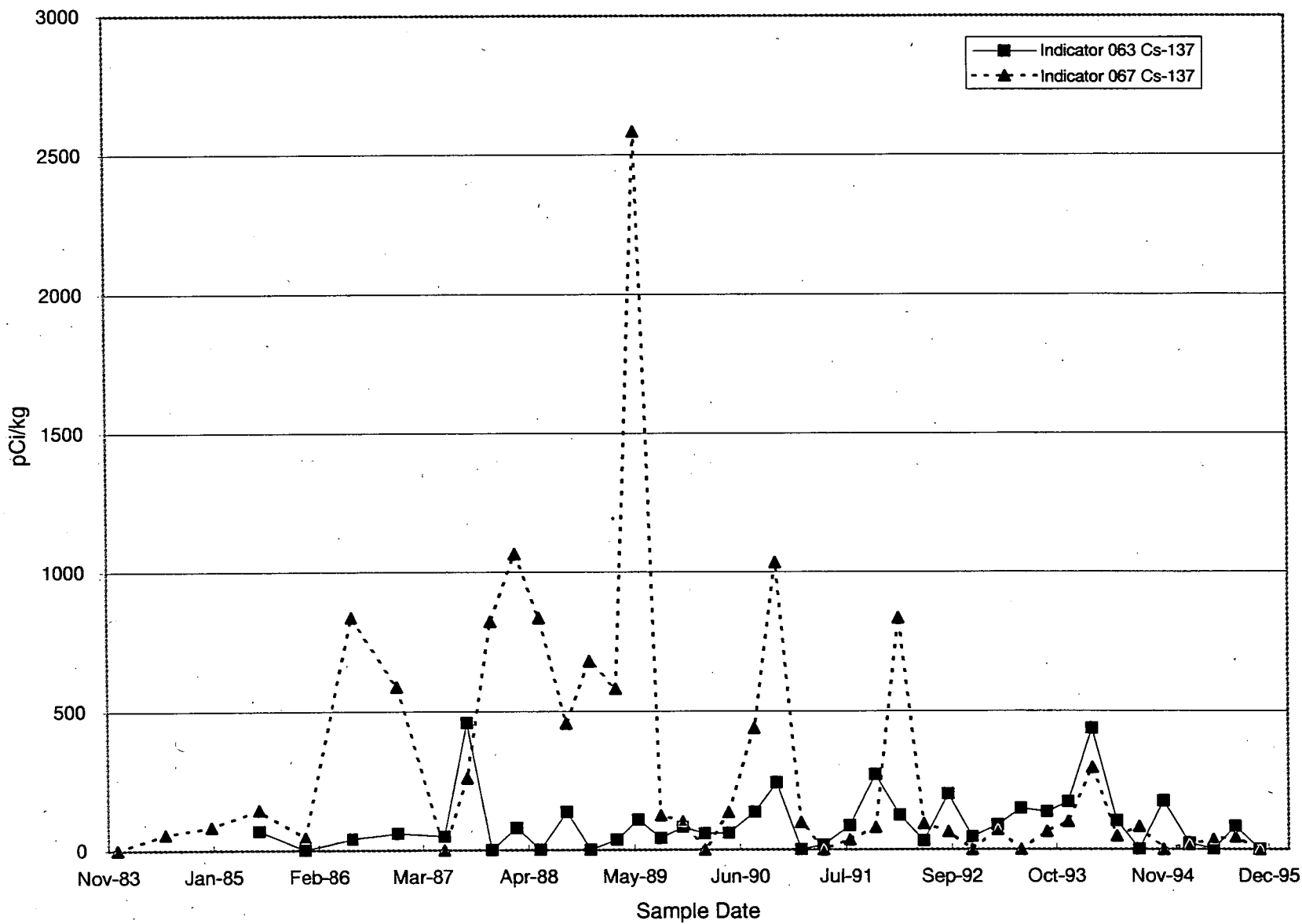
Oconee Nuclear Station Radiological Environmental Monitoring Shoreline Sediment Co-60 Activity



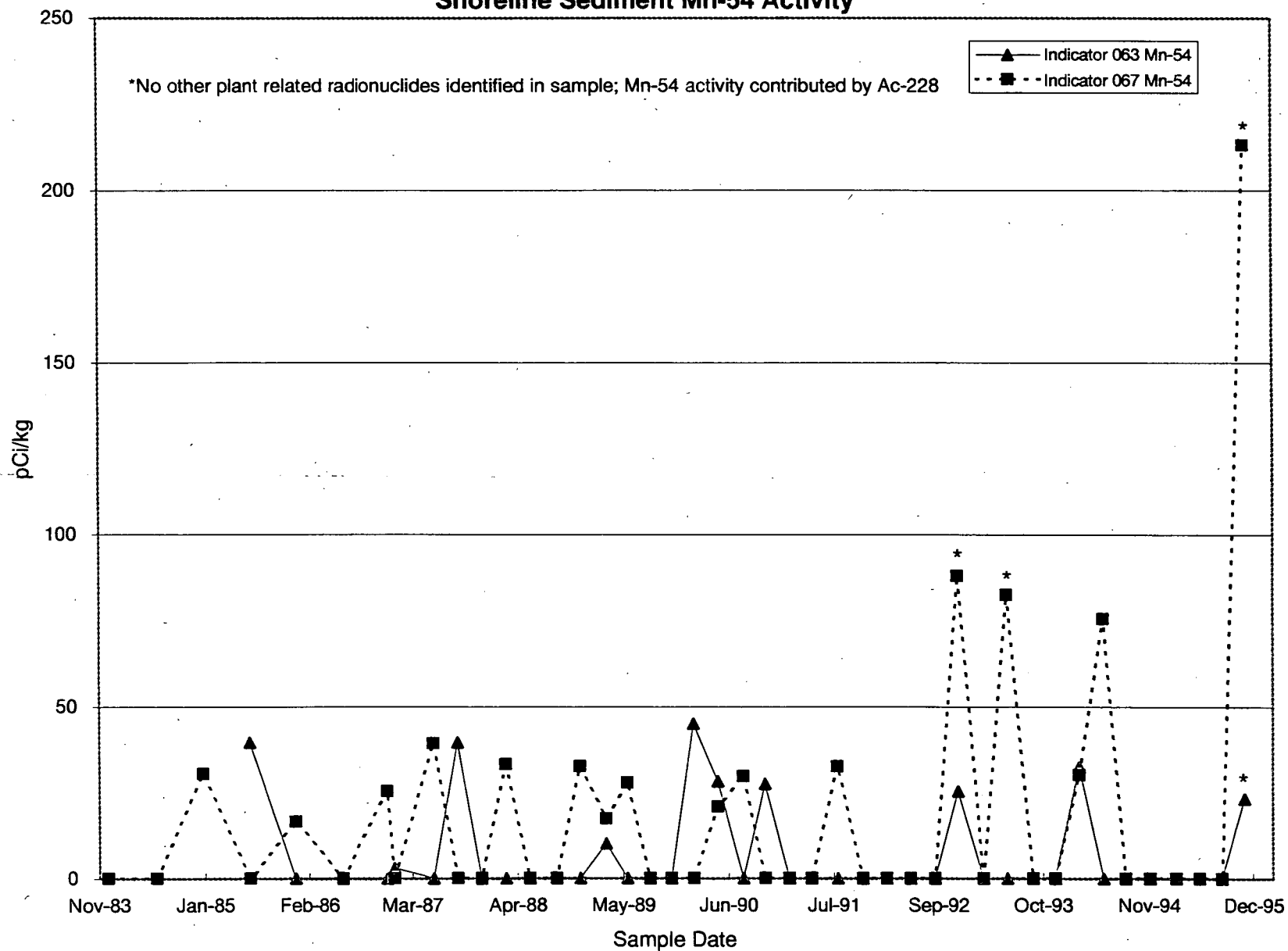
Oconee Nuclear Station Radiological Environmental Monitoring Shoreline Sediment Cs-134 Activity



Oconee Nuclear Station Radiological Environmental Monitoring Shoreline Sediment Cs-137 Activity



Ocone Nuclear Station Radiological Environmental Monitoring Shoreline Sediment Mn-54 Activity



3.7 FISH

Gamma spectroscopy was performed on 12 fish samples. Table 3.7-A summarizes the radionuclides that were detected. Comparison of data to previous years does not indicate any increases in concentrations.

TABLE 3.7-A
FISH MEAN ANNUAL CONCENTRATIONS (pCi/kg, wet)

Isotope	1994 Highest Mean	1995		1995	
		Highest Mean	%Reporting Level	Control Mean	%Reporting Level
Cs-134	2.8E1(3/4)	3.1E1(2/4)	3.1%	---	(0/4)---
Cs-137	1.05E2(4/4)	9.2E1(4/4)	4.6%	3.9E1(2/4)	1.45%

Value in parenthesis is the fraction of detectable measurements.

Radioactivity concentrations in downstream fish samples are higher than those reported in preoperational fish samples, however, visual inspection of tabular data from previous environmental report summaries and the 1995 summary did not reveal any continued increasing trends. Table 3.7-B lists the data used and the results of the linear regression analysis. Cs-134 and Cs-137 had positive correlation coefficients. Figures 3.7-1 and 3.7-2 contain the graphs displaying individual sample results for Cs-134 and Cs-137. Based on these graphs, the levels at the two downstream locations do not appear to be increasing. One factor affecting the trend analysis is a change in sampling locations. In 1984, a second downstream fish location was added. Location 063 is closer to the liquid effluent discharge point and has been the highest mean indicator since it was added.

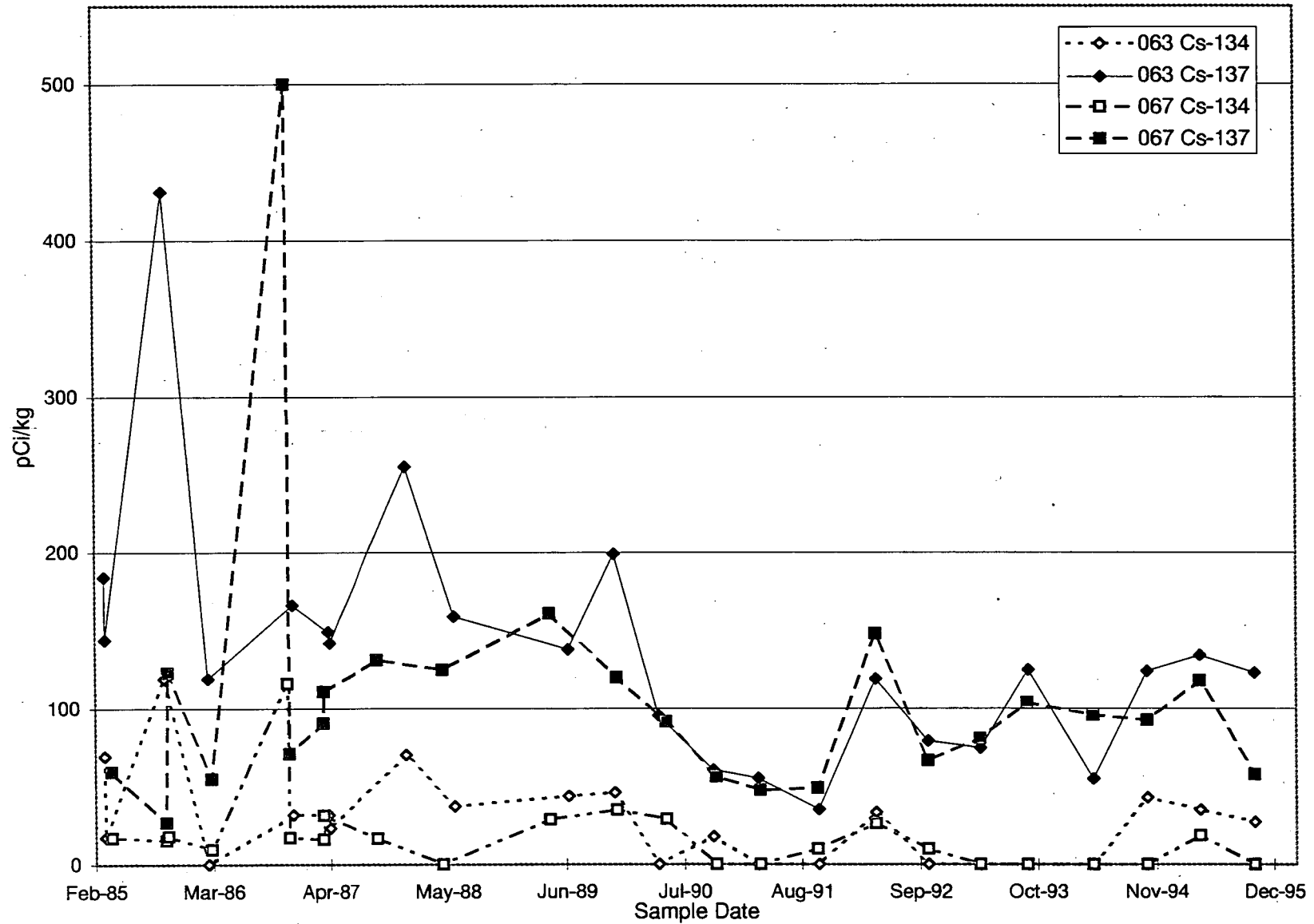
K-40 was observed in fish samples in addition to the radionuclides listed in the tables.

TABLE 3.7-B
FISH TREND ANALYSIS OF MEAN ANNUAL CONCENTRATIONS (pCi/kg)

YEAR	Co-58	Co-60	Cs-134	Cs-137
	INDICATOR	INDICATOR	INDICATOR	INDICATOR
1969			0.00E+00	1.29E+02
1970			0.00E+00	1.66E+02
1971			0.00E+00	1.90E+02
1972			0.00E+00	1.41E+02
1973			0.00E+00	1.89E+02
1974			0.00E+00	1.84E+01
1975			2.16E+01	1.87E+02
1976			3.23E+01	1.66E+02
1977			1.17E+02	3.22E+02
1978			2.76E+02	6.90E+02
1979	1.91E+00	1.56E+01	7.56E+01	4.09E+02
1980	1.45E+01	1.90E+01	8.14E+01	3.93E+02
1981	2.25E+01	1.49E+01	9.19E+01	3.38E+02
1982	9.83E-01	8.03E+00	1.18E+02	2.94E+02
1983	3.35E+01	4.53E+00	1.24E+02	3.06E+02
1984	1.21E+02	6.23E+01	3.79E+02	1.04E+03
1985	1.62E+01	1.10E+01	8.95E+01	2.93E+02
1986	9.56E+01	2.59E+01	2.42E+02	7.36E+02
1987	1.63E+02	6.30E+01	9.80E+01	3.93E+02
1988	9.60E+01	0.00E+00	7.20E+01	2.60E+02
1989	4.30E+01	1.50E+01	8.60E+01	3.36E+02
1990	1.50E+01	0.00E+00	4.80E+01	1.19E+02
1991	4.59E+01	0.00E+00	1.25E+02	1.94E+02
1992	6.10E+01	0.00E+00	4.81E+01	1.36E+02
1993	0.00E+00	0.00E+00	2.10E+01	1.10E+02
1994	0.00E+00	0.00E+00	2.80E+01	1.05E+02
1995	0.00E+00	0.00E+00	3.10E+01	9.20E+01
Correlation Coefficient	-4.21E-02	-3.77E-01	2.17E-01	3.81E-02
Type Trend	Decreasing	Decreasing	Increasing	Increasing

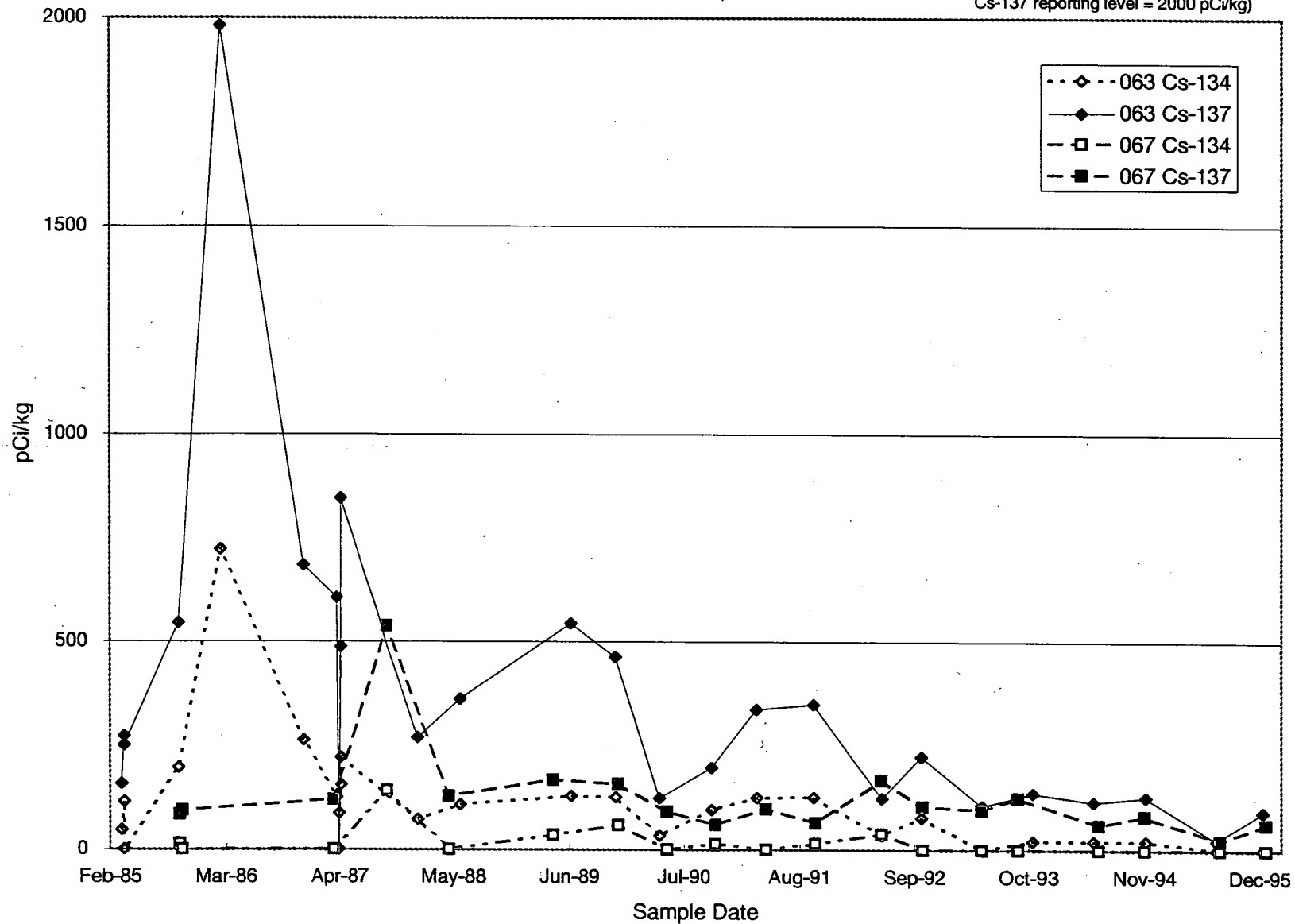
Oconee Nuclear Station Radiological Environmental Monitoring Cs-134 and Cs-137 in Bass

(Cs-134 reporting level = 1000 pCi/kg,
Cs-137 reporting level = 2000 pCi/kg)



Oconee Nuclear Station Radiological Environmental Monitoring Cs-134 and Cs-137 in Catfish

(Cs-134 reporting level = 1000 pCi/kg,
Cs-137 reporting level = 2000 pCi/kg)



3.8 DIRECT GAMMA RADIATION

Thermoluminescent Dosimeter (TLD) measurements for direct gamma radiation were made each quarter at forty-one locations. Many of the TLDs are placed at the same site used by the NRC in their TLD Direct Radiation Monitoring Network. All but six of the TLDs placed in the field were recovered and processed. The highest annual mean dose for an indicator location was 132 millirad. This TLD was located at indicator location 034 at the site boundary fence. The annual mean dose for the control location was also 132 millirad.

The test statistic, or t-test discussed in Section 2, was used to compare the TLD measurements taken during preoperation to those taken during 1995. In this case, the ratios of results from the site boundary radius and the 4-5 mile radius were compared from one year to the next.

The value of t-statistic was calculated by comparing preoperational results to 1995. As shown in Table 3.8 the t-value was -0.188. This compared well to the expected value of the t-statistic, ± 2.030 (based on 37 measurements and 95% confidence in the result).

A value of the t-statistic was also calculated by comparing 1984 to 1995 results. The TLD locations were standardized in 1984. As shown in Table 3.8, the value of the t-statistic was 0.92. This compares favorably with the allowable result of ± 2.042 (based on 32 measurements and 95% confidence in the result). In addition, because the calculated whole body dose (from gaseous effluents) from 1995 was 0.031 millirem (0.02% of the measured dose) it can be concluded that discharges from the plant had very little impact on measured TLD doses.

TABLE 3.8
COMPARISON OF INNER RING/OUTER RING TLD RESULTS

	1995	Preop	1984
Inner Ring mrad/yr	93.61	113.08	87.48
Outer Ring mrad/yr	101.71	123.92	82.60
Ratio Average	0.92	0.91	1.00
Ratio Variance	0.02	0.03	0.10

1995 vs. Preop t-value = -0.188

1995 vs. Preop Expected t-statistic = ± 2.030

1995 vs. 1984 t-value = 0.92

1995 vs. 1984 Expected t-statistic = ± 2.042

3.9 LAND USE CENSUS

The Land Use Census was conducted during August in 1995. The census results are contained in Table 3.9. No program changes were required based on the results of the census.

TABLE 3.9
LAND USE CENSUS RESULTS

Dates(s) Performed: 8-03-95, 8-30-95

Sector	Distance (Miles)	Sector	Distance (Miles)
N	Nearest Residence 2.98	S	Nearest Residence 1.85
	Nearest Meat Animal -		Nearest Meat Animal -
	Nearest Cow -		Nearest Cow -
	Nearest Goat -		Nearest Goat -
NNE	Nearest Residence 2.39	SSW	Nearest Residence 1.42
	Nearest Meat Animal -		Nearest Meat Animal -
	Nearest Cow -		Nearest Cow -
	Nearest Goat -		Nearest Goat -
NE	Nearest Residence 1.44	SW	Nearest Residence 1.33
	Nearest Meat Animal 4.25		Nearest Meat Animal 1.33
	Nearest Cow -		Nearest Cow -
	Nearest Goat -		Nearest Goat -
ENE	Nearest Residence 1.25	WSW	Nearest Residence 1.79
	Nearest Meat Animal 3.25		Nearest Meat Animal -
	Nearest Cow -		Nearest Cow -
	Nearest Goat -		Nearest Goat -
E	Nearest Residence 1.16	W	Nearest Residence 2.31
	Nearest Meat Animal 2.90		Meat Animal 1.75
	Nearest Cow -		Nearest Cow -
	Nearest Goat -		Nearest Goat -
ESE	Nearest Residence 1.67	WNW	Nearest Residence 1.33
	Nearest Meat Animal 1.90		Nearest Meat Animal 2.75
	Nearest Cow -		Nearest Cow 4.50
	Nearest Goat -		Nearest Goat -
SE	Nearest Residence 1.45	NW	Nearest Residence 1.0
	Nearest Meat Animal 4.50		Nearest Meat Animal -
	Nearest Cow -		Nearest Cow -
	Nearest Goat -		Nearest Goat -
SSE	Nearest Residence 1.55	NNW	Nearest Residence 1.56
	Nearest Meat Animal -		Nearest Meat Animal -
	Nearest Cow -		Nearest Cow -
	Nearest Goat -		Nearest Goat -

4.0 EVALUATION OF DOSE FROM ENVIRONMENTAL MEASUREMENTS VERSUS ESTIMATED DOSE FROM RELEASES

4.1 DOSE FROM ENVIRONMENTAL MEASUREMENTS

Doses were estimated for measured concentrations of radionuclides in direct pathways to man using NRC Regulatory Guide 1.109 methodology and factors. A dose factor of zero was used when the Guides listed "NO DATA" for a factor. The highest annual mean values for each sample type and radionuclide given in Section 3 were used after the background concentrations, as measured at the control location, had been subtracted. The high mean and control mean are conservatively based on detectable measurements only. Naturally occurring K-40 and Be-7 concentrations were not included in the dose calculations. The maximum exposed individual doses are summarized in Table 4.1-A. The individual critical age and pathway dose calculations are contained in Table 4.1-B.

4.2 ESTIMATED DOSE FROM RELEASES

Doses were estimated for released concentrations of radionuclides in direct pathways to man using NRC Regulatory Guide 1.109 methodology. The doses were calculated using GASPAR and LADTAP computer programs as reported in the 1995 ONS Annual Liquid and Gaseous Effluent Report (reference 6.6).

The effluent-based liquid release doses are summations of the dose contributions from the liquid pathways. The effluent-based gaseous release doses report separately noble gas exposure and iodine, particulate, and tritium exposure. For noble gas exposure there is no critical age group; as the maximum exposed individuals are assumed to receive the same doses, regardless of their age group. For iodine, particulate, and tritium exposure the 1995 ONS Annual Liquid and Gaseous Effluent Report lists the maximum total organ dose for the highest dose location, but only for the maximum organ (thyroid) for the critical age group (child). Effluent-based dose estimates for organs other than the thyroid are not reported in the iodine, particulate, and tritium exposure summary. The maximum exposed individual doses are summarized in Table 4.1-A with the critical age and critical pathway listed.

4.3 COMPARISON OF DOSES

The environmental and release data doses given in Table 4.1-A agree reasonably well. The similarity of the doses indicate that the radioactivity levels in the environment do not differ significantly from those expected based on effluent measurements and modeling of the environmental exposure pathways.

In calculations based on liquid release effluent pathways, fish consumption is the predominant dose path based on environmental and effluent samples. In most cases, liquid effluent doses are higher than environmental data doses. The environmental thyroid and lung doses are the only comparisons exceeding the effluent dose for the organs.

A zero dose was calculated for the thyroid based on environmental sample results representing the gaseous release pathways. Environmental sample results did not contain any detectable radionuclides that have thyroid dose factors. The effluent data dose is based on the vegetation pathway to the child. The majority of the effluent dose is due to I-131. No I-131 was detected in broadleaf vegetation samples.

Doses from all sampled paths were summed. The doses calculated do not exceed the 40CFR190 dose commitment limits for members of the public.

TABLE 4.1-A

Page 1 of 2

1995 ENVIRONMENTAL AND EFFLUENT DOSE COMPARISON FOR LIQUID AND GASEOUS WASTE RELEASE PATHWAYS

LIQUID RELEASE PATHWAY

Organ	Environmental or Effluent Data	Critical Age	Critical Pathway	Maximum Dose* (mrem)
Skin	Environmental	Teen	Shoreline Sediment	1.11E-03
Skin	Effluent	Teen	Shoreline Sediment	2.18E-03
Bone	Environmental	Child	Fish	1.92E-01
Bone	Effluent	Child	Fish	4.90E-01
Liver	Environmental	Adult	Fish	2.73E-01
Liver	Effluent	Teen	Fish	3.40E-01
T. Body	Environmental	Adult	Fish	2.05E-01
T. Body	Effluent	Adult	Fish	2.92E-01
Thyroid	Environmental	Child	Drinking Water	3.41E-02
Thyroid	Effluent	Teen	Fish	8.61E-03
Kidney	Environmental	Adult	Fish	1.12E-01
Kidney	Effluent	Teen	Fish	1.16E-01
Lung	Environmental	Child	Fish	5.92E-02
Lung	Effluent	Teen	Fish	4.68E-02
GI-LLI	Environmental	Adult	Drinking Water	3.67E-02
GI-LLI	Effluent	Adult	Fish	1.43E-01

* Maximum dose is a summation of the fish, drinking water and shoreline sediment pathways.

GASEOUS RELEASE PATHWAY

Organ	Environmental or Effluent Data	Critical Age	Critical Pathway	Maximum Dose (mrem)
NOBLE GAS EXPOSURE				
Skin	Environmental	-	-	Not Sampled
Skin	Effluent	N/A	Noble Gas	8.35E-02
T. Body	Environmental	-	-	Not Sampled
T. Body	Effluent	N/A	Noble Gas	3.14E-02

Organ	Environmental or Effluent Data	Critical Age	Critical Pathway	Maximum Dose* (mrem)
IODINE, PARTICULATE, and TRITIUM				
Bone	Environmental	Infant	Milk	5.17E-02
Liver	Environmental	Infant	Milk	6.05E-02
T. Body	Environmental	Adult	Milk	6.64E-03
Thyroid	Environmental	-	-	0.00E+00
Thyroid	Effluent	Child	Vegetation	1.10E-01
Kidney	Environmental	Infant	Milk	1.62E-02
Lung	Environmental	Infant	Milk	6.37E-02
GI-LLI	Environmental	Teen	Milk	2.54E-04

* Maximum dose is a summation of the inhalation, milk and vegetation pathways.

TABLE 4.1-B

Maximum Individual Dose for 1995 based on Environmental Measurements (mrem) for Oconee Nuclear Station

Age	Sample Medium	Bone	Liver	T. Body	Thyroid	Kidney	Lung	GI-LLI	Skin
Infant	Airborne	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Drinking Water	0.00E+00	2.52E-02	2.52E-02	2.52E-02	2.52E-02	2.52E-02	2.52E-02	0.00E+00
	Milk	5.17E-02	6.05E-02	4.29E-03	0.00E+00	1.62E-02	6.57E-03	1.89E-04	0.00E+00
	TOTAL	5.17E-02	8.57E-02	2.95E-02	2.52E-02	4.14E-02	3.18E-02	2.54E-02	0.00E+00
Child	Airborne	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Drinking Water	0.00E+00	2.57E-02	2.57E-02	2.57E-02	2.57E-02	2.57E-02	2.57E-02	0.00E+00
	Milk	3.24E-02	3.10E-02	4.57E-03	0.00E+00	1.01E-02	3.63E-03	1.94E-04	0.00E+00
	Broadleaf Vegetation	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Fish	1.92E-01	2.27E-01	4.58E-02	8.38E-03	7.82E-02	3.35E-02	9.68E-03	0.00E+00
	Shoreline Sediment	0.00E+00	0.00E+00	1.99E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.33E-04
	TOTAL	2.24E-01	2.84E-01	7.63E-02	3.41E-02	1.14E-01	6.28E-02	3.56E-02	2.33E-04
Teen	Airborne	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Drinking Water	0.00E+00	1.34E-02	1.34E-02	1.34E-02	1.34E-02	1.34E-02	1.34E-02	0.00E+00
	Milk	1.34E-02	1.79E-02	6.23E-03	0.00E+00	6.08E-03	2.36E-03	2.54E-04	0.00E+00
	Broadleaf Vegetation	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Fish	1.54E-01	2.58E-01	1.08E-01	1.02E-02	9.23E-02	4.19E-02	1.35E-02	0.00E+00
	Shoreline Sediment	0.00E+00	0.00E+00	9.50E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.11E-03
	TOTAL	1.67E-01	2.89E-01	1.29E-01	2.36E-02	1.12E-01	5.77E-02	2.72E-02	1.11E-03
Adult	Airborne	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Drinking Water	0.00E+00	1.90E-02	1.90E-02	1.90E-02	1.90E-02	1.90E-02	1.90E-02	0.00E+00
	Milk	7.41E-03	1.01E-02	6.64E-03	0.00E+00	3.44E-03	1.14E-03	1.96E-04	0.00E+00
	Broadleaf Vegetation	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Fish	1.46E-01	2.54E-01	1.86E-01	1.32E-02	9.33E-02	3.98E-02	1.77E-02	0.00E+00
	Shoreline Sediment	0.00E+00	0.00E+00	1.70E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.99E-04
	TOTAL	1.53E-01	2.83E-01	2.12E-01	3.22E-02	1.16E-01	5.99E-02	3.69E-02	1.99E-04

Note: Dose tables are provided for sample media displaying positive nuclide occurrence.

***Dose from Drinking Water Pathway for 1995 Data
Maximum Exposed Infant***

Infant Dose from Drinking Water Pathway (mrem) = Usage (l) x Dose Factor (mrem/pCi ingested) x Concentration (pCi/l)

Usage (intake in one year) = 330 l

Radionuclide	Ingestion Dose Factor							Highest Annual Net Mean Concentration		Dose (mrem)						
	Bone	Liver	T. Body	Thyroid	Kidney	Lung	GI-LLI	Indicator Location	Water (pCi/L)	Bone	Liver	T. Body	Thyroid	Kidney	Lung	GI-LLI
Mn-54	NO DATA	1.99E-05	4.51E-06	NO DATA	4.41E-06	NO DATA	7.31E-06	ALL	0.00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Co-58	NO DATA	3.60E-06	8.98E-06	NO DATA	NO DATA	NO DATA	8.97E-06	ALL	0.00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Fe-59	3.08E-05	5.38E-05	2.12E-05	NO DATA	NO DATA	1.59E-05	2.57E-05	ALL	0.00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Co-60	NO DATA	1.08E-05	2.55E-05	NO DATA	NO DATA	NO DATA	2.57E-05	ALL	0.00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Zn-65	1.84E-05	6.31E-05	2.91E-05	NO DATA	3.06E-05	NO DATA	5.33E-05	ALL	0.00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Nb-95	4.20E-08	1.73E-08	1.00E-08	NO DATA	1.24E-08	NO DATA	1.46E-05	ALL	0.00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Zr-95	2.06E-07	5.02E-08	3.56E-08	NO DATA	5.41E-08	NO DATA	2.50E-05	ALL	0.00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
I-131	3.59E-05	4.23E-05	1.86E-05	1.39E-02	4.94E-05	NO DATA	1.51E-06	ALL	0.00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Cs-134	3.77E-04	7.03E-04	7.10E-05	NO DATA	1.81E-04	7.42E-05	1.91E-06	ALL	0.00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Cs-137	5.22E-04	6.11E-04	4.33E-05	NO DATA	1.64E-04	6.64E-05	1.91E-06	ALL	0.00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
BaLa-140	1.71E-04	1.71E-07	8.81E-06	NO DATA	4.06E-08	1.05E-07	4.20E-05	ALL	0.00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
H-3	NO DATA	3.08E-07	3.08E-07	3.08E-07	3.08E-07	3.08E-07	3.08E-07	066	248.00	0.00E+00	2.52E-02	2.52E-02	2.52E-02	2.52E-02	2.52E-02	2.52E-02
Dose Commitment (mrem) =										0.00E+00	2.52E-02	2.52E-02	2.52E-02	2.52E-02	2.52E-02	2.52E-02

Dose from Milk Pathway for 1995 Data
Maximum Exposed Infant

Infant Dose from Milk Pathway (mrem) = Usage (l) x Dose Factor (mrem/pCi ingested) x Concentration (pCi/l)

Usage (intake in one year) = 330 l

Radionuclide	<u>Ingestion Dose Factor</u>							<u>Highest Annual Net Mean Concentration</u>		<u>Dose (mrem)</u>						
	Bone	Liver	T. Body	Thyroid	Kidney	Lung	GI-LLI	Indicator Location	Milk (pCi/L)	Bone	Liver	T. Body	Thyroid	Kidney	Lung	GI-LLI
Mn-54	NO DATA	1.99E-05	4.51E-06	NO DATA	4.41E-06	NO DATA	7.31E-06	ALL	0.00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Co-58	NO DATA	3.60E-06	8.98E-06	NO DATA	NO DATA	NO DATA	8.97E-06	ALL	0.00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Fe-59	3.08E-05	5.38E-05	2.12E-05	NO DATA	NO DATA	1.59E-05	2.57E-05	ALL	0.00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Co-60	NO DATA	1.08E-05	2.55E-05	NO DATA	NO DATA	NO DATA	2.57E-05	ALL	0.00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Zn-65	1.84E-05	6.31E-05	2.91E-05	NO DATA	3.06E-05	NO DATA	5.33E-05	ALL	0.00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Nb-95	4.20E-08	1.73E-08	1.00E-08	NO DATA	1.24E-08	NO DATA	1.46E-05	ALL	0.00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Zr-95	2.06E-07	5.02E-08	3.56E-08	NO DATA	5.41E-08	NO DATA	2.50E-05	ALL	0.00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
I-131	3.59E-05	4.23E-05	1.86E-05	1.39E-02	4.94E-05	NO DATA	1.51E-06	ALL	0.00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Cs-134	3.77E-04	7.03E-04	7.10E-05	NO DATA	1.81E-04	7.42E-05	1.91E-06	ALL	0.00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Cs-137	5.22E-04	6.11E-04	4.33E-05	NO DATA	1.64E-04	6.64E-05	1.91E-06	069	0.30	5.17E-02	6.05E-02	4.29E-03	0.00E+00	1.62E-02	6.57E-03	1.89E-04
BaLa-140	1.71E-04	1.71E-07	8.81E-06	NO DATA	4.06E-08	1.05E-07	4.20E-05	ALL	0.00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Dose Commitment (mrem) =										5.17E-02	6.05E-02	4.29E-03	0.00E+00	1.62E-02	6.57E-03	1.89E-04

*Dose from Drinking Water Pathway for 1995 Data
Maximum Exposed Child*

Child Dose from Drinking Water Pathway (mrem) = Usage (l) x Dose Factor (mrem/pCi ingested) x Concentration (pCi/l)

Usage (intake in one year) = 510 l

Radionuclide	<u>Ingestion Dose Factor</u>							<u>Highest Annual Net Mean Concentration</u>		<u>Dose (mrem)</u>						
	Bone	Liver	T. Body	Thyroid	Kidney	Lung	GI-LLI	Indicator Location	Water (pCi/l)	Bone	Liver	T. Body	Thyroid	Kidney	Lung	GI-LLI
Mn-54	NO DATA	1.07E-05	2.85E-06	NO DATA	3.00E-06	NO DATA	8.98E-06	ALL	0.00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Co-58	NO DATA	1.80E-06	5.51E-06	NO DATA	NO DATA	NO DATA	1.05E-05	ALL	0.00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Fe-59	1.65E-05	2.67E-05	1.33E-05	NO DATA	NO DATA	7.74E-06	2.78E-05	ALL	0.00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Co-60	NO DATA	5.29E-06	1.56E-05	NO DATA	NO DATA	NO DATA	2.93E-05	ALL	0.00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Zn-65	1.37E-05	3.65E-05	2.27E-05	NO DATA	2.30E-05	NO DATA	6.41E-06	ALL	0.00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Nb-95	2.25E-08	8.76E-09	6.26E-09	NO DATA	8.23E-09	NO DATA	1.62E-05	ALL	0.00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Zr-95	1.16E-07	2.55E-08	2.27E-08	NO DATA	3.65E-08	NO DATA	2.66E-05	ALL	0.00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
I-131	1.72E-05	1.73E-05	9.83E-06	5.72E-03	2.84E-05	NO DATA	1.54E-06	ALL	0.00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Cs-134	2.34E-04	3.84E-04	8.10E-05	NO DATA	1.19E-04	4.27E-05	2.07E-06	ALL	0.00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Cs-137	3.27E-04	3.13E-04	4.62E-05	NO DATA	1.02E-04	3.67E-05	1.96E-06	ALL	0.00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
BaLa-140	8.31E-05	7.28E-08	4.85E-06	NO DATA	2.37E-08	4.34E-08	4.21E-05	ALL	0.00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
H-3	NO DATA	2.03E-07	2.03E-07	2.03E-07	2.03E-07	2.03E-07	2.03E-07	066	248.00	0.00E+00	2.57E-02	2.57E-02	2.57E-02	2.57E-02	2.57E-02	2.57E-02
Dose Commitment (mrem) =										0.00E+00	2.57E-02	2.57E-02	2.57E-02	2.57E-02	2.57E-02	2.57E-02

*Dose from Milk Pathway for 1995 Data
Maximum Exposed Child*

Child Dose from Milk Pathway (mrem) = Usage (l) x Dose Factor (mrem/pCi ingested) x Concentration (pCi/l)

Usage (intake in one year) = 330 l

Radionuclide	<u>Ingestion Dose Factor</u>							<u>Highest Annual Net Mean Concentration</u>		<u>Dose (mrem)</u>						
	Bone	Liver	T. Body	Thyroid	Kidney	Lung	GI-LLI	Location	(pCi/l)	Bone	Liver	T. Body	Thyroid	Kidney	Lung	GI-LLI
Mn-54	NO DATA	1.07E-05	2.85E-06	NO DATA	3.00E-06	NO DATA	8.98E-06	ALL	0.00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Co-58	NO DATA	1.80E-06	5.51E-06	NO DATA	NO DATA	NO DATA	1.05E-05	ALL	0.00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Fe-59	1.65E-05	2.67E-05	1.33E-05	NO DATA	NO DATA	7.74E-06	2.78E-05	ALL	0.00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Co-60	NO DATA	5.29E-06	1.56E-05	NO DATA	NO DATA	NO DATA	2.93E-05	ALL	0.00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Zn-65	1.37E-05	3.65E-05	2.27E-05	NO DATA	2.30E-05	NO DATA	6.41E-06	ALL	0.00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Nb-95	2.25E-08	8.76E-09	6.26E-09	NO DATA	8.23E-09	NO DATA	1.62E-05	ALL	0.00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Zr-95	1.16E-07	2.55E-08	2.27E-08	NO DATA	3.65E-08	NO DATA	2.66E-05	ALL	0.00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
I-131	1.72E-05	1.73E-05	9.83E-06	5.72E-03	2.84E-05	NO DATA	1.54E-06	ALL	0.00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Cs-134	2.34E-04	3.84E-04	8.10E-05	NO DATA	1.19E-04	4.27E-05	2.07E-06	ALL	0.00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Cs-137	3.27E-04	3.13E-04	4.62E-05	NO DATA	1.02E-04	3.67E-05	1.96E-06	069	0.30	3.24E-02	3.10E-02	4.57E-03	0.00E+00	1.01E-02	3.63E-03	1.94E-04
BaLa-140	8.31E-05	7.28E-08	4.85E-06	NO DATA	2.37E-08	4.34E-08	4.21E-05	ALL	0.00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Dose Commitment (mrem) =										3.24E-02	3.10E-02	4.57E-03	0.00E+00	1.01E-02	3.63E-03	1.94E-04

Dose from Fish Pathway for 1995 Data
Maximum Exposed Child

Child Dose from Fish Pathway (mrem) = Usage (kg) x Dose Factor (mrem/pCi ingested) x Concentration (pCi/kg)

H-3 Concentration in Fish = Surface Water pCi/l x Bioaccumulation Factor 0.9 pCi/kg per pCi/l = 6650 pCi/l x 0.9 = 5985 pCi/kg

Usage (intake in one year) = 6.9 kg

Radionuclide	<u>Ingestion Dose Factor</u>							<u>Highest Annual Net Mean Concentration</u>		<u>Dose (mrem)</u>						
	Bone	Liver	T. Body	Thyroid	Kidney	Lung	GI-LLI	Indicator Location	Fish (pCi/kg)	Bone	Liver	T. Body	Thyroid	Kidney	Lung	GI-LLI
Mn-54	NO DATA	1.07E-05	2.85E-06	NO DATA	3.00E-06	NO DATA	8.98E-06	ALL	0.00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Co-58	NO DATA	1.80E-06	5.51E-06	NO DATA	NO DATA	NO DATA	1.05E-05	ALL	0.00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Fe-59	1.65E-05	2.67E-05	1.33E-05	NO DATA	NO DATA	7.74E-06	2.78E-05	ALL	0.00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Co-60	NO DATA	5.29E-06	1.56E-05	NO DATA	NO DATA	NO DATA	2.93E-05	ALL	0.00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Zn-65	1.37E-05	3.65E-05	2.27E-05	NO DATA	2.30E-05	NO DATA	6.41E-06	ALL	0.00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Nb-95	2.25E-08	8.76E-09	6.26E-09	NO DATA	8.23E-09	NO DATA	1.62E-05	ALL	0.00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Zr-95	1.16E-07	2.55E-08	2.27E-08	NO DATA	3.65E-08	NO DATA	2.66E-05	ALL	0.00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
I-131	1.72E-05	1.73E-05	9.83E-06	5.72E-03	2.84E-05	NO DATA	1.54E-06	ALL	0.00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Cs-134	2.34E-04	3.84E-04	8.10E-05	NO DATA	1.19E-04	4.27E-05	2.07E-06	063	31.00	5.01E-02	8.21E-02	1.73E-02	0.00E+00	2.55E-02	9.13E-03	4.43E-04
Cs-137	3.27E-04	3.13E-04	4.62E-05	NO DATA	1.02E-04	3.67E-05	1.96E-06	063	63.00	1.42E-01	1.36E-01	2.01E-02	0.00E+00	4.43E-02	1.60E-02	8.52E-04
BaLa-140	8.31E-05	7.28E-08	4.85E-06	NO DATA	2.37E-08	4.34E-08	4.21E-05	ALL	0.00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
H-3	NO DATA	2.03E-07	2.03E-07	2.03E-07	2.03E-07	2.03E-07	2.03E-07	063	5985	0.00E+00	8.38E-03	8.38E-03	8.38E-03	8.38E-03	8.38E-03	8.38E-03
Dose Commitment (mrem) =										1.92E-01	2.27E-01	4.58E-02	8.38E-03	7.82E-02	3.35E-02	9.68E-03

Dose from Shoreline Sediment Pathway for 1995 Data

Maximum Exposed Child

Shoreline Recreation= 14 hr (in one year)
 Shore Width Factor = 0.2
 Sediment Surface Mass = 40 kg/m²

Child Dose from Shoreline Sediment Pathway (mrem) = Shoreline Recreation (hr) x External
 Dose Factor (mrem/hr per pCi/m²) x Shore Width Factor x Sediment Surface Mass (kg/m²) x
 Sediment Concentration (pCi/kg)

Radionuclide	External Dose Factor Standing on Contaminated Ground		Indicator Location	Sediment (pCi/kg)	Highest Annual Net Mean Concentration		Dose
	(mrem/hr per pCi/m ²) T. Body	Skin			(mrem) T. Body	Skin	
Mn-54	5.80E-09	6.80E-09	067	143.0	9.29E-05	1.09E-04	
Co-58	7.00E-09	8.20E-09	063	39.0	3.06E-05	3.58E-05	
Fe-59	8.00E-09	9.40E-09	ALL	0.0	0.00E+00	0.00E+00	
Co-60	1.70E-08	2.00E-08	063	24.0	4.57E-05	5.38E-05	
Zn-65	4.00E-09	4.60E-09	ALL	0.0	0.00E+00	0.00E+00	
Nb-95	5.10E-09	6.00E-09	ALL	0.0	0.00E+00	0.00E+00	
Zr-95	5.00E-09	5.80E-09	ALL	0.0	0.00E+00	0.00E+00	
I-131	2.80E-09	3.40E-09	ALL	0.0	0.00E+00	0.00E+00	
Cs-134	1.20E-08	1.40E-08	063	11.0	1.48E-05	1.72E-05	
Cs-137	4.20E-09	4.90E-09	063	31.0	1.46E-05	1.70E-05	
BaLa-140	2.10E-09	2.40E-09	ALL	0.0	0.00E+00	0.00E+00	
Dose Commitment (mrem) =					1.99E-04	2.33E-04	

***Dose from Drinking Water Pathway for 1995 Data
Maximum Exposed Teen***

Teen Dose from Drinking Water Pathway (mrem) = Usage (l) x Dose Factor (mrem/pCi ingested) x Concentration (pCi/l)

Usage (intake in one year) = 510 l

Radionuclide	<u>Ingestion Dose Factor</u>							<u>Highest Annual Net Mean Concentration</u>		<u>Dose (mrem)</u>						
	Bone	Liver	T. Body	Thyroid	Kidney	Lung	GI-LLI	Indicator Location	Water (pCi/l)	Bone	Liver	T. Body	Thyroid	Kidney	Lung	GI-LLI
Mn-54	NO DATA	5.90E-06	1.17E-06	NO DATA	1.76E-06	NO DATA	1.21E-05	ALL	0.00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Co-58	NO DATA	9.72E-07	2.24E-06	NO DATA	NO DATA	NO DATA	1.34E-05	ALL	0.00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Fe-59	5.87E-06	1.37E-05	5.29E-06	NO DATA	NO DATA	4.32E-06	3.24E-05	ALL	0.00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Co-60	NO DATA	2.81E-06	6.33E-06	NO DATA	NO DATA	NO DATA	3.66E-05	ALL	0.00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Zn-65	5.76E-06	2.00E-05	9.33E-06	NO DATA	1.28E-05	NO DATA	8.47E-06	ALL	0.00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Nb-95	8.22E-09	4.56E-09	2.51E-09	NO DATA	4.42E-09	NO DATA	1.95E-05	ALL	0.00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Zr-95	4.12E-08	1.30E-08	8.94E-09	NO DATA	1.91E-08	NO DATA	3.00E-05	ALL	0.00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
I-131	5.85E-06	8.19E-06	4.40E-06	2.39E-03	1.41E-05	NO DATA	1.62E-06	ALL	0.00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Cs-134	8.37E-05	1.97E-04	9.14E-05	NO DATA	6.26E-05	2.39E-05	2.45E-06	ALL	0.00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Cs-137	1.12E-04	1.49E-04	5.19E-05	NO DATA	5.07E-05	1.97E-05	2.12E-06	ALL	0.00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
BaLa-140	2.84E-05	3.48E-08	1.83E-06	NO DATA	1.18E-08	2.34E-08	4.38E-05	ALL	0.00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
H-3	NO DATA	1.06E-07	1.06E-07	1.06E-07	1.06E-07	1.06E-07	1.06E-07	066	248.00	0.00E+00	1.34E-02	1.34E-02	1.34E-02	1.34E-02	1.34E-02	1.34E-02
Dose Commitment (mrem) =										0.00E+00	1.34E-02	1.34E-02	1.34E-02	1.34E-02	1.34E-02	1.34E-02

***Dose from Milk Pathway for 1995 Data
Maximum Exposed Teen***

Teen Dose from Milk Pathway (mrem) = Usage (l) x Dose Factor (mrem/pCi ingested) x Concentration (pCi/l)

Usage (intake in one year) = 400 l

Radionuclide	<u>Ingestion Dose Factor</u>							<u>Highest Annual Net Mean Concentration</u>		<u>Dose (mrem)</u>						
	Bone	Liver	T. Body	Thyroid	Kidney	Lung	GI-LLI	Indicator Location	Milk (pCi/L)	Bone	Liver	T. Body	Thyroid	Kidney	Lung	GI-LLI
Mn-54	NO DATA	5.90E-06	1.17E-06	NO DATA	1.76E-06	NO DATA	1.21E-05	ALL	0.00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Co-58	NO DATA	9.72E-07	2.24E-06	NO DATA	NO DATA	NO DATA	1.34E-05	ALL	0.00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Fe-59	5.87E-06	1.37E-05	5.29E-06	NO DATA	NO DATA	4.32E-06	3.24E-05	ALL	0.00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Co-60	NO DATA	2.81E-06	6.33E-06	NO DATA	NO DATA	NO DATA	3.66E-05	ALL	0.00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Zn-65	5.76E-06	2.00E-05	9.33E-06	NO DATA	1.28E-05	NO DATA	8.47E-06	ALL	0.00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Nb-95	8.22E-09	4.56E-09	2.51E-09	NO DATA	4.42E-09	NO DATA	1.95E-05	ALL	0.00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Zr-95	4.12E-08	1.30E-08	8.94E-09	NO DATA	1.91E-08	NO DATA	3.00E-05	ALL	0.00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
I-131	5.85E-06	8.19E-06	4.40E-06	2.39E-03	1.41E-05	NO DATA	1.62E-06	ALL	0.00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Cs-134	8.37E-05	1.97E-04	9.14E-05	NO DATA	6.26E-05	2.39E-05	2.45E-06	ALL	0.00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Cs-137	1.12E-04	1.49E-04	5.19E-05	NO DATA	5.07E-05	1.97E-05	2.12E-06	069	0.30	1.34E-02	1.79E-02	6.23E-03	0.00E+00	6.08E-03	2.36E-03	2.54E-04
BaLa-140	2.84E-05	3.48E-08	1.83E-06	NO DATA	1.18E-08	2.34E-08	4.38E-05	ALL	0.00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Dose Commitment (mrem) =										1.34E-02	1.79E-02	6.23E-03	0.00E+00	6.08E-03	2.36E-03	2.54E-04

Dose from Fish Pathway for 1995 Data
Maximum Exposed Teen

Teen Dose from Fish Pathway (mrem) = Usage (kg) x Dose Factor (mrem/pCi ingested) x Concentration (pCi/kg)

H-3 Concentration in Fish = Surface Water pCi/l x Bioaccumulation Factor 0.9 pCi/kg per pCi/l = 6650 pCi/l x 0.9 = 5985 pCi/kg

Usage (intake in one year) = 16 kg

Radionuclide	Ingestion Dose Factor							Highest Annual Net Mean Concentration		Dose (mrem)						
	Bone	Liver	T. Body	Thyroid	Kidney	Lung	GI-LLI	Indicator Location	Fish (kg/yr)	Bone	Liver	T. Body	Thyroid	Kidney	Lung	GI-LLI
Mn-54	NO DATA	5.90E-06	1.17E-06	NO DATA	1.76E-06	NO DATA	1.21E-05	ALL	0.00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Co-58	NO DATA	9.72E-07	2.24E-06	NO DATA	NO DATA	NO DATA	1.34E-05	ALL	0.00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Fe-59	5.87E-06	1.37E-05	5.29E-06	NO DATA	NO DATA	4.32E-06	3.24E-05	ALL	0.00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Co-60	NO DATA	2.81E-06	6.33E-06	NO DATA	NO DATA	NO DATA	3.66E-05	ALL	0.00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Zn-65	5.76E-06	2.00E-05	9.33E-06	NO DATA	1.28E-05	NO DATA	8.47E-06	ALL	0.00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Nb-95	8.22E-09	4.56E-09	2.51E-09	NO DATA	4.42E-09	NO DATA	1.95E-05	ALL	0.00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Zr-95	4.12E-08	1.30E-08	8.94E-09	NO DATA	1.91E-08	NO DATA	3.00E-05	ALL	0.00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
I-131	5.85E-06	8.19E-06	4.40E-06	2.39E-03	1.41E-05	NO DATA	1.62E-06	ALL	0.00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Cs-134	8.37E-05	1.97E-04	9.14E-05	NO DATA	6.26E-05	2.39E-05	2.45E-06	063	31.00	4.15E-02	9.77E-02	4.53E-02	0.00E+00	3.10E-02	1.19E-02	1.22E-03
Cs-137	1.12E-04	1.49E-04	5.19E-05	NO DATA	5.07E-05	1.97E-05	2.12E-06	063	63.00	1.13E-01	1.50E-01	5.23E-02	0.00E+00	5.11E-02	1.99E-02	2.14E-03
BaLa-140	2.84E-05	3.48E-08	1.83E-06	NO DATA	1.18E-08	2.34E-08	4.38E-05	ALL	0.00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
H-3	NO DATA	1.06E-07	1.06E-07	1.06E-07	1.06E-07	1.06E-07	1.06E-07	063	5985.00	0.00E+00	1.02E-02	1.02E-02	1.02E-02	1.02E-02	1.02E-02	1.02E-02
Dose Commitment (mrem) =										1.54E-01	2.58E-01	1.08E-01	1.02E-02	9.23E-02	4.19E-02	1.35E-02

Dose from Shoreline Sediment Pathway for 1995 Data
Maximum Exposed Teen

Shoreline Recreation = 67 hr (in one year)
 Shore Width Factor = 0.2
 Sediment Surface Mass = 40 kg/m²

Teen Dose from Shoreline Sediment Pathway (mrem) = Shoreline Recreation (hr) x External
 Dose Factor (mrem/hr per pCi/m²) x Shore Width Factor x Sediment Surface Mass (kg/m²) x
 Sediment Concentration (pCi/kg)

External Dose Factor Standing on Contaminated Ground			Highest Annual Net Mean Concentration		Dose	
Radionuclide	(mrem/hr per pCi/m ²) T. Body	Skin	Indicator Location	Sediment (pCi/kg)	(mrem) T. Body	Skin
Mn-54	5.80E-09	6.80E-09	067	143.00	4.45E-04	5.21E-04
Co-58	7.00E-09	8.20E-09	063	39.00	1.46E-04	1.71E-04
Fe-59	8.00E-09	9.40E-09	ALL	0.00	0.00E+00	0.00E+00
Co-60	1.70E-08	2.00E-08	063	24.00	2.19E-04	2.57E-04
Zn-65	4.00E-09	4.60E-09	ALL	0.00	0.00E+00	0.00E+00
Nb-95	5.10E-09	6.00E-09	ALL	0.00	0.00E+00	0.00E+00
Zr-95	5.00E-09	5.80E-09	ALL	0.00	0.00E+00	0.00E+00
I-131	2.80E-09	3.40E-09	ALL	0.00	0.00E+00	0.00E+00
Cs-134	1.20E-08	1.40E-08	063	11.00	7.08E-05	8.25E-05
Cs-137	4.20E-09	4.90E-09	063	31.00	6.98E-05	8.14E-05
BaLa-140	2.10E-09	2.40E-09	ALL	0.00	0.00E+00	0.00E+00
Dose Commitment (mrem) =					9.50E-04	1.11E-03

***Dose from Drinking Water Pathway for 1995 Data
Maximum Exposed Adult***

Adult Dose from Drinking Water Pathway (mrem) = Usage (l) x Dose Factor (mrem/pCi ingested) x Concentration (pCi/l)

Usage (intake in one year) = 730 l

Radionuclide	Ingestion Dose Factor							Highest Annual Net Mean Concentration		Dose (mrem)						
	Bone	Liver	T. Body	Thyroid	Kidney	Lung	GI-LLI	Indicator Location	Water (pCi/l)	Bone	Liver	T. Body	Thyroid	Kidney	Lung	GI-LLI
Mn-54	NO DATA	4.57E-06	8.72E-07	NO DATA	1.36E-06	NO DATA	1.40E-05	ALL	0.00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Co-58	NO DATA	7.45E-07	1.67E-06	NO DATA	NO DATA	NO DATA	1.51E-05	ALL	0.00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Fe-59	4.34E-06	1.02E-05	3.91E-06	NO DATA	NO DATA	2.85E-06	3.40E-05	ALL	0.00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Co-60	NO DATA	2.14E-06	4.72E-06	NO DATA	NO DATA	NO DATA	4.02E-05	ALL	0.00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Zn-65	4.84E-06	1.54E-05	6.96E-06	NO DATA	1.03E-05	NO DATA	9.70E-06	ALL	0.00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Nb-95	6.22E-09	3.46E-09	1.86E-09	NO DATA	3.42E-09	NO DATA	2.10E-05	ALL	0.00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Zr-95	3.04E-08	9.75E-09	6.60E-09	NO DATA	1.53E-08	NO DATA	3.09E-05	ALL	0.00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
I-131	4.16E-06	5.95E-06	3.41E-06	1.95E-03	1.02E-05	NO DATA	1.57E-06	ALL	0.00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Cs-134	6.22E-05	1.48E-04	1.21E-04	NO DATA	4.79E-05	1.59E-05	2.59E-06	ALL	0.00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Cs-137	7.97E-05	1.09E-04	7.14E-05	NO DATA	3.70E-05	1.23E-05	2.11E-06	ALL	0.00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
BaLa-140	2.03E-05	2.55E-08	1.33E-06	NO DATA	8.67E-09	1.46E-08	4.18E-05	ALL	0.00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
H-3	NO DATA	1.05E-07	1.05E-07	1.05E-07	1.05E-07	1.05E-07	1.05E-07	066	248.00	0.00E+00	1.90E-02	1.90E-02	1.90E-02	1.90E-02	1.90E-02	1.90E-02
Dose Commitment (mrem) =										0.00E+00	1.90E-02	1.90E-02	1.90E-02	1.90E-02	1.90E-02	1.90E-02

Dose from Milk Pathway for 1995 Data
Maximum Exposed Adult

Adult Dose from Milk Pathway (mrem) = Usage (l) x Dose Factor (mrem/pCi ingested) x Concentration (pCi/l)

Usage (intake in one year) = 310 l

Radionuclide	<u>Ingestion Dose Factor</u>							<u>Highest Annual Net Mean Concentration</u>		<u>Dose (mrem)</u>						
	Bone	Liver	T. Body	Thyroid	Kidney	Lung	GI-LLI	Location	(pCi/L)	Bone	Liver	T. Body	Thyroid	Kidney	Lung	GI-LLI
Mn-54	NO DATA	4.57E-06	8.72E-07	NO DATA	1.36E-06	NO DATA	1.40E-05	ALL	0.00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Co-58	NO DATA	7.45E-07	1.67E-06	NO DATA	NO DATA	NO DATA	1.51E-05	ALL	0.00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Fe-59	4.34E-06	1.02E-05	3.91E-06	NO DATA	NO DATA	2.85E-06	3.40E-05	ALL	0.00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Co-60	NO DATA	2.14E-06	4.72E-06	NO DATA	NO DATA	NO DATA	4.02E-05	ALL	0.00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Zn-65	4.84E-06	1.54E-05	6.96E-06	NO DATA	1.03E-05	NO DATA	9.70E-06	ALL	0.00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Nb-95	6.22E-09	3.46E-09	1.86E-09	NO DATA	3.42E-09	NO DATA	2.10E-05	ALL	0.00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Zr-95	3.04E-08	9.75E-09	6.60E-09	NO DATA	1.53E-08	NO DATA	3.09E-05	ALL	0.00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
I-131	4.16E-06	5.95E-06	3.41E-06	1.95E-03	1.02E-05	NO DATA	1.57E-06	ALL	0.00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Cs-134	6.22E-05	1.48E-04	1.21E-04	NO DATA	4.79E-05	1.59E-05	2.59E-06	ALL	0.00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Cs-137	7.97E-05	1.09E-04	7.14E-05	NO DATA	3.70E-05	1.23E-05	2.11E-06	069	0.30	7.41E-03	1.01E-02	6.64E-03	0.00E+00	3.44E-03	1.14E-03	1.96E-04
BaLa-140	2.03E-05	2.55E-08	1.33E-06	NO DATA	8.67E-09	1.46E-08	9.25E-05	ALL	0.00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Dose Commitment (mrem) =										7.41E-03	1.01E-02	6.64E-03	0.00E+00	3.44E-03	1.14E-03	1.96E-04

Dose from Fish Pathway for 1995 Data
Maximum Exposed Adult

Adult Dose from Fish Pathway (mrem) = Usage (kg) x Dose Factor (mrem/pCi ingested) x Concentration (pCi/kg)

H-3 Concentration in Fish = Surface Water pCi/l x Bioaccumulation Factor 0.9 pCi/kg per pCi/l = 6650 pCi/l x 0.9 = 5985 pCi/kg

Usage (intake in one year) = 21 kg

Radionuclide	<u>Ingestion Dose Factor</u>							<u>Highest Annual Net Mean Concentration</u>		<u>Dose (mrem)</u>						
	Bone	Liver	T. Body	Thyroid	Kidney	Lung	GI-LLI	Indicator Location	Fish (pCi/kg)	Bone	Liver	T. Body	Thyroid	Kidney	Lung	GI-LLI
Mn-54	NO DATA	4.57E-06	8.72E-07	NO DATA	1.36E-06	NO DATA	1.40E-05	ALL	0.00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Co-58	NO DATA	7.45E-07	1.67E-06	NO DATA	NO DATA	NO DATA	1.51E-05	ALL	0.00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Fe-59	4.34E-06	1.02E-05	3.91E-06	NO DATA	NO DATA	2.85E-06	3.40E-05	ALL	0.00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Co-60	NO DATA	2.14E-06	4.72E-06	NO DATA	NO DATA	NO DATA	4.02E-05	ALL	0.00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Zn-65	4.84E-06	1.54E-05	6.96E-06	NO DATA	1.03E-05	NO DATA	9.70E-06	ALL	0.00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Nb-95	6.22E-09	3.46E-09	1.86E-09	NO DATA	3.42E-09	NO DATA	2.10E-05	ALL	0.00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Zr-95	3.04E-08	9.75E-09	6.60E-09	NO DATA	1.53E-08	NO DATA	3.09E-05	ALL	0.00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
I-131	4.16E-06	5.95E-06	3.41E-06	1.95E-03	1.02E-05	NO DATA	1.57E-06	ALL	0.00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Cs-134	6.22E-05	1.48E-04	1.21E-04	NO DATA	4.79E-05	1.59E-05	2.59E-06	063	31.00	4.05E-02	9.63E-02	7.88E-02	0.00E+00	3.12E-02	1.04E-02	1.69E-03
Cs-137	7.97E-05	1.09E-04	7.14E-05	NO DATA	3.70E-05	1.23E-05	2.11E-06	063	63.00	1.05E-01	1.44E-01	9.45E-02	0.00E+00	4.90E-02	1.63E-02	2.79E-03
BaLa-140	2.03E-05	2.55E-08	1.33E-06	NO DATA	8.67E-09	1.46E-08	4.18E-05	ALL	0.00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
H-3	NO DATA	1.05E-07	1.05E-07	1.05E-07	1.05E-07	1.05E-07	1.05E-07	063	5985.00	0.00E+00	1.32E-02	1.32E-02	1.32E-02	1.32E-02	1.32E-02	1.32E-02
Dose Commitment (mrem) =										1.46E-01	2.54E-01	1.86E-01	1.32E-02	9.33E-02	3.98E-02	1.77E-02

Dose from Shoreline Sediment Pathway for 1995 Data

Maximum Exposed Adult

Shoreline Recreation = 12 hr (in one year)
 Shore Width Factor = 0.2
 Sediment Surface Mass = 40 kg/m²

Adult Dose from Shoreline Sediment Pathway (mrem) = Shoreline Recreation (hr) x External
 Dose Factor (mrem/hr per pCi/m²) x Shore Width Factor x Sediment Surface Mass (kg/m²) x
 Sediment Concentration (pCi/kg)

Radionuclide	<u>External Dose Factor Standing on Contaminated Ground</u> (mrem/hr per pCi/m ²)		Indicator Location	Sediment (pCi/kg)	<u>Dose</u> (mrem)	
	T. Body	Skin			T. Body	Skin
Mn-54	5.80E-09	6.80E-09	067	143.00	7.96E-05	9.34E-05
Co-58	7.00E-09	8.20E-09	063	39.00	2.62E-05	3.07E-05
Fe-59	8.00E-09	9.40E-09	ALL	0.00	0.00E+00	0.00E+00
Co-60	1.70E-08	2.00E-08	063	24.00	3.92E-05	4.61E-05
Zn-65	4.00E-09	4.60E-09	ALL	0.00	0.00E+00	0.00E+00
Nb-95	5.10E-09	6.00E-09	ALL	0.00	0.00E+00	0.00E+00
Zr-95	5.00E-09	5.80E-09	ALL	0.00	0.00E+00	0.00E+00
I-131	2.80E-09	3.40E-09	ALL	0.00	0.00E+00	0.00E+00
Cs-134	1.20E-08	1.40E-08	063	11.00	1.27E-05	1.48E-05
Cs-137	4.20E-09	4.90E-09	063	31.00	1.25E-05	1.46E-05
BaLa-140	2.10E-09	2.40E-09	ALL	0.00	0.00E+00	0.00E+00
Dose Commitment (mrem) =					1.70E-04	1.99E-04

5.0 QUALITY ASSURANCE

5.1 DUKE POWER COMPANY'S RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM

5.1.1 SAMPLE COLLECTION

The ONS Chemistry Section performed the environmental sample collections as specified by approved sample collection procedures.

5.1.2 SAMPLE ANALYSIS

The Radiological and Environmental Services Group performed the environmental sample analyses as specified by approved analysis procedures.

5.1.3 DOSIMETRY ANALYSIS

The Radiation Dosimetry and Records group performed environmental dosimetry measurements as specified by approved dosimetry analysis procedures.

5.1.4 INTRALABORATORY QUALITY ASSURANCE

Radiological and Environmental Services has an internal quality assurance program which monitors each type of instrumentation for reliability and accuracy. Daily quality control checks ensure that instruments are in proper working order and these checks are used to monitor instrument performance.

Additionally, National Institute of Standards and Technology (NIST) standards that represent counting geometries are analyzed as unknowns at various frequencies ranging from weekly to annually to verify that efficiency calibrations are valid. The frequency is dependent upon instrument use and performance. Investigations are performed and documented should calibration verification data fall out of limits.

5.1.5 INTERLABORATORY QUALITY ASSURANCE

5.1.5.1 DUKE POWER'S AUDIT DIVISION

The Oconee Nuclear Station Radiation Protection Section participated in a Quality Assurance audit during November 1995. This audit was conducted by the Nuclear Assessment and Issues Division, Regulatory Audit Group. No recommendations pertaining to the Oconee Radiological Environmental Monitoring Program were identified in the audit.

5.1.5.2 DUKE POWER'S NUCLEAR PRODUCTION INTERCOMPARISON PROGRAM

The Radiological and Environmental Services group participated in the Duke Power Nuclear Generation Department Intercomparison Program during 1995. Interlaboratory cross-check standards, including marinelli beakers, air filters, air cartridges, gross alpha/beta on smears, and tritium in water samples were analyzed at various times of the year by the four counting laboratories in Duke Power Company for this program. A summary of these Intercomparison Reports for 1995 is documented in Table 5.0-A.

5.1.5.3 U.S. NUCLEAR REGULATORY COMMISSION INSPECTIONS

The Radiological Environmental Monitoring Program was not audited by the NRC in 1995.

5.1.5.4 UNITED STATES ENVIRONMENTAL PROTECTION AGENCY INTERCOMPARISON PROGRAM

The Radiological and Environmental Services Group participated in the Environmental Protection Agency (EPA) Environmental Monitoring Systems Laboratory Intercomparison Program. The EPA sample types included mixed gamma in water, mixed gamma in milk, gamma in air filters, iodine in milk, tritium in water, iodine in water, gross beta in air filters and gross beta in water.

Radiological and Environmental Services prepared and analyzed each sample as quickly as possible. Data obtained greater than EPA limits is documented by follow-up investigations. The Radiological and Environmental Services EPA Intercomparison Report code is "CP". A summary of the EPA Intercomparison Reports for 1995 is documented in Table 5.0-B.

An investigation was made into failed Beta in Water and Gamma in Water dated 4/18/95. Both tests conducted by Radiological and Environmental Services failed high due to cross-contamination of the samples. The investigation reviewed preparation of samples, training of personnel, materials used for sample preparation, laboratory area used for preparation, and review of data.

One sample was analyzed but results were not reported by the required date. (See corrective action #1 below).

After careful review of preparation of samples, it was determined that all procedure steps were accurately followed. No deviation in preparation procedures were found. Laboratory personnel that performed the analysis were sufficiently trained and had conducted similar analyses with acceptable results. The contamination of the cross-check samples is believed to have resulted from analysis of primary reactor coolant samples by Radiological and Environmental Services. The potential existed for glassware and work surfaces to be contaminated with primary coolant in the preparation area. This is considered to be the root cause of the contamination.

Corrective actions are as follows:

- 1) The receipt and tracking of EPA samples was refined in order to meet all future deadlines.
- 2) An entire process improvement initiative was implemented that distinctly isolates all lab work by potential activity.
- 3) Specific glassware has been physically identified for all analyses types, e.g. environmental, effluent, primary reactor coolant, EPA, etc..
- 4) Cleaning procedures have been reviewed and improved for glassware and counter surfaces, minimizing the potential for contamination.
- 5) Data reviewers have been reminded to use historical information as a "benchmark" data to find potential anomalies.

- 6) Procedures will be modified for 1996 samples to include a blank to be prepared with each set of samples. This will verify the presence of any interfering contaminants in sample matrices.

5.1.5.5 NRC/STATE OF S.C. INTERCOMPARISON PROGRAM

Oconee Nuclear Station routinely participates with the Bureau of Radiological Health of the State's Department of Health and Environmental Control (DHEC) in an intercomparison program. Water, milk, vegetation, sediment, and fish samples collected by ONS Chemistry are routinely split with DHEC for intercomparison analysis. DHEC collects air samples from two of the locations sampled for air by ONS. Results of the analyses performed on split and duplicate samples are sent to DHEC for use in their report to the NRC.

5.1.5.6 STATE OF N.C. TLD INTERCOMPARISON PROGRAM

Radiation Dosimetry and Records routinely participates in a TLD intercomparison program. Every six to eight months, the State of North Carolina Radiation Protection Section irradiates environmental dosimeters and sends them to the Radiation Dosimetry and Records group for analysis of the unknown estimated delivered exposure. A summary of the State of North Carolina Environmental Dosimetry Intercomparison Report for 1995 is documented in Table 5.0-C.

5.2 CONTRACTOR LABORATORIES

No contractor laboratories were used during 1995.

TABLE 5.0-A

DUKE POWER COMPANY INTERLABORATORY COMPARISON PROGRAM

1995 CROSS-CHECK RESULTS FOR THE RADIOLOGICAL & ENVIRONMENTAL
SERVICES LABORATORY

Gamma:

Collection Date	Geometry	Nuclide	Acceptance Range (pCi/l)	Reference Value (pCi/l)	Reported Value (pCi/l)
6/23/95	3.5 Liter	Cr-51	1.93E4 - 3.42E4	2.57E4	2.60E4
		Mn-54	1.30E4 - 2.30E4	1.73E4	1.77E4
		Co-58	5.82E3 - 1.03E4	7.76E3	8.01E3
		Fe-59	5.46E3 - 9.68E3	7.28E3	7.51E3
		Co-60	1.31E4 - 2.33E4	1.75E4	1.78E4
		Zn-65	1.31E4 - 2.33E4	1.75E4	1.84E4
		Cs-134	7.95E3 - 1.41E4	1.06E4	9.8E3
		Cs-137	7.36E3 - 1.31E4	9.81E3	9.97E3
		Ce-141	5.62E3 - 9.96E3	7.49E3	7.70E3
Collection Date	Geometry	Nuclide	Acceptance Range (pCi/total)	Reference Value (pCi/total)	Reported Value (pCi/total)
6/23/95	1.0 Liter	Cr-51	4.45E4 - 7.89E4	5.93E4	6.02E4
		Mn-54	3.02E4 - 5.35E4	4.02E4	4.16E4
		Co-58	1.36E4 - 2.41E4	1.81E4	1.88E4
		Fe-59	1.27E4 - 2.25E4	1.69E4	1.84E4
		Co-60	3.04E4 - 5.39E4	4.05E4	4.20E4
		Zn-65	3.03E4 - 5.37E4	4.04E4	4.34E4
		Cs-134	1.83E4 - 3.25E4	2.44E4	2.26E4
		Cs-137	1.70E4 - 3.02E4	2.27E4	2.28E4
		Ce-141	1.31E4 - 2.31E4	1.74E4	1.85E4

Gamma:

Collection Date	Geometry	Nuclide	Acceptance Range (pCi/total)	Reference Value (pCi/total)	Reported Value (pCi/total)
8/18/95	Cartridge	I-131	4.43E-1 - 7.86E-1	5.91E-1	6.07E-1

Tritium:

Collection Date	Geometry	Nuclide	Acceptance Range (uCi/ml)	Reference Value (uCi/ml)	Reported Value (uCi/ml)
8/18/95	20ml vial	H-3	1.22E-3 - 3.39E-3	2.04E-3	1.74E-3

TABLE 5.0-B

U.S. ENVIRONMENTAL PROTECTION AGENCY INTERLABORATORY COMPARISON PROGRAM

1995 CROSS-CHECK RESULTS FOR THE RADIOLOGICAL & ENVIRONMENTAL SERVICES LABORATORY

Gamma in Water:

Collection Date	Nuclide(s)	Control Limits (3 Sigma, N=3) (pCi/l)	Known Value (pCi/l)	Reported Value (pCi/l)
2/3/95	I-131	82.7 - 117.3	100	98.7
4/18/95	Co-60	20.3 - 37.7	29	30.7
	Cs-134	11.3 - 28.7	20	213.7 ⁽¹⁾
	Cs-137	2.3 - 19.7	11	276.3 ⁽¹⁾
6/9/95	Ba-133	65.1 - 92.9	79	81.0
	Co-60	31.3 - 48.7	40	41.7
	Zn-65	62.1 - 89.9	76	81.0
	Cs-134	41.3 - 58.9	50	46.7
	Cs-137	26.3 - 43.7	35	34.7
10/6/95	I-131	122.0 - 174.0	148	158.7
10/17/95	Co-60	40.3 - 57.7	49	50.0
	Cs-134	31.3 - 48.7	40	37.7
	Cs-137	21.3 - 38.7	30	30.0
11/3/95	Ba-133	81.7 - 116.3	99	100
	Co-60	51.3 - 68.7	60	55.7
	Zn-65	102.5 - 147.5	125	132.7
	Cs-134	31.3 - 48.7	40	35.3
	Cs-137	40.3 - 57.7	49	51.3

Gamma in Milk:

Collection Date	Nuclide(s)	Control Limits (3 Sigma, N=3) (pCi/l)	Known Value (pCi/l)	Reported Value (pCi/l)
9/29/95	I-131	81.7 - 116.3	99	106.3
	Cs-137	41.3 - 58.7	50	49.3

Beta in Water:

Collection Date	Nuclide(s)	Control Limits (3 Sigma, N=3) (pCi/l)	Known Value (pCi/l)	Reported Value (pCi/l)
1/27/95	Gross Beta	0.0 - 13.7	5.0	8.3 ⁽²⁾
4/18/95	Gross Beta	69.3 - 103.9	86.6	405.0 ⁽¹⁾
7/21/95	Gross Beta	10.7 - 28.1	19.4	27.3
10/27/95	Gross Beta	16.1 - 33.5	24.8	29.0

Tritium in Water:

Collection Date	Nuclide(s)	Control Limits (3 Sigma, N=3) (pCi/l)	Known Value (pCi/l)	Reported Value (pCi/l)
3/10/95	H-3	6144.2 - 8725.8	7435	7132.3
8/4/95	H-3	4028.5 - 5715.5	4872	4626.7

Air Filter:

Collection Date	Nuclide(s)	Control Limits (3 Sigma, N=3) (pCi/l)	Known Value (pCi/l)	Reported Value (pCi/l)
8/25/95	Cs-137	16.3 - 33.7	25.0	26.7
	Gross Beta	69.3 - 103.9	86.6	86.7

(1) See Explanation in Section 5.1.5.4.

(2) This value was not reported before the due date and was not included in the reports.

TABLE 5.0-C

STATE OF NORTH CAROLINA DEPARTMENT OF ENVIRONMENTAL HEALTH AND NATURAL RESOURCES

1995 ENVIRONMENTAL DOSIMETER CROSS-CHECK RESULTS

Cross-Check Date	State of N.C. Delivered Value (mR)	Radiation Dosimetry & Records Reported Value (mR)	Acceptance Criteria +/- 10 %
May-95	100	92.5	Pass
Nov-95	60	56.9	Pass

6.0 REFERENCES

- 6.1 Oconee Selected License Commitments
- 6.2 Oconee Technical Specifications
- 6.3 Oconee Final Safety Analysis Review
- 6.4 Oconee Offsite Dose Calculation Manual
- 6.5 Oconee Annual Environmental Operating Report 1969-1994
- 6.6 Oconee Annual Effluent Report 1995
- 6.7 Probability and Statistics in Engineering and Management Science, Hines and Montgomery, 1969, pages 287-293.
- 6.8 Practical Statistics for the Physical Sciences, Havilcek and Crain, 1988, pages 83-93.
- 6.9 Nuclear Regulatory Commission Regulatory Guide 1.109, Calculation of Annual Doses to Man from Routine Releases of Reactor Effluents for the Purposes of Evaluating Compliance with 10CFR50, Appendix I.
- 6.10 Radiological and Environmental Services Operating Procedures
- 6.11 NUREG/CR-1276, Users Manual for LADTAP II - A Computer Program for Calculating Radiation Exposure to Man from Routine Release of Nuclear Reactor Liquid Effluents.
- 6.12 Oconee Environmental Chemistry Operating Procedures

APPENDIX A

ENVIRONMENTAL SAMPLING AND ANALYSIS PROCEDURES

APPENDIX A

ENVIRONMENTAL SAMPLING AND ANALYSIS PROCEDURES

Adherence to established procedures for sampling and analysis of all environmental media at Oconee Nuclear Station is required to ensure compliance with Station Selected Licensee Commitments. Analytical procedures were employed to ensure that Selected Licensee Commitments detection capabilities were achieved.

Environmental sampling and analyses were performed by ONS Environmental Chemistry, Radiological and Environmental Services, Dosimetry and Records, and Fisheries and Aquatic Ecology.

Starting at Section A.1, this appendix describes the environmental sampling frequencies and analysis procedures by media type.

I. CHANGE OF SAMPLING PROCEDURES

Two airborne particulate and radioiodine locations were removed from the program in 1995. Sampling at Location 061 (1.2 miles SSW) and Location 072 (1.8 miles S) was discontinued since they had the lowest deposition factors of the seven indicator locations.

Oconee continues to sample five indicator locations. This exceeds the SLC sampling requirements.

II. DESCRIPTION OF ANALYSIS PROCEDURES

Gamma spectroscopy analyses are performed using high purity germanium gamma detectors and Canberra analytical software. Designated sample volumes are transferred to appropriate counting geometries and analyzed by gamma spectroscopy. Perishable samples such as fish and broadleaf vegetation are ground to achieve a homogeneous mixture. Soils and sediments are dried, sifted to remove foreign objects (rocks, clams, glass, etc.) then transferred to appropriate counting geometry.

Low-level iodine analyses are performed by passing a designated sample aliquot through an ion exchange resin to remove and concentrate any iodine in the aqueous sample (milk or water). The resin is then dried and transferred to appropriate counting geometry and analyzed by gamma spectroscopy.

Tritium analyses are performed quarterly by using low-level environmental liquid scintillation analysis technique on a Packard 2550 liquid scintillation system.

Gross beta analysis is performed by concentrating a designated aliquot of sample precipitate and analyzing by gas-flow proportional counters.

III. CHANGE OF ANALYSIS PROCEDURES

No analysis procedures were changed during 1995.

IV. SAMPLING AND ANALYSIS PROCEDURES

A.1 AIRBORNE PARTICULATE AND RADIOIODINE

Airborne particulate and radioiodine samples at each of six locations were composited continuously by means of continuous air samplers. Air particulates were collected on a particulate filter and radioiodines were collected in a charcoal cartridge situated behind the filter in the sampler. The samplers are designed to operate at a constant flow rate (in order to compensate for any filter loading) and are set to sample approximately 3 cubic feet per minute. Filters and cartridges were collected weekly. A weekly gamma analysis was performed on each filter and a weekly gamma analysis was performed on each charcoal cartridge. The filter and charcoal cartridge were analyzed independently. The continuous composite samples were collected from the locations listed below.

Location 060	=	New Greenville Water Intake Rd. (2.6 mi. NNE)
Location 073	=	Tamassee Dar School (9.2 mi. NW)
Location 074	=	Keowee Key Resort (2.3 mi. NNW)
Location 077	=	Skimmer Wall (1.0 mi. SW)
Location 078	=	Recreation Site (0.6 mi. WSW)
Location 079	=	Keowee Dam (0.5 mi. NE)

A.2 DRINKING WATER

Monthly composite samplers were operated to collect an aliquot at least every two hours. Low-level Iodine-131, gross beta, and gamma analysis was performed on the monthly composites. Tritium analysis was performed on the quarterly composites. The composites were collected monthly from the locations listed below.

Location 060	=	New Greenville Water Intake Rd. (2.6 mi. NNE)
Location 064	=	Seneca (6.7 mi. SW)
Location 066	=	Anderson (19.0 mi SSE)

A.3 SURFACE WATER

Monthly composite samplers were operated to collect an aliquot at least every two hours. Gamma analysis was performed on the monthly composites. Tritium analysis was performed on the quarterly composites sample. The composites were collected monthly from the locations listed below.

Location 062	=	Lake Keowee/Hydro Intake (0.8 mi. ENE)
Location 063	=	Lake Hartwell - Hwy 183 Bridge (0.8 mi. ESE)

A.4 MILK

Semimonthly grab samples were collected at each dairy. A gamma and low-level Iodine-131 analysis was performed on each sample. The semimonthly grab samples were collected from the locations listed below.

Location 069	=	Orr's Dairy - (4.5 mi. WNW)
Location 071	=	Clemson Dairy - (10.3 mi. SSE)
Location 080	=	Martin's Dairy - (19.0 mi. SSE)

A.5 BROADLEAF VEGETATION

Monthly samples were collected and a gamma analysis was performed on each sample. The samples were collected from the locations listed below.

Location 028	=	Site Boundary (0.5 mi. S)
Location 060	=	New Greenville Water Intake Rd. (2.6 mi. NNE)
Location 073	=	Tamassee Dar School (9.2 mi. NW)
Location 077	=	Skimmer Wall (1.0 mi. SW)
Location 079	=	Keowee Dam (0.5 mi. NE)

A.6 SHORELINE SEDIMENT

Quarterly samples were collected, although Selected Licensee Commitments require semiannual collection. A gamma analysis was performed on each following the drying and removal of rocks and clams. The samples were collected from the locations listed below.

Location 063	=	Lake Hartwell - Hwy 183 Bridge (0.8 mi. ESE)
Location 067	=	Lawrence Ramsey Bridge, Hwy 27 (4.2 mi. SSE)
Location 068	=	High Falls County Park (2.0 mi. W)

A.7 FISH

Semiannual samples were collected and a gamma analysis was performed on the edible portions of each sample. The samples were collected from the locations listed below.

Location 060	=	New Greenville Water Intake Rd. (2.6 mi. NNE)
Location 063	=	Lake Hartwell - Hwy 183 Bridge (0.8 mi. ESE)
Location 067	=	Lawrence Ramsey Bridge, Hwy 27 (4.2 mi. SSE)

A.8 DIRECT GAMMA RADIATION (TLD)

Thermoluminescent dosimeters (TLD) were collected quarterly at forty-one locations. A gamma dose rate was determined for each TLD. The TLDs were placed as indicated below.

- * An inner ring of 16 TLDs, one in each meteorological sector in the general area of the site boundary.
- * An outer ring of 16 TLDs, one in each meteorological sector in the 6 to 8 kilometer range.
- * The remaining TLDs were placed in special interest areas such as population centers, residential areas, schools, and control locations.

TLD Locations are listed in Table 2.1-B.

A.9 ANNUAL LAND USE CENSUS

An annual Land Use Census was conducted to identify within a distance of 8 kilometers (5.0 miles) from the station, the nearest location from the site boundary in each of the sixteen meteorological sectors, the following:

- * The Nearest Residence
- * The Nearest Meat Animal
- * The Nearest Milk-giving Animal (cow, goat, etc.) where milk is used for human consumption

The census was conducted during August 1995 and results are shown in Table 3.9.

APPENDIX B

RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM

SUMMARY OF RESULTS 1995

Note: Locations, respective sectors and distances are included in Section 2.1, Site Descriptions

Environmental Radiological Monitoring Program Summary

Name of Facility : OCONEE NUCLEAR STATION
 Location of Facility : PICKENS COUNTY, S.C.
 Time Report Generated : 16-JAN-1996 12:10:52

Docket Number : 50-269,270,287
 Reporting Period : 1-JAN-1995 through 31-DEC-1995
 Database Name : \$DISK1:[USER.ASC]OCONEE NUCLEAR STATION95.SAF;3

Medium or Pathway Sampled (Units)	Type & Total Number of Analyses Performed	Lower Limit of Detection (LLD)	All Indicator Locations Mean (Fraction) Range	Location with Highest Mean		Control Locations Mean (Fraction) Range	No. of Non- Routine Report Meas.
				Name, Distance and Direction Location Code	Mean (Fraction) Range		
AIR PARTICULATE (PCI/M3)						073 (9.2 Mi NW)	
6 LOCATIONS	MN-54	312	0.00E+00	0.00E+00(0/ 260) 0.00E+00-- 0.00E+00	0.00E+00(0/ 52) 0.00E+00-- 0.00E+00	0.00E+00(0/ 52) 0.00E+00-- 0.00E+00	0
	CO-58	312	0.00E+00	0.00E+00(0/ 260) 0.00E+00-- 0.00E+00	0.00E+00(0/ 52) 0.00E+00-- 0.00E+00	0.00E+00(0/ 52) 0.00E+00-- 0.00E+00	0
	FE-59	312	0.00E+00	0.00E+00(0/ 260) 0.00E+00-- 0.00E+00	0.00E+00(0/ 52) 0.00E+00-- 0.00E+00	0.00E+00(0/ 52) 0.00E+00-- 0.00E+00	0
	CO-60	312	0.00E+00	0.00E+00(0/ 260) 0.00E+00-- 0.00E+00	0.00E+00(0/ 52) 0.00E+00-- 0.00E+00	0.00E+00(0/ 52) 0.00E+00-- 0.00E+00	0
	ZN-65	312	0.00E+00	0.00E+00(0/ 260) 0.00E+00-- 0.00E+00	0.00E+00(0/ 52) 0.00E+00-- 0.00E+00	0.00E+00(0/ 52) 0.00E+00-- 0.00E+00	0
	NB-95	312	0.00E+00	0.00E+00(0/ 260) 0.00E+00-- 0.00E+00	0.00E+00(0/ 52) 0.00E+00-- 0.00E+00	0.00E+00(0/ 52) 0.00E+00-- 0.00E+00	0
	ZR-95	312	0.00E+00	0.00E+00(0/ 260) 0.00E+00-- 0.00E+00	0.00E+00(0/ 52) 0.00E+00-- 0.00E+00	0.00E+00(0/ 52) 0.00E+00-- 0.00E+00	0
	I-131	312	7.00E-02	0.00E+00(0/ 260) 0.00E+00-- 0.00E+00	0.00E+00(0/ 52) 0.00E+00-- 0.00E+00	0.00E+00(0/ 52) 0.00E+00-- 0.00E+00	0
	CS-134	312	5.00E-02	0.00E+00(0/ 260) 0.00E+00-- 0.00E+00	0.00E+00(0/ 52) 0.00E+00-- 0.00E+00	0.00E+00(0/ 52) 0.00E+00-- 0.00E+00	0
	CS-137	312	6.00E-02	0.00E+00(0/ 260) 0.00E+00-- 0.00E+00	0.00E+00(0/ 52) 0.00E+00-- 0.00E+00	0.00E+00(0/ 52) 0.00E+00-- 0.00E+00	0
	BALA-140	312	0.00E+00	0.00E+00(0/ 260) 0.00E+00-- 0.00E+00	0.00E+00(0/ 52) 0.00E+00-- 0.00E+00	0.00E+00(0/ 52) 0.00E+00-- 0.00E+00	0

Mean and range based upon detectable measurements only

Fraction of detectable measurements at specified Locations is indicated in parentheses, (Fraction)

Zero range indicates no detectable activity measurements

If LLD is equal to 0, then LLD is not required by Selected Licensee Commitments

Environmental Radiological Monitoring Program Summary

Name of Facility : OCONEE NUCLEAR STATION
 Location of Facility : PICKENS COUNTY, S.C.
 Time Report Generated : 16-JAN-1996 12:10:52

Docket Number : 50-269,270,287
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 Database Name : \$DISK1:[USER.ASC]OCONEE NUCLEAR STATION95.SAF;3

Medium or Pathway Sampled (Units)	Type & Total Number of Analyses Performed		Lower Limit of Detection (LLD)	All Indicator Locations Mean (Fraction) Range	Location with Highest Mean		Control Locations Mean (Fraction) Range	No. of Non-Routine Report Meas.
					Name, Distance and Direction Location Code	Mean (Fraction) Range		
AIR RADIOIODINES (PCI/M3)							073 (9.2 Mi NW)	
6 LOCATIONS	MN-54	312	0.00E+00	0.00E+00(0/ 260) 0.00E+00-- 0.00E+00	0.00E+00(0/ 52) 0.00E+00-- 0.00E+00	0.00E+00(0/ 52) 0.00E+00-- 0.00E+00	0.00E+00(0/ 52) 0.00E+00-- 0.00E+00	0
	CO-58	312	0.00E+00	0.00E+00(0/ 260) 0.00E+00-- 0.00E+00	0.00E+00(0/ 52) 0.00E+00-- 0.00E+00	0.00E+00(0/ 52) 0.00E+00-- 0.00E+00	0.00E+00(0/ 52) 0.00E+00-- 0.00E+00	0
	FE-59	312	0.00E+00	0.00E+00(0/ 260) 0.00E+00-- 0.00E+00	0.00E+00(0/ 52) 0.00E+00-- 0.00E+00	0.00E+00(0/ 52) 0.00E+00-- 0.00E+00	0.00E+00(0/ 52) 0.00E+00-- 0.00E+00	0
	CO-60	312	0.00E+00	0.00E+00(0/ 260) 0.00E+00-- 0.00E+00	0.00E+00(0/ 52) 0.00E+00-- 0.00E+00	0.00E+00(0/ 52) 0.00E+00-- 0.00E+00	0.00E+00(0/ 52) 0.00E+00-- 0.00E+00	0
	ZN-65	312	0.00E+00	0.00E+00(0/ 260) 0.00E+00-- 0.00E+00	0.00E+00(0/ 52) 0.00E+00-- 0.00E+00	0.00E+00(0/ 52) 0.00E+00-- 0.00E+00	0.00E+00(0/ 52) 0.00E+00-- 0.00E+00	0
	NB-95	312	0.00E+00	0.00E+00(0/ 260) 0.00E+00-- 0.00E+00	0.00E+00(0/ 52) 0.00E+00-- 0.00E+00	0.00E+00(0/ 52) 0.00E+00-- 0.00E+00	0.00E+00(0/ 52) 0.00E+00-- 0.00E+00	0
	ZR-95	312	0.00E+00	0.00E+00(0/ 260) 0.00E+00-- 0.00E+00	0.00E+00(0/ 52) 0.00E+00-- 0.00E+00	0.00E+00(0/ 52) 0.00E+00-- 0.00E+00	0.00E+00(0/ 52) 0.00E+00-- 0.00E+00	0
	I-131	312	7.00E-02	0.00E+00(0/ 260) 0.00E+00-- 0.00E+00	0.00E+00(0/ 52) 0.00E+00-- 0.00E+00	0.00E+00(0/ 52) 0.00E+00-- 0.00E+00	0.00E+00(0/ 52) 0.00E+00-- 0.00E+00	0
	CS-134	312	5.00E-02	0.00E+00(0/ 260) 0.00E+00-- 0.00E+00	0.00E+00(0/ 52) 0.00E+00-- 0.00E+00	0.00E+00(0/ 52) 0.00E+00-- 0.00E+00	0.00E+00(0/ 52) 0.00E+00-- 0.00E+00	0
	CS-137	312	6.00E-02	6.67E-03(4/ 260) 4.19E-03-- 8.62E-03	7.37E-03(2/ 52) 6.12E-03-- 8.62E-03	5.63E-03(2/ 52) 2.13E-03-- 9.12E-03		0
	BALA-140	312	0.00E+00	0.00E+00(0/ 260) 0.00E+00-- 0.00E+00	0.00E+00(0/ 52) 0.00E+00-- 0.00E+00	0.00E+00(0/ 52) 0.00E+00-- 0.00E+00	0.00E+00(0/ 52) 0.00E+00-- 0.00E+00	0
						077 (1.0 Mi SW)		

Mean and range based upon detectable measurements only

Fraction of detectable measurements at specified Locations is indicated in parentheses, (Fraction)

Zero range indicates no detectable activity measurements

If LLD is equal to 0, then LLD is not required by Selected Licensee Commitments

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				Name, Distance and Direction Location Code	Mean (Fraction) Range		
BROAD LEAF VEGET (PCI/WET/KG)						073 (9.2 MI NW)	
5 LOCATIONS	MN-54	60	0.00E+00	0.00E+00(0/ 48) 0.00E+00-- 0.00E+00	0.00E+00(0/ 12) 0.00E+00-- 0.00E+00	0.00E+00(0/ 12) 0.00E+00-- 0.00E+00	0
	CO-58	60	0.00E+00	0.00E+00(0/ 48) 0.00E+00-- 0.00E+00	0.00E+00(0/ 12) 0.00E+00-- 0.00E+00	0.00E+00(0/ 12) 0.00E+00-- 0.00E+00	0
	FE-59	60	0.00E+00	0.00E+00(0/ 48) 0.00E+00-- 0.00E+00	0.00E+00(0/ 12) 0.00E+00-- 0.00E+00	0.00E+00(0/ 12) 0.00E+00-- 0.00E+00	0
	CO-60	60	0.00E+00	0.00E+00(0/ 48) 0.00E+00-- 0.00E+00	0.00E+00(0/ 12) 0.00E+00-- 0.00E+00	0.00E+00(0/ 12) 0.00E+00-- 0.00E+00	0
	ZN-65	60	0.00E+00	0.00E+00(0/ 48) 0.00E+00-- 0.00E+00	0.00E+00(0/ 12) 0.00E+00-- 0.00E+00	0.00E+00(0/ 12) 0.00E+00-- 0.00E+00	0
	NB-95	60	0.00E+00	0.00E+00(0/ 48) 0.00E+00-- 0.00E+00	0.00E+00(0/ 12) 0.00E+00-- 0.00E+00	0.00E+00(0/ 12) 0.00E+00-- 0.00E+00	0
	ZR-95	60	0.00E+00	0.00E+00(0/ 48) 0.00E+00-- 0.00E+00	0.00E+00(0/ 12) 0.00E+00-- 0.00E+00	0.00E+00(0/ 12) 0.00E+00-- 0.00E+00	0
	I-131	60	60.	0.00E+00(0/ 48) 0.00E+00-- 0.00E+00	0.00E+00(0/ 12) 0.00E+00-- 0.00E+00	0.00E+00(0/ 12) 0.00E+00-- 0.00E+00	0
	CS-134	60	60.	0.00E+00(0/ 48) 0.00E+00-- 0.00E+00	0.00E+00(0/ 12) 0.00E+00-- 0.00E+00	0.00E+00(0/ 12) 0.00E+00-- 0.00E+00	0
	CS-137	60	80.	43. (2/ 48) 24. -- 62.	43. (2/ 12) 24. -- 62.	1.58E+02(11/ 12) 44. -- 3.35E+02	0
	BALA-140	60	0.00E+00	0.00E+00(0/ 48) 0.00E+00-- 0.00E+00	0.00E+00(0/ 12) 0.00E+00-- 0.00E+00	0.00E+00(0/ 12) 0.00E+00-- 0.00E+00	0

Mean and range based upon detectable measurements only

Fraction of detectable measurements at specified Locations is indicated in parentheses, (Fraction)

Zero range indicates no detectable activity measurements

If LLD is equal to 0, then LLD is not required by Selected Licensee Commitments

Environmental Radiological Monitoring Program Summary

Name of Facility : OCONEE NUCLEAR STATION
 Location of Facility : PICKENS COUNTY, S.C.
 Time Report Generated : 16-JAN-1996 12:10:52

Docket Number : 50-269,270,287
 Reporting Period : 1-JAN-1995 through 31-DEC-1995
 Database Name : \$DISK1:[USER.ASC]OCONEE NUCLEAR STATION95.SAF;3

Medium or Pathway Sampled (Units)	Type & Total Number of Analyses Performed		Lower Limit of Detection (LLD)	All Indicator Locations Mean (Fraction) Range	Location with Highest Mean		Control Locations Mean (Fraction) Range	No. of Non-Routine Report Meas.
					Name, Distance and Direction Location Code	Mean (Fraction) Range		
DRINKING WATER (PCI/LITER)							064 (6.7 Mi SW)	
3 LOCATIONS	MN-54	39	15.	0.00E+00(0/ 26) 0.00E+00-- 0.00E+00		0.00E+00(0/ 13) 0.00E+00-- 0.00E+00	0.00E+00(0/ 13) 0.00E+00-- 0.00E+00	0
	CO-58	39	15.	0.00E+00(0/ 26) 0.00E+00-- 0.00E+00		0.00E+00(0/ 13) 0.00E+00-- 0.00E+00	0.00E+00(0/ 13) 0.00E+00-- 0.00E+00	0
	FE-59	39	30.	0.00E+00(0/ 26) 0.00E+00-- 0.00E+00		0.00E+00(0/ 13) 0.00E+00-- 0.00E+00	0.00E+00(0/ 13) 0.00E+00-- 0.00E+00	0
	CO-60	39	15.	0.00E+00(0/ 26) 0.00E+00-- 0.00E+00		0.00E+00(0/ 13) 0.00E+00-- 0.00E+00	0.00E+00(0/ 13) 0.00E+00-- 0.00E+00	0
	ZN-65	39	30.	0.00E+00(0/ 26) 0.00E+00-- 0.00E+00		0.00E+00(0/ 13) 0.00E+00-- 0.00E+00	0.00E+00(0/ 13) 0.00E+00-- 0.00E+00	0
	NB-95	39	15.	0.00E+00(0/ 26) 0.00E+00-- 0.00E+00		0.00E+00(0/ 13) 0.00E+00-- 0.00E+00	0.00E+00(0/ 13) 0.00E+00-- 0.00E+00	0
	ZR-95	39	15.	0.00E+00(0/ 26) 0.00E+00-- 0.00E+00		0.00E+00(0/ 13) 0.00E+00-- 0.00E+00	0.00E+00(0/ 13) 0.00E+00-- 0.00E+00	0
	I-131	39	15.	0.00E+00(0/ 26) 0.00E+00-- 0.00E+00		0.00E+00(0/ 13) 0.00E+00-- 0.00E+00	0.00E+00(0/ 13) 0.00E+00-- 0.00E+00	0
	CS-134	39	15.	0.00E+00(0/ 26) 0.00E+00-- 0.00E+00		0.00E+00(0/ 13) 0.00E+00-- 0.00E+00	0.00E+00(0/ 13) 0.00E+00-- 0.00E+00	0
	CS-137	39	18.	0.00E+00(0/ 26) 0.00E+00-- 0.00E+00		0.00E+00(0/ 13) 0.00E+00-- 0.00E+00	0.00E+00(0/ 13) 0.00E+00-- 0.00E+00	0
	BALA-140	39	15.	0.00E+00(0/ 26) 0.00E+00-- 0.00E+00		0.00E+00(0/ 13) 0.00E+00-- 0.00E+00	0.00E+00(0/ 13) 0.00E+00-- 0.00E+00	0
	BETA	39	4.0	3.6 (19/ 26) 0.97 -- 10.	066 (19.0 Mi SSE)	5.1 (9/ 13) 2.0 -- 10.	2.9 (9/ 13) 0.92 -- 6.3	0

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Environmental Radiological Monitoring Program Summary

Name of Facility : OCONEE NUCLEAR STATION

Docket Number : 50-269,270,287

Location of Facility : PICKENS COUNTY, S.C.

Reporting Period : 1-JAN-1995 through 31-DEC-1995

Time Report Generated : 16-JAN-1996 12:10:52

Database Name : \$DISK1:[USER.ASC]OCONEE NUCLEAR STATION95.SAF;3

Medium or Pathway Sampled (Units)	Type & Total Number of Analyses Performed	Lower Limit of Detection (LLD)	All Indicator Locations Mean (Fraction) Range	Location with Highest Mean		Control Locations Mean (Fraction) Range	No. of Non- Routin Report Meas.
				Name, Distance and Direction Location Code	Mean (Fraction) Range		
DW TRITIUM (PCI/LITER)						064 (6.7 Mi SW)	
				066 (19.0 Mi SSE)			
3 LOCATIONS	H-3	15	2.00E+03	2.25E+02(5/ 10)	2.48E+02(4/ 5)	0.00E+00(0/ 5)	0
				1.33E+02-- 3.00E+02	1.92E+02-- 3.00E+02	0.00E+00-- 0.00E+00	

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 Time Report Generated : 16-JAN-1996 12:10:52

Docket Number : 50-269,270,287
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Medium or Pathway Sampled (Units)	Type & Total Number of Analyses Performed	Lower Limit of Detection (LLD)	All Indicator Locations Mean (Fraction) Range	Location with Highest Mean		Control Locations Mean (Fraction) Range	No. of Non-Routine Report Meas.
				Name, Distance and Direction Location Code	Mean (Fraction) Range		
FISH (PCI/WET/KG)							
3 LOCATIONS	MN-54	12	1.30E+02	0.00E+00(0/ 8) 0.00E+00-- 0.00E+00	0.00E+00(0/ 4) 0.00E+00-- 0.00E+00	060 (2.6 Mi NNE) 0.00E+00(0/ 4) 0.00E+00-- 0.00E+00	0
	CO-58	12	1.30E+02	0.00E+00(0/ 8) 0.00E+00-- 0.00E+00	0.00E+00(0/ 4) 0.00E+00-- 0.00E+00	0.00E+00(0/ 4) 0.00E+00-- 0.00E+00	0
	FE-59	12	2.60E+02	0.00E+00(0/ 8) 0.00E+00-- 0.00E+00	0.00E+00(0/ 4) 0.00E+00-- 0.00E+00	0.00E+00(0/ 4) 0.00E+00-- 0.00E+00	0
	CO-60	12	1.30E+02	0.00E+00(0/ 8) 0.00E+00-- 0.00E+00	0.00E+00(0/ 4) 0.00E+00-- 0.00E+00	0.00E+00(0/ 4) 0.00E+00-- 0.00E+00	0
	ZN-65	12	2.60E+02	0.00E+00(0/ 8) 0.00E+00-- 0.00E+00	0.00E+00(0/ 4) 0.00E+00-- 0.00E+00	0.00E+00(0/ 4) 0.00E+00-- 0.00E+00	0
	NB-95	12	0.00E+00	0.00E+00(0/ 8) 0.00E+00-- 0.00E+00	0.00E+00(0/ 4) 0.00E+00-- 0.00E+00	0.00E+00(0/ 4) 0.00E+00-- 0.00E+00	0
	ZR-95	12	0.00E+00	0.00E+00(0/ 8) 0.00E+00-- 0.00E+00	0.00E+00(0/ 4) 0.00E+00-- 0.00E+00	0.00E+00(0/ 4) 0.00E+00-- 0.00E+00	0
	I-131	12	0.00E+00	0.00E+00(0/ 8) 0.00E+00-- 0.00E+00	0.00E+00(0/ 4) 0.00E+00-- 0.00E+00	0.00E+00(0/ 4) 0.00E+00-- 0.00E+00	0
	CS-134	12	1.30E+02	27. (3/ 8) 19. -- 35.	063 (0.8 Mi ESE) 31. (2/ 4) 27. -- 35.	0.00E+00(0/ 4) 0.00E+00-- 0.00E+00	0
	CS-137	12	1.50E+02	79. (8/ 8) 21. -- 1.34E+02	063 92. (4/ 4) 21. -- 1.34E+02	29. (2/ 4) 25. -- 32.	0
	BALA-140	12	0.00E+00	0.00E+00(0/ 8) 0.00E+00-- 0.00E+00	0.00E+00(0/ 4) 0.00E+00-- 0.00E+00	0.00E+00(0/ 4) 0.00E+00-- 0.00E+00	0

Mean and range based upon detectable measurements only

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Environmental Radiological Monitoring Program Summary

Name of Facility : OCONEE NUCLEAR STATION
 Location of Facility : PICKENS COUNTY, S.C.
 Time Report Generated : 16-JAN-1996 12:10:52

Docket Number : 50-269,270,287
 Reporting Period : 1-JAN-1995 through 31-DEC-1995
 Database Name : \$DISK1:[USER.ASC]OCONEE NUCLEAR STATION95.SAF;3

Medium or Pathway Sampled (Units)	Type & Total Number of Analyses Performed		Lower Limit of Detection (LLD)	All Indicator Locations Mean (Fraction) Range	Location with Highest Mean		Control Locations Mean (Fraction) Range	No. of Non- Routine Report Meas.
					Name, Distance and Direction Location Mean (Fraction) Code Range			
MILK (PCI/LITER)							080 (19.0 Mi SSE)	
3 LOCATIONS	MN-54	78	0.00E+00	0.00E+00(0/ 52) 0.00E+00-- 0.00E+00	0.00E+00(0/ 26) 0.00E+00-- 0.00E+00		0.00E+00(0/ 26) 0.00E+00-- 0.00E+00	0
	CO-58	78	0.00E+00	0.00E+00(0/ 52) 0.00E+00-- 0.00E+00	0.00E+00(0/ 26) 0.00E+00-- 0.00E+00		0.00E+00(0/ 26) 0.00E+00-- 0.00E+00	0
	FE-59	78	0.00E+00	0.00E+00(0/ 52) 0.00E+00-- 0.00E+00	0.00E+00(0/ 26) 0.00E+00-- 0.00E+00		0.00E+00(0/ 26) 0.00E+00-- 0.00E+00	0
	CO-60	78	0.00E+00	0.00E+00(0/ 52) 0.00E+00-- 0.00E+00	0.00E+00(0/ 26) 0.00E+00-- 0.00E+00		0.00E+00(0/ 26) 0.00E+00-- 0.00E+00	0
	ZN-65	78	0.00E+00	0.00E+00(0/ 52) 0.00E+00-- 0.00E+00	0.00E+00(0/ 26) 0.00E+00-- 0.00E+00		0.00E+00(0/ 26) 0.00E+00-- 0.00E+00	0
	NB-95	78	0.00E+00	0.00E+00(0/ 52) 0.00E+00-- 0.00E+00	0.00E+00(0/ 26) 0.00E+00-- 0.00E+00		0.00E+00(0/ 26) 0.00E+00-- 0.00E+00	0
	ZR-95	78	0.00E+00	0.00E+00(0/ 52) 0.00E+00-- 0.00E+00	0.00E+00(0/ 26) 0.00E+00-- 0.00E+00		0.00E+00(0/ 26) 0.00E+00-- 0.00E+00	0
	I-131	78	15.	0.00E+00(0/ 52) 0.00E+00-- 0.00E+00	0.00E+00(0/ 26) 0.00E+00-- 0.00E+00		0.00E+00(0/ 26) 0.00E+00-- 0.00E+00	0
	LLI-131	78	1.0	0.00E+00(0/ 52) 0.00E+00-- 0.00E+00	0.00E+00(0/ 26) 0.00E+00-- 0.00E+00		0.00E+00(0/ 26) 0.00E+00-- 0.00E+00	0
	CS-134	78	15.	0.00E+00(0/ 52) 0.00E+00-- 0.00E+00	0.00E+00(0/ 26) 0.00E+00-- 0.00E+00		0.00E+00(0/ 26) 0.00E+00-- 0.00E+00	0
	CS-137	78	18.	2.3 (1/ 52) 2.3 -- 2.3	2.3 (1/ 26) 2.3 -- 2.3	069 (4.5 Mi WNW)	2.0 (1/ 26) 2.0 -- 2.0	0
	BALA-140	78	15.	0.00E+00(0/ 52) 0.00E+00-- 0.00E+00	0.00E+00(0/ 26) 0.00E+00-- 0.00E+00		0.00E+00(0/ 26) 0.00E+00-- 0.00E+00	0

Mean and range based upon detectable measurements only

Fraction of detectable measurements at specified Locations is indicated in parentheses, (Fraction)

Zero range indicates no detectable activity measurements

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Environmental Radiological Monitoring Program Summary

Name of Facility : OCONEE NUCLEAR STATION
 Location of Facility : PICKENS COUNTY, S.C.
 Time Report Generated : 16-JAN-1996 12:10:52

Docket Number : 50-269,270,287
 Reporting Period : 1-JAN-1995 through 31-DEC-1995
 Database Name : \$DISK1:[USER.ASC]OCONEE NUCLEAR STATION95.SAF;3

Medium or Pathway Sampled (Units)	Type & Total Number of Analyses Performed	Lower Limit of Detection (LLD)	All Indicator Locations Mean (Fraction) Range	Location with Highest Mean		Control Locations Mean (Fraction) Range	No. of Non-Routine Report Meas.
				Name, Distance and Direction Location Code	Mean (Fraction) Range		
SEDIMENT (PCI/DRY/KG)							
3 LOCATIONS	MN-54	12	0.00E+00	1.03E+02(3/ 8) 23. -- 2.13E+02	067 (4.2 Mi SSE) 1.43E+02(2/ 4) 74. -- 2.13E+02	068 (2.0 Mi W) 0.00E+00(0/ 4) 0.00E+00-- 0.00E+00	0
	CO-58	12	0.00E+00	39. (1/ 8) 39. -- 39.	063 (0.8 Mi ESE) 39. (1/ 4) 39. -- 39.	0.00E+00(0/ 4) 0.00E+00-- 0.00E+00	0
	FE-59	12	0.00E+00	0.00E+00(0/ 8) 0.00E+00-- 0.00E+00	0.00E+00(0/ 4) 0.00E+00-- 0.00E+00	0.00E+00(0/ 4) 0.00E+00-- 0.00E+00	0
	CO-60	12	0.00E+00	24. (1/ 8) 24. -- 24.	063 24. (1/ 4) 24. -- 24.	0.00E+00(0/ 4) 0.00E+00-- 0.00E+00	0
	ZN-65	12	0.00E+00	0.00E+00(0/ 8) 0.00E+00-- 0.00E+00	0.00E+00(0/ 4) 0.00E+00-- 0.00E+00	0.00E+00(0/ 4) 0.00E+00-- 0.00E+00	0
	NB-95	12	0.00E+00	0.00E+00(0/ 8) 0.00E+00-- 0.00E+00	0.00E+00(0/ 4) 0.00E+00-- 0.00E+00	0.00E+00(0/ 4) 0.00E+00-- 0.00E+00	0
	ZR-95	12	0.00E+00	0.00E+00(0/ 8) 0.00E+00-- 0.00E+00	0.00E+00(0/ 4) 0.00E+00-- 0.00E+00	0.00E+00(0/ 4) 0.00E+00-- 0.00E+00	0
	I-131	12	0.00E+00	0.00E+00(0/ 8) 0.00E+00-- 0.00E+00	0.00E+00(0/ 4) 0.00E+00-- 0.00E+00	0.00E+00(0/ 4) 0.00E+00-- 0.00E+00	0
	CS-134	12	1.50E+02	11. (1/ 8) 11. -- 11.	063 11. (1/ 4) 11. -- 11.	0.00E+00(0/ 4) 0.00E+00-- 0.00E+00	0
	CS-137	12	1.80E+02	41. (5/ 8) 19. -- 83.	063 52. (2/ 4) 22. -- 83.	21. (1/ 4) 21. -- 21.	0
	BALA-140	12	0.00E+00	0.00E+00(0/ 8) 0.00E+00-- 0.00E+00	0.00E+00(0/ 4) 0.00E+00-- 0.00E+00	0.00E+00(0/ 4) 0.00E+00-- 0.00E+00	0

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Medium or Pathway Sampled (Units)	Type & Total Number of Analyses Performed		Lower Limit of Detection (LLD)	All Indicator Locations Mean (Fraction) Range		Location with Highest Mean		Control Locations Mean (Fraction) Range	No. of Non-Routine Report Meas.
						Name, Distance and Direction Location Code	Mean (Fraction) Range		
SURFACE WATER (PCI/LITER)								062 (0.8 Mi ENE)	
2 LOCATIONS	MN-54	26	15.	0.00E+00(0/ 13) 0.00E+00-- 0.00E+00		0.00E+00(0/ 13) 0.00E+00-- 0.00E+00		0.00E+00(0/ 13) 0.00E+00-- 0.00E+00	0
	CO-58	26	15.	0.00E+00(0/ 13) 0.00E+00-- 0.00E+00		0.00E+00(0/ 13) 0.00E+00-- 0.00E+00		0.00E+00(0/ 13) 0.00E+00-- 0.00E+00	0
	FE-59	26	30.	0.00E+00(0/ 13) 0.00E+00-- 0.00E+00		0.00E+00(0/ 13) 0.00E+00-- 0.00E+00		0.00E+00(0/ 13) 0.00E+00-- 0.00E+00	0
	CO-60	26	15.	0.00E+00(0/ 13) 0.00E+00-- 0.00E+00		0.00E+00(0/ 13) 0.00E+00-- 0.00E+00		0.00E+00(0/ 13) 0.00E+00-- 0.00E+00	0
	ZN-65	26	30.	0.00E+00(0/ 13) 0.00E+00-- 0.00E+00		0.00E+00(0/ 13) 0.00E+00-- 0.00E+00		0.00E+00(0/ 13) 0.00E+00-- 0.00E+00	0
	NB-95	26	15.	0.00E+00(0/ 13) 0.00E+00-- 0.00E+00		0.00E+00(0/ 13) 0.00E+00-- 0.00E+00		0.00E+00(0/ 13) 0.00E+00-- 0.00E+00	0
	ZR-95	26	15.	0.00E+00(0/ 13) 0.00E+00-- 0.00E+00		0.00E+00(0/ 13) 0.00E+00-- 0.00E+00		0.00E+00(0/ 13) 0.00E+00-- 0.00E+00	0
	I-131	26	15.	0.00E+00(0/ 13) 0.00E+00-- 0.00E+00		0.00E+00(0/ 13) 0.00E+00-- 0.00E+00		0.00E+00(0/ 13) 0.00E+00-- 0.00E+00	0
	CS-134	26	15.	0.00E+00(0/ 13) 0.00E+00-- 0.00E+00		0.00E+00(0/ 13) 0.00E+00-- 0.00E+00		0.00E+00(0/ 13) 0.00E+00-- 0.00E+00	0
	CS-137	26	18.	0.00E+00(0/ 13) 0.00E+00-- 0.00E+00		0.00E+00(0/ 13) 0.00E+00-- 0.00E+00		0.00E+00(0/ 13) 0.00E+00-- 0.00E+00	0
	BALA-140	26	15.	0.00E+00(0/ 13) 0.00E+00-- 0.00E+00		0.00E+00(0/ 13) 0.00E+00-- 0.00E+00		0.00E+00(0/ 13) 0.00E+00-- 0.00E+00	0

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Medium or Pathway Sampled (Units)	Type & Total Number of Analyses Performed	Lower Limit of Detection (LLD)	All Indicator Locations Mean (Fraction) Range	Location with Highest Mean		Control Locations Mean (Fraction) Range	No. of Non- Routin Report Meas.
				Name, Distance and Direction Location Code	Mean (Fraction) Range		
SW TRITIUM (PCI/LITER)				063 (0.8 Mi ESE)		062 (0.8 Mi ENE)	
2 LOCATIONS	H-3 10	2.00E+03	6.65E+03(5/ 5) 2.73E+03-- 1.14E+04	6.65E+03(5/ 5) 2.73E+03-- 1.14E+04		0.00E+00(0/ 5) 0.00E+00-- 0.00E+00	0

Mean and range based upon detectable measurements only

Fraction of detectable measurements at specified Locations is indicated in parentheses, (Fraction)

Zero range indicates no detectable activity measurements

If LLD is equal to 0, then LLD is not required by Selected Licensee Commitments

Environmental Radiological Monitoring Program Summary

Name of Facility : OCONEE NUCLEAR STATION

Docket Number : 50-269,270,287

Location of Facility : PICKENS COUNTY, S.C.

Reporting Period : 1-JAN-1995 through 31-DEC-1995

Time Report Generated : 6-MAR-1996 10:57:22

Database Name : \$DISK1:[USER.ASC]ONS95.SAF;3

Medium or Pathway Sampled (Units)	Type & Total Number of Analyses Performed	Lower Limit of Detection (LLD)	All Indicator Locations Mean (Fraction) Range	Location with Highest Mean		Control Locations Mean (Fraction) Range	No. of Non- Routine Report Meas.
				Name, Distance and Direction Location Code	Mean (Fraction) Range		
DIRECT RAD-TLD (mR/Quarter)						058 (9.4 Mi WSW)	
41 Locations	mR/QTR 158	0.00E+00	25. (154/ 154) 8.7 -- 39.	034 (0.2 Mi NW) 33. (4/ 4) 26. -- 39.		33. (4/ 4) 28. -- 38.	0

Mean and range based upon detectable measurements only

Fraction of detectable measurements at specified locations is indicated in parentheses, (Fraction)

Zero range indicates no detectable activity measurements

If LLD is equal to 0, then LLD is not required by Selected Licensee Commitments

APPENDIX C

SAMPLING DEVIATIONS & UNAVAILABLE ANALYSES

APPENDIX C

OCONEE NUCLEAR STATION SAMPLING DEVIATIONS & UNAVAILABLE ANALYSES

DEVIATION & UNAVAILABLE REASON CODES			
BF	Blown Fuse	PO	Power Outage
FZ	Sample Frozen	PS	Pump out of service / Undergoing Repair
IW	Inclement Weather	SL	Sample Loss/Lost due to Laboratory Accident
LC	Line Clog to Sampler	SM	Motor / Rotor Seized
OT	Other	TF	Torn Filter
PI	Power Interrupt	VN	Vandalism
PM	Preventive Maintenance		

C.1 SAMPLING DEVIATIONS

The following deviations from sampling requirements occurred during 1995:

Air Particulate and Air Radioiodines

Location	Scheduled Collection Dates	Actual Collection Dates	Reason	Corrective Action
077	1/17-1/24/95	1/17-1/19/95	PO	Breaker tripped to both samplers due to lightning. Reset breaker and samplers resumed running. Pursued installing surge resistors and determined this was not practicable.
060	6/20-6/27/95	6/20-6/22/95	PO	Transformer went out during electrical storm. Maintenance performed and power restored.

Drinking Water

Location	Scheduled Collection Dates	Actual Collection Dates	Reason	Corrective Action
066	2/15-3/14/95	3/16/95	PS	Pump tubing cracked, therefore no water flow. Tubing replaced. Procedure was revised to verify flow before new sampling period. Collected grab sample.

C.2 UNAVAILABLE ANALYSES

The following unavailable analyses occurred during 1995:

TLD

Location	Scheduled Collection Dates	Reason	Corrective Action
057	3/15-6/8/95	SL	Replacement TLD was mounted on a tree across the road from original location. The tree and TLD at the original location were removed and destroyed due to construction at Oconee Memorial Hospital.
054	3/15-6/8/95	VN	Replacement TLD was moved higher up on tree limb where TLD was mounted.
045	3/15-6/8/95	VN	Replacement TLD was mounted on a tree that is deeper in the wooded area.
024	3/15-6/8/95	VN	Replacement TLD was moved to a location approximately 30' from previous location. The TLD is on the same fence in the same sector, but is now away from a fishing access path to prevent tampering.
054	6/8-9/28/95	VN	TLD has been moved to new location on tubing leading to electrical junction box at the rear of the Norris Post Office.
022	6/8-9/28/95	VN	Appeared that birds removed the protective wrapping and TLD from package. Replaced with 4th quarter TLD double wrapped and moved from fence to post.

APPENDIX D

ANALYTICAL DEVIATIONS

No analytical deviations were incurred for the 1995 Radiological Environmental Monitoring Program.

APPENDIX E

RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM RESULTS

1995

This appendix includes all of the sample analysis reports generated from each sample medium for 1995. Appendix E is located separately from this report and is permanently archived at Duke Power Company's Environmental Center radiological environmental master file, located at the McGuire Nuclear Station Site in Huntersville, North Carolina.