ANNUAL RADIOLOGICAL ENVIRONMENTAL OPERATING REPORT

DUKE ENERGY CORPORATION
MCGUIRE NUCLEAR STATION
Units 1 and 2

2010

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LIST OF ACRONYMS USED IN THIS TEXT *(in alphabetical order)*

BW	BiWeekly
C	Control
DEHNR	Department of Environmental Health and Natural Resources
DHEC	Department of Health and Environmental Control
EPA	Environmental Protection Agency
ERA	Environmental Resource Associates
GI-LLI	Gastrointestinal – Lower Large Intestine
GPS	Global Positioning System
ISFSI	Independent Spent Fuel Storage Installation
LLD	Lower Limit of Detection
M	Monthly
MDA	Minimum Detectable Activity
MNS	McGuire Nuclear Station
mrem	millirem
NIST	National Institute of Standards and Technology
NRC	Nuclear Regulatory Commission
ODCM	Offsite Dose Calculation Manual
pCi/kg	picocurie per kilogram
pCi/l	picocurie per liter
pCi/m3	picocurie per cubic meter
PIP	Problem Investigation Program
Q	Quarterly
REMP	Radiological Environmental Monitoring Program
SA	Semiannually
SLCs	Selected Licensee Commitments
SM	Semimonthly
TECH SPECs	Technical Specifications
TLD	Thermoluminescent Dosimeter
µCi/ml	microcurie per milliliter
UFSAR	Updated Final Safety Analysis Report
W	Weekly

1.0 EXECUTIVE SUMMARY

This Annual Radiological Environmental Operating Report describes the McGuire Nuclear Station Radiological Environmental Monitoring Program (REMP), and the program results for the calendar year 2010.

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 collected samples as required by SLC's. Eleven-hundred forty-five samples were analyzed comprising 1,607 test results in order to compile data for the 2010 report. Based on the annual land use census, the current number of sampling sites for McGuire Nuclear Station is sufficient.

Concentrations observed in the environment in 2010 for station related radionuclides were generally 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 7.91E-2 mrem for 2010. 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

McGuire Nuclear Station (MNS) is located geographically near the center of a highly industrialized region of the Carolinas. The land is predominantly rural non-farm with a small amount of land being used for farming. The McGuire site is in northwestern Mecklenburg County, North Carolina, 17 miles north-northwest of Charlotte, North Carolina. The site is bounded to the west by the Catawba River channel and to the north by 32,510 acre Lake Norman. Lake Norman is impounded by Duke Energy Corporation's Cowans Ford Dam Hydroelectric Station. The tailwater of Cowans Ford Dam is the upper limit of Mountain Island Reservoir. Mountain Island Dam is located 15 miles downstream from the site. Lookout Shoals Hydroelectric Station is at the upper reaches of Lake Norman. Marshall Steam Station is located on the western shore of Lake Norman, approximately 16 miles upstream from the site (reference 6.3).

MNS consists of two pressurized water reactors. Each reactor unit is essentially a mirror image of the other joined by an auxiliary building housing both separate and common equipment. Each unit was designed to produce approximately 1200 gross Megawatts of electricity. Unit 1 achieved criticality August 8, 1981 and Unit 2 on May 8, 1983.

Figures 2.1-1 and 2.1-2 are maps depicting the Thermoluminescent Dosimeter (TLD) monitoring locations and the sampling locations. The location numbers shown on these maps correspond to those listed in Tables 2.1-A and 2.1-B. Figure 2.1-1 comprises all sample locations within 0.5 mile radius of MNS. Figure 2.1-2 comprises all sample locations within a ten mile radius of MNS.

2.2 SCOPE AND REQUIREMENTS OF THE REMP

An environmental monitoring program has been in effect at McGuire Nuclear Station since 1977, four years prior to operation of Unit 1 in 1981. 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 the 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 McGuire 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 3.10.

Participation in an 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 Radiological Environmental Monitoring Program. “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. The following equation was used to estimate the mean (reference 6.8):

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

Where:

$\overline{x}$ = estimate of the mean,
i = individual sample,
N = total number of samples with a net activity (or concentration),
χ_i = net activity (or concentration) for sample i.

2.3.2 LOWER LEVEL OF DETECTION AND MINIMUM DETECTABLE ACTIVITY

The Lower Level of Detection (LLD) and Minimum Detectable Activity (MDA) 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.

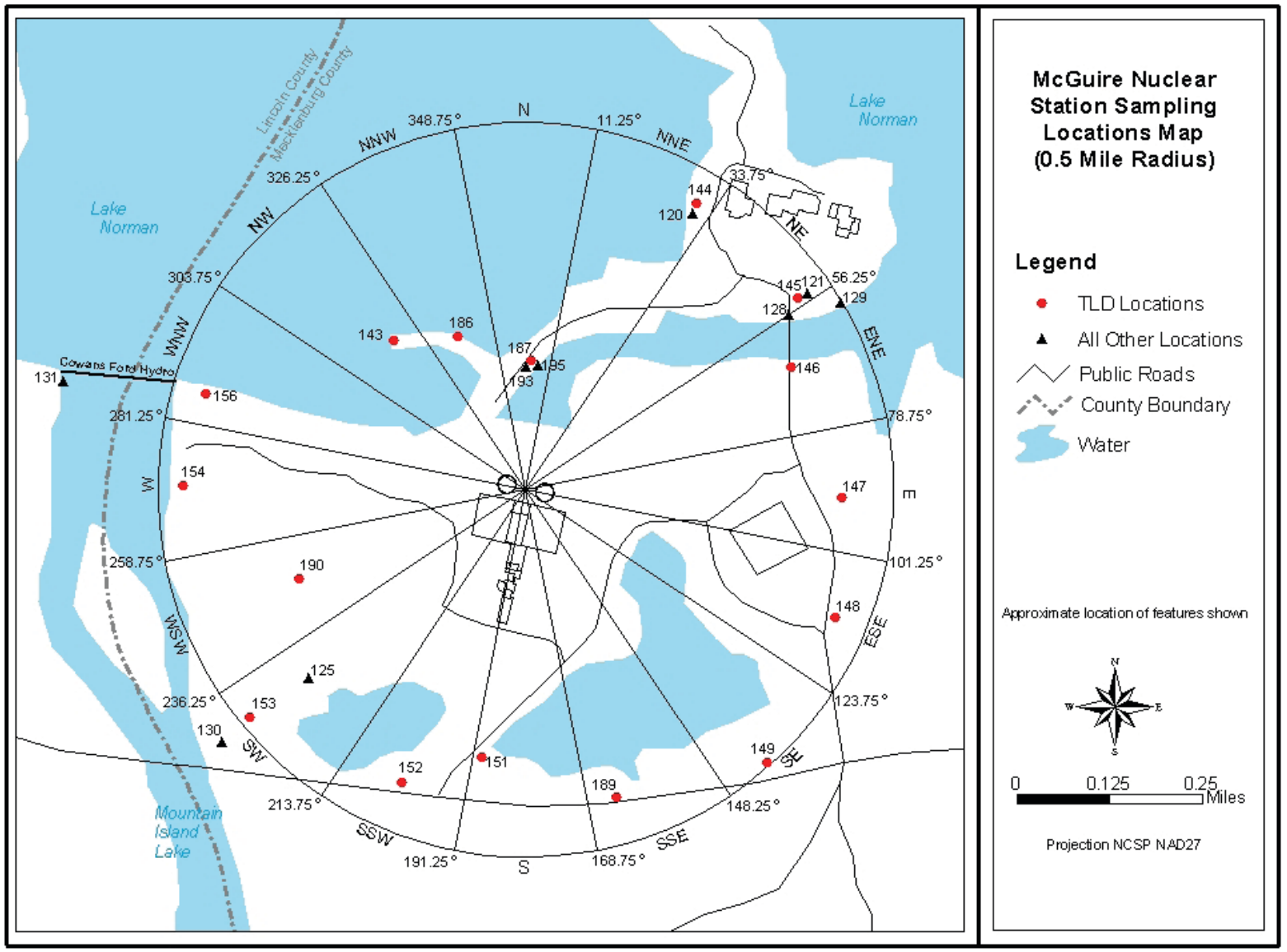
MDA - The MDA is the net counting rate (sample after subtraction of background) that must be surpassed before a sample is considered to contain a scientifically measurable amount of a radioactive material exceeding background amounts. The MDA is calculated using a sample background and may be thought of as an "actual" LLD for a particular sample measurement.

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. Visual inspection of tabular or graphical presentations of data (including preoperational) is used to determine if a trend exists. A decrease 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.

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. Some factors that may affect environmental levels of radionuclides include prevailing weather conditions (periods of drought, solar cycles or heavier than normal precipitation), construction in or around either the nuclear plant or the sampling location, and addition or deletion of other sources of radioactive materials (such as the Chernobyl accident). Some of these factors may be obvious while others are sometimes unknown. Therefore, how trends are identified will include some judgment by plant personnel.

Figure 2.1-1


McGuire Nuclear Station Sampling Locations Map (0.5 Mile Radius)
Legend
TLD Locations
All Other Locations
Public Roads
County Boundary
Water
Approximate location of features shown
0
0.125
0.25
Miles
Projection NCSP NAD27
Lake Norman
Lake Norman
Mountain Island Lake
Lincoln County
Mecklenburg County
Cowans Ford Hydro
N
NNE
NE
ENE
E
ESE
SE
SSE
S
SSW
SW
WSW
W
WNW
NW
NNW
11.25°
33.75°
56.25°
78.75°
101.25°
123.75°
148.25°
168.75°
191.25°
213.75°
236.25°
258.75°
281.25°
303.75°
326.25°
348.75°
120
121
128
129
131
130
125
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193
195

Figure 2.1-2

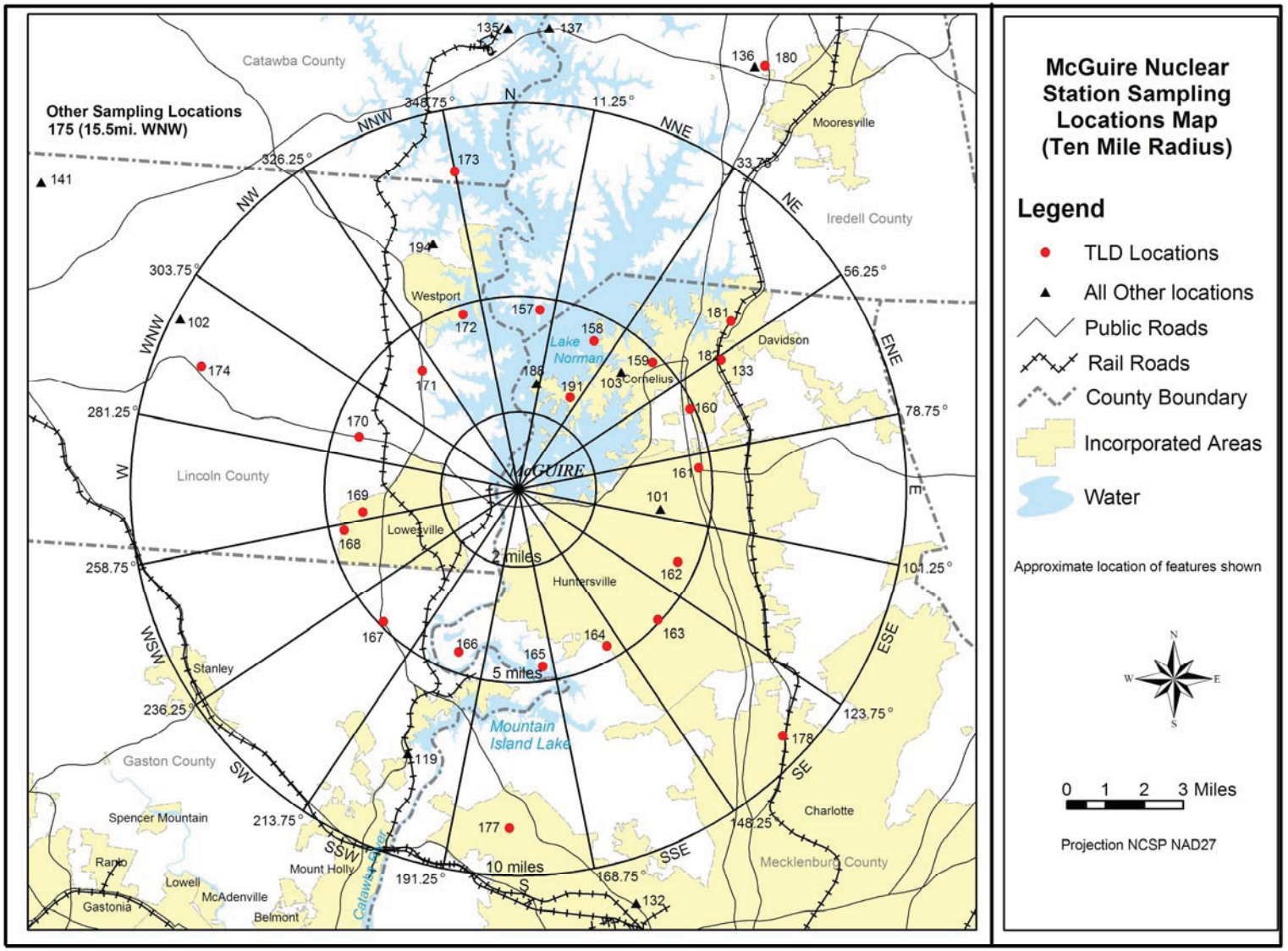

McGuire Nuclear Station Sampling Locations Map (Ten Mile Radius)
Legend
TLD Locations
All Other locations
Public Roads
Rail Roads
County Boundary
Incorporated Areas
Water
Approximate location of features shown
0 1 2 3 Miles
Projection NCSP NAD27
Other Sampling Locations
175 (15.5mi. WNW)
Catawba County
Iredell County
Lincoln County
Gaston County
Mecklenburg County
Mooresville
Davidson
Cornelius
Westport
Lowesville
Huntersville
Stanley
Spencer Mountain
Mount Holly
Lowell
McAdenville
Gastonia
Belmont
Charlotte
Lake Norman
Mountain Island Lake
Catawba River
MCGUIRE
2 miles
5 miles
10 miles
N
NNE
NE
ENE
E
ESE
SE
SSE
S
SSW
SW
WSW
W
WNW
NW
NNW
11.25°
33.75°
56.25°
78.75°
101.25°
123.75°
148.25°
168.75°
191.25°
213.75°
236.25°
258.75°
281.25°
303.75°
326.25°
348.75°

TABLE 2.1-A

MCGUIRE RADIOLOGICAL MONITORING PROGRAM
SAMPLING LOCATIONS

Table 2.1-A Codes			
W	Weekly	SM	Semimonthly
BW	BiWeekly	Q	Quarterly
M	Monthly	SA	Semiannually
C	Control	I	Indicator

Site #	Measure Type	Location Description*	Air Rad. & Part.	Surface Water	Drinking Water	Shoreline Sediment	Food Products	Fish	Milk	Broad Leaf Veg.
101	I	North Mecklenburg Water Treatment Facility (3.31 mi E)			M					
102	C	Amity Church Road (9.89 mi WNW)	W							M (b)
103	I	Cottonwood Substation (4.20 mi NE)	W							
119	I	Mt. Holly Municipal Water Supply (7.40 mi SSW)			M					
120	I	Site Boundary (0.46 mi NNE)	W							M (b)
121	I	Site Boundary (0.47 mi NE)	W							
125	I	Site Boundary (0.38 mi SW)	W							M (b)
128	I	Discharge Canal Bridge (0.45 mi NE)		M						
129	I	Discharge Canal Entrance to Lake Norman (0.51 mi ENE)				SA		SA		
130	I	Hwy 73 Bridge Downstream (0.52 mi SW)				SA				
131	I	Cowans Ford Dam (0.64 mi WNW)		M						
132	I	Charlotte Municipal Water Supply (11.1 mi SSE)			M					
133	I	Cornelius (6.23 mi ENE)	W							
135	C	Plant Marshall Intake Canal (11.9 mi N)		M						
136	C	Mooresville Municipal Water Supply (12.7 mi NNE)			M					
137	C	Pinnacle Access Area (12.0 mi N)				SA		SA		
141	C	Lynch Dairy-Cows (14.8 mi WNW)							SM	
188	I	5 mile radius Gardens (2.79 mi NNE)					M (a)			
193	I	Site Boundary (0.19 mi N)								M (b)
194	I	East Lincoln County Water Supply (6.73 mi NNW)			M					
195	I	Fishing Access Road (0.19 mi N)	W							

(a) During Harvest Season
(b) When Available

* GPS data reflect approximate accuracy to within 2-5 meters. GPS field measurements were taken as close as possible to the item of interest.

TABLE 2.1-B

MCGUIRE RADIOLOGICAL MONITORING PROGRAM
SAMPLING LOCATIONS (TLD SITES)

Table 2.1-B Codes			
IR	Inner Ring	OR	Outer Ring
C	Control	SI	Special Interest

Site #	Measure Type	Location	Distance* (miles)	Sector	Site #	Measure Type	Location	Distance* (miles)	Sector
143	IR	SITE BOUNDARY	0.27	NW	164	OR	HAMBRIGHT & BEATTIES FORD ROAD	4.64	SSE
144	IR	SITE BOUNDARY	0.46	NNE	165	OR	ARTHER AUTEN ROAD	4.57	S
145	IR	SITE BOUNDARY	0.47	NE	166	OR	NECK ROAD REFUGE BOUNDARY	4.44	SSW
146	IR	SITE BOUNDARY	0.42	ENE	167	OR	LUCIA RIVERBEND HWY/OLD FIREHOUSE	4.87	SW
147	IR	SITE BOUNDARY	0.44	E	168	OR	OLD PLANK ROAD BRIDGE	4.60	WSW
148	IR	SITE BOUNDARY	0.46	ESE	169	OR	GLOVER LANE	4.03	W
149	IR	SITE BOUNDARY	0.50	SE	170	OR	LITTLE EGYPT ROAD	4.32	WNW
151	IR	SITE BOUNDARY	0.37	S	171	OR	TRIANGLE ACE HARDWARE	3.95	NW
152	IR	SITE BOUNDARY	0.44	SSW	172	OR	LAKESHORE S RD ISLAND VIEW COURT	4.69	NNW
153	IR	SITE BOUNDARY	0.47	SW	173	SI	KEISTLER STORE / GLENWOOD ROAD	8.39	NNW
154	IR	SITE BOUNDARY	0.45	W	174	SI	EAST LINCOLN JR. HIGH SCHOOL	8.77	WNW
156	IR	SITE BOUNDARY	0.44	WNW	175	C	BOGER CITY	15.5	WNW
189	IR	SITE BOUNDARY	0.43	SSE	177	SI	BELMARROW RD / COULWOOD	8.77	S
190	IR	SITE BOUNDARY	0.37	WSW	178	SI	FLORIDA STEEL CORPORATION	9.36	SE
157	IR	THE POINTE (MOORESVILLE)	4.69	N	180	SI	MOORESVILLE WATER TREATMENT FACILITY	12.7	NNE
158	OR	BETHEL CHURCH RD	4.33	NNE	181	SI	OLD DAVIDSON WATER FACILITY	7.02	NE
159	OR	HENDERSON ROAD & W CATAWBA AVENUE	4.73	NE	182	SI	CORNELIUS AIR SITE # 133	6.23	ENE
160	OR	ANCHORAGE MARINE SHOWROOM	4.89	ENE	186	SI	MCGUIRE FISHING ACCESS ROAD	0.24	NNW
161	OR	SAM FURR ROAD & HWY 21	4.70	E	187	SI	ENERGY EXPLORIUM / AIR SITE # 195	0.19	N
162	OR	RANSON ROAD	4.53	ESE	191	SI	PENINSULA DEVELOPMENT	2.84	NNE
163	OR	MCCOY ROAD	4.94	SE					

* GPS data reflect approximate accuracy to within 2-5 meters. GPS field measurements were taken as close as possible to the item of interest.

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)
H-3	20,000[(a),(b)]				
Mn-54	1,000		30,000		
Fe-59	400		10,000		
Co-58	1,000		30,000		
Co-60	300		10,000		
Zn-65	300		20,000		
Zr-Nb-95	400				
I-131	2	0.9		3	100
Cs-134	30	10	1,000	60	1,000
Cs-137	50	20	2,000	70	2,000
Ba-La-140	200			300	

(a) If no drinking water pathway exists, a value of 30,000 pCi/liter may be used.
(b) H-3 Reporting level not applicable to surface water

TABLE 2.2-B

REMP ANALYSIS FREQUENCY

Sample Medium	Analysis Schedule	Gamma Isotopic	Tritium	Low Level I-131	Gross Beta	TLD
Air Radioiodine	Weekly	X				
Air	Weekly	X			X	
Direct Radiation	Quarterly					X
Surface Water	Monthly Composite	X				
	Quarterly Composite		X			
Drinking Water	Monthly Composite	X		(a)	X	
	Quarterly Composite		X			
Shoreline Sediment	Semiannually	X				
Milk	Semimonthly	X		X		
Fish	Semiannually	X				
Broadleaf Vegetation	Monthly[(b)]	X				
Food Products	Monthly[(b)]	X				

(a) Low-level I-131 analysis will be performed if the dose calculated for the consumption of drinking water is > 1 mrem per year. An LLD of 1 pCi/liter will be required for this analysis.
(b) When Available

TABLE 2.2-C

MAXIMUM VALUES FOR THE LOWER LIMITS OF DETECTION

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	0.01				
H-3	2000 [a]					
Mn-54	15		130			
Fe-59	30		260			
Co-58, 60	15		130			
Zn-65	30		260			
Zr-Nb-95	15					
I-131	1 [b]	0.07		1	60	
Cs-134	15	0.05	130	15	60	150
Cs-137	18	0.06	150	18	80	180
Ba-La-140	15			15		

(a) If no drinking water pathway exists, a value of 3000 pCi/liter may be used.
(b) If no drinking water pathway exists, the LLD of gamma isotopic analysis may be used.

3.0 INTERPRETATION OF RESULTS

Review of 2010 REMP analysis results was performed to detect and identify changes in environmental levels as a result of station operation. The radionuclides with Selected Licensee Commitments reporting levels that indicate consistent detectable activity have been historically trended from preoperation to present. Analyses from 1977 - 1978 have been excluded since these results were much higher than the other preoperational years due to outside influences such as weapons testing. The preoperational analyses from 1981 were combined with the operational analyses from the latter part of 1981 and averaged to give one concentration for each radionuclide for that year.

The highest annual mean concentration of applicable Selected Licensee Commitments radionuclides from the indicator locations for each media type was used for trending purposes. Trending was performed by comparing annual mean concentrations to historical results. Factors evaluated include the frequency of detection and the concentration in terms of the percent of the radionuclide's SLC reporting level (Table 2.2-A). All maximum percent of reporting level values were well below the 100% action level. The highest value reached during 2010 was 3.60% for drinking water tritium at the North Mecklenburg Water Treatment Facility (Location 101). Only Selected Licensee Commitments radionuclides were detected in 2010.

Changes in sample location, analytical technique, and presentation of results must be considered when reviewing for trends. Calculation of the annual mean concentrations has been performed differently over the history of the REMP. During 1979-1986, all net results (sample minus background) positive and negative, were included in the calculation of the mean. Only positive net activity results were used to calculate the mean for the other years. All negative values were replaced with a zero for calculational and graphical purposes to properly represent environmental conditions. A change in gamma spectroscopy analysis systems in 1987 ended a period when many measurements yielded detectable low-level activity for both indicator and control location samples. It is possible that the method the previous system used to estimate net activity may have been vulnerable to false-positive results.

This section includes tables and graphs containing the highest annual mean concentrations of any effluent related radionuclide detected since the change in analysis systems in 1987. Any zero concentrations used in tables or graphs represent activity measurements less than detectable levels. Only the specific radionuclides that represent the highest dose contributors or demonstrate consistent detectable activity are shown graphically.

Data presented in Sections 3.1 through 3.9 support the conclusion that there was no significant increase in radioactivity in the environment around McGuire Nuclear Station due to station operations in 2010. Similarly, there was no significant increase in ambient background radiation levels in the surrounding areas. The 2010 land use census data, shown in Section 3.10, indicates that no program changes are required as a result of the census.

3.1 AIRBORNE RADIOIODINE AND PARTICULATES

In 2010, 371 particulate and radioiodine samples were analyzed, 318 at six indicator locations and 53 at the control location. Particulate samples were analyzed weekly for gamma and gross beta. Radioiodine samples received a weekly gamma analysis.

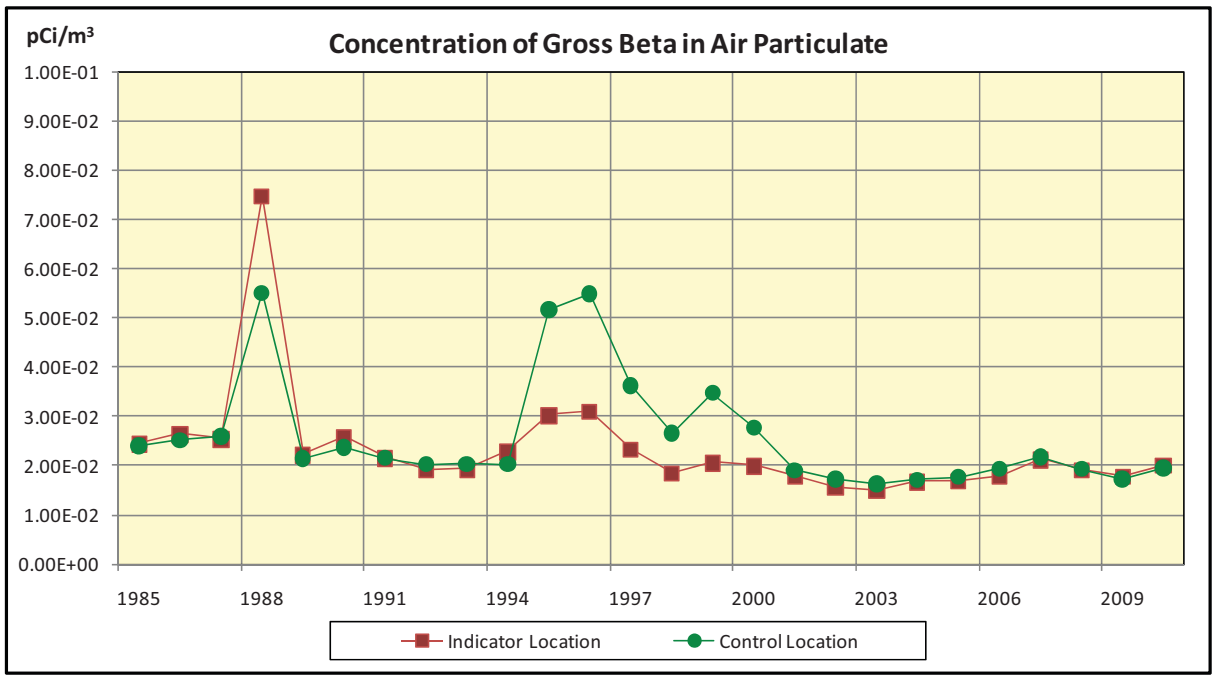
Gross beta analyses indicated 2.01E-2 pCi/m^3 at the location with the highest annual mean and 1.95E-2 pCi/m^3 at the control location. The control location was relocated during 2008 (reference 6.14). Detectable gamma emitting particulate activity (Co-58) was last observed in environmental air particulate samples in 2004 (reference 6.15).

No detectable I-131 activity in any environmental air radioiodine samples was found in 2010. K-40 and Be-7 that occur naturally were routinely detected in charcoal cartridges collected during the year. Cs-137 activity was not detected on any cartridges in 2010. Cs-137 detection on the charcoal cartridge was determined in 1990 to be an active constituent of the charcoal. A similar study was performed in 2001 again yielding this conclusion. Therefore, any Cs-137 activities were not used in any dose calculations in Section 4.0 of this report.

Figure 3.1 shows gross beta highest annual mean indicator and control location concentrations since 1985. There is no reporting level for gross beta. Table 3.1-A shows indicator and control location highest annual means for Cs-137 and gross beta.

Table 3.1-B gives indicator location highest annual means and control means since 1979 for I-131. Preoperational and ten year averages are also shown. No I-131 activity has been detected since 1989. Since no activity was detected in 2010, no reporting levels were approached.

Figure 3.1



There is no reporting level for Gross Beta in air particulate

Table 3.1-A Mean Concentrations of Radionuclides in Air Particulate

YEAR	Cs-137 Indicator (pCi/m^3)	Cs-137 Control (pCi/m^3)	Beta Indicator (pCi/m^3)	Beta Control (pCi/m^3)
1979*	4.40E-3	1.47E-3	**	**
1980*	6.70E-3	4.53E-3	**	**
1981*	6.16E-3	5.32E-3	**	**
1982*	3.82E-3	2.29E-3	**	**
1983*	2.93E-3	3.21E-3	**	**
1984	1.74E-3	8.29E-4	**	**
1985	1.86E-3	1.32E-3	2.44E-2	2.40E-2
1986	4.98E-3	3.03E-3	2.64E-2	2.52E-2
1987	1.07E-2	7.91E-3	2.54E-2	2.59E-2
1988	0.00E0	0.00E0	7.49E-2	5.51E-2
1989	0.00E0	0.00E0	2.22E-2	2.14E-2
1990	0.00E0	0.00E0	2.58E-2	2.37E-2
1991	0.00E0	0.00E0	2.16E-2	2.15E-2
1992	0.00E0	0.00E0	1.92E-2	2.02E-2
1993	0.00E0	0.00E0	1.93E-2	2.04E-2
1994	0.00E0	0.00E0	2.28E-2	2.02E-2
1995	0.00E0	0.00E0	3.02E-2	5.17E-2
1996	0.00E0	0.00E0	3.11E-2	5.49E-2
1997	0.00E0	0.00E0	2.34E-2	3.62E-2
1998	0.00E0	0.00E0	1.86E-2	2.66E-2
1999	0.00E0	0.00E0	2.06E-2	3.47E-2
2000	0.00E0	0.00E0	2.00E-2	2.77E-2
2001	0.00E0	0.00E0	1.79E-2	1.91E-2

Table 3.1-A continued

YEAR	Cs-137 Indicator (pCi/m^3)	Cs-137 Control (pCi/m^3)	Beta Indicator (pCi/m^3)	Beta Control (pCi/m^3)
2002	0.00E0	0.00E0	1.57E-2	1.72E-2
2003	0.00E0	0.00E0	1.50E-2	1.63E-2
2004	0.00E0	0.00E0	1.67E-2	1.71E-2
2005	0.00E0	0.00E0	1.68E-2	1.77E-2
2006	0.00E0	0.00E0	1.79E-2	1.94E-2
2007	0.00E0	0.00E0	2.12E-2	2.18E-2
2008	0.00E0	0.00E0	1.92E-2	1.93E-2
2009	0.00E0	0.00E0	1.79E-2	1.76E-2
Average (2000 – 2009)	NOT APPLICABLE	NOT APPLICABLE	1.78E-2	1.93E-2
2010	0.00E0	0.00E0	2.01E-2	1.95E-2

0.00E0 = no detectable measurements * Radioiodine and Particulates analyzed together ** Gross Beta analysis not performed

Table 3.1-B Mean Concentrations of Air Radioiodine (I-131)

Year	Indicator Location (pCi/m^3)	Control Location (pCi/m^3)
1979*	3.28E-3	1.04E-3
1980*	2.01E-3	1.10E-3
1981*	4.17E-3	6.27E-4
1982*	1.42E-3	2.48E-3
1983*	1.99E-3	2.01E-4
1984	3.17E-3	0.00E0
1985	3.15E-3	1.04E-3
1986	1.27E-2	6.10E-3
1987	1.07E-2	6.60E-3
1988	0.00E0	0.00E0
1989	2.18E-2	0.00E0
1990	0.00E0	0.00E0
1991	0.00E0	0.00E0
1992	0.00E0	0.00E0
1993	0.00E0	0.00E0
1994	0.00E0	0.00E0
1995	0.00E0	0.00E0
1996	0.00E0	0.00E0
1997	0.00E0	0.00E0
1998	0.00E0	0.00E0
1999	0.00E0	0.00E0
2000	0.00E0	0.00E0
2001	0.00E0	0.00E0
2002	0.00E0	0.00E0
2003	0.00E0	0.00E0
2004	0.00E0	0.00E0
2005	0.00E0	0.00E0
2006	0.00E0	0.00E0
2007	0.00E0	0.00E0
2008	0.00E0	0.00E0
2009	0.00E0	0.00E0
2010	0.00E0	0.00E0

0.00E0 = no detectable measurements * Radioiodine and Particulate analyzed together.

3.2 DRINKING WATER

In 2010, 65 drinking water samples were analyzed for gross beta and gamma emitting radionuclides. Fifty-two samples were from the four indicator locations and 13 from the control location. Tritium (H-3) analyses were performed on 20 composite samples, 16 at indicator locations and four at the control location.

No detectable gamma activity was found in drinking water samples in 2010 and has not been detected since 1987. Gross beta analyses indicated 1.85 pCi/l at the location with the highest annual mean and 1.74 pCi/l at the control location. Tritium was detected in thirteen of the 16 indicator composite samples taken in 2010 with the highest annual mean resulting in only 3.60% of the reporting level. Tritium was detected in one of the four control location samples. The dose for consumption of water was less than one mrem per year, historically and for 2010; therefore low-level iodine analysis is not required.

Figure 3.2 shows tritium highest annual mean indicator and control location concentrations with comparisons to 20% of the reporting level. Table 3.2 gives indicator location highest annual means and control means since 1979 for tritium and gross beta. There is no reporting level for gross beta.

Drinking water Location 101 was added to the sampling program in 1999. Figure 3.2 shows an increase beginning in that year. There was an increase in tritium releases in 2006 due to silica removal from the spent fuel pools. This resulted in additional water volume being released from the plant. An extreme drought during the second half of 2007 and much of 2008 affecting the Catawba River Basin resulted in less dilution volume available in Lake Norman.

Figure 3.2

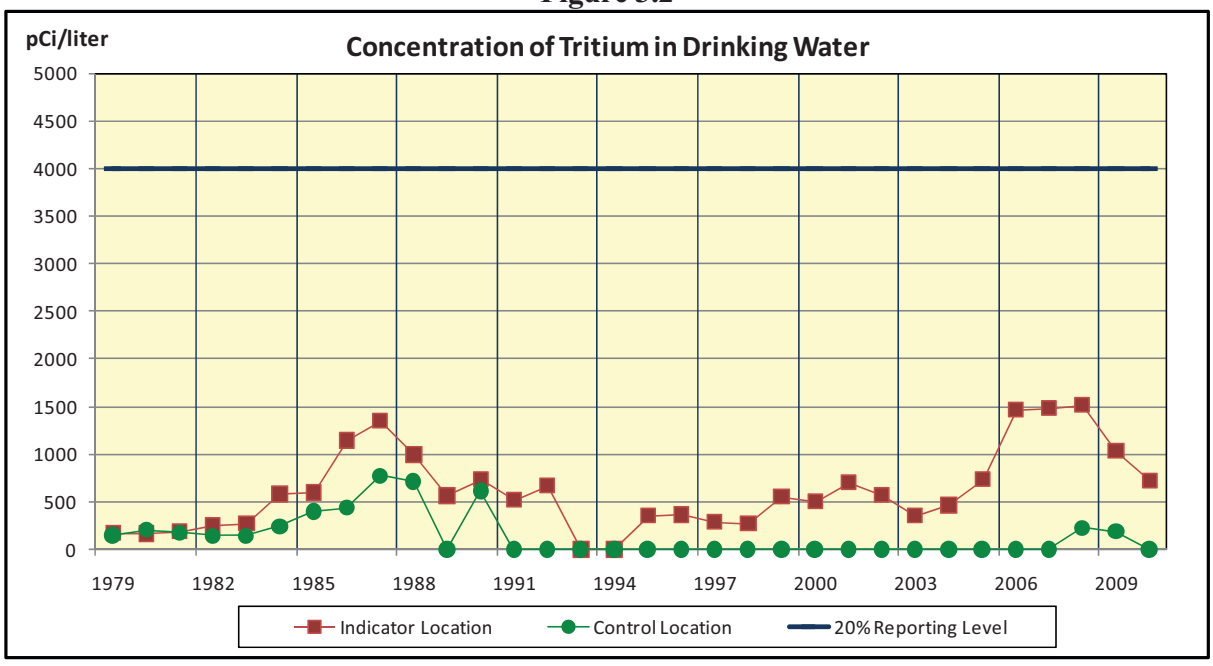


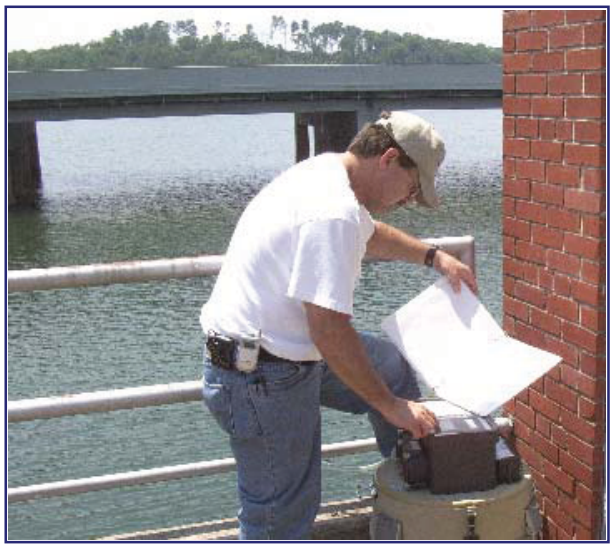
Table 3.2 Mean Concentrations of Radionuclides in Drinking Water

YEAR	Gross Beta (pCi/l)		Tritium (pCi/l)	
	Indicator Location	Control Location	Indicator Location	Control Location
1979	2.40E0	2.03E0	1.65E2	1.50E2
1980	2.34E0	1.87E0	1.63E2	2.05E2
1981	2.79E0	2.41E0	1.88E2	1.78E2
1982	2.62E0	2.43E0	2.43E2	1.45E2
1983	1.80E0	1.87E0	2.65E2	1.45E2
1984	2.78E0	1.81E0	5.77E2	2.45E2
1985	1.88E0	1.90E0	5.93E2	4.00E2
1986	2.13E0	2.15E0	1.14E3	4.37E2
1987	2.30E0	2.00E0	1.35E3	7.75E2
1988	2.00E0	2.00E0	9.92E2	7.11E2
1989	2.80E0	2.70E0	5.62E2	0.00E0
1990	3.70E0	4.30E0	7.32E2	6.11E2
1991	2.40E0	2.50E0	5.22E2	0.00E0
1992	2.00E0	1.70E0	6.73E2	0.00E0
1993	2.80E0	2.40E0	0.00E0	0.00E0
1994	2.47E0	2.90E0	0.00E0	0.00E0
1995	4.20E0	3.30E0	3.58E2	0.00E0
1996	2.75E0	2.11E0	3.60E2	0.00E0
1997	2.70E0	2.24E0	2.90E2	0.00E0
1998	2.75E0	2.33E0	2.68E2	0.00E0
1999	2.48E0	2.17E0	5.49E2	0.00E0
2000	2.66E0	1.99E0	5.04E2	0.00E0
2001	2.48E0	2.19E0	6.98E2	0.00E0
2002	2.47E0	2.08E0	5.64E2	0.00E0
2003	1.81E0	1.52E0	3.51E2	0.00E0
2004	1.68E0	1.29E0	4.61E2	0.00E0
2005	1.74E0	1.30E0	7.35E2	0.00E0
2006	1.75E0	1.80E0	1.46E3	0.00E0
2007	1.81E0	1.76E0	1.48E3	0.00E0
2008	2.40E0	1.87E0	1.52E3	2.26E2
2009	1.90E0	1.81E0	1.03E3	1.86E2
2010	1.85E0	1.74E0	7.20E2	0.00E0

0.00E0 = no detectable measurements

3.3 SURFACE WATER

In 2010, 39 surface water samples were analyzed for gamma emitting radionuclides, 26 at the two indicator locations and 13 at the control location. Analyses for H-3 were performed on 12 samples, eight at indicator locations and four at the control location.



No detectable gamma activity was found in surface water samples in 2010 and has not been detected since 1988. Tritium was detected in all of the eight indicator composite samples taken in 2010. Tritium was not detected in any of the four control location composite samples in 2010.

Figure 3.3 shows tritium highest annual mean indicator and control location concentrations. Table 3.3 gives indicator and control location highest annual means since 1979 for tritium.

There was an increase in surface water tritium in 2006 due to silica removal from the spent fuel pools. This resulted in additional water volume being released from the plant. An extreme drought during the second half of 2007 and much of 2008 affecting the Catawba River Basin resulted in less dilution volume available in Lake Norman.

Figure 3.3

There is no reporting level for tritium in surface water

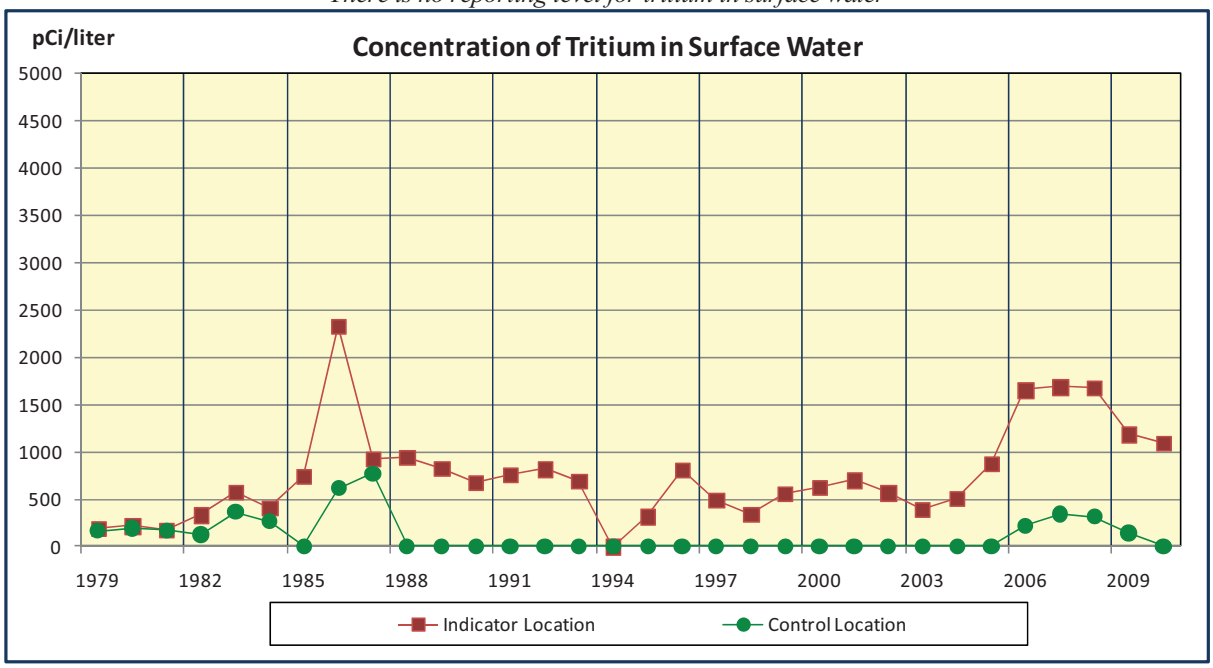


Table 3.3 Mean Concentrations of Tritium in Surface Water

YEAR	H-3 Indicator (pCi/l)	H-3 Control (pCi/l)
1979	1.85E2	1.66E2
1980	2.13E2	1.93E2
1981	1.75E2	1.70E2
1982	3.30E2	1.23E2
1983	5.75E2	3.67E2
1984	4.10E2	2.65E2
1985	7.33E2	0.00E0
1986	2.33E3	6.13E2
1987	9.20E2	7.70E2
1988	9.40E2	0.00E0
1989	8.22E2	0.00E0
1990	6.77E2	0.00E0
1991	7.53E2	0.00E0
1992	8.13E2	0.00E0
1993	6.85E2	0.00E0
1994	0.00E0	0.00E0
1995	3.15E2	0.00E0
1996	8.08E2	0.00E0
1997	4.85E2	0.00E0
1998	3.40E2	0.00E0
1999	5.60E2	0.00E0
2000	6.22E2	0.00E0
2001	6.98E2	0.00E0
2002	5.65E2	0.00E0
2003	3.91E2	0.00E0
2004	5.04E2	0.00E0
2005	8.74E2	0.00E0
2006	1.65E3	2.19E2
2007	1.68E3	3.42E2
2008	1.67E3	3.13E2
2009	1.18E3	1.41E2
2010	1.09E3	0.00E0

0.00E0 = no detectable measurements

3.4 MILK

In 2010, 26 milk samples were analyzed for low level I-131 and other gamma emitting radionuclides. One control location was sampled. No indicator dairies were identified by the 2010 land use census.

No detectable activity was found in milk samples in 2010 other than naturally-occurring K-40. Cs-137 has not been detected in milk samples since 1990 and all other radionuclides have not been detected since 1987.

Table 3.4 gives indicator location highest annual means and control means since 1979 for Cs-137. Since no activity was detected in 2010, no reporting levels were approached.

Table 3.4 Mean Concentrations of Cs-137 in Milk

YEAR	Cs-137 Indicator (pCi/l)	Cs-137 Control (pCi/l)
1979	2.48E1	6.04E0
1980	1.72E1	4.13E0
1981	2.04E1	4.15E0
1982	1.21E1	5.20E0
1983	2.01E1	2.82E0
1984	1.48E1	2.56E0
1985	1.42E1	2.72E0
1986	3.74E0	3.45E0
1987	5.20E0	8.60E0
1988	3.40E0	2.90E0
1989	6.00E0	5.60E0
1990	5.30E0	2.60E0
1991	0.00E0	0.00E0
1992	0.00E0	0.00E0
1993	0.00E0	0.00E0
1994	0.00E0	0.00E0
1995	0.00E0	0.00E0
1996	0.00E0	0.00E0
1997	0.00E0	0.00E0
1998	0.00E0	0.00E0
1999	0.00E0	0.00E0
2000	0.00E0	0.00E0
2001	0.00E0	0.00E0
2002	0.00E0	0.00E0
2003	0.00E0	0.00E0
2004	0.00E0	0.00E0
2005	0.00E0	0.00E0
2006	0.00E0	0.00E0
2007	0.00E0	0.00E0
2008	0.00E0	0.00E0
2009	0.00E0	0.00E0
2010	0.00E0	0.00E0

0.00E0 = no detectable measurements

3.5 BROADLEAF VEGETATION

In 2010, 48 broadleaf vegetation samples were analyzed, 36 at the three indicator locations and twelve at the control location.

The control location was relocated during 2008 (reference 6.14). There were no gamma emitting radionuclides identified in any indicator location or control location broadleaf vegetation samples during 2010.

No airborne Cs-137 has been released from the plant since 1998. Cs-137 attributable to past nuclear weapons testing is known to exist in many environmental media at low and highly variable levels.

Table 3.5 gives indicator and control location highest annual means since 1979 for Cs-137. Since no activity was detected in 2010, no reporting levels were approached.

Table 3.5 Mean Concentrations of Cs-137 in Broadleaf Vegetation

YEAR	Cs-137 Indicator (pCi/kg)	Cs-137 Control (pCi/kg)
1979	2.19E1	1.93E1
1980	2.30E1	1.92E1
1981	3.04E1	2.02E1
1982	2.46E1	1.22E1
1983	9.07E0	7.85E0
1984	1.02E1	1.05E1
1985	8.05E0	2.37E-2
1986	4.03E1	1.27E1
1987	2.20E1	1.70E1
1988	3.90E1	3.40E1
1989	9.60E1	0.00E0
1990	4.00E1	0.00E0
1991	3.30E1	0.00E0
1992	4.90E1	0.00E0
1993	1.60E1	0.00E0
1994	0.00E0	0.00E0
1995	0.00E0	0.00E0
1996	0.00E0	0.00E0
1997	0.00E0	0.00E0
1998	0.00E0	2.69E1
1999	0.00E0	0.00E0
2000	0.00E0	0.00E0
2001	0.00E0	0.00E0
2002	0.00E0	0.00E0
2003	0.00E0	0.00E0
2004	0.00E0	0.00E0
2005	0.00E0	0.00E0
2006	2.98E1	0.00E0
2007	1.34E1	0.00E0
2008	0.00E0	0.00E0
2009	0.00E0	0.00E0
2010	0.00E0	0.00E0

0.00E0 = no detectable measurements

3.6 FOOD PRODUCTS

In 2010, 12 food products (crops) samples were analyzed, all at one indicator location. There is no control location for this media.

No detectable activity has been detected in this media since 1987. Table 3.6 shows Cs-137 indicator highest annual means with preoperational data. Since no activity was detected in 2010, no reporting levels were approached.

Table 3.6 Mean Concentrations of Cs-137 in Food Products

YEAR	Cs-137 Indicator (pCi/kg)
1979	2.19E1
1980	2.30E1
1981	3.04E1
1982	2.46E1
1983	9.07E0
1984	8.45E0
1985	7.99E0
1986	2.15E1
1987	2.90E1
1988	0.00E0
1989	0.00E0
1990	0.00E0
1991	0.00E0
1992	0.00E0
1993	0.00E0
1994	0.00E0
1995	0.00E0
1996	0.00E0
1997	0.00E0
1998	0.00E0
1999	0.00E0
2000	0.00E0
2001	0.00E0
2002	0.00E0
2003	0.00E0
2004	0.00E0
2005	0.00E0
2006	0.00E0
2007	0.00E0
2008	0.00E0
2009	0.00E0
2010	0.00E0

0.00E0 = no detectable measurements

3.7 FISH

In 2010, 12 fish samples were analyzed for gamma emitting radionuclides, six at the indicator location and six at the control location.

Figure 3.7-1 shows Cs-137 highest annual mean indicator and control location concentrations with comparisons to 5% of the reporting level. Figure 3.7-2 shows Co-60 highest annual mean indicator and control location concentrations also with comparisons to 5% of the reporting level. Table 3.7 gives indicator location highest annual means since 1980 for all radionuclides detected since the analysis change in 1988.

Co-58 activity was not detected in 2010 in any of the indicator or control samples. Cs-137 activity was detected in one of the six indicator samples taken at Location 129 with a mean concentration of 23.3 pCi/kg, which is 1.17% of the reporting level. Cs-137 was detected in one of the six control samples.

All other radionuclides not shown in the table have demonstrated no detectable activity since 1986.

Figure 3.7-1

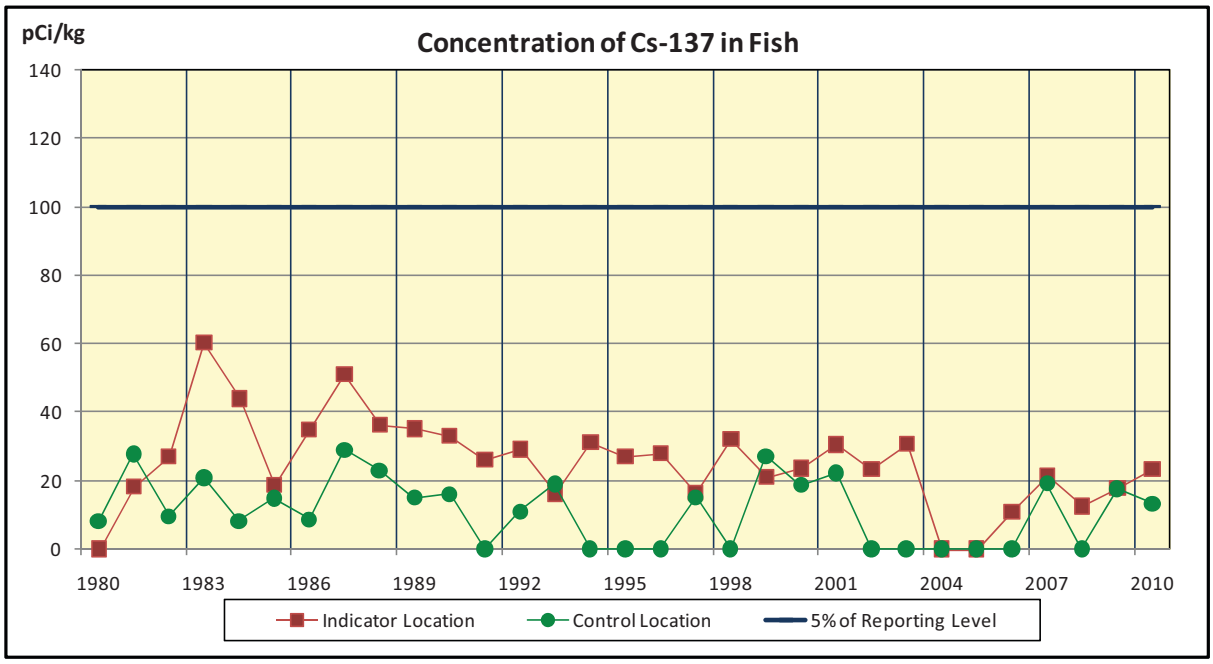


Figure 3.7-2

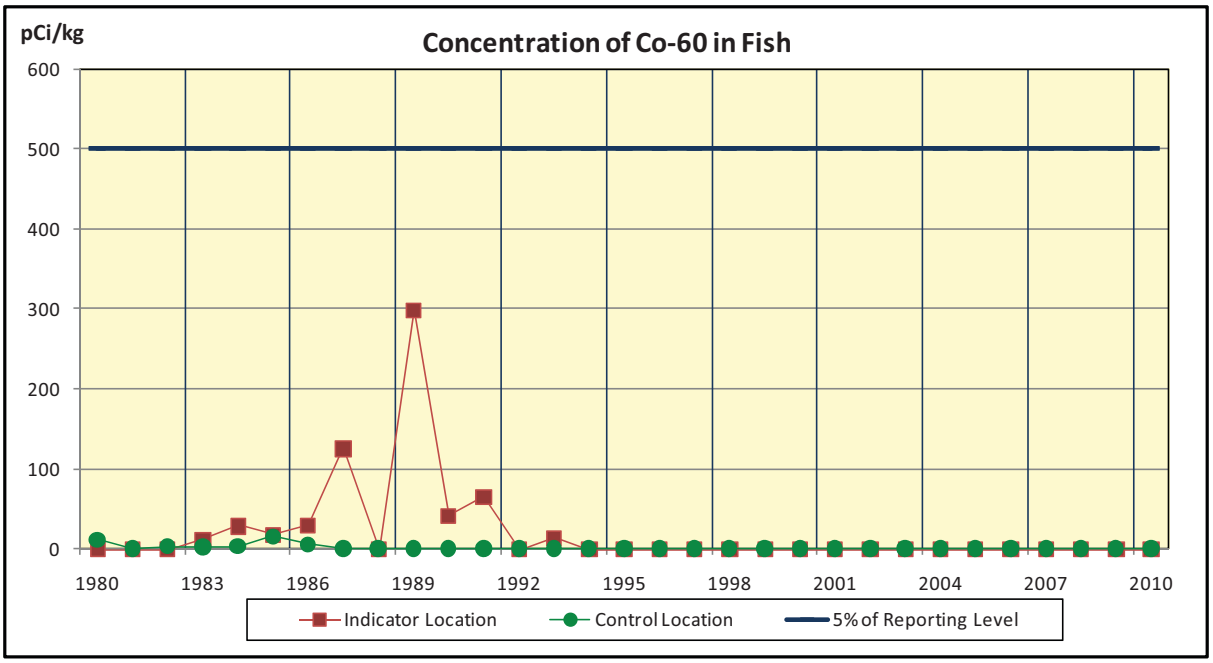


Table 3.7 Mean Concentrations of Radionuclides in Fish (pCi/kg)

YEAR	Mn-54 Indicator	Co-58 Indicator	Co-60 Indicator	Cs-134 Indicator	Cs-137 Indicator
1980	-1.97E1	8.36E0	-2.25E1	-2.70E1	-4.13E0
1981	-2.71E0	-2.98E0	-2.65E0	-1.99E0	1.80E1
1982	-3.83E0	8.16E0	-4.34E-1	-8.22E-1	2.69E1
1983	-2.60E0	2.60E1	1.11E1	-1.32E0	6.03E1
1984	3.61E0	1.45E2	2.82E1	3.11E1	4.38E1
1985	2.53E-1	7.19E0	1.72E1	-1.56E0	1.86E1
1986	1.03E0	3.17E1	2.96E1	1.67E1	3.49E1
1987	0.00E0	2.71E2	1.25E2	2.60E1	5.10E1
1988	1.20E1	7.70E1	0.00E0	2.70E1	3.60E1
1989	9.00E1	4.05E2	2.99E2	1.10E1	3.50E1
1990	0.00E0	5.60E1	4.10E1	0.00E0	3.30E1
1991	6.20E0	1.40E1	6.50E1	5.90E0	2.60E1
1992	0.00E0	0.00E0	0.00E0	0.00E0	2.90E1
1993	0.00E0	8.20E1	1.30E1	0.00E0	1.60E1
1994	0.00E0	0.00E0	0.00E0	0.00E0	3.10E1
1995	0.00E0	0.00E0	0.00E0	0.00E0	2.70E1
1996	0.00E0	0.00E0	0.00E0	0.00E0	2.78E1
1997	0.00E0	0.00E0	0.00E0	0.00E0	1.62E1
1998	0.00E0	0.00E0	0.00E0	0.00E0	3.21E1
1999	0.00E0	3.53E1	0.00E0	0.00E0	2.10E1
2000	0.00E0	4.28E1	0.00E0	0.00E0	2.34E1
2001	0.00E0	1.32E1	0.00E0	0.00E0	3.04E1
2002	0.00E0	0.00E0	0.00E0	0.00E0	2.33E1
2003	0.00E0	0.00E0	0.00E0	0.00E0	3.05E1
2004	0.00E0	0.00E0	0.00E0	0.00E0	0.00E0
2005	0.00E0	0.00E0	0.00E0	0.00E0	0.00E0
2006	0.00E0	0.00E0	0.00E0	0.00E0	1.08E1
2007	0.00E0	0.00E0	0.00E0	0.00E0	2.11E1
2008	0.00E0	0.00E0	0.00E0	0.00E0	1.24E1
2009	0.00E0	0.00E0	0.00E0	0.00E0	1.76E1
2010	0.00E0	0.00E0	0.00E0	0.00E0	2.33E1

0.00E0 = no detectable measurements

All negative values have been replaced with zeros for calculational purposes

3.8 SHORELINE SEDIMENT

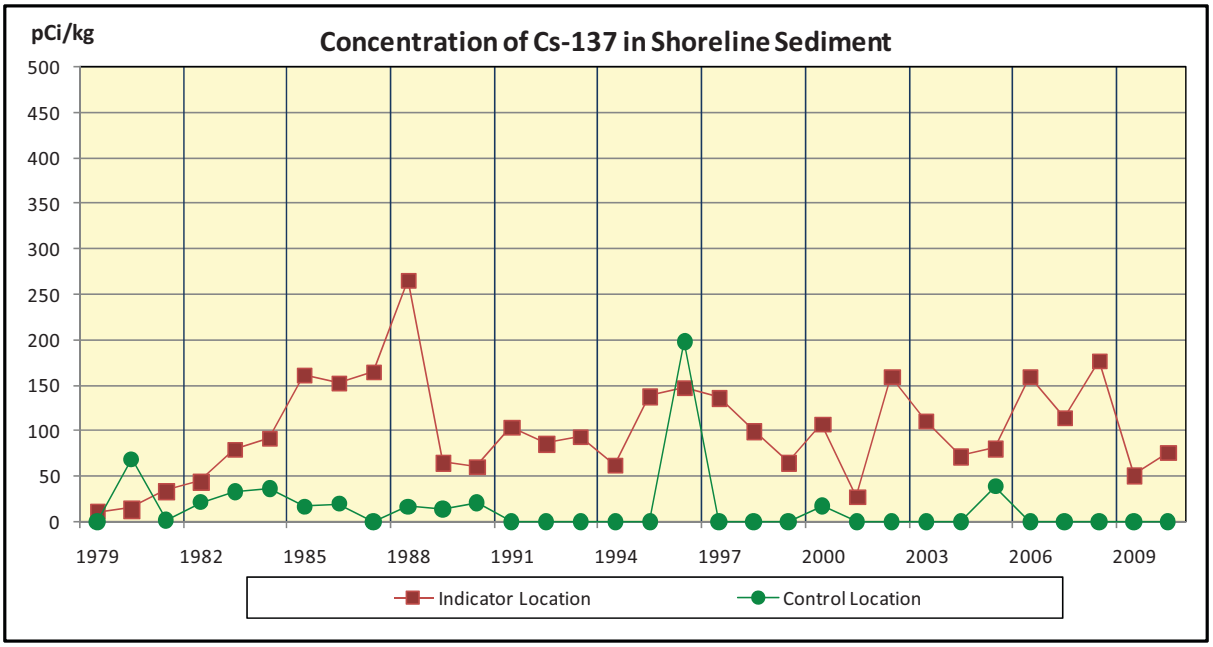
In 2010, six shoreline sediment samples were analyzed, four from two indicator locations and two at the control location.

Figure 3.8-1 shows Cs-137 highest annual mean indicator and control location concentrations since 1979. Figure 3.8-2 shows Co-60 highest annual mean indicator and control location concentrations since 1979.

Cs-137 activity was detected in two of the four indicator samples taken. The shoreline sediment location with the highest annual mean was Location 130 with a mean concentration of 75.8 pCi/kg. Cs-137 was not detected in any control location samples.

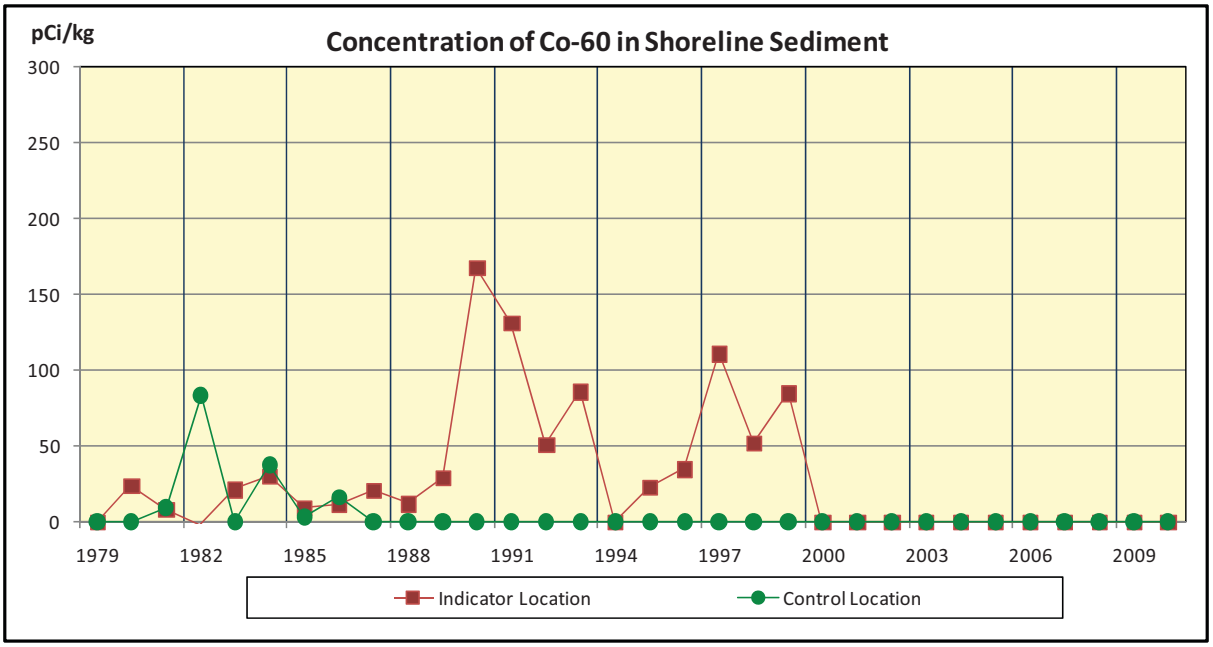
Table 3.8 gives indicator location highest annual means since 1979 for all radionuclides detected since the analysis change in 1988. There is no reporting level for shoreline sediment.

Figure 3.8-1



There is no reporting level for Cs-137 in shoreline sediment

Figure 3.8-2



There is no reporting level for Co-60 in shoreline sediment

Table 3.8 Mean Concentrations of Radionuclides in Shoreline Sediment (pCi/kg)

YEAR	Mn-54 Indicator	Co-58 Indicator	Co-60 Indicator	Cs-134 Indicator	Cs-137 Indicator
1979	-1.07E1	2.25E1	-6.50E0	0.00E0	1.20E1
1980	1.06E1	-8.74E0	2.36E1	-3.53E0	1.44E1
1981	2.13E1	1.20E1	8.21E0	3.97E1	3.36E1
1982	5.38E1	1.66E1	-1.69E0	7.67E1	4.40E1
1983	4.40E0	3.43E1	2.12E1	7.65E1	8.02E1
1984	1.19E1	7.11E1	3.04E1	3.34E1	9.13E1
1985	4.77E0	1.46E1	9.20E0	2.02E1	1.61E2
1986	1.37E1	1.02E1	1.16E1	6.35E1	1.53E2
1987	0.00E0	1.06E2	2.10E1	4.20E1	1.65E2
1988	6.50E0	9.20E1	1.20E1	9.10E0	2.66E2
1989	2.90E1	3.80E1	2.90E1	5.30E1	6.50E1
1990	3.80E1	2.70E1	1.68E2	0.00E0	6.10E1
1991	2.80E1	5.30E1	1.31E2	0.00E0	1.03E2
1992	9.40E0	0.00E0	5.10E1	9.20E0	8.60E1
1993	0.00E0	2.20E1	8.60E1	0.00E0	9.30E1
1994	4.10E1	0.00E0	0.00E0	0.00E0	8.00E1
1995	1.70E1	0.00E0	2.30E1	0.00E0	1.38E2
1996	2.90E1	1.78E1	3.50E1	0.00E0	1.47E2
1997	0.00E0	0.00E0	1.11E2	3.10E1	1.36E2
1998	0.00E0	0.00E0	5.21E1	0.00E0	9.97E1
1999	0.00E0	2.47E1	8.49E1	0.00E0	6.51E1
2000	0.00E0	3.04E1	0.00E0	0.00E0	1.08E2

Table 3.8 continued

YEAR	Mn-54 Indicator	Co-58 Indicator	Co-60 Indicator	Cs-134 Indicator	Cs-137 Indicator
2001	0.00E0	0.00E0	0.00E0	0.00E0	2.77E1
2002	2.24E1	0.00E0	0.00E0	0.00E0	1.59E2
2003	0.00E0	0.00E0	0.00E0	0.00E0	1.11E2
2004	0.00E0	0.00E0	0.00E0	0.00E0	7.17E1
2005	0.00E0	0.00E0	0.00E0	0.00E0	8.08E1
2006	0.00E0	0.00E0	0.00E0	0.00E0	1.59E2
2007	0.00E0	0.00E0	0.00E0	0.00E0	1.14E2
2008	0.00E0	0.00E0	0.00E0	0.00E0	1.77E2
2009	0.00E0	0.00E0	0.00E0	0.00E0	5.08E1
2010	0.00E0	0.00E0	0.00E0	0.00E0	7.58E1

3.9 DIRECT GAMMA RADIATION

3.9.1 ENVIRONMENTAL TLD

In 2010, 163 TLDs were analyzed, 159 at indicator locations, four at the control location. TLDs are collected and analyzed quarterly. The highest annual mean exposure for an indicator location was 108 milliroentgen. The annual mean exposure for the control location was 89.2 milliroentgen.

Figure 3.9-1 and Table 3.9-A show TLD inner ring (site boundary), outer ring (4-5 miles), and control location annual averages in milliroentgen per year. Preoperational data and ten year rolling averages are also given. As shown in the graph, inner and outer ring averages historically compare closely, with control data somewhat higher. Inner and outer ring averages comprise a number of data points with the control average representing only one location.

The control location has historically been higher than indicator locations. This is most likely an artifact of the underlying geologic structures at the control location. TLDs located greater than 5 miles from the plant demonstrate a wide range of background radiation levels. The control location is 15.5 miles WNW, well beyond the influence of the plant.

The calculated total body dose from gaseous effluents for 2010 was 2.96E-1 millirem, which is 0.45% of the average inner ring TLD values. Therefore, it can be concluded that discharges from the plant had very little impact on the measured TLD values.

A TLD intercomparison program is conducted as part of the quality assurance program. Results of this program are included in section 5.10.

Figures 3.9-2 and 3.9-3 show the TLD mean for each inner and outer ring TLD location from 1987 through 2010.

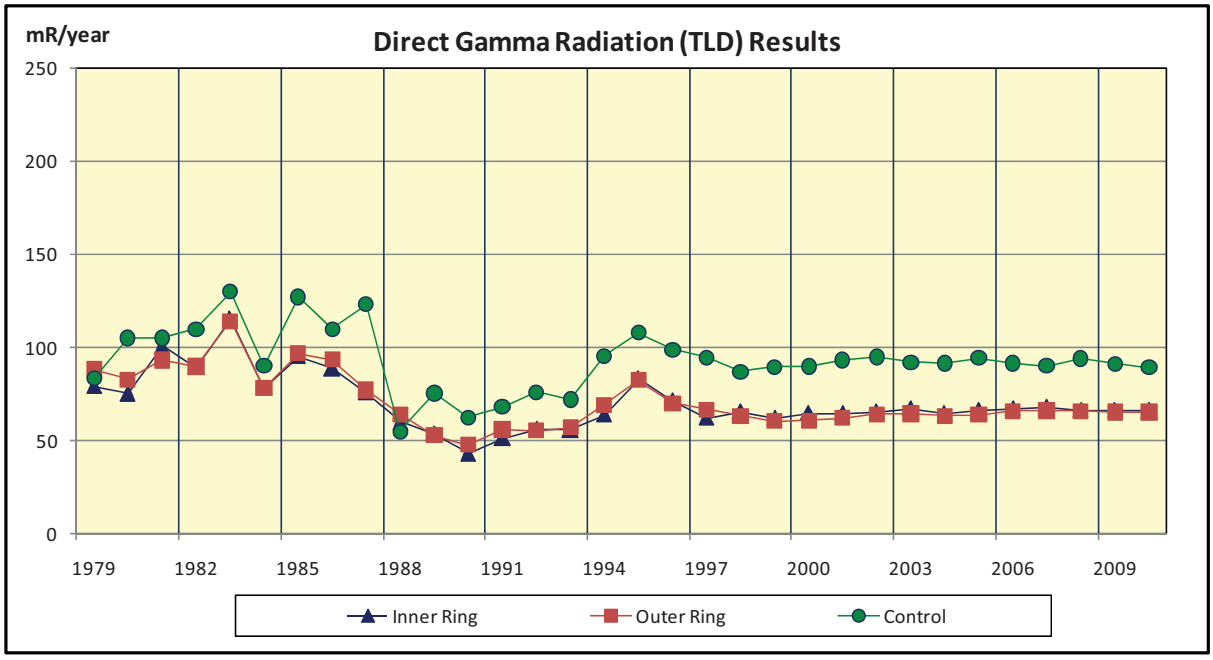
3.9.2 ISFSI

The McGuire ISFSI is located inside the protected area on the west side of the plant approximately 244 meters from plant centerline. The ISFSI protected area fence on the north side is approximately 60 meters from the owner control fence atop the berm adjacent to Lake Norman and just west of the intake structure. At a distance of 425 meters the ISFSI is closest to the Exclusion Area Boundary (EAB) on the west side along the Catawba River. The nearest resident to the ISFSI is just over a kilometer away in the east sector with the next closest resident at 1.1 kilometers in the WNW sector.

The ISFSI is situated in a slight depression in relationship to other structures inside the protected area. The ISFSI direct radiation to the north is shielded by the berm on the south boundary of Lake Norman. The EAB to the west of ISFSI is shielded from direct radiation by the drop in elevation from 754' at the ISFSI to the river bank below the Cowan's Ford Dam. These features lessen the dose impact to the public accessing the EAB west of ISFSI and the Lake Norman shoreline inside the EAB north of ISFSI.

There are 38 loaded casks currently in the ISFSI. There are no effluent releases from the fuel canisters stored inside the shielded casks to the environment. Doses measured by environmental TLDs show little or no change since the current TLD system was implemented.

Figure 3.9-1



There is no reporting level for Direct Radiation (TLD)

Table 3.9-A Direct Gamma Radiation (TLD) Results

YEAR	Inner Ring Average (mR/yr)	Outer Ring Average (mR/yr)	Control (mR/yr)
1979	7.91E1	8.82E1	8.32E1
1980	7.54E1*	8.29E1*	1.05E2
1981	1.01E2	9.31E1	1.05E2
1982	8.95E1	8.97E1	1.10E2
1983	1.16E2	1.14E2	1.30E2
1984	7.85E1	7.83E1	9.02E1
1985	9.54E1	9.69E1	1.27E2
1986	8.91E1	9.35E1	1.10E2
1987	7.58E1	7.71E1	1.23E2
1988	6.03E1	6.42E1	5.48E1
1989	5.37E1	5.30E1	7.55E1
1990	4.34E1	4.78E1	6.25E1
1991	5.14E1	5.59E1	6.80E1
1992	5.65E1	5.55E1	7.60E1
1993	5.61E1	5.71E1	7.20E1
1994	6.40E1	6.93E1	9.55E1
1995	8.36E1	8.25E1	1.08E2
1996	7.18E1	7.02E1	9.88E1
1997	6.22E1	6.68E1	9.45E1
1998	6.59E1	6.32E1	8.69E1
1999	6.23E1	6.05E1	8.96E1
2000	6.50E1	6.08E1	8.97E1
2001	6.51E1	6.22E1	9.33E1
2002	6.57E1	6.43E1	9.48E1
2003	6.74E1	6.45E1	9.20E1
2004	6.46E1	6.33E1	9.16E1
2005	6.62E1	6.34E1	9.44E1
2006	6.75E1	6.58E1	9.17E1
2007	6.84E1	6.60E1	9.00E1
2008	6.69E1	6.58E1	9.14E1
2009	6.67E1	6.53E1	9.12E1
Average (2000 – 2009)	6.64E1	6.41E1	9.20E1
2010	6.63E1	6.53E1	8.92E1

* Values are based on two quarters due to change in TLD locations.

Figure 3.9-2

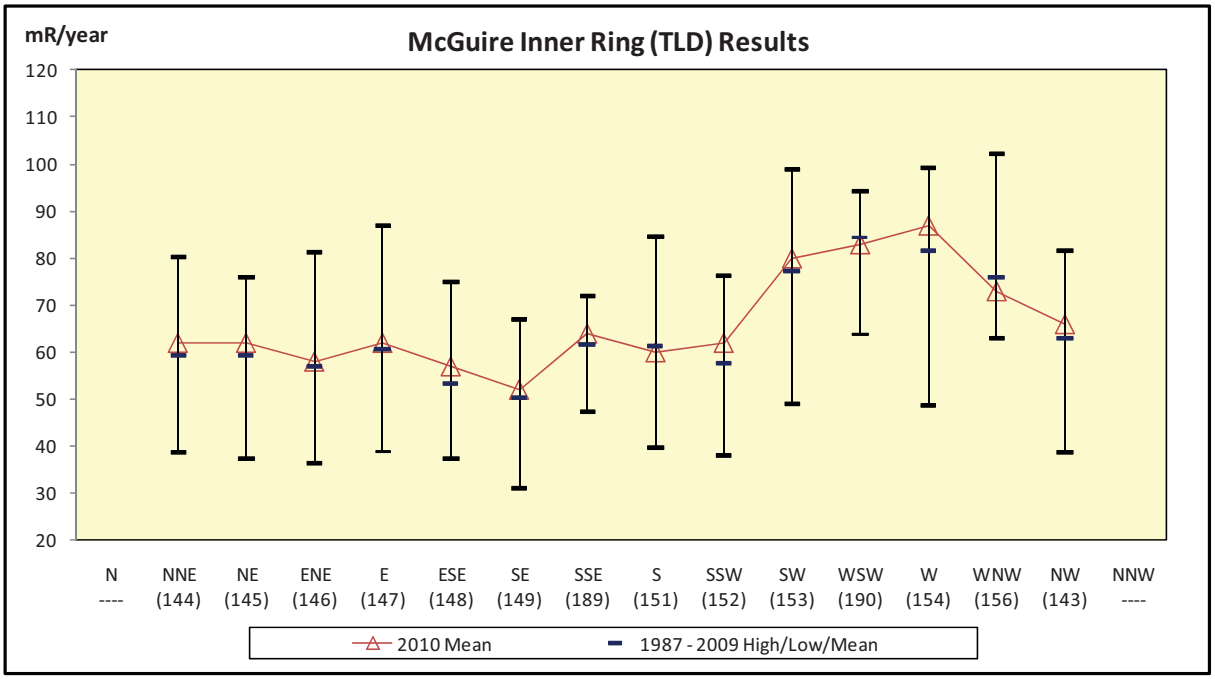


Table 3.9-B Direct Gamma Radiation (TLD) Results Inner Ring

Sector (Location)	1987 - 2009 Mean	1987 - 2009 Low	1987 - 2009 High	2010 Mean
NNE (144)	5.94E+01	3.88E+01	8.02E+01	6.20E+01
NE (145)	5.93E+01	3.75E+01	7.59E+01	6.20E+01
ENE (146)	5.72E+01	3.64E+01	8.13E+01	5.80E+01
E (147)	6.08E+01	3.89E+01	8.69E+01	6.20E+01
ESE (148)	5.34E+01	3.75E+01	7.50E+01	5.70E+01
SE (149)	5.06E+01	3.11E+01	6.70E+01	5.20E+01
SSE (189)	6.17E+01	4.73E+01	7.20E+01	6.40E+01
S (151)	6.15E+01	3.97E+01	8.45E+01	6.00E+01
SSW (152)	5.77E+01	3.80E+01	7.64E+01	6.20E+01
SW (153)	7.73E+01	4.89E+01	9.89E+01	8.00E+01
WSW (190)	8.45E+01	6.38E+01	9.41E+01	8.30E+01
W (154)	8.16E+01	4.88E+01	9.93E+01	8.70E+01
WNW (156)	7.59E+01	6.31E+01	1.02E+02	7.30E+01
NW (143)	6.31E+01	3.87E+01	8.15E+01	6.60E+01
NNE (144)	5.94E+01	3.88E+01	8.02E+01	6.20E+01
NE (145)	5.93E+01	3.75E+01	7.59E+01	6.20E+01

Figure 3.9-3

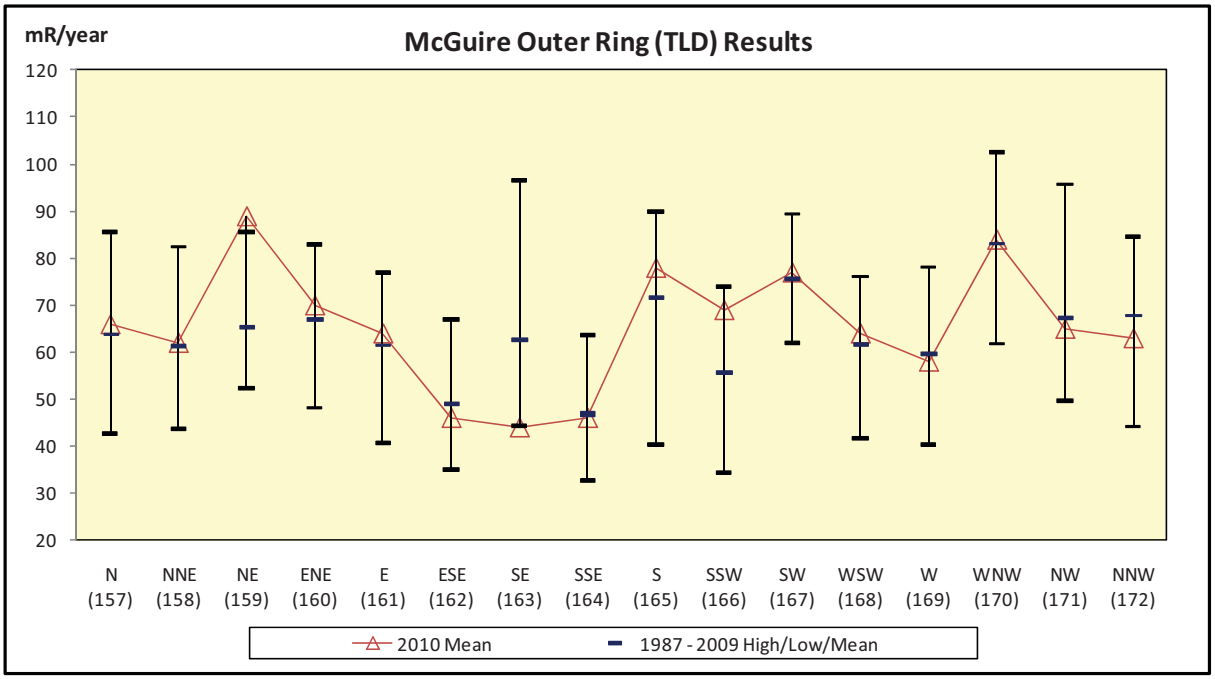


Table 3.9-C Direct Gamma Radiation (TLD) Results Outer Ring

Sector (Location)	1987 - 2009 Mean	1987 - 2009 Low	1987 - 2009 High	2010 Mean
N (157)	6.38E+01	4.27E+01	8.56E+01	6.60E+01
NNE (158)	6.14E+01	4.37E+01	8.24E+01	6.20E+01
NE (159)	6.54E+01	5.23E+01	8.57E+01	8.90E+01
ENE (160)	6.70E+01	4.82E+01	8.29E+01	7.00E+01
E (161)	6.15E+01	4.07E+01	7.68E+01	6.40E+01
ESE (162)	4.89E+01	3.50E+01	6.70E+01	4.60E+01
SE (163)	6.25E+01	4.43E+01	9.64E+01	4.40E+01
SSE (164)	4.69E+01	3.26E+01	6.37E+01	4.60E+01
S (165)	7.15E+01	4.05E+01	9.00E+01	7.80E+01
SSW (166)	5.56E+01	3.43E+01	7.38E+01	6.90E+01
SW (167)	7.56E+01	6.20E+01	8.94E+01	7.70E+01
WSW (168)	6.17E+01	4.17E+01	7.61E+01	6.40E+01
W (169)	5.96E+01	4.04E+01	7.81E+01	5.80E+01
WNW (170)	8.31E+01	6.18E+01	1.03E+02	8.40E+01
NW (171)	6.73E+01	4.98E+01	9.57E+01	6.50E+01
NNW (172)	6.78E+01	4.42E+01	8.46E+01	6.30E+01

3.10 LAND USE CENSUS

The land use census was conducted May 19, 2010 as required by SLC 16.11.14. Table 3.10 summarizes census results. A map indicating identified locations is shown in Figure 3.10.

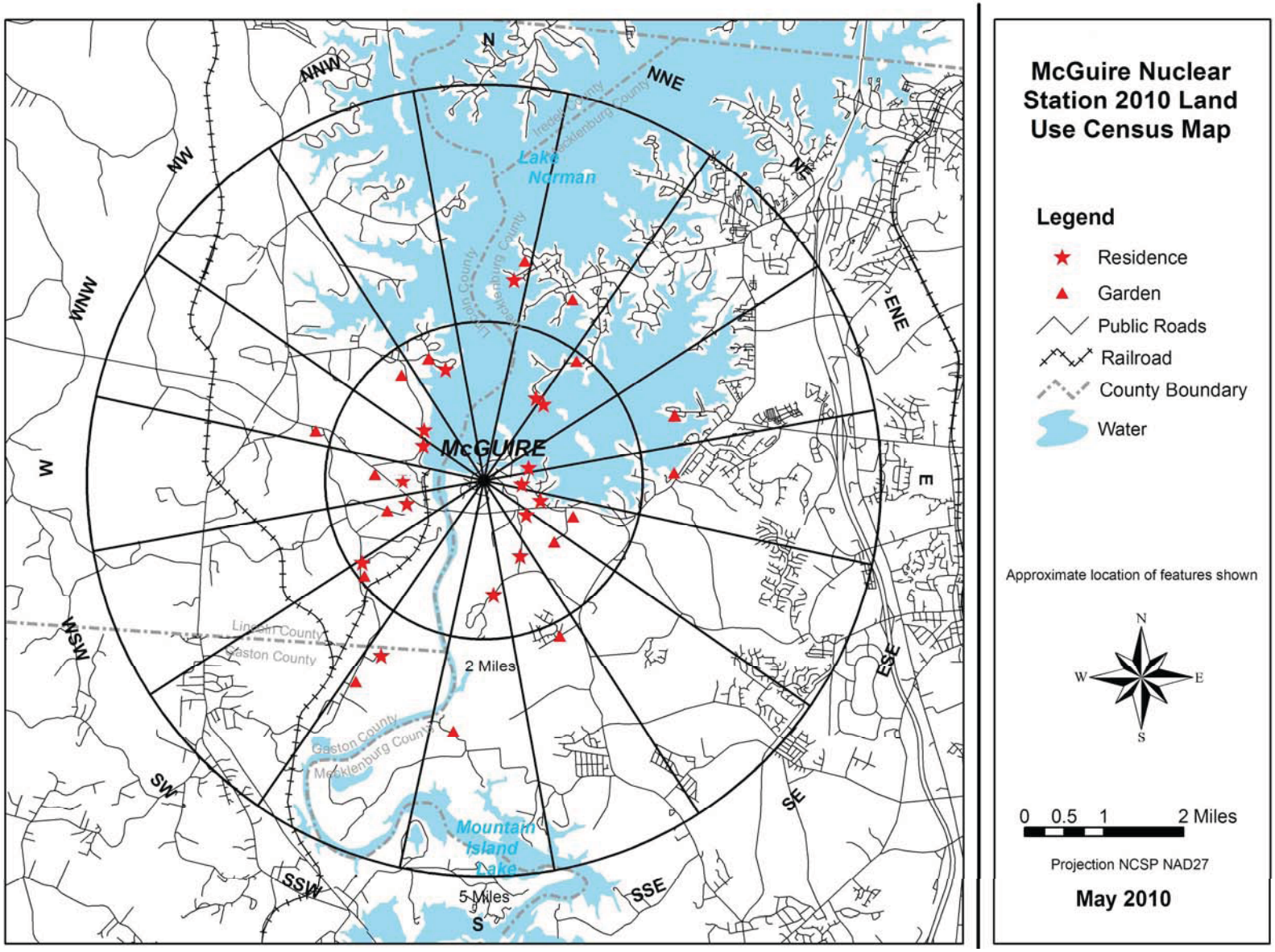
During the 2010 census, no new residences (nearer to the plant), irrigated gardens (superior to existing gardens) or milk locations were identified. The nearest residence is located in the East sector at 0.48 miles. No environmental program changes were required as a result of the 2010 land use census.

Table 3.10 McGuire 2010 Land Use Census Results

Sector		Distance (Miles)	Sector		Distance (Miles)
N	Nearest Residence	2.53	S	Nearest Residence	1.45
	Nearest Garden (irrigated)	2.79		Nearest Garden	3.19
	Nearest Milk Animal	-		Nearest Milk Animal	-
NNE	Nearest Residence	1.23	SSW	Nearest Residence	2.56
	Nearest Garden (irrigated)	2.53		Nearest Garden	2.94
	Nearest Milk Animal	-		Nearest Milk Animal	-
NE	Nearest Residence	1.21	SW	Nearest Residence	1.85
	Nearest Garden	1.80		Nearest Garden	1.98
	Nearest Milk Animal	-		Nearest Milk Animal	-
ENE	Nearest Residence	0.57	WSW	Nearest Residence	1.01
	Nearest Garden	2.54		Nearest Garden	1.33
	Nearest Milk Animal	-		Nearest Milk Animal	-
E	Nearest Residence	0.48	W	Nearest Residence	1.15
	Nearest Garden	2.10		Nearest Garden	1.23
	Nearest Milk Animal	-		Nearest Milk Animal	-
ESE	Nearest Residence	0.65	WNW	Nearest Residence	0.88
	Nearest Garden	1.23		Nearest Garden	2.15
	Nearest Milk Animal	-		Nearest Milk Animal	-
SE	Nearest Residence	0.67	NW	Nearest Residence	0.95
	Nearest Garden	1.18		Nearest Garden	1.68
	Nearest Milk Animal	-		Nearest Milk Animal	-
SSE	Nearest Residence	1.06	NNW	Nearest Residence	1.48
	Nearest Garden	2.18		Nearest Garden (irrigated)	1.69
	Nearest Milk Animal	-		Nearest Milk Animal	-

"-" indicates no occurrences within the 5 mile radius

Figure 3.10


N
NNW
NNE
NW
NE
WNW
ENE
W
E
WSW
ESE
SW
SE
SSW
SSE
S
McGUIRE
Lake Norman
Mountain Island Lake
2 Miles
5 Miles
Lincoln County
Gaston County
Mecklenburg County
McGuire Nuclear Station 2010 Land Use Census Map
Legend
Residence
Garden
Public Roads
Railroad
County Boundary
Water
Approximate location of features shown
0 0.5 1 2 Miles
Projection NCSP NAD27
May 2010

4.0 EVALUATION OF DOSE

4.1 DOSE FROM ENVIRONMENTAL MEASUREMENTS

Annual doses to maximum exposed individuals were estimated based on measured concentrations of radionuclides in 2010 MNS REMP samples. The primary purpose of estimating doses based on sample results is to allow comparison to effluent program dose estimates.

Doses based on sample results were calculated using the methodology and data presented in NRC Regulatory Guide 1.109. Measured radionuclide concentrations, averaged over the entire year for a specific radionuclide, indicator location and sample type, were used to calculate REMP-based doses. Where applicable, average background concentration at the corresponding control location was subtracted. Regulatory Guide 1.109 consumption rates for the maximum exposed individual were used in the calculations. When the guide listed "NO DATA" as the dose factor for a given radionuclide and organ, a dose factor of zero was assumed.

Maximum dose estimates (Highest Annual Mean Concentration) based on drinking water, fish, and shoreline sediment sample results are reported in Table 4.1-A. The individual critical population and pathway dose calculations are reported in Table 4.1-B.

REMP-based dose estimates are not reported for airborne radioiodine, milk or vegetation sample types because no radionuclides other than naturally occurring K-40 and Be-7 were detected in the samples. Dose estimates are not reported for surface water because sampled surface water is not considered to be a potable drinking water source although surface water tritium concentrations are used in calculating doses from fish. Exposure estimates based upon REMP TLD results are discussed in Section 3.9.

The maximum environmental organ dose estimate for any single sample type (excluding TLD results) collected during 2010 was 7.45E-2 mrem to the maximum exposed child liver, total body, thyroid, kidney, lung, and GI-LLI from the consumption of drinking water.

4.2 ESTIMATED DOSE FROM RELEASES

Throughout the year, dose estimates were calculated based on actual 2010 liquid and gaseous effluent release data. Effluent-based dose estimates were calculated using the RETDAS computer program which employs methodology and data presented in NRC Regulatory Guide 1.109. These doses are shown in Table 4.1-A along with the corresponding REMP-based dose estimates. Summaries of RETDAS dose calculations are reported in the Annual Radioactive Effluent Release Report (reference 6.6).

The effluent-based liquid release doses are summations of the dose contributions from the drinking water, fish, and shoreline pathways. For iodine, particulate, and tritium

exposure the effluent-based gaseous release doses are summations of the dose contributors from ground/plane, inhalation, milk and vegetation pathways.

4.3 COMPARISON OF DOSES

The environmental and effluent dose estimates 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. This indicates that effluent program dose estimates are both valid and reasonably conservative.

There are some differences in how effluent and environmental doses are calculated that affect the comparison. Doses calculated from environmental data are conservative because they are based on a mean that includes only samples with a net positive activity versus a mean that includes all sample results (i.e. zero results are not included in the mean). Also, airborne tritium is not measured in environmental samples but is used to calculate effluent doses.

In addition, McGuire began reporting estimated dose from effluent Carbon 14 (C-14). This change came about with the issuing of Regulatory Guide 1.21, Revision 2, Measuring, Evaluating and Reporting Radioactive Material in Liquid and Gaseous Effluents and Solid Waste. A description of this change is found in the 2010 Annual Radiological Effluent Release Report. C-14 is not measured in the environment and therefore, environmental and effluent doses from C-14 cannot be compared directly.

In calculations based on liquid release pathways, drinking water and fish consumption were the predominant dose pathways based on environmental and effluent data. The maximum total organ dose based on 2010 environmental sample results was 9.77E-2 mrem to the child liver. The maximum total organ dose of 1.57E-1 mrem for liquid effluent-based estimates was to the child liver.

In calculations based on gaseous release pathways, vegetation was the predominant dose pathway for effluent samples. The maximum organ dose for gaseous effluent estimates was 9.18E-1 mrem to the child bone. No radioactivity was detected from gaseous pathways in environmental samples; therefore, there is no calculated dose.

The doses calculated do not exceed 40CFR190 or 10CFR50 dose commitment limits for members of the public. Doses to members of the public attributable to the operation of MNS are being maintained well within regulatory limits.

TABLE 4.1-A

MCGUIRE NUCLEAR STATION
2010 ENVIRONMENTAL AND EFFLUENT DOSE COMPARISON

LIQUID RELEASE PATHWAY

Organ	Environmental or Effluent Data	Critical Age [1]	Critical Pathway [2]	Location	Maximum Dose [3] (mrem)
Skin	Environmental	Teen	Shoreline Sediment	130 (0.52 mi SW)	1.99E-04
Skin	Effluent	Teen	Shoreline Sediment	Discharge Pt.	8.05E-04
Bone	Environmental	Child	Fish	129 (0.51 mi ENE)	2.28E-02
Bone	Effluent	Child	Fish	Discharge Pt.	1.83E-02
Liver	Environmental	Child	Drinking Water	101 (3.31 mi E)	9.77E-02
Liver	Effluent	Child	Drinking Water	3.31 mi E	1.57E-01
T. Body	Environmental	Child	Drinking Water	101 (3.31 mi E)	7.91E-02
T. Body	Effluent	Child	Drinking Water	3.31 mi E	1.41E-01
Thyroid	Environmental	Child	Drinking Water	101 (3.31 mi E)	7.59E-02
Thyroid	Effluent	Child	Drinking Water	3.31 mi E	1.38E-01
Kidney	Environmental	Child	Drinking Water	101 (3.31 mi E)	8.30E-02
Kidney	Effluent	Child	Drinking Water	3.31 mi E	1.44E-01
Lung	Environmental	Child	Drinking Water	101 (3.31 mi E)	7.84E-02
Lung	Effluent	Child	Drinking Water	3.31 mi E	1.40E-01
GI-LLI	Environmental	Child	Drinking Water	101 (3.31 mi E)	7.60E-02
GI-LLI	Effluent	Child	Drinking Water	3.31 mi E	1.40E-01

(1) Critical Age is the highest total dose (all pathways) to an age group.

(2) Critial Pathway is the highest individual dose within the identified Critical Age group.

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

GASEOUS RELEASE PATHWAY

IODINE, PARTICULATE, and TRITIUM

Organ	Environmental or Effluent Data	Critical Age (1)	Critical Pathway (2)	Location	Maximum Dose (3) (mrem)
Skin	Environmental	-	-	-	0.00E+00
Skin	Effluent	All	Ground Plane	1.5 mi. NE	2.45E-05
Bone	Environmental	-	-	-	0.00E+00
Bone	Effluent	Child	Vegetation	1.5 mi. NE	9.18E-01
Liver	Environmental	-	-	-	0.00E+00
Liver	Effluent	Teen	Vegetation	1.5 mi. NE	2.96E-01
T. Body	Environmental	-	-	-	0.00E+00
T. Body	Effluent	Child	Vegetation	1.5 mi. NE	2.96E-01
Thyroid	Environmental	-	-	-	0.00E+00
Thyroid	Effluent	Child	Vegetation	1.5 mi. NE	2.96E-01
Kidney	Environmental	-	-	-	0.00E+00
Kidney	Effluent	Child	Vegetation	1.5 mi. NE	2.96E-01
Lung	Environmental	-	-	-	0.00E+00
Lung	Effluent	Child	Vegetation	1.5 mi. NE	2.96E-01
GI-LLI	Environmental	-	-	-	0.00E+00
GI-LLI	Effluent	Child	Vegetation	1.5 mi. NE	2.96E-01

(1) Critical Age is the highest total dose (all pathways) to an age group.

(2) Critial Pathway is the highest individual dose within the identified Critical Age group.

(3) Maximum dose is a summation of the ground/plane, inhalation, milk and vegetation pathways.

TABLE 4.1-B

Maximum Individual Dose for 2010 based on Environmental Measurements (mrem) for McGuire 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	7.32E-02	7.32E-02	7.32E-02	7.32E-02	7.32E-02	7.32E-02	0.00E+00
	Milk	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	TOTAL	0.00E+00	7.32E-02	7.32E-02	7.32E-02	7.32E-02	7.32E-02	7.32E-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	7.45E-02	7.45E-02	7.45E-02	7.45E-02	7.45E-02	7.45E-02	0.00E+00
	Milk	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	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	2.28E-02	2.32E-02	4.59E-03	1.37E-03	8.48E-03	3.93E-03	1.51E-03	0.00E+00
	Shoreline Sediment	0.00E+00	0.00E+00	3.57E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.16E-05
	TOTAL	2.28E-02	9.77E-02	7.91E-02	7.59E-02	8.30E-02	7.84E-02	7.60E-02	4.16E-05
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	3.89E-02	3.89E-02	3.89E-02	3.89E-02	3.89E-02	3.89E-02	0.00E+00
	Milk	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	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	1.81E-02	2.57E-02	1.01E-02	1.66E-03	9.86E-03	4.85E-03	2.01E-03	0.00E+00
	Shoreline Sediment	0.00E+00	0.00E+00	1.71E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.99E-04
	TOTAL	1.81E-02	6.46E-02	4.92E-02	4.06E-02	4.88E-02	4.38E-02	4.09E-02	1.99E-04
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	5.52E-02	5.52E-02	5.52E-02	5.52E-02	5.52E-02	5.52E-02	0.00E+00
	Milk	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	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	1.69E-02	2.53E-02	1.73E-02	2.16E-03	1.00E-02	4.77E-03	2.61E-03	0.00E+00
	Shoreline Sediment	0.00E+00	0.00E+00	3.06E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.57E-05
	TOTAL	1.69E-02	8.05E-02	7.25E-02	5.74E-02	6.52E-02	6.00E-02	5.78E-02	3.57E-05

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

McGuire Nuclear Station
Dose from Drinking Water Pathway for 2010 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**

	Ingestion Dose Factor							Highest Annual Net Mean Concentration		Dose (mrem)						
Radionuclide	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	101	720	0.00E+00	7.32E-02	7.32E-02	7.32E-02	7.32E-02	7.32E-02	7.32E-02
						Dose Commitment (mrem) =				0.00E+00	7.32E-02	7.32E-02	7.32E-02	7.32E-02	7.32E-02	7.32E-02

McGuire Nuclear Station
Dose from Drinking Water Pathway for 2010 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

	Ingestion Dose Factor							Highest Annual Net Mean Concentration		Dose (mrem)						
Radionuclide	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
C0-60	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	101	720	0.00E+00	7.45E-02	7.45E-02	7.45E-02	7.45E-02	7.45E-02	7.45E-02
						Dose Commitment (mrem) =				0.00E+00	7.45E-02	7.45E-02	7.45E-02	7.45E-02	7.45E-02	7.45E-02

McGuire Nuclear Station
Dose from Fish Pathway for 2010 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 = 1090 pCi/l x 0.9 = 981 pCi/kg

Usage (intake in one year) = 6.9 kg

	Ingestion Dose Factor							Highest Annual Net Mean Concentration		Dose (mrem)						
Radionuclide	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
C0-60	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
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	129	10.1	2.28E-02	2.18E-02	3.22E-03	0.00E+00	7.11E-03	2.56E-03	1.37E-04
H-3	NO DATA	2.03E-07	2.03E-07	2.03E-07	2.03E-07	2.03E-07	2.03E-07	128	981	0.00E+00	1.37E-03	1.37E-03	1.37E-03	1.37E-03	1.37E-03	1.37E-03
						Dose Commitment (mrem) =				2.28E-02	2.32E-02	4.59E-03	1.37E-03	8.48E-03	3.93E-03	1.51E-03

McGuire Nuclear Station
Dose from Shoreline Sediment Pathway for 2010 Data
Maximum Exposed Child

Shoreline Recreation =	**14**	**hr (in one year)**
Shore Width Factor =	**0.3**	**(lake shore - location 129)**
Shore Width Factor =	**0.2**	**(river shoreline - location 130)**
Sediment Surface Mass =	**40**	**kg/m^2**

Child Dose from Shoreline Sediment Pathway (mrem) = Shoreline Recreation (hr) x External Dose Factor (mrem/hr per pCi/m^2) x Shore Width Factor x Sediment Surface Mass (kg/m^2) x Sediment Concentration (pCi/kg)

	External Dose Factor Standing on Contaminated Ground		**Highest Annual Net Mean Concentration**		**Dose**	
	(mrem/hr per pCi/m^2)		**Indicator**	**Sediment**	**(mrem)**	
Radionuclide	**T. Body**	**Skin**	**Location**	**(pCi/kg)**	**T. Body**	**Skin**
Mn-54	**5.80E-09**	**6.80E-09**	**ALL**	**0.00**	**0.00E+00**	**0.00E+00**
Co-58	**7.00E-09**	**8.20E-09**	**ALL**	**0.00**	**0.00E+00**	**0.00E+00**
Co-60	**1.70E-08**	**2.00E-08**	**ALL**	**0.00**	**0.00E+00**	**0.00E+00**
Cs-134	**1.20E-08**	**1.40E-08**	**ALL**	**0.00**	**0.00E+00**	**0.00E+00**
Cs-137	**4.20E-09**	**4.90E-09**	**130**	**75.8**	**3.57E-05**	**4.16E-05**
		Dose Commitment (mrem) =			**3.57E-05**	**4.16E-05**

McGuire Nuclear Station
Dose from Drinking Water Pathway for 2010 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**

				Ingestion Dose Factor				Highest Annual Net Mean Concentration		Dose (mrem)						
Radionuclide	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	101	720	0.00E+00	3.89E-02	3.89E-02	3.89E-02	3.89E-02	3.89E-02	3.89E-02
						Dose Commitment (mrem)=				0.00E+00	3.89E-02	3.89E-02	3.89E-02	3.89E-02	3.89E-02	3.89E-02

McGuire Nuclear Station

Dose from Fish Pathway for 2010 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 = 1090 pCi/l x 0.9 = 981 pCi/kg

Usage (intake in one year) = 16 kg

	Ingestion Dose Factor							Highest Annual Net Mean Concentration		Dose (mrem)						
Radionuclide	Bone	Liver	T. Body	Thyroid	Kidney	Lung	GI-LLI	Location	(pCi/kg)	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
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	129	10.1	1.81E-02	2.41E-02	8.39E-03	0.00E+00	8.19E-03	3.18E-03	3.43E-04
H-3	NO DATA	1.06E-07	1.06E-07	1.06E-07	1.06E-07	1.06E-07	1.06E-07	128	981	0.00E+00	1.66E-03	1.66E-03	1.66E-03	1.66E-03	1.66E-03	1.66E-03
						Dose Commitment (mrem) =				1.81E-02	2.57E-02	1.01E-02	1.66E-03	9.86E-03	4.85E-03	2.01E-03

McGuire Nuclear Station
Dose from Shoreline Sediment Pathway for 2010 Data
Maximum Exposed Teen

Shoreline Recreation =	**67**	**hr (in one year)**
Shore Width Factor =	**0.3**	**(lake shore - location 129)**
Shore Width Factor =	**0.2**	**(river shoreline - location 130)**
Sediment Surface Mass =	**40**	**kg/m^2**

Teen Dose from Shoreline Sediment Pathway (mrem) = Shoreline Recreation (hr) x External Dose Factor (mrem/hr per pCi/m^2) x Shore Width Factor x Sediment Surface Mass (kg/m^2) x Sediment Concentration (pCi/kg)

	External Dose Factor Standing on Contaminated Ground		Highest Annual Net Mean Concentration		Dose	
	(mrem/hr per pCi/m^2)		Indicator	Sediment	(mrem)	
Radionuclide	**T. Body**	**Skin**	**Location**	**(pCi/kg)**	**T. Body**	**Skin**
Mn-54	**5.80E-09**	**6.80E-09**	**ALL**	**0.00**	**0.00E+00**	**0.00E+00**
Co-58	**7.00E-09**	**8.20E-09**	**ALL**	**0.00**	**0.00E+00**	**0.00E+00**
Co-60	**1.70E-08**	**2.00E-08**	**ALL**	**0.00**	**0.00E+00**	**0.00E+00**
Cs-134	**1.20E-08**	**1.40E-08**	**ALL**	**0.00**	**0.00E+00**	**0.00E+00**
Cs-137	**4.20E-09**	**4.90E-09**	**130**	**75.8**	**1.71E-04**	**1.99E-04**
	Dose Commitment (mrem) =				**1.71E-04**	**1.99E-04**

McGuire Nuclear Station
Dose from Drinking Water Pathway for 2010 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**

	Ingestion Dose Factor							Highest Annual Net Mean Concentration		Dose (mrem)						
Radionuclide	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	101	720	0.00E+00	5.52E-02	5.52E-02	5.52E-02	5.52E-02	5.52E-02	5.52E-02
						Dose Commitment (mrem) =				0.00E+00	5.52E-02	5.52E-02	5.52E-02	5.52E-02	5.52E-02	5.52E-02

McGuire Nuclear Station
Dose from Fish Pathway for 2010 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 = 1090 pCi/l x 0.9 = 981 pCi/kg

Usage (intake in one year) = 21 kg

	Ingestion Dose Factor							Highest Annual Net Mean Concentration		Dose (mrem)						
Radionuclide	Bone	Liver	T. Body	Thyroid	Kidney	Lung	GI-LLI	Location	(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
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	129	10.1	1.69E-02	2.31E-02	1.51E-02	0.00E+00	7.85E-03	2.61E-03	4.48E-04
H-3	NO DATA	1.05E-07	1.05E-07	1.05E-07	1.05E-07	1.05E-07	1.05E-07	128	981	0.00E+00	2.16E-03	2.16E-03	2.16E-03	2.16E-03	2.16E-03	2.16E-03
						Dose Commitment (mrem) =				1.69E-02	2.53E-02	1.73E-02	2.16E-03	1.00E-02	4.77E-03	2.61E-03

McGuire Nuclear Station
Dose from Shoreline Sediment Pathway for 2010 Data
Maximum Exposed Adult

Shoreline Recreation =	**12**	**hr (in one year)**
Shore Width Factor =	**0.3**	**(lake shore - location 129)**
Shore Width Factor =	**0.2**	**(river shoreline - location 130)**
Sediment Surface Mass =	**40**	**kg/m^2**

Adult Dose from Shoreline Sediment Pathway (mrem) = Shoreline Recreation (hr) x External Dose Factor (mrem/hr per pCi/m^2) x Shore Width Factor x Sediment Surface Mass (kg/m^2) x Sediment Concentration (pCi/kg)

	External Dose Factor Standing on Contaminated Ground		**Highest Annual Net Mean Concentration**		**Dose**	
	(mrem/hr per pCi/m^2)				**(mrem)**	
Radionuclide	**T. Body**	**Skin**	**Indicator Location**	**Sediment (pCi/kg)**	**T. Body**	**Skin**
Mn-54	**5.80E-09**	**6.80E-09**	**ALL**	**0.00**	**0.00E+00**	**0.00E+00**
Co-58	**7.00E-09**	**8.20E-09**	**ALL**	**0.00**	**0.00E+00**	**0.00E+00**
Co-60	**1.70E-08**	**2.00E-08**	**ALL**	**0.00**	**0.00E+00**	**0.00E+00**
Cs-134	**1.20E-08**	**1.40E-08**	**ALL**	**0.00**	**0.00E+00**	**0.00E+00**
Cs-137	**4.20E-09**	**4.90E-09**	**130**	**75.8**	**3.06E-05**	**3.57E-05**
	Dose Commitment (mrem) =				**3.06E-05**	**3.57E-05**

5.0 QUALITY ASSURANCE

5.1 SAMPLE COLLECTION

EnRad Laboratories, Fisheries, and Aquatic Ecology performed the environmental sample collections as specified by approved sample collection procedures.

5.2 SAMPLE ANALYSIS

EnRad Laboratories performed the environmental sample analyses as specified by approved analysis procedures. EnRad Laboratories is located in Huntersville, North Carolina, at Duke Energy Corporation's Environmental Center.

Duke Energy Corporation's Environmental Center

5.3 DOSIMETRY ANALYSIS

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

5.4 LABORATORY EQUIPMENT QUALITY ASSURANCE

5.4.1 DAILY QUALITY CONTROL

EnRad Laboratories 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.

5.4.2 CALIBRATION VERIFICATION

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.

5.4.3 BATCH PROCESSING

Method quality control samples are analyzed with sample analyses that are processed in batches. These include gross beta in drinking water and all tritium analyses.

5.5 DUKE ENERGY INTERCOMPARISON PROGRAM

EnRad Laboratories participated in the Duke Energy Nuclear Generation Department Intercomparison Program during 2010. Interlaboratory cross-check standards, including, Marinelli beakers, air filters, air cartridges, gross beta on smears, and tritium in water samples were analyzed at various times of the year. A summary of the EnRad Laboratory program results for 2010 is documented in Table 5.0-A.

5.6 ERA PROFICIENCY TESTING

EnRad Laboratories performed method proficiency testing through a program administered by Environmental Resource Associates (ERA) of Arvada, CO. ERA supplied requested method proficiency samples for analysis and nuclide concentration determination. ERA reported proficiency test results to the North Carolina Department of Health and Human Services, North Carolina Public Health Drinking Water Laboratory Certification Program. A summary of these proficiency test data for 2010 is documented in Table 5.0-B.

5.7 DUKE ENERGY AUDITS

The McGuire Nuclear Station Radiological Environmental Monitoring Program was audited by the Quality Assurance Group in 2010. Procedure and report enhancements were identified by this audit (reference 6.14).

In addition, an item was identified concerning the calibration media used for fish and vegetation. Special tests were performed to confirm that the existing calibration media are acceptable. Additional information is included in Table 5.0-A and reference 6.15.

5.8 U.S. NUCLEAR REGULATORY COMMISSION INSPECTIONS

The McGuire Nuclear Station Radiological Environmental Monitoring Program was not audited by the NRC in 2010. The program was audited by the NRC in 2009 (reference 6.12). There were no REMP findings identified by the 2009 audit.

5.9 STATE OF NORTH CAROLINA INTERCOMPARISON PROGRAM

EnRad Laboratories routinely participates with the State of North Carolina Department of Environmental Health and Natural Resources (DEHNR) in an intercomparison program. EnRad Laboratories sends air, surface water, milk, crops,

vegetation, sediment, and fish samples which have been collected to the State of North Carolina Radiation Protection Section.

5.10 TLD INTERCOMPARISON PROGRAM

5.10.1 NUCLEAR TECHNOLOGY SERVICES INTERCOMPARISON PROGRAM

Radiation Dosimetry and Records participates in a quarterly TLD intercomparison program administered by Nuclear Technology Services, Inc. of Roswell, GA. Nuclear Technology Services irradiates environmental dosimeters quarterly and sends them to the Radiation Dosimetry and Records group for analysis of the unknown estimated delivered exposure. A summary of the Nuclear Technology Services Intercomparison Report is documented in Table 5.0-C.

5.10.2 INTERNAL CROSSCHECK (DUKE ENERGY)

Radiation Dosimetry and Records participates in a quarterly TLD intracomparison program administered internally by the Dosimetry Lab. The Dosimetry Lab Staff irradiates environmental dosimeters quarterly and submits them for analysis of the unknown estimated delivered exposure. A summary of the Internal Cross Check (Duke Energy) Result is documented in Table 5.0-C.

TABLE 5.0-A
DUKE ENERGY
INTERLABORATORY COMPARISON PROGRAM

2010 CROSS-CHECK RESULTS FOR ENRAD LABORATORIES

Cross-Check samples are normally analyzed a minimum of three times. A status of "3 Pass" indicates that all three analyses yielded results within the designated acceptance range. A status of "1 Pass" indicates that one analysis of the cross check was performed

If applicable, footnote explanations are included following this table.

Gamma in Water 3.5 liters

Reference Date	Sample I.D.	Nuclide	Acceptance Range pCi/l	Reference Value pCi/l	Mean Reported Value pCi/l	Cross Check Status
2/22/2010	Q101GWR	Co-57	0.86 - 1.52 E4	1.14 E4	1.16 E4	3 Pass
		Co-60	2.72 - 4.82 E3	3.62 E3	3.66 E3	3 Pass
		Ba-133	5.31 - 9.43 E3	7.09 E3	5.70 E3	3 Pass
		Cs-137	4.67 - 8.27 E3	6.22 E3	6.15 E3	3 Pass
6/2/2010	Q102GWSL	Cr-51	1.15 - 2.05 E5	1.54 E5	1.85 E5	3 Pass
		Mn-54	4.91 - 8.70 E4	6.54 E4	6.65 E4	3 Pass
		Co-58	3.10 - 5.49 E4	4.13 E4	4.37 E4	3 Pass
		Fe-59	3.79 - 6.72 E4	5.05 E4	5.87 E4	3 Pass
		Co-60	5.63 - 9.99 E4	7.51 E4	7.39 E4	3 Pass
		Zn-65	6.00 - 10.63 E4	7.99 E4	8.28 E4	3 Pass
		Cs-134	3.62 - 6.42 E4	4.82 E4	4.33 E4	3 Pass
		Cs-137	4.29 - 7.61 E4	5.72 E4	5.38 E4	3 Pass
		Ce-141	3.66 - 6.49 E4	4.88 E4	5.70 E4	3 Pass
9/9/2010	Q103GWSL	Cr-51	1.00 - 1.77 E5	1.33 E5	1.35 E5	3 Pass
		Mn-54	4.34 - 7.69 E4	5.79 E4	6.05 E4	3 Pass
		Co-58	2.82 - 5.00 E4	3.76 E4	3.82 E4	3 Pass
		Fe-59	3.64 - 6.46 E4	4.86 E4	5.21 E4	3 Pass
		Co-60	6.13 - 10.86 E4	8.17 E4	8.38 E4	3 Pass
		Zn-65	7.44 - 13.19 E4	9.92 E4	10.43 E4	3 Pass
		Cs-134	3.35 - 5.94 E4	4.47 E4	4.13 E4	3 Pass
		Cs-137	3.38 - 6.00 E4	4.51 E4	4.45 E4	3 Pass
		Ce-141	5.41 - 9.59 E4	7.21 E4	7.37 E4	3 Pass

Gamma in Water 1.0 liter

Reference Date	Sample I.D.	Nuclide	Acceptance Range pCi/l	Reference Value pCi/l	Mean Reported Value pCi/l	Cross Check Status
2/22/2010	Q101GWR	Co-57	0.86 - 1.52 E4	1.14 E4	1.12 E4	3 Pass
		Co-60	2.72 - 4.82 E3	3.62 E3	3.73 E3	3 Pass
		Ba-133	5.31 - 9.43 E3	7.09 E3	5.56 E3	3 Pass
		Cs-137	4.67 - 8.27 E3	6.22 E3	6.06 E3	3 Pass

Gamma in Water 1.0 liter, continued

Reference Date	Sample I.D.	Nuclide	Acceptance Range pCi/l	Reference Value pCi/l	Mean Reported Value pCi/l	Cross Check Status
6/2/2010	Q102GWSL	Cr-51	1.15 - 2.05 E5	1.54 E5	1.85 E5	2 Pass
		Mn-54	4.91 - 8.70 E4	6.54 E4	6.70 E4	2 Pass
		Co-58	3.10 - 5.49 E4	4.13 E4	4.38 E4	2 Pass
		Fe-59	3.79 - 6.72 E4	5.05 E4	5.91 E4	2 Pass
		Co-60	5.63 - 9.99 E4	7.51 E4	7.44 E4	2 Pass
		Zn-65	6.00 - 10.63 E4	7.99 E4	8.35 E4	2 Pass
		Cs-134	3.62 - 6.42 E4	4.82 E4	4.25 E4	2 Pass
		Cs-137	4.29 - 7.61 E4	5.72 E4	5.39 E4	2 Pass
		Ce-141	3.66 - 6.49 E4	4.88 E4	5.69 E4	2 Pass
9/9/2010	Q103GWSL	Cr-51	1.00 - 1.77 E5	1.33 E5	1.33 E5	3 Pass
		Mn-54	4.34 - 7.69 E4	5.79 E4	5.98 E4	3 Pass
		Co-58	2.82 - 5.00 E4	3.76 E4	3.76 E4	3 Pass
		Fe-59	3.64 - 6.46 E4	4.86 E4	5.16 E4	3 Pass
		Co-60	6.13 - 10.86 E4	8.17 E4	8.32 E4	3 Pass
		Zn-65	7.44 - 13.19 E4	9.92 E4	10.43 E4	3 Pass
		Cs-134	3.35 - 5.94 E4	4.47 E4	3.98 E4	3 Pass
		Cs-137	3.38 - 6.00 E4	4.51 E4	4.43 E4	3 Pass
		Ce-141	5.41 - 9.59 E4	7.21 E4	7.24 E4	3 Pass

Gamma in Water 0.5 liter

Reference Date	Sample I.D.	Nuclide	Acceptance Range pCi/l	Reference Value pCi/l	Mean Reported Value pCi/l	Cross Check Status
2/22/2010	Q101GWR	Co-57	0.86 - 1.52 E4	1.14 E4	1.12 E4	3 Pass
		Co-60	2.72 - 4.82 E3	3.62 E3	3.73 E3	3 Pass
		Ba-133	5.31 - 9.43 E3	7.09 E3	5.53 E3	3 Pass
		Cs-137	4.67 - 8.27 E3	6.22 E3	6.04 E3	3 Pass
6/2/2010	Q102GWSL	Cr-51	1.15 - 2.05 E5	1.54 E5	1.81 E5	3 Pass
		Mn-54	4.91 - 8.70 E4	6.54 E4	6.45 E4	3 Pass
		Co-58	3.10 - 5.49 E4	4.13 E4	4.22 E4	3 Pass
		Fe-59	3.79 - 6.72 E4	5.05 E4	5.73 E4	3 Pass
		Co-60	5.63 - 9.99 E4	7.51 E4	7.24 E4	3 Pass
		Zn-65	6.00 - 10.63 E4	7.99 E4	8.10 E4	3 Pass
		Cs-134	3.62 - 6.42 E4	4.82 E4	4.10 E4	3 Pass
		Cs-137	4.29 - 7.61 E4	5.72 E4	5.17 E4	3 Pass
		Ce-141	3.66 - 6.49 E4	4.88 E4	5.46 E4	3 Pass
9/9/2010	Q103GWSL	Cr-51	1.00 - 1.77 E5	1.33 E5	1.26 E5	3 Pass
		Mn-54	4.34 - 7.69 E4	5.79 E4	5.55 E4	3 Pass
		Co-58	2.82 - 5.00 E4	3.76 E4	3.47 E4	3 Pass
		Fe-59	3.64 - 6.46 E4	4.86 E4	4.85 E4	3 Pass
		Co-60	6.13 - 10.86 E4	8.17 E4	7.80 E4	3 Pass
		Zn-65	7.44 - 13.19 E4	9.92 E4	9.76 E4	3 Pass
		Cs-134	3.35 - 5.94 E4	4.47 E4	3.69 E4	3 Pass
		Cs-137	3.38 - 6.00 E4	4.51 E4	4.11 E4	3 Pass
		Ce-141	5.41 - 9.59 E4	7.21 E4	6.68 E4	3 Pass

Gamma in Water 0.25 liter

Reference Date	Sample I.D.	Nuclide	Acceptance Range pCi/l	Reference Value pCi/l	Mean Reported Value pCi/l	Cross Check Status
2/22/2010	Q101GWR	Co-57	0.86 - 1.52 E4	1.14 E4	1.09 E4	3 Pass
		Co-60	2.72 - 4.82 E3	3.62 E3	3.71 E3	3 Pass
		Ba-133	5.31 - 9.43 E3	7.09 E3	5.56 E3	3 Pass
		Cs-137	4.67 - 8.27 E3	6.22 E3	5.88 E3	3 Pass
6/2/2010	Q102GWSL	Cr-51	1.15 - 2.05 E5	1.54 E5	1.77 E5	3 Pass
		Mn-54	4.91 - 8.70 E4	6.54 E4	6.39 E4	3 Pass
		Co-58	3.10 - 5.49 E4	4.13 E4	4.20 E4	3 Pass
		Fe-59	3.79 - 6.72 E4	5.05 E4	5.68 E4	3 Pass
		Co-60	5.63 - 9.99 E4	7.51 E4	7.21 E4	3 Pass
		Zn-65	6.00 - 10.63 E4	7.99 E4	8.09 E4	3 Pass
		Cs-134	3.62 - 6.42 E4	4.82 E4	4.09 E4	3 Pass
		Cs-137	4.29 - 7.61 E4	5.72 E4	5.19 E4	3 Pass
		Ce-141	3.66 - 6.49 E4	4.88 E4	5.34 E4	3 Pass
9/9/2010	Q103GWSL	Cr-51	1.00 - 1.77 E5	1.33 E5	1.35 E5	3 Pass
		Mn-54	4.34 - 7.69 E4	5.79 E4	5.90 E4	3 Pass
		Co-58	2.82 - 5.00 E4	3.76 E4	3.67 E4	3 Pass
		Fe-59	3.64 - 6.46 E4	4.86 E4	5.18 E4	3 Pass
		Co-60	6.13 - 10.86 E4	8.17 E4	8.25 E4	3 Pass
		Zn-65	7.44 - 13.19 E4	9.92 E4	10.33 E4	3 Pass
		Cs-134	3.35 - 5.94 E4	4.47 E4	3.92 E4	3 Pass
		Cs-137	3.38 - 6.00 E4	4.51 E4	4.33 E4	3 Pass
		Ce-141	5.41 - 9.59 E4	7.21 E4	7.09 E4	3 Pass

Gamma on Filter

Reference Date	Sample I.D.	Nuclide	Acceptance Range pCi	Reference Value pCi	Mean Reported Value pCi	Cross Check Status
6/17/2010	E7153-37	Cr-51	2.46 - 4.36 E2	3.28 E2	3.76 E2	2 Pass
		Mn-54	1.23 - 2.18 E2	1.64 E2	1.65 E2	2 Pass
		Co-58	7.34 - 13.02 E1	9.79 E1	9.93 E1	2 Pass
		Fe-59	0.86 - 1.53 E2	1.15 E2	1.05 E2	2 Pass
		Co-60	1.43 - 2.53 E2	1.90 E2	1.86 E2	2 Pass
		Zn-65	1.49 - 2.65 E2	1.99 E2	1.92 E2	2 Pass
		Cs-134	0.92 - 1.62 E2	1.22 E2	1.13 E2	2 Pass
		Cs-137	1.09 - 1.93 E2	1.45 E2	1.40 E2	2 Pass
		Ce-141	0.80 - 1.42 E2	1.07 E2	1.01 E2	2 Pass

*Gamma in Soil (Special Testing)**

Reference Date	Sample I.D.	Nuclide	Acceptance Range pCi/kg	Reference Value pCi/kg	Mean Reported Value pCi/kg	Cross Check Status
12/9/2010	E7380-37	Cr-51	2.60 - 9.98 E2	5.09 E2	5.85 E2	4 Pass
		Mn-54	1.01 - 1.78 E2	1.34 E2	1.42 E2	4 Pass
		Co-58	0.76 - 1.34 E2	1.01 E2	0.96 E2	1/4 Low (1)
		Fe-59	0.95 - 2.25 E2	1.46 E2	1.42 E2	4 Pass
		Co-60	2.52 - 4.47 E2	3.36 E2	3.27 E2	4 Pass
		Zn-65	1.46 - 2.58 E2	1.94 E2	1.97 E2	4 Pass
		Cs-134	1.31 - 2.33 E2	1.75 E2	1.54 E2	4 Pass
		Cs-137	2.24 - 3.96 E2	2.98 E2	2.89 E2	4 Pass

** INOS Audit 10-15(INOS)(REC)(MNS) 2010, PIP M-10-06597*

*Gamma in Vegetation (Special Testing)**

Reference Date	Sample I.D.	Nuclide	Acceptance Range pCi/kg	Reference Value pCi/kg	Mean Reported Value pCi/kg	Cross Check Status
12/9/2010	E7381-37	Cr-51	2.36 - 11.11 E2	5.12 E2	5.10 E2	1 Pass
		Mn-54	1.01 - 1.78 E2	1.34 E2	1.51 E2	1 Pass
		Co-58	0.76 - 1.34 E2	1.01 E2	1.00 E2	1 Pass
		Fe-59	0.84 - 2.57 E2	1.47 E2	1.54 E2	1 Pass
		Co-60	2.54 - 4.50 E2	3.38 E2	3.38 E2	1 Pass
		Zn-65	1.46 - 2.59 E2	1.95 E2	2.24 E2	1 Pass
		Cs-134	1.32 - 2.34 E2	1.76 E2	1.51 E2	1 Pass
		Cs-137	1.57 - 2.78 E2	2.09 E2	2.03 E2	1 Pass

** INOS Audit 10-15(INOS)(REC)(MNS) 2010, PIP M-10-06597*

Iodine in Milk

Reference Date	Sample I.D.	Nuclide	Acceptance Range pCi/l	Reference Value pCi/l	Mean Reported Value pCi/l	Cross Check Status
3/2/2010	Q101LIM1	I-131	2.29 - 4.06 E1	3.06 E1	2.38 E1	1 Pass
3/2/2010	Q101LIM2	I-131	1.25 - 2.21 E3	1.66 E3	1.39 E3	3 Pass
3/2/2010	Q101LIM3	I-131	6.27 - 11.13 E3	8.37 E3	6.44 E3	2 Pass

Iodine on Cartridge

Reference Date	Sample I.D.	Nuclide	Acceptance Range pCi	Reference Value pCi	Mean Reported Value pCi	Cross Check Status
6/17/2010	E7154-37	I-131	6.01 - 10.65 E1	8.01 E1	8.39 E1	3 Pass

Tritium in Water

Reference Date	Sample I.D.	Nuclide	Acceptance Range pCi/l	Reference Value pCi/l	Mean Reported Value pCi/l	Cross Check Status
2/22/2010	Q101TWS1	H-3	6.68 - 11.84 E5	8.91 E5	9.00 E5	3 Pass
2/22/2010	Q101TWS2	H-3	0.79 - 1.40 E7	1.05 E7	1.00 E7	3 Pass
11/4/2010	Q104TWR1	H-3	3.14 - 5.56 E3	4.18 E3	3.91 E3	3 Pass
11/4/2010	Q104TWR2	H-3	3.40 - 6.02 E4	4.53 E4	4.26 E4	3 Pass
11/4/2010	Q104TWR3	H-3	4.98 - 8.83 E2	6.64 E2	6.12 E2	3 Pass

Gross Beta in Water

Reference Date	Sample I.D.	Nuclide	Acceptance Range pCi/l	Reference Value pCi/l	Mean Reported Value pCi/l	Cross Check Status
11/18/2010	Q104ABW1	Cs-137	5.43 - 9.63 E1	7.24 E1	6.79 E1	3 Pass
11/18/2010	Q104ABW2	Cs-137	4.88 - 8.66 E1	6.51 E1	6.44 E1	3 Pass
11/18/2010	Q104ABW3	Cs-137	1.15 - 2.03 E1	1.53 E1	1.52 E1	3 Pass

Table 5.0-A Footnote Explanations

(1) Gamma in Soil (Special Testing), Sample ID E7380-37, Reference Date 12/9/2010

One of four Co-58 results was biased low and outside of the acceptance range (reference 6.16).

TABLE 5.0-B

ENVIRONMENTAL RESOURCE ASSOCIATES (ERA)
QUIK™ RESPONSE PROGRAM

2010 PROFICIENCY TEST RESULTS FOR
ENRAD LABORATORIES

ERA LABORATORY CODE: D242401

Proficiency test samples are received, prepared, analyzed, and reported to Environmental Resource Associates as described in the "Quik" Response instruction package within the study period. Proficiency test data are reported to ERA for evaluation. ERA reports proficiency test results to the North Carolina Department of Health and Human Services, North Carolina Public Drinking Water Laboratory Certification Program.

If applicable, footnote explanations are included following this data table.

Gamma Emitters in Water

Reference Date	Sample I.D.	Nuclide	Acceptance Range pCi/l	Reference Value pCi/l	Reported Value pCi/l	Proficiency Check Status
4/5/2010	RAD-81*	Ba-133	5.49 - 7.25 E1	6.59 E1	7.26 E1	High [(1)]
		Cs-134	5.84 - 7.88 E1	7.16 E1	6.74 E1	Pass
		Cs-137	1.31 - 1.63 E2	1.46 E2	1.33 E2	Pass
		Co-60	7.60 - 9.53 E1	8.45 E1	8.40 E1	Pass
		Zn-65	1.67 - 2.19 E2	1.86 E2	1.93 E2	Pass
1/10/2010	Quik 120810K**	Ba-133	6.10 - 8.02 E1	7.29 E1	7.75 E1	Pass
		Cs-134	5.15 - 6.97 E1	6.34 E1	6.18 E1	Pass
		Cs-137	1.08 - 1.34 E2	1.20 E2	1.14 E2	Pass
		Co-60	8.10 - 10.1 E1	9.00 E1	9.90 E1	Pass
		Zn-65	1.89 - 2.46 E2	2.10 E2	2.12 E2	Pass

Tritium in Water

Reference Date	Sample I.D.	Nuclide	Acceptance Range pCi/l	Reference Value pCi/l	Reported Value pCi/l	Proficiency Check Status
4/5/2010	RAD-81*	H-3	1.08 - 1.36 E4	1.24 E4	1.16 E4	Pass
1/10/2010	Quik 120810K**	H-3	3.16 - 4.10 E3	3.72 E3	3.58 E3	Pass

** ERA study period 4/5/2010 - 5/20/2010, ERA data report issue date 5/26/2010*

*** ERA study period 12/8/2010 - 3/30/2011, ERA data report issue date 3/30/2010*

Table 5.0-B Footnote Explanations

(1) Gamma Emitters in Water, Sample ID RAD-81, Reference Date 4/5/2010

Reported result for Ba-133 was above the acceptance range limit (reference 6.17).

TABLE 5.0-C
2010 ENVIRONMENTAL DOSIMETER CROSS-CHECK RESULTS

Nuclear Technology Services

1st Quarter 2010

TLD Number	Reported (mR)	Delivered (mR)	Bias (% diff)	Pass/Fail Criteria	Pass/Fail
102379	105.0	101.9	3.04	<+/-15%	Pass
102385	103.0	101.9	1.08	<+/-15%	Pass
102403	103.0	101.9	1.08	<+/-15%	Pass
102480	101.0	101.9	-0.88	<+/-15%	Pass
102505	103.0	101.9	1.08	<+/-15%	Pass
		Average Bias (B)	1.08		
		Standard Deviation (S)	1.39		
		Measure Performance |B|+S	2.47	<15%	Pass

2nd Quarter 2010

TLD Number	Reported (mR)	Delivered (mR)	Bias (% diff)	Pass/Fail Criteria	Pass/Fail
102501	71.0	73.0	-2.74	<+/-15%	Pass
102013	73.0	73.0	0.00	<+/-15%	Pass
100309	73.0	73.0	0.00	<+/-15%	Pass
100623	70.0	73.0	-4.11	<+/-15%	Pass
102060	72.0	73.0	-1.37	<+/-15%	Pass
		Average Bias (B)	-1.64		
		Standard Deviation (S)	1.79		
		Measure Performance |B|+S	3.43	<15%	Pass

3rd Quarter 2010

TLD Number	Reported (mR)	Delivered (mR)	Bias (% diff)	Pass/Fail Criteria	Pass/Fail
100252	56.1	55.9	0.36	<+/-15%	Pass
100403	55.2	55.9	-1.25	<+/-15%	Pass
101143	55.3	55.9	-1.07	<+/-15%	Pass
100065	54.2	55.9	-3.04	<+/-15%	Pass
100054	57.2	55.9	2.33	<+/-15%	Pass
		Average Bias (B)	-0.54		
		Standard Deviation (S)	2.00		
		Measure Performance |B|+S	2.54	<15%	Pass

4th Quarter 2010

TLD Number	Reported (mR)	Delivered (mR)	Bias (% diff)	Pass/Fail Criteria	Pass/Fail
102367	88.0	84.0	4.76	<+/-15%	Pass
102399	91.0	84.0	8.33	<+/-15%	Pass
102402	87.0	84.0	3.57	<+/-15%	Pass
102480	90.0	84.0	7.14	<+/-15%	Pass
102510	90.0	84.0	7.14	<+/-15%	Pass
		Average Bias (B)	6.19		
		Standard Deviation (S)	1.96		
		Measure Performance |B|+S	8.15	<15%	Pass

Internal Crosscheck (Duke Energy)

1st Quarter 2010

TLD Number	Reported (mR)	Delivered (mR)	Bias (% diff)	Pass/Fail Criteria	Pass/Fail
102384	21.5	22.0	-2.18	<+/-15%	Pass
102399	21.4	22.0	-2.82	<+/-15%	Pass
102406	21.9	22.0	-0.50	<+/-15%	Pass
102487	20.5	22.0	-6.68	<+/-15%	Pass
102260	21.1	22.0	-4.27	<+/-15%	Pass
102504	21.2	22.0	-3.45	<+/-15%	Pass
102393	20.8	22.0	-5.45	<+/-15%	Pass
102261	21.2	22.0	-3.68	<+/-15%	Pass
102343	20.9	22.0	-5.09	<+/-15%	Pass
101235	21.5	22.0	-2.36	<+/-15%	Pass
		Average Bias (B)	-3.65		
		Standard Deviation (S)	1.81		
		Measure Performance |B|+S	5.46	<15%	Pass

2nd Quarter 2010

TLD Number	Reported (mR)	Delivered (mR)	Bias (% diff)	Pass/Fail Criteria	Pass/Fail
101183	29.2	30.0	-2.60	<+/-15%	Pass
100709	29.8	30.0	-0.70	<+/-15%	Pass
101167	29.0	30.0	-3.30	<+/-15%	Pass
101290	28.2	30.0	-6.07	<+/-15%	Pass
100027	28.2	30.0	-6.07	<+/-15%	Pass
101310	28.6	30.0	-4.67	<+/-15%	Pass
101189	29.6	30.0	-1.33	<+/-15%	Pass
101158	29.7	30.0	-1.03	<+/-15%	Pass
101386	31.0	30.0	3.47	<+/-15%	Pass
101398	32.4	30.0	8.03	<+/-15%	Pass
		Average Bias (B)	-1.43		
		Standard Deviation (S)	4.38		
		Measure Performance |B|+S	5.81	<15%	Pass

3rd Quarter 2010

TLD Number	Reported (mR)	Delivered (mR)	Bias (% diff)	Pass/Fail Criteria	Pass/Fail
102264	96.8	100.0	-3.21	<+/-15%	Pass
102406	101.4	100.0	1.41	<+/-15%	Pass
102399	99.7	100.0	-0.30	<+/-15%	Pass
102403	97.0	100.0	-2.97	<+/-15%	Pass
102480	98.8	100.0	-1.17	<+/-15%	Pass
102505	99.0	100.0	-1.00	<+/-15%	Pass
102440	95.1	100.0	-4.95	<+/-15%	Pass
102479	95.7	100.0	-4.33	<+/-15%	Pass
101136	98.2	100.0	-1.84	<+/-15%	Pass
102339	95.6	100.0	-4.41	<+/-15%	Pass
		Average Bias (B)	-2.28		
		Standard Deviation (S)	2.05		
		Measure Performance |B|+S	4.33	<15%	Pass

4th Quarter 2010

TLD Number	Reported (mR)	Delivered (mR)	Bias (% diff)	Pass/Fail Criteria	Pass/Fail
102301	33.1	35.0	-5.46	<+/-15%	Pass
102471	34.8	35.0	-0.49	<+/-15%	Pass
102083	33.7	35.0	-3.66	<+/-15%	Pass
102442	33.4	35.0	-4.60	<+/-15%	Pass
102389	33.4	35.0	-4.46	<+/-15%	Pass
102362	33.9	35.0	-3.20	<+/-15%	Pass
101413	33.4	35.0	-4.66	<+/-15%	Pass
102007	33.1	35.0	-5.57	<+/-15%	Pass
102509	34.9	35.0	-0.31	<+/-15%	Pass
102058	33.2	35.0	-5.23	<+/-15%	Pass
		Average Bias (B)	-3.76		
		Standard Deviation (S)	1.92		
		Measure Performance |B|+S	5.68	<15%	Pass

6.0 REFERENCES

6.1 McGuire Selected License Commitment Manual

6.2 McGuire Technical Specifications

6.3 McGuire Updated Final Safety Analysis Report

6.4 McGuire Offsite Dose Calculation Manual

6.5 McGuire Annual Radiological Environmental Operating Report 1979 - 2009

6.6 McGuire Annual Radioactive Effluent Release Report 2010

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 EnRad Laboratories Operating Procedures

6.11 RETDAS, Radiological Effluent Tracking and Dose Assessment Software, Canberra Version 3.5.1, DPC Revision #4.0

6.12 NRC Integrated Inspection Report (50-369/2009004, 50-370/2009004)

6.13 Duke Energy Corporation EnRad Laboratory Charcoal Cartridge Study, performed 2001

6.14 Radiological Effluents Controls INOS Audit 10-15(INOS)(REC)(MNS)

6.15 Problem Investigation Program Database, V 3.4.1, Duke Energy Company, M-10-06597

6.16 Problem Investigation Program Database, V 3.4.1, Duke Energy Company, G-11-00581

6.17 Problem Investigation Program Database, V 3.4.1, Duke Energy Company, G-11-00598

6.18 Problem Investigation Program Database, V 3.4.1, Duke Energy Company, G-09-01290

6.19 Problem Investigation Program Database, V 3.4.1, Duke Energy Company, G-10-00780

6.20 Nuclear System Directive (NSD) 701, Records Management

APPENDIX A

ENVIRONMENTAL SAMPLING
&
ANALYSIS PROCEDURES

APPENDIX A

ENVIRONMENTAL SAMPLING AND ANALYSIS PROCEDURES

Adherence to established procedures for sampling and analysis of all environmental media at McGuire Nuclear Station was 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 EnRad Laboratories, Dosimetry and Records, and Fisheries and Aquatic Ecology.

This appendix describes the environmental sampling frequencies and analysis procedures by media type.

I. CHANGE OF SAMPLING PROCEDURES

TLD Location 178 (Special Interest) distance was updated from SE sector 9.32 miles to 9.36 miles as a result of assessment RP-SA-2009-0024 (reference 6.18).

TLD Location 190 (Site Boundary TLD) was relocated due to onsite construction. Distance updated from WSW sector 0.33 miles to 0.37 miles (reference 6.19).

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 a pre-weighed amount of ion exchange resin to remove and concentrate any iodine in the aqueous sample (milk). The resin is then dried, mixed thoroughly, and a net resin weight determined before being 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 or Perkin-Elmer 2900TR liquid scintillation system. Tritium samples are distilled and batch processed with a tritium

spike and blank to verify instrument performance and sample preparation technique are acceptable.

Gross beta analysis is performed by concentrating a designated aliquot of sample precipitate and analyzing by Tennelec XLB Series 5 gas-flow proportional counters. Samples are batch processed with a blank to ensure sample contamination has not occurred.

III. CHANGE OF ANALYSIS PROCEDURES

No analysis procedures were changed during 2010.

IV. SAMPLING AND ANALYSIS PROCEDURES

A.1 AIRBORNE PARTICULATE AND RADIOIODINE

Airborne particulate and radioiodine samples at each of seven 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 positioned 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 2 cubic feet per minute. Filters and cartridges were collected weekly. A separate weekly gamma analysis was performed on each charcoal cartridge and air particulate. A weekly gross beta analysis was performed on each filter. The continuous composite samples were collected from the locations listed below.

Location 102	=	Amity Church Road (9.89 mi. WNW)
Location 103	=	Cottonwood (4.20 mi. NE)
Location 120	=	Site Boundary (0.46 mi. NNE)
Location 121	=	Site Boundary (0.47 mi. NE)
Location 125	=	Site Boundary (0.38 mi. SW)
Location 133	=	Cornelius (6.23 mi. ENE)
Location 195	=	Fishing Access Road (0.19 mi. N)

A.2 DRINKING WATER

Monthly composite samples were collected. A gross beta and gamma analysis was performed on monthly composites. Tritium analysis was performed on the quarterly composites. The composites were collected monthly from the locations listed below.

Location 101	=	North Mecklenburg Water Treatment Facility (3.31 mi E)
Location 119	=	Mt. Holly Municipal Water Supply (7.40 mi. SSW)
Location 132	=	Charlotte Municipal Water Supply (11.1 mi. SSE)
Location 136	=	Mooresville Municipal Water Supply (12.7 mi. NNE)
Location 194	=	East Lincoln County Water Supply (6.73 mi. NNW)

A.3 SURFACE WATER

Monthly composite samples were collected. A 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 128	=	Discharge Canal Bridge (0.45 mi. NE)
Location 131	=	Cowans Ford Dam (0.64 mi. WNW)
Location 135	=	Plant Marshall Intake Canal (11.9 mi. N)

A.4 MILK

Biweekly grab samples were collected at one location. A gamma and low-level Iodine-131 analysis was performed on each sample. The biweekly grab samples were collected from the location listed below.

Location 141	=	Lynch Dairy - Cows (14.8 mi. WNW)

A.5 BROADLEAF VEGETATION

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

Location 102	=	Amity Church Road (9.89 mi. WNW)
Location 120	=	Site Boundary (0.46 mi. NNE)
Location 125	=	Site Boundary (0.38 mi. SW)
Location 193	=	Site Boundary (0.19 mi. N)

A.6 FOOD PRODUCTS

Samples were collected monthly when available during the harvest season and a gamma analysis was performed on each. The samples were collected at the location listed below.

Location 188	=	5 mile radius Gardens (2.79 mi NNE)

A.7 FISH

Semiannual samples were collected and a gamma analysis was performed on the edible portions of each sample. Boney fish (i.e. Sunfish) were prepared whole minus the head and tail portions. The samples were collected from the locations listed below.

Location 129	=	Discharge Canal Entrance to Lake Norman (0.51 mi. ENE)
Location 137	=	Pinnacle Access Area (12.0 mi. N)

A.8 SHORELINE SEDIMENT

Semiannual samples were collected and 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 129	=	Discharge Canal Entrance to Lake Norman (0.51 mi. ENE)
Location 130	=	Highway 73 Bridge Downstream (0.52 mi. SW)
Location 137	=	Pinnacle Access Area (12.0 mi. N)

A.9 DIRECT GAMMA RADIATION (TLD)

Thermoluminescent dosimeters (TLD) were collected quarterly at forty-one locations. A gamma exposure rate was determined for each TLD. TLD locations are listed in Table 2.1-B. The TLDs were placed as indicated below.

* An inner ring of 14 TLDs at the site boundary, one in each available meteorological sector. The site boundary locations in the N and NNW sectors are over water; however, two special interest TLD's were placed in these sectors inside the site boundary in March, 1991.

* 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.

A.10 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 Garden greater than 50 square meters or 500 square feet
* The Nearest Milk-giving Animal (cow, goat, etc.)

The census was conducted during the growing season on 5/19/2010. Results are shown in Table 3.10. No changes were made to the sampling procedures during 2010 as a result of the 2010 census.

In the environmental program, the air deposition parameters (D/Q) are used to determine air, broadleaf vegetation and milk sampling locations. McGuire's sectors with the three highest values did not change in 2010.

V. GLOBAL POSITIONING SYSTEM (GPS) ANALYSIS

The McGuire site centerline used for GPS measurements was referenced from the McGuire Nuclear Station Updated Final Safety Analysis Report (UFSAR), section 2.1.1, Site Location. Waypoint coordinates used for MNS GPS measurements were latitude 35°-25'-59"N and longitude 80°-56'-55"W. Maps and tables were generated using North American Datum (NAD) 27. Data normally reflect accuracy to within 2 to 5 meters from point of measurement. GPS field measurements were taken as close as possible to the item of interest. Distances for the locations are displayed using three significant figures.

APPENDIX B

RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM

SUMMARY OF RESULTS

2010

Environmental Radiological Monitoring Program Summary

Facility: McGuire Nuclear Station **Docket No. 50-369,370**

Location: Mecklenburg County, North Carolina **Report Period: 01-JAN-2010 to 31-DEC-2010**

Medium or Pathway Sampled Unit of Measurement	Type and Total Number of Analyses Performed		Lower Limit of Detection (LLD)	All Indicator Locations Mean (Fraction) Range	Location with Highest Annual Mean Name, Distance, Direction Location Code	 Mean (Fraction) Range	Control Location Mean (Fraction) Range	No.of Non-Routine Report Meas.
Air Particulate (pCi/m3)							102 (9.89 mi WNW)	
	BETA	371	1.00E-02	1.93E-2 (318/318)	103	2.01E-2 (53/53)	1.95E-2 (53/53)	0
				7.53E-3 - 3.56E-2	(4.20 mi NE)	1.21E-2 - 3.23E-2	9.59E-3 - 3.40E-2	
	CS-134	371	5.00E-02	0.00 (0/318)		0.00 (0/53)	0.00 (0/53)	0
				0.00 - 0.00		0.00 - 0.00	0.00 - 0.00	
	CS-137	371	6.00E-02	0.00 (0/318)		0.00 (0/53)	0.00 (0/53)	0
				0.00 - 0.00		0.00 - 0.00	0.00 - 0.00	
	I-131	371	7.00E-02	0.00 (0/318)		0.00 (0/53)	0.00 (0/53)	0
				0.00 - 0.00		0.00 - 0.00	0.00 - 0.00	

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

Environmental Radiological Monitoring Program Summary

Facility: McGuire Nuclear Station **Docket No. 50-369,370**

Location: Mecklenburg County, North Carolina **Report Period: 01-JAN-2010 to 31-DEC-2010**

Medium or Pathway Sampled	Type and Total Number of	Lower Limit of Detection	All Indicator Locations	Location with Highest Annual Mean Name, Distance, Direction		Control Location	No. of Non-Routine Report Meas.
Unit of Measurement	Analyses Performed	(LLD)	Mean (Fraction) Range	Location Code	Mean (Fraction) Range	Mean (Fraction) Range	
Air Radioiodine (pCi/m3)						102 (9.89 mi WNW)	
CS-134	371	5.00E-02	0.00 (0/318)		0.00 (0/53)	0.00 (0/53)	0
			0.00 - 0.00		0.00 - 0.00	0.00 - 0.00	
CS-137	371	6.00E-02	0.00 (0/318)		0.00 (0/53)	0.00 (0/53)	0
			0.00 - 0.00		0.00 - 0.00	0.00 - 0.00	
I-131	371	7.00E-02	0.00 (0/318)		0.00 (0/53)	0.00 (0/53)	0
			0.00 - 0.00		0.00 - 0.00	0.00 - 0.00	

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

Environmental Radiological Monitoring Program Summary

Facility: McGuire Nuclear Station **Docket No. 50-369,370**

Location: Mecklenburg County, North Carolina **Report Period: 01-JAN-2010 to 31-DEC-2010**

Medium or Pathway Sampled Unit of Measurement	Type and Total Number of Analyses Performed		Lower Limit of Detection (LLD)	All Indicator Locations Mean (Fraction) Range	Location with Highest Annual Mean Name, Distance, Direction Location Code	 Mean (Fraction) Range	Control Location Mean (Fraction) Range	No. of Non-Routine Report Meas.
Drinking Water (pCi/liter)							136 (12.7 mi NNE)	
	BALA-140	65	15	0.00 (0/52)		0.00 (0/13)	0.00 (0/13)	0
				0.00 - 0.00		0.00 - 0.00	0.00 - 0.00	
	BETA	65	4	1.78 (50/52)	101	1.85 (13/13)	1.74 (12/13)	0
				0.83 - 2.68	(3.31 mi E)	1.08 - 2.57	1.12 - 2.37	
	CO-58	65	15	0.00 (0/52)		0.00 (0/13)	0.00 (0/13)	0
				0.00 - 0.00		0.00 - 0.00	0.00 - 0.00	
	CO-60	65	15	0.00 (0/52)		0.00 (0/13)	0.00 (0/13)	0
				0.00 - 0.00		0.00 - 0.00	0.00 - 0.00	
	CS-134	65	15	0.00 (0/52)		0.00 (0/13)	0.00 (0/13)	0
				0.00 - 0.00		0.00 - 0.00	0.00 - 0.00	
	CS-137	65	18	0.00 (0/52)		0.00 (0/13)	0.00 (0/13)	0
				0.00 - 0.00		0.00 - 0.00	0.00 - 0.00	
	FE-59	65	30	0.00 (0/52)		0.00 (0/13)	0.00 (0/13)	0
				0.00 - 0.00		0.00 - 0.00	0.00 - 0.00	
	H-3	20	2000	503 (13/16)	101	720 (4/4)	0.00(0/0)	0
				176 - 1210	(3.31 mi E)	474 - 1210	0.00 - 0.00	
	I-131	65	15	0.00 (0/52)		0.00 (0/13)	0.00 (0/13)	0
				0.00 - 0.00		0.00 - 0.00	0.00 - 0.00	
	MN-54	65	15	0.00 (0/52)		0.00 (0/13)	0.00 (0/13)	0
				0.00 - 0.00		0.00 - 0.00	0.00 - 0.00	
	NB-95	65	15	0.00 (0/52)		0.00 (0/13)	0.00 (0/13)	0
				0.00 - 0.00		0.00 - 0.00	0.00 - 0.00	
	ZN-65	65	30	0.00 (0/52)		0.00 (0/13)	0.00 (0/13)	0
				0.00 - 0.00		0.00 - 0.00	0.00 - 0.00	
	ZR-95	65	15	0.00 (0/52)		0.00 (0/13)	0.00 (0/13)	0
				0.00 - 0.00		0.00 - 0.00	0.00 - 0.00	

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

Environmental Radiological Monitoring Program Summary

Facility: McGuire Nuclear Station **Docket No. 50-369,370**

Location: Mecklenburg County, North Carolina **Report Period: 01-JAN-2010 to 31-DEC-2010**

Medium or Pathway Sampled Unit of Measurement	Type and Total Number of Analyses Performed		Lower Limit of Detection (LLD)	All Indicator Locations Mean (Fraction) Range	Location with Highest Annual Mean Name, Distance, Direction Location Code	 Mean (Fraction) Range	Control Location Mean (Fraction) Range	No. of Non-Routine Report Meas.
Surface Water (pCi/liter)							135 (11.9 mi N)	
	BALA-140	39	15	0.00 (0/26)		0.00 (0/13)	0.00 (0/13)	0
				0.00 - 0.00		0.00 - 0.00	0.00 - 0.00	
	CO-58	39	15	0.00 (0/26)		0.00 (0/13)	0.00 (0/13)	0
				0.00 - 0.00		0.00 - 0.00	0.00 - 0.00	
	CO-60	39	15	0.00 (0/26)		0.00 (0/13)	0.00 (0/13)	0
				0.00 - 0.00		0.00 - 0.00	0.00 - 0.00	
	CS-134	39	15	0.00 (0/26)		0.00 (0/13)	0.00 (0/13)	0
				0.00 - 0.00		0.00 - 0.00	0.00 - 0.00	
	CS-137	39	18	0.00 (0/26)		0.00 (0/13)	0.00 (0/13)	0
				0.00 - 0.00		0.00 - 0.00	0.00 - 0.00	
	FE-59	39	30	0.00 (0/26)		0.00 (0/13)	0.00 (0/13)	0
				0.00 - 0.00		0.00 - 0.00	0.00 - 0.00	
	H-3	12	2000	740 (8/8)	128	1090 (4/4)	0.00 (0/4)	0
				242 - 1790	(0.45 mi NE)	528 - 1790	0.00 - 0.00	
	I-131	39	15	0.00 (0/26)		0.00 (0/13)	0.00 (0/13)	0
				0.00 - 0.00		0.00 - 0.00	0.00 - 0.00	
	MN-54	39	15	0.00 (0/26)		0.00 (0/13)	0.00 (0/13)	0
				0.00 - 0.00		0.00 - 0.00	0.00 - 0.00	
	NB-95	39	15	0.00 (0/26)		0.00 (0/13)	0.00 (0/13)	0
				0.00 - 0.00		0.00 - 0.00	0.00 - 0.00	
	ZN-65	39	30	0.00 (0/26)		0.00 (0/13)	0.00 (0/13)	0
				0.00 - 0.00		0.00 - 0.00	0.00 - 0.00	
	ZR-95	39	15	0.00 (0/26)		0.00 (0/13)	0.00 (0/13)	0
				0.00 - 0.00		0.00 - 0.00	0.00 - 0.00	

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

Environmental Radiological Monitoring Program Summary

Facility: McGuire Nuclear Station **Docket No. 50-369,370**

Location: Mecklenburg County, North Carolina **Report Period: 01-JAN-2010 to 31-DEC-2010**

Medium or Pathway Sampled Unit of Measurement	Type and Total Number of Analyses Performed		Lower Limit of Detection (LLD)	All Indicator Locations Mean (Fraction) Range	Location with Highest Annual Mean Name, Distance, Direction Location Code	 Mean (Fraction) Range	Control Location Mean (Fraction) Range	No. of Non-Routine Report Meas.
Milk (pCi/liter)				NO INDICATOR LOCATION			141 (14.8 mi WNW)	
	BALA-140	26	15	0.00 (0/26)		0.00 (0/26)	0.00 (0/26)	0
				0.00 - 0.00		0.00 - 0.00	0.00 - 0.00	
	CS-134	26	15	0.00 (0/26)		0.00 (0/26)	0.00 (0/26)	0
				0.00 - 0.00		0.00 - 0.00	0.00 - 0.00	
	CS-137	26	18	0.00 (0/26)		0.00 (0/26)	0.00 (0/26)	0
				0.00 - 0.00		0.00 - 0.00	0.00 - 0.00	
	I-131	26	15	0.00 (0/26)		0.00 (0/26)	0.00 (0/26)	0
				0.00 - 0.00		0.00 - 0.00	0.00 - 0.00	
	LLI-131	26	1	0.00 (0/26)		0.00 (0/26)	0.00 (0/26)	0
				0.00 - 0.00		0.00 - 0.00	0.00 - 0.00	

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

Environmental Radiological Monitoring Program Summary

Facility: McGuire Nuclear Station **Docket No. 50-369,370**

Location: Mecklenburg County, North Carolina **Report Period: 01-JAN-2010 to 31-DEC-2010**

Medium or Pathway Sampled Unit of Measurement	Type and Total Number of Analyses Performed		Lower Limit of Detection (LLD)	All Indicator Locations Mean (Fraction) Range	Location with Highest Annual Mean Name, Distance, Direction Location Code	 Mean (Fraction) Range	Control Location Mean (Fraction) Range	No. of Non-Routine Report Meas.
Broadleaf Vegetation (pCi/kg-wet)							102 (9.89 mi WNW)	
	CS-134	48	60	0.00 (0/36)		0.00 (0/12)	0.00 (0/12)	0
				0.00 - 0.00		0.00 - 0.00	0.00 - 0.00	
	CS-137	48	80	0.00 (0/36)		0.00 (0/12)	0.00 (0/12)	0
				0.00 - 0.00		0.00 - 0.00	0.00 - 0.00	
	I-131	48	60	0.00 (0/36)		0.00 (0/12)	0.00 (0/12)	0
				0.00 - 0.00		0.00 - 0.00	0.00 - 0.00	

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

Environmental Radiological Monitoring Program Summary

Facility: McGuire Nuclear Station **Docket No. 50-369,370**

Location: Mecklenburg County, North Carolina **Report Period: 01-JAN-2010 to 31-DEC-2010**

Medium or Pathway Sampled Unit of Measurement	Type and Total Number of Analyses Performed		Lower Limit of Detection (LLD)	All Indicator Locations Mean (Fraction) Range	Location with Highest Annual Mean Name, Distance, Direction Location Code	 Mean (Fraction) Range	Control Location Mean (Fraction) Range	No. of Non-Routine Report Meas.
Food Products (pCi/kg-wet)							NO CONTROL LOCATION	
	CS-134	12	60	0.00 (0/12)		0.00 (0/12)	0.00 (0/0)	0
				0.00 - 0.00		0.00 - 0.00	0.00 - 0.00	
	CS-137	12	80	0.00 (0/12)		0.00 (0/12)	0.00 (0/0)	0
				0.00 - 0.00		0.00 - 0.00	0.00 - 0.00	
	I-131	12	60	0.00 (0/12)		0.00 (0/12)	0.00 (0/0)	0
				0.00 - 0.00		0.00 - 0.00	0.00 - 0.00	

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

Environmental Radiological Monitoring Program Summary

Facility: McGuire Nuclear Station **Docket No. 50-369,370**

Location: Mecklenburg County, North Carolina **Report Period: 01-JAN-2010 to 31-DEC-2010**

Medium or Pathway Sampled Unit of Measurement	Type and Total Number of Analyses Performed		Lower Limit of Detection (LLD)	All Indicator Locations Mean (Fraction) Range	Location with Highest Annual Mean Name, Distance, Direction Location Code	 Mean (Fraction) Range	Control Location Mean (Fraction) Range	No. of Non-Routine Report Meas.
Fish (pCi/kg-wet)							137 (12.0 mi N)	
	CO-58	12	130	0.00 (0/6)		0.00 (0/6)	0.00 (0/6)	0
				0.00 - 0.00		0.00 - 0.00	0.00 - 0.00	
	CO-60	12	130	0.00 (0/6)		0.00 (0/6)	0.00 (0/6)	0
				0.00 - 0.00		0.00 - 0.00	0.00 - 0.00	
	CS-134	12	130	0.00 (0/6)		0.00 (0/6)	0.00 (0/6)	0
				0.00 - 0.00		0.00 - 0.00	0.00 - 0.00	
	CS-137	12	150	23.3 (1/6)	129	23.3 (1/6)	13.2 (1/6)	0
				23.3 - 23.3	(0.51 mi ENE)	23.3 - 23.3	13.2 - 13.2	
	FE-59	12	260	0.00 (0/6)		0.00 (0/6)	0.00 (0/6)	0
				0.00 - 0.00		0.00 - 0.00	0.00 - 0.00	
	MN-54	12	130	0.00 (0/6)		0.00 (0/6)	0.00 (0/6)	0
				0.00 - 0.00		0.00 - 0.00	0.00 - 0.00	
	ZN-65	12	260	0.00 (0/6)		0.00 (0/6)	0.00 (0/6)	0
				0.00 - 0.00		0.00 - 0.00	0.00 - 0.00	

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

Environmental Radiological Monitoring Program Summary

Facility: McGuire Nuclear Station **Docket No. 50-369,370**

Location: Mecklenburg County, North Carolina **Report Period: 01-JAN-2010 to 31-DEC-2010**

Medium or Pathway Sampled Unit of Measurement	Type and Total Number of Analyses Performed		Lower Limit of Detection (LLD)	All Indicator Locations Mean (Fraction) Range	Location with Highest Annual Mean Name, Distance, Direction Location Code	 Mean (Fraction) Range	Control Location Mean (Fraction) Range	No. of Non-Routine Report Meas.
Shoreline Sediment (pCi/kg-dry)							137 (12.0 mi N)	
	MN-54	6	0	0.00 (0/4)		0.00 (0/2)	0.00 (0/2)	
				0.00 - 0.00		0.00 - 0.00	0.00 - 0.00	
	CO-58	6	0	0.00 (0/4)		0.00 (0/2)	0.00 (0/2)	0
				0.00 - 0.00		0.00 - 0.00	0.00 - 0.00	
	CO-60	6	0	0.00 (0/4)		0.00 (0/2)	0.00 (0/2)	0
				0.00 - 0.00		0.00 - 0.00	0.00 - 0.00	
	CS-134	6	150	0.00 (0/4)		0.00 (0/2)	0.00 (0/2)	0
				0.00 - 0.00		0.00 - 0.00	0.00 - 0.00	
	CS-137	6	180	75.8 (2/4)	130	75.8 (2/2)	0.00 (0/2)	0
				31.6 - 120	(0.52 mi SW)	31.6 - 120	0.00 - 0.00	

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 0.00, then the LLD is not required by Selected Licensee Commitments

Environmental Radiological Monitoring Program Summary

Facility: McGuire Nuclear Station **Docket No. 50-369,370**

Location: Mecklenburg County, North Carolina **Report Period: 01-JAN-2010 to 31-DEC-2010**

Medium or Pathway Sampled Unit of Measurement	Type and Total Number of Analyses Performed	Lower Limit of Detection (LLD)	All Indicator Locations Mean (Fraction) Range	Location with Highest Annual Mean Name, Distance, Direction Location Code	 Mean (Fraction) Range	Control Location Mean (Fraction) Range	No. of Non-Routine Report Meas.
Direct Radiation TLD (mR/standard quarter)						175 (15.5 mi WNW)	
	163	0.00E+00	17.0 (159/159)	180	27.0 (4/4)	22.3 (4/4)	0
			10.0 - 30.0	(12.7 mi NNE)	25.0 - 30.	20.0 - 25.0	

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

APPENDIX C

SAMPLING DEVIATIONS
&
UNAVAILABLE ANALYSES

APPENDIX C

MCGUIRE 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 Lab Accident
LC	Line Clog to Sampler	SM	Motor / Rotor Seized
OT	Other	TF	Torn Filter
PI	Power Interrupt	VN	Vandalism
PM	Preventive Maintenance	CN	Construction

C.1 SAMPLING DEVIATIONS

Air Particulate and Air Radioiodines

Location	Scheduled Collection Dates	Actual Collection Dates	Reason Code	Corrective Action
103	1/18 - 1/25/2010	1/18 - 1/25/2010	PI	Power to equipment was interrupted for about 12 hours during composite period. Suspected cause inclement weather.

Drinking Water

Location	Scheduled Collection Dates	Actual Collection Dates	Reason Code	Corrective Action
119	6/1 - 6/28/2010	6/1 - 6/28/2010	LC	Collection reservoir supply line clogged. Line clog removed and flow restored. Grab sample taken at time of collection. Normal sampling resumed 6/28/2010.

Surface Water

Location	Scheduled Collection Dates	Actual Collection Dates	Reason Code	Corrective Action
128	6/28 - 7/26/2010	6/28 - 7/26/2010	PS	Power to sampling equipment interrupted. Work request 81510 written. Grab sample taken. Maintenance personnel found lightning strike damage to power supply. Submersible pump and components replaced and normal sampling resumed.
135	11/15 - 12/13/2010	11/15 - 12/13/2010	PO	Power outage to sampling equipment. Work request 85922 written. Grab sample taken. Power outage estimated to be about 1 day based on available sample volume.

C.2 UNAVAILABLE ANALYSES

TLD

Location	Scheduled Collection Dates	Reason Code	Corrective Action
161	6/17 - 9/16/2010	CN	TLD missing. 4th quarter 2010 TLD placed in field.

APPENDIX D

ANALYTICAL DEVIATIONS

No Analytical deviations were incurred for the
2010 Radiological Environmental Monitoring Program

APPENDIX E

RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM RESULTS

This appendix includes sample analysis reports and supportive data generated from each sample medium. Appendix E is located separately from this report and is permanently archived in the Nuclear Electronic Document Library (NEDL) as described in reference 6.20.