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May 5, 2003

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

Subject: McGuire Nuclear Station
Docket Nos. 50-369 and 50-370
Annual Radiological Environmental Operating Report

Pursuant to the requirements of Technical Specification 5.6.2, attached is the Annual Radiological Environmental Operating Report (AREOR) for the 2002 calendar year.

Questions regarding this report should be directed to Kay Crane, McGuire Regulatory Compliance at (704) 875-4306.

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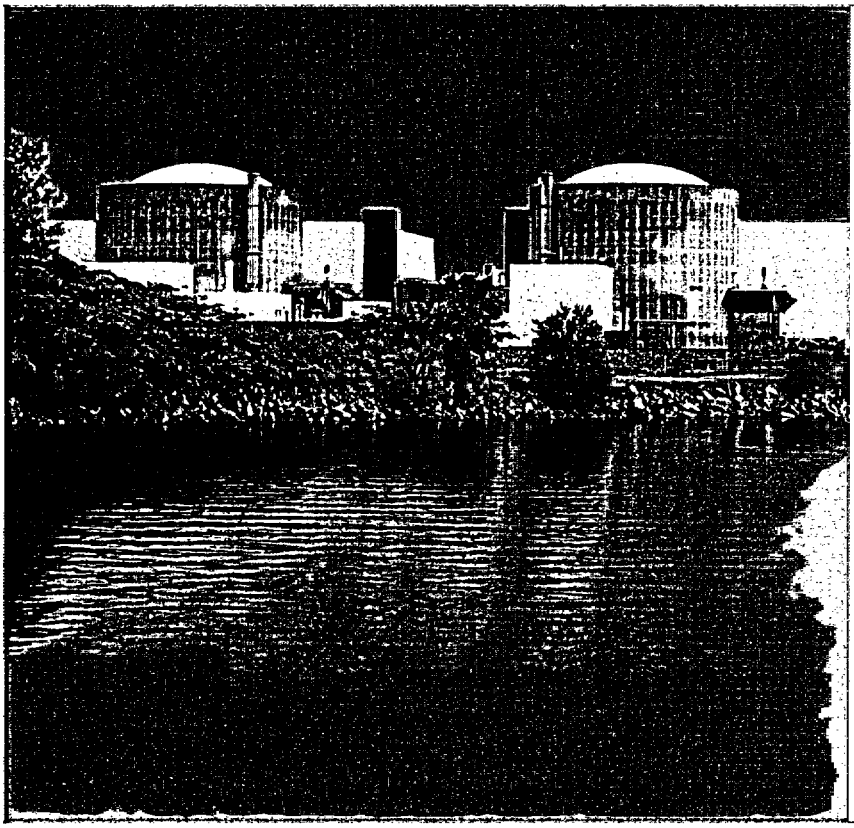
McGuire Nuclear Station
Units 1 and 2



AREOR

Annual
Radiological Environmental
Operating Report
2002

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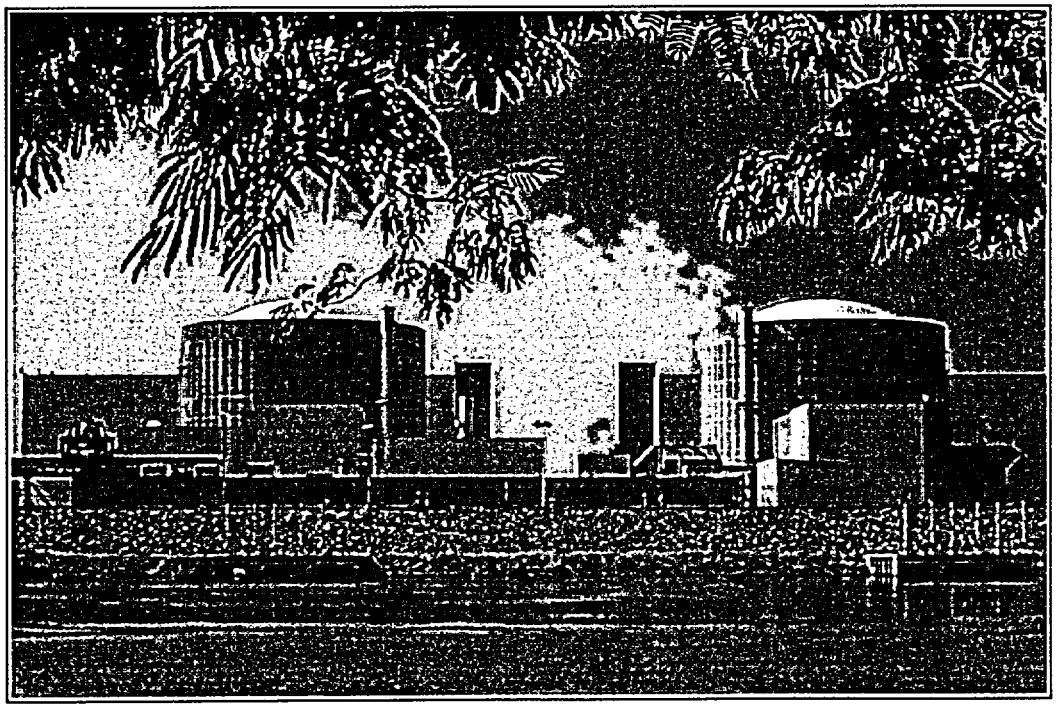
ANNUAL RADIOLOGICAL ENVIRONMENTAL OPERATING REPORT

DUKE POWER COMPANY
MCGUIRE NUCLEAR STATION
Units 1 and 2

2002



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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
GI-LLI	Gastrointestinal – Lower Large Intestine
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 Process
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 2002.

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 ninety-one samples were analyzed comprising 1,334 test results in order to compile data for the 2002 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 2002 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 7.93E-2 mrem for 2002. It is therefore concluded that station operations has had no significant radiological impact on the health and safety of the public or the environment.

Vegetation Sampling

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 to support beef cattle and 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 Power Company'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. The following equation was used to estimate the mean (reference 6.8):

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

Where:

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

NOTE: "Net activity (or concentration)" is the activity (or concentration) determined to be present in the sample. No "Minimum Detectable Activity", "Lower Limit of Detection", "Less Than Level", or negative activities or concentrations are included in the calculation of the mean.

2.3.2 LOWER LEVEL OF DETECTION 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.

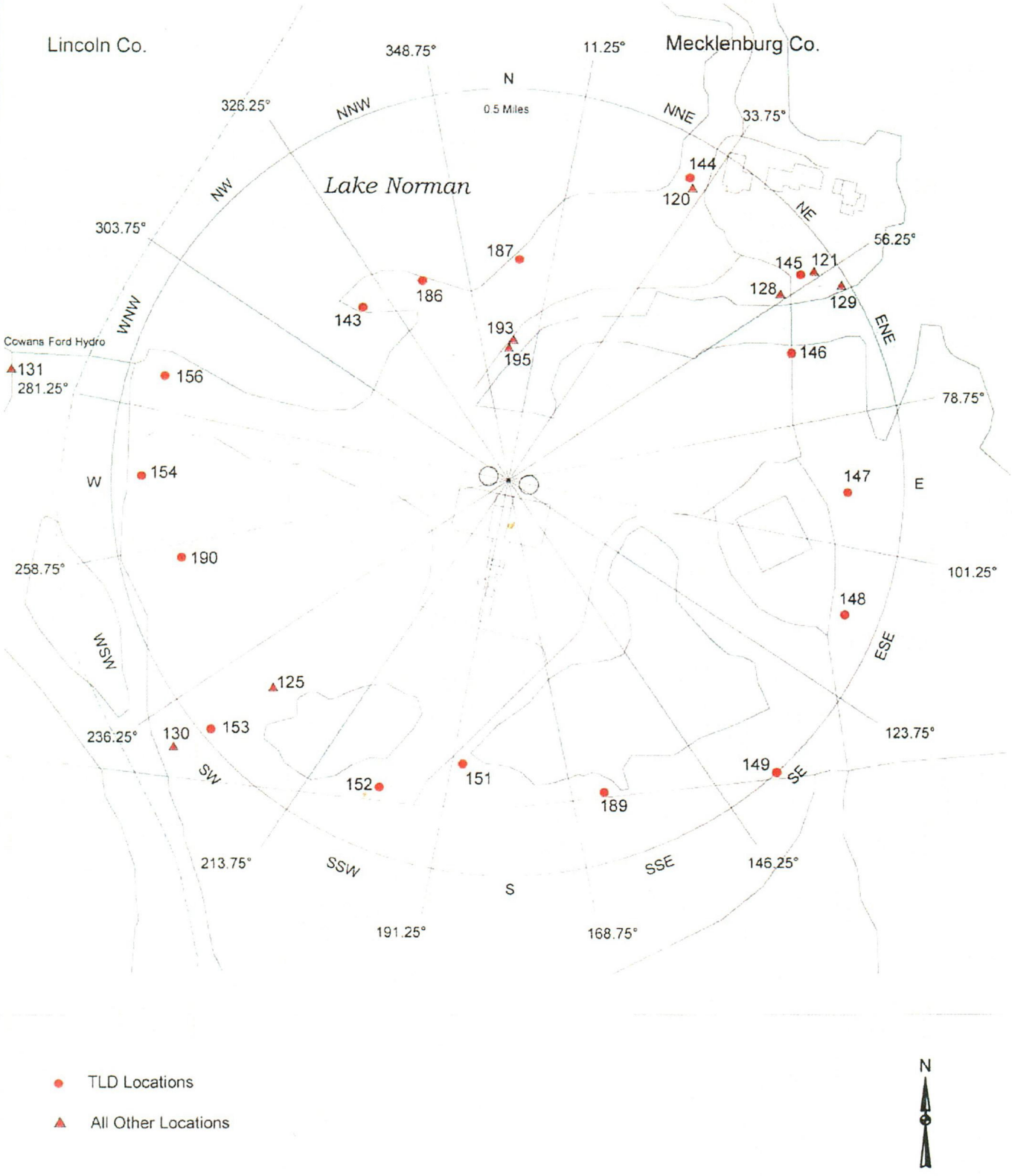
MDA - The MDA may be thought of as an "actual" LLD for a particular sample measurement remembering that the MDA is calculated using a sample background instead of a system background.

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.

McGuire Nuclear Station
Figure 2.1-1
Sampling Locations Map (0.5 Mile Radius)



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McGuire Nuclear Station
Figure 2.1-2
Sampling Locations Map (Ten Mile Radius)

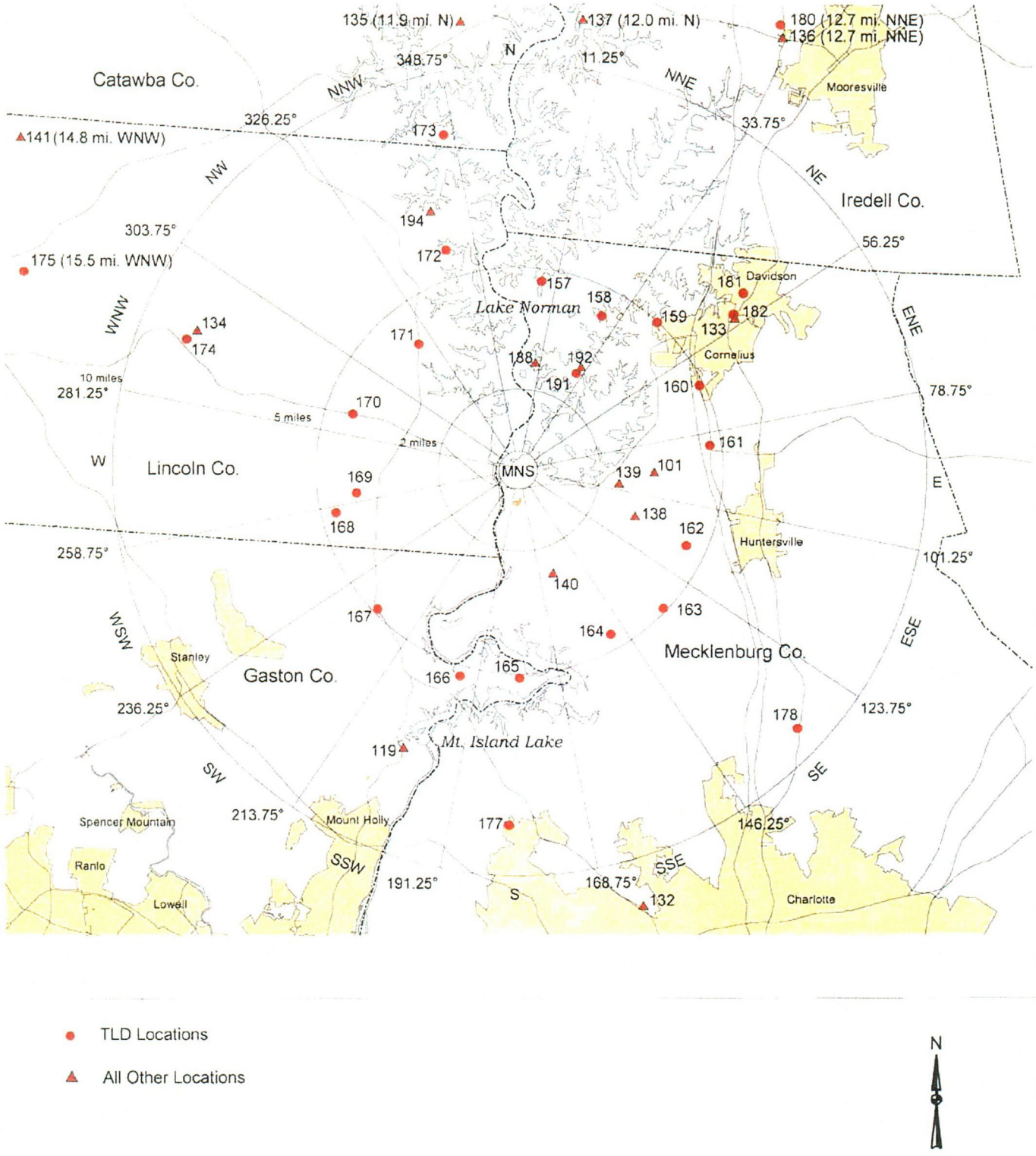

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TABLE 2.1-A

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		

Site #	Location Description	Air Rad. & Part.	Surface Water	Drinking Water	Shoreline Sediment	Food Products	Fish	Milk	Broad Leaf Veg.
101	North Mecklenburg Water Supply (3.3 mi E)			BW					
119	Mt. Holly Municipal Water Supply (7.4 mi SSW)			BW					
120	Site Boundary (0.5 mi NNE)	W							M (b)
121	Site Boundary (0.5 mi NE)	W							
125	Site Boundary (0.4 mi SW)	W							M (b)
128	Discharge Canal Bridge (0.4 mi NE)		BW						
129	Discharge Canal Entrance to Lake Norman (0.5 mi ENE)				SA		SA		
130	Hwy 73 Bridge Downstream (0.5 mi SW)				SA				
131	Cowans Ford Dam (0.6 mi WNW)		BW						
132	Charlotte Municipal Water Supply (11.2 mi SSE)			BW					
133	Cornelius (6.2 mi NE)	W							
134 C	East Lincoln Jr.High School (8.8 mi WNW)	W							M (b)
135 C	Plant Marshall Intake Canal (11.9 mi N)		BW						
136 C	Mooresville Municipal Water Supply (12.7 mi NNE)			BW					
137 C	Pinnacle Access Area (12.0 mi N)				SA		SA		
138	Henry Cook Dairy (3.1 mi ESE)							SM	
139	William Cook Dairy (2.5 mi E)							SM	
141 C	Lynch Dairy-Cows (14.8 mi WNW)							SM	
188	5 mile radius Gardens (2.8 mi N)					M (a)			
192	Peninsula (2.8 mi NNE)	W							
193	Site Boundary (0.2 mi N)								M (b)
194	East Lincoln County Water Supply (6.7 mi NNW)			BW					
195	Fishing Access Road (0.2 mi N)	W							

(a) During Harvest Season
(b) When Available

TABLE 2.1-B

MCGUIRE RADIOLOGICAL MONITORING PROGRAM
SAMPLING LOCATIONS

(TLD SITES)

Site #	Location	Distance	Sector	Site #	Location	Distance	Sector
143	SITE BOUNDARY	0.3 miles	NW	164	HAMBRIGHT & BEATTIES FORD ROAD	4.6 miles	SSE
144	SITE BOUNDARY	0.5 miles	NNE	165	HORSESHOE BEND BEACH ROAD	5.1 miles	S
145	SITE BOUNDARY	0.5 miles	NE	166	RIVERBEND FOSSIL STATION	5.3 miles	SSW
146	SITE BOUNDARY	0.4 miles	ENE	167	LUCIA RIVERBEND HWY/ OLD FIREHOUSE	4.9 miles	SW
147	SITE BOUNDARY	0.4 miles	E	168	OLD PLANK ROAD BRIDGE	4.6 miles	WSW
148	SITE BOUNDARY	0.5 miles	ESE	169	GLOVER LANE	4.0 miles	W
149	SITE BOUNDARY	0.5 miles	SE	170	LITTLE EGYPT ROAD	4.3 miles	WNW
151	SITE BOUNDARY	0.4 miles	S	171	TRIANGLE ACE HARDWARE	4.0 miles	NW
152	SITE BOUNDARY	0.4 miles	SSW	172	WESTPORT COMMUNITY AT GOLF COURSE DRIVE	5.7 miles	NNW
153	SITE BOUNDARY	0.5 miles	SW	173 SI	KEISTLER STORE / GLENWOOD ROAD	8.4 miles	NNW
154	SITE BOUNDARY	0.5 miles	W	174 SI	EAST LINCOLN JR. HIGH SCHOOL	8.8 miles	WNW
156	SITE BOUNDARY	0.5 miles	WNW	175 C	BOGER CITY	15.5 miles	WNW
189	SITE BOUNDARY	0.4 miles	SSE	177 SI	BELMARROW ROAD / COULWOOD COMMUNITY	8.8 miles	S
190	SITE BOUNDARY	0.4 miles	WSW	178 SI	FLORIDA STEEL CORPORATION	9.3 miles	SE
157	THE POINTE/MOORESVILLE	4.7 miles	N	180 SI	MOORESVILLE WATER TREATMENT FACILITY	12.7 miles	NNE
158	BETHEL CHURCH ROAD	4.3 miles	NNE	181 SI	OLD DAVIDSON WATER TREATMENT FACILITY	7.0 miles	NE
159	HENDERSON ROAD	5.0 miles	NE	182 SI	CORNELIUS / AIR SITE # 133	6.2 miles	NE
160	ANCHORAGE MARINE SHOWROOM	4.9 miles	ENE	186 SI	MCGUIRE FISHING ACCESS ROAD ON PENINSULA	0.2 miles	NNW
161	SAM FURR ROAD & HWY 21	4.7 miles	E	187 SI	ENERGY EXPLORIUM / AIR SITE # 195	0.2 miles	N
162	RANSON ROAD	4.5 miles	ESE	191 SI	PENINSULA DEVELOPMENT / AIR SITE # 192	2.8 miles	NNE
163	MCCOY ROAD	4.9 miles	SE				

C = Control
SI = Special 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	1		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 Particulates	Weekly				X	
	Quarterly Composite	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					
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 2002 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 2002 was 3.22% for drinking water tritium at the North Mecklenburg Water Treatment Facility (Location 101). Only Selected Licensee Commitments radionuclides were detected in 2002.

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.

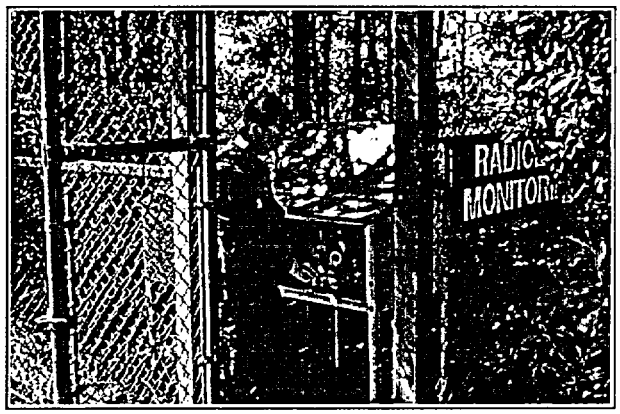
Data presented in Sections 3.1 through 3.9 support the conclusion that there was no significant increase in radioactivity in the environment around McGuire Nuclear Station due to station operations in 2002. Similarly, there was no significant increase in ambient background radiation levels in the surrounding areas. The 2002 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 2002, 364 particulate and radioiodine samples were analyzed, 312 at six indicator locations and 52 at the control location. Particulate samples were analyzed weekly for gross beta. Gamma analysis was performed on 28 particulate composite samples, 24 at the six indicator locations and four at the control location. Radioiodine samples received a weekly gamma analysis.

Per Selected Licensee Commitments, if gross beta in air particulate samples is greater than ten times the yearly mean of control samples, gamma isotopic analysis shall be performed on individual samples. As in previous years, the location with the highest mean (1.57E-2 pCi/m^3) in 2002 was less than ten times the yearly mean of the control location (1.72E-2 pCi/m^3). Therefore, gamma isotopic analysis was performed quarterly on composite particulate filters. No detectable gamma emitting particulate activity has been found in environmental air samples since 1987.

No detectable I-131 activity in any environmental air radioiodine samples was found in 2002. 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 2002. 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.

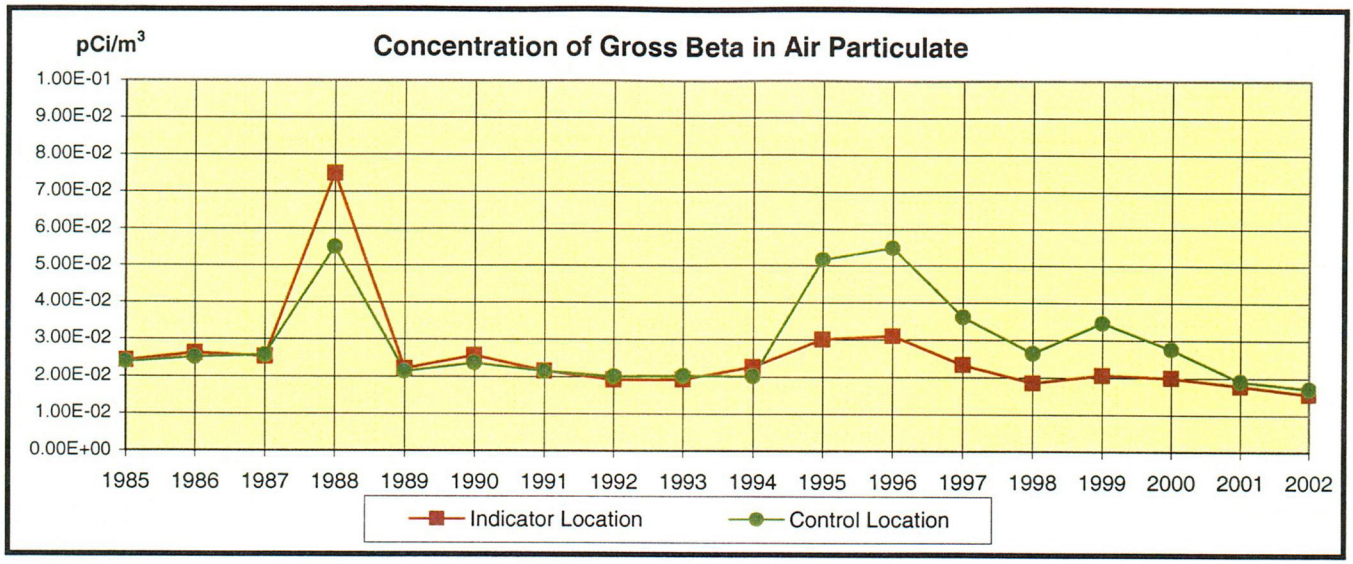


Air Sampling at McGuire Nuclear Station

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. Since no gamma activity was detected in 2002, no reporting levels were approached.

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 radionuclides were detected in 2002, 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
Average (1992 – 2001)	NOT APPLICABLE	NOT APPLICABLE	2.23E-2	3.12E-2
2002	0.00E0	0.00E0	1.57E-2	1.72E-2

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

C03

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

0.00E0 = no detectable measurements

* Radioiodines and Particulates analyzed together.

3.2 DRINKING WATER

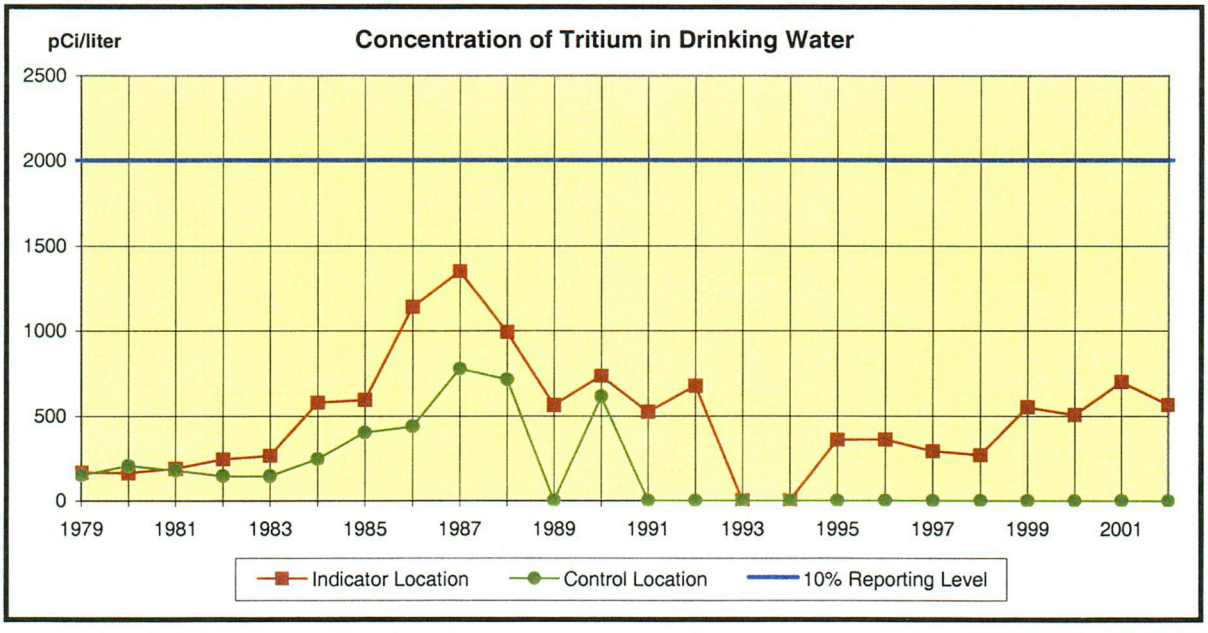
In 2002, 65 drinking water samples were analyzed for gross beta and gamma emitting radionuclides. Fifty-two samples were from the four indicator locations and 13 from the control location. Tritium (H-3) analyses were performed on 20 composite samples, 16 at indicator locations and four at the control location.

No detectable gamma activity was found in drinking water samples in 2002 and has not been detected since 1987. Gross beta analyses indicated 2.47 pCi/l at the location with the highest annual mean and 2.08 pCi/l at the control location. Tritium was detected in 12 of the 16 indicator composite samples taken in 2002 with the highest annual mean resulting in only 2.82% of the reporting level. The dose for consumption of water was less than one mrem per year, historically and for 2002; therefore low-level iodine analysis is not required.

Figure 3.2 shows tritium highest annual mean indicator and control location concentrations with comparisons to 10% 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.

A new drinking water site (Location 101) closer to the plant was added to the sampling program in 1999. Figure 3.2 shows a slight increase beginning in that year.

Figure 3.2



C04

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

0.00E0 = no detectable measurements

3.3 SURFACE WATER

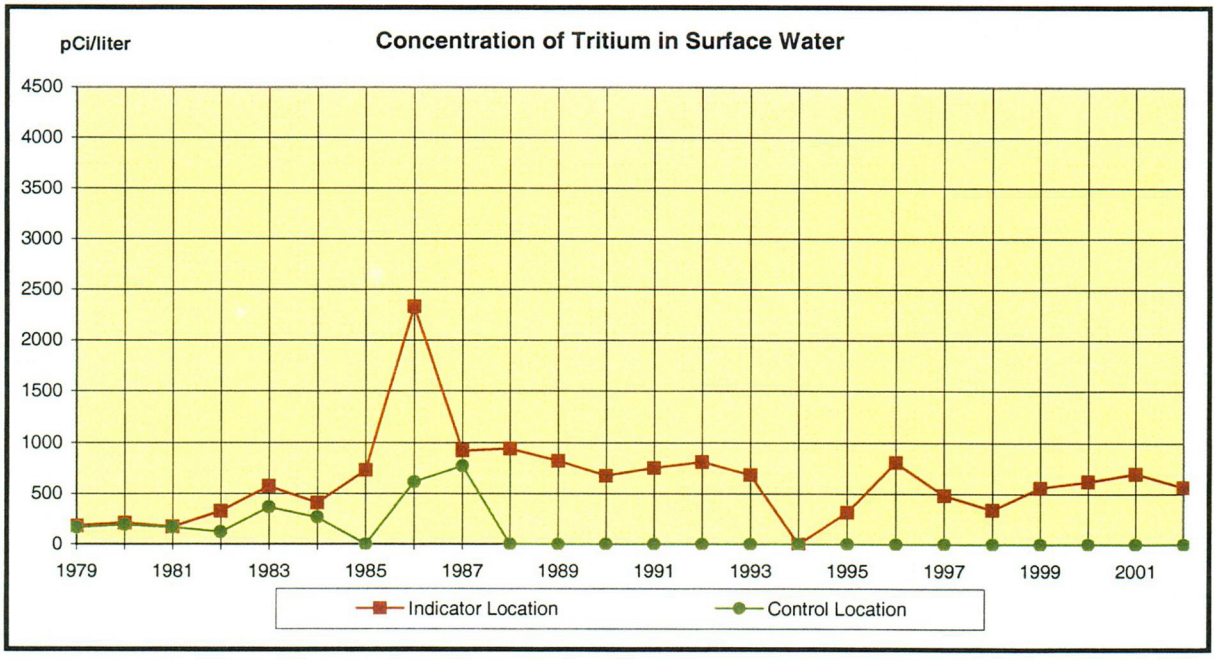
In 2002, 39 surface water samples were analyzed for gamma emitting radionuclides, 26 at the two indicator locations and 13 at the control location. Analyses for H-3 were performed on 12 samples, eight at indicator locations and four at the control location.

No detectable gamma activity was found in surface water samples in 2002 and has not been detected since 1988. Tritium was detected in the eight indicator composite samples taken in 2002. Tritium was not detected in any of the control location composite samples in 2002.

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.

Surface Water Sampling at McGuire Nuclear Station

Figure 3.3



There is no reporting level for tritium in surface water

C05

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

0.00E0 = no detectable measurements

3.4 MILK

In 2002, 78 milk samples were analyzed for low level I-131 and other gamma emitting radionuclides, 52 at the two indicator locations and 26 at the control location.

No detectable activity was found in milk samples in 2002. 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 2002, 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

0.00E0 = no detectable measurements

3.5 BROADLEAF VEGETATION

In 2002, 28 broadleaf vegetation samples were analyzed, 21 at the three indicator locations and seven at the control location.

No detectable activity was detected in any of the vegetation samples taken in 2002.

Cs-137 was last detected in 1998 in one vegetation sample. No other detectable gamma activity was found in vegetation samples in 1998 and no other radionuclides have been detected in vegetation samples since 1987. Table 3.5 gives indicator and control location highest annual means since 1979 for Cs-137.

Broadleaf Vegetation Sampling at
McGuire Nuclear Station

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

0.00E0 = no detectable measurements

3.6 FOOD PRODUCTS

In 2002, 11 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 and ten year averages. Since no activity was detected in 2002, 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

0.00E0 = no detectable measurements

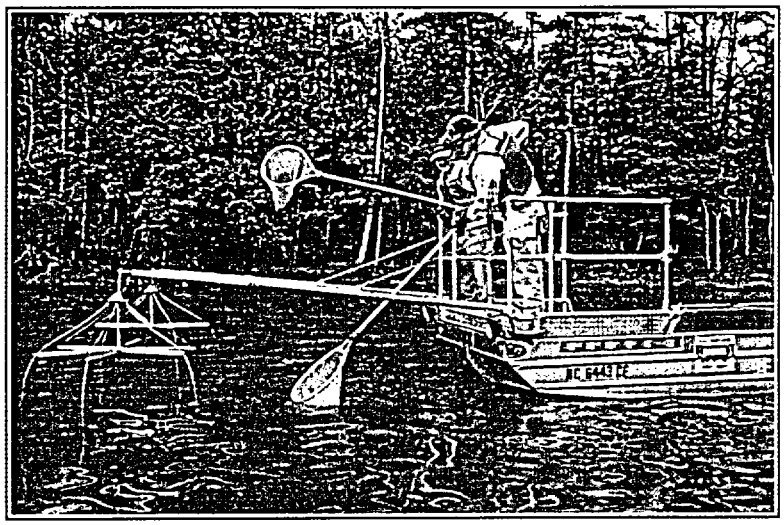
3.7 FISH

In 2002, 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. No indicator samples were analyzed in 1979. Co-58 activity was not detected in 2002 in any of the six indicator samples. Cs-137 activity was detected in 2002 in two of the six indicator samples taken. Cs-137 was not detected in any of the six control location samples. All other radionuclides not shown in the table have demonstrated no detectable activity since 1986.

Co-58 was not detected at the indicator or control locations during 2002. The highest annual mean for Cs-137 activity in an indicator sample resulted in only 1.17% of the reporting level. Cs-137 was not detected at the control location.



Fish Sampling at McGuire Nuclear Station

Figure 3.7-1

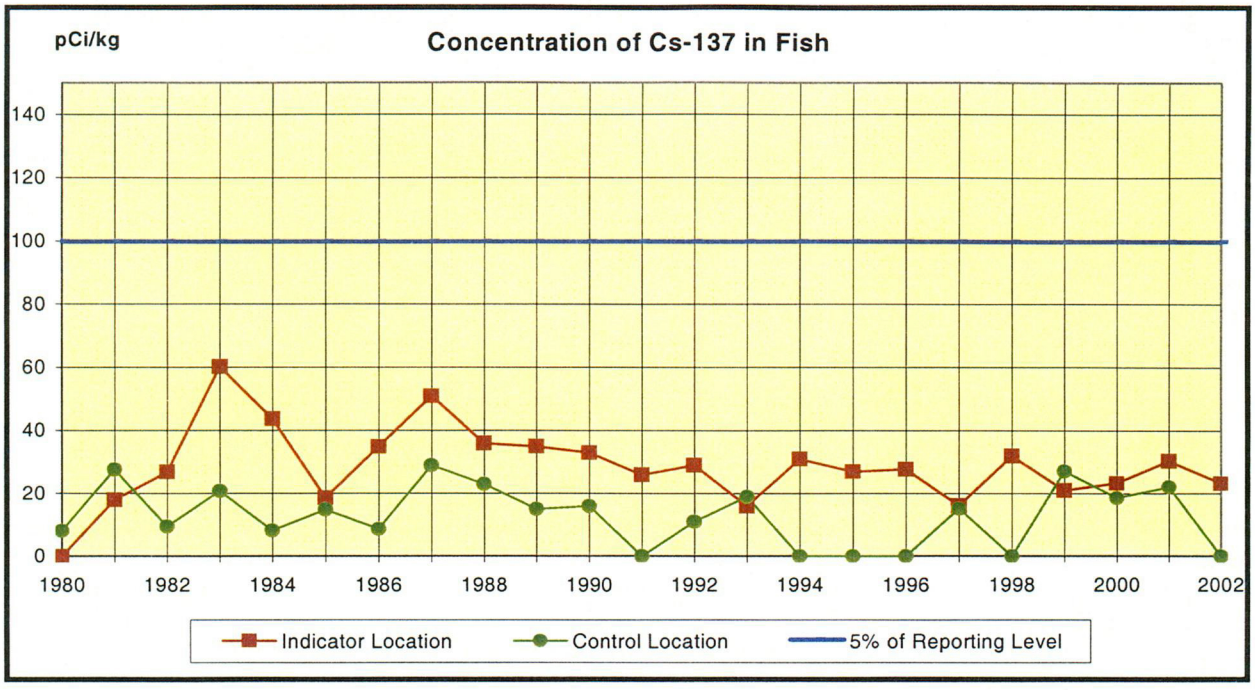
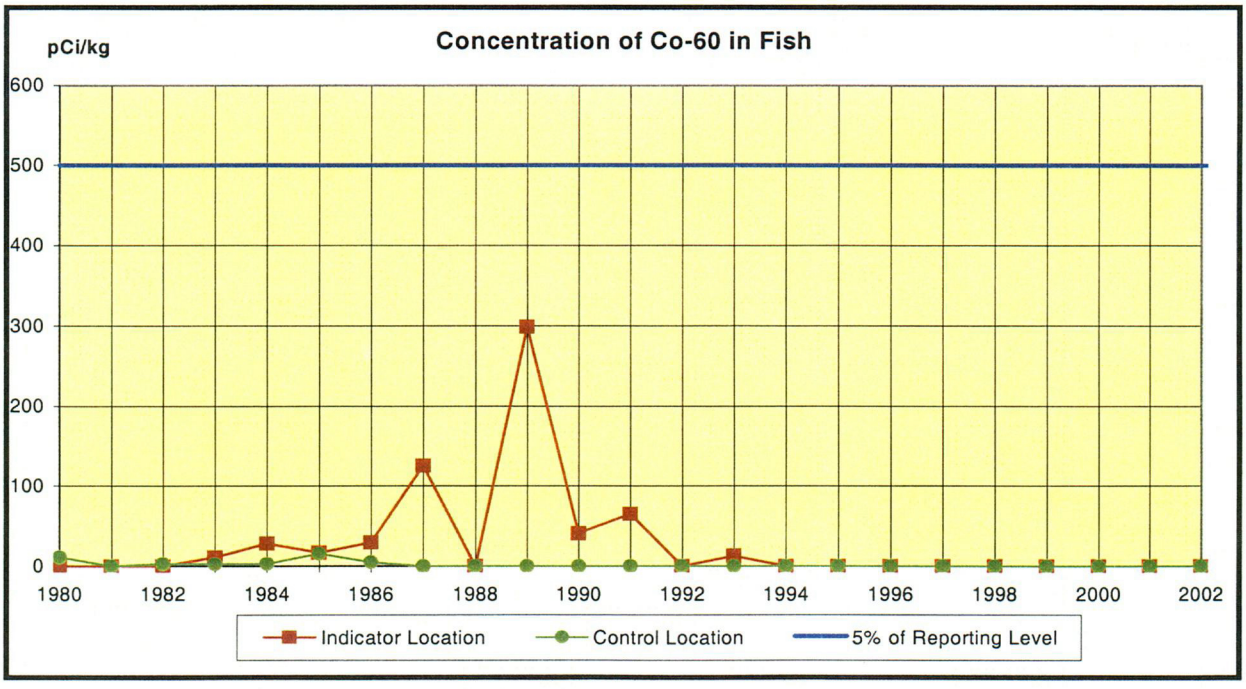


Figure 3.7-2



C06

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

0.00E0 = no detectable measurements
All negative values have been replaced with zeros for calculational purposes

3.8 SHORELINE SEDIMENT

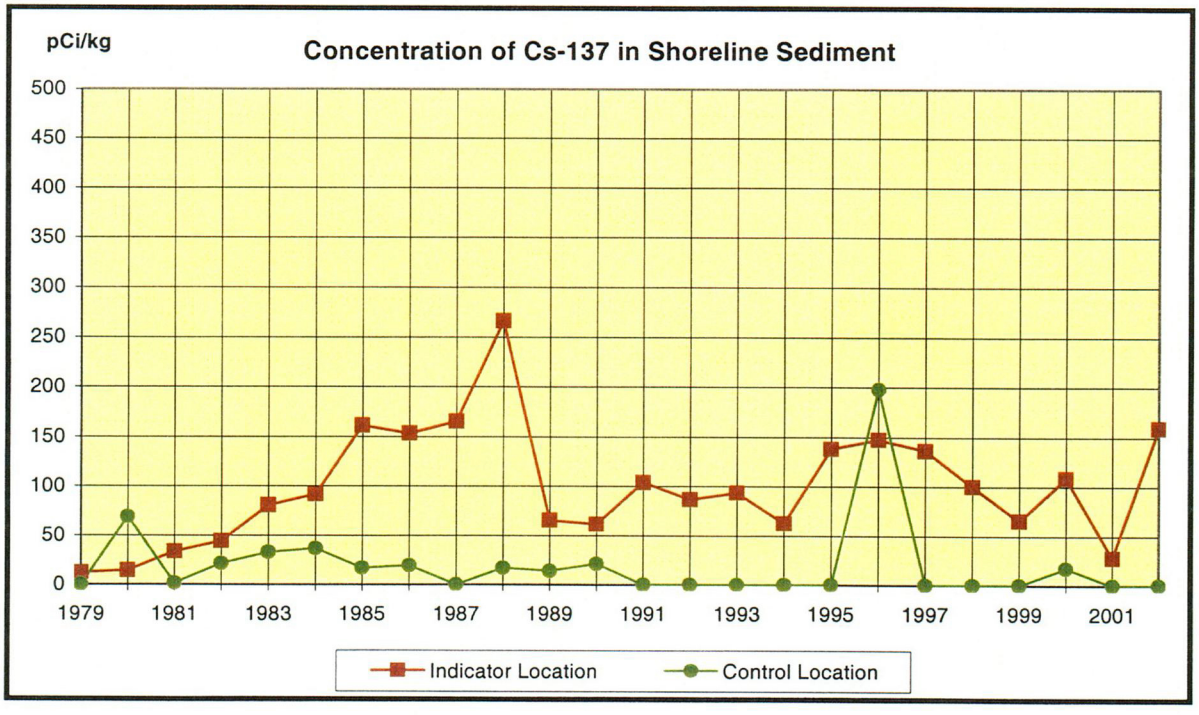
In 2002, six shoreline sediment samples were analyzed, four from two indicator locations and two at the control location.

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.

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.

Shoreline Sediment sampling

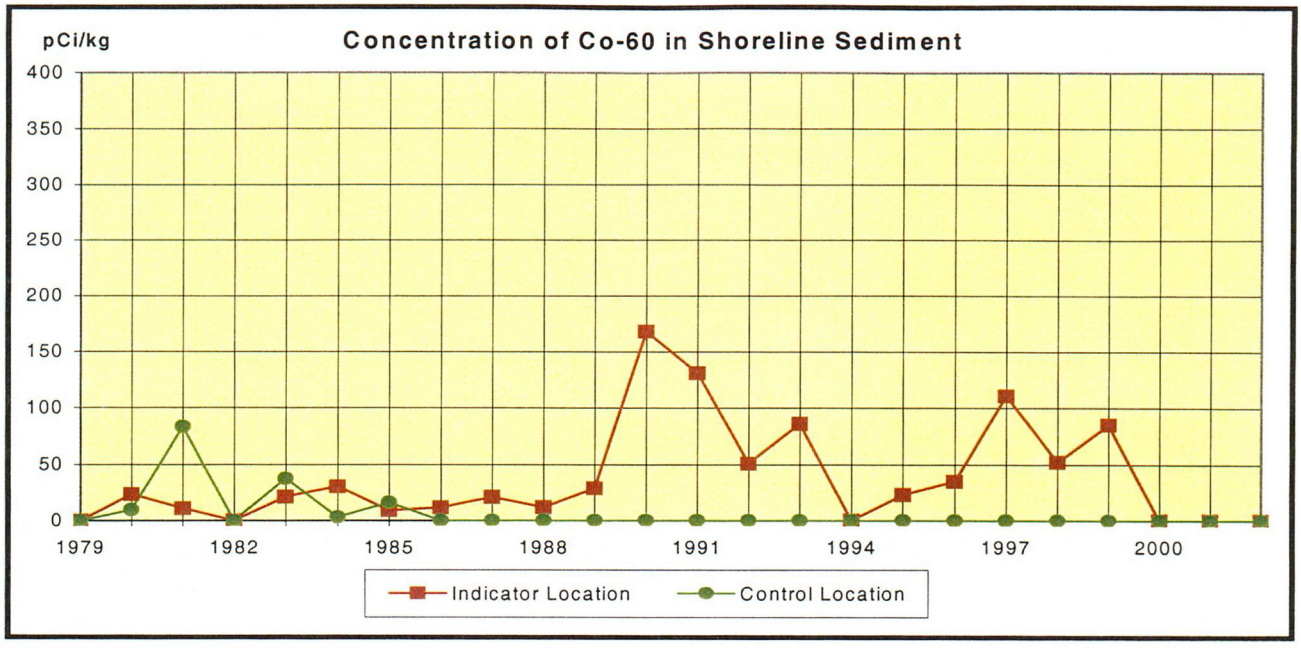
Figure 3.8-1



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

C07

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
2001	0.00E0	0.00E0	0.00E0	0.00E0	2.77E1
2002	2.24E1	0.00E0	0.00E0	0.00E0	1.59E2

C08

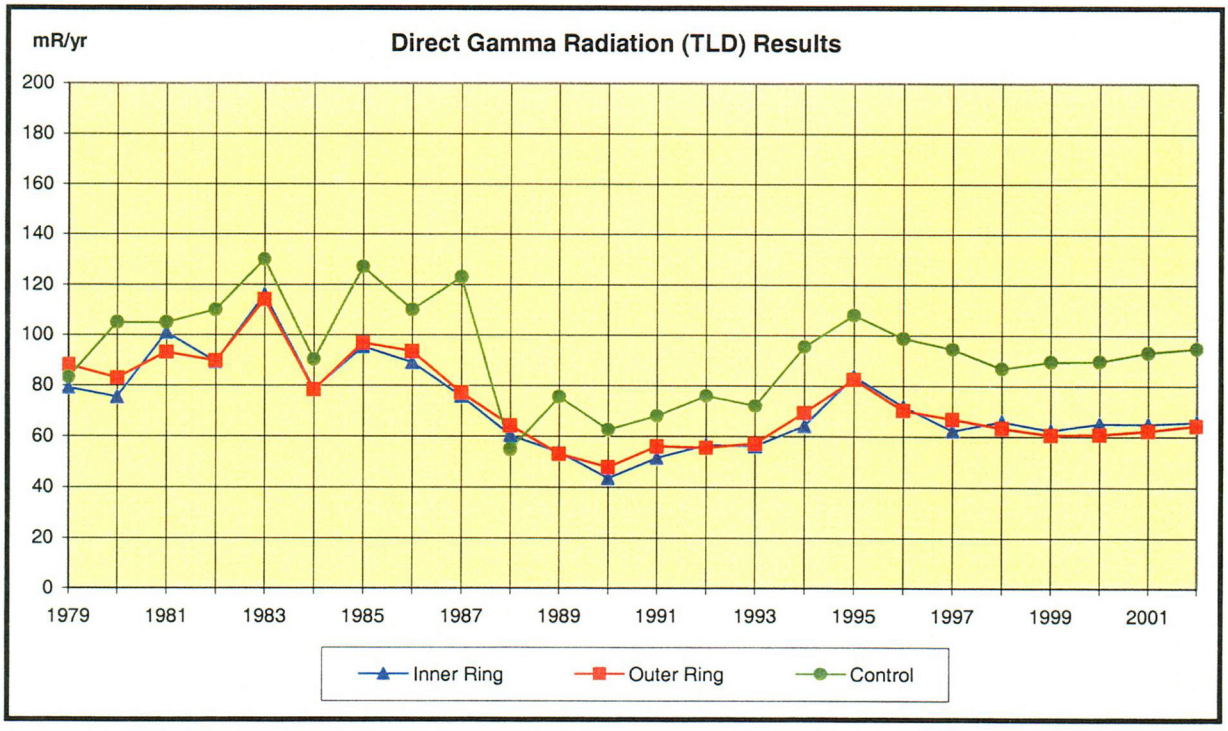
3.9 DIRECT GAMMA RADIATION

In 2002, 164 TLDs were analyzed, 160 at indicator locations, four at the control location. TLDs are collected and analyzed quarterly. The highest annual mean exposure for an indicator location was 97.2 milliroentgen. The annual mean exposure for the control location was 94.8 milliroentgen.

Figure 3.9 and Table 3.9 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 calculated total body dose from gaseous effluents for 2002 was 7.42E-1 millirem, which is 1.14% 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.

Figure 3.9



There is no reporting level for Direct Radiation (TLD)

C09

Table 3.9 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
Average (1992 – 2001)	6.39E1	6.42E1	8.79E1
2002	6.57E1	6.43E1	9.48E1

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

3.10 LAND USE CENSUS

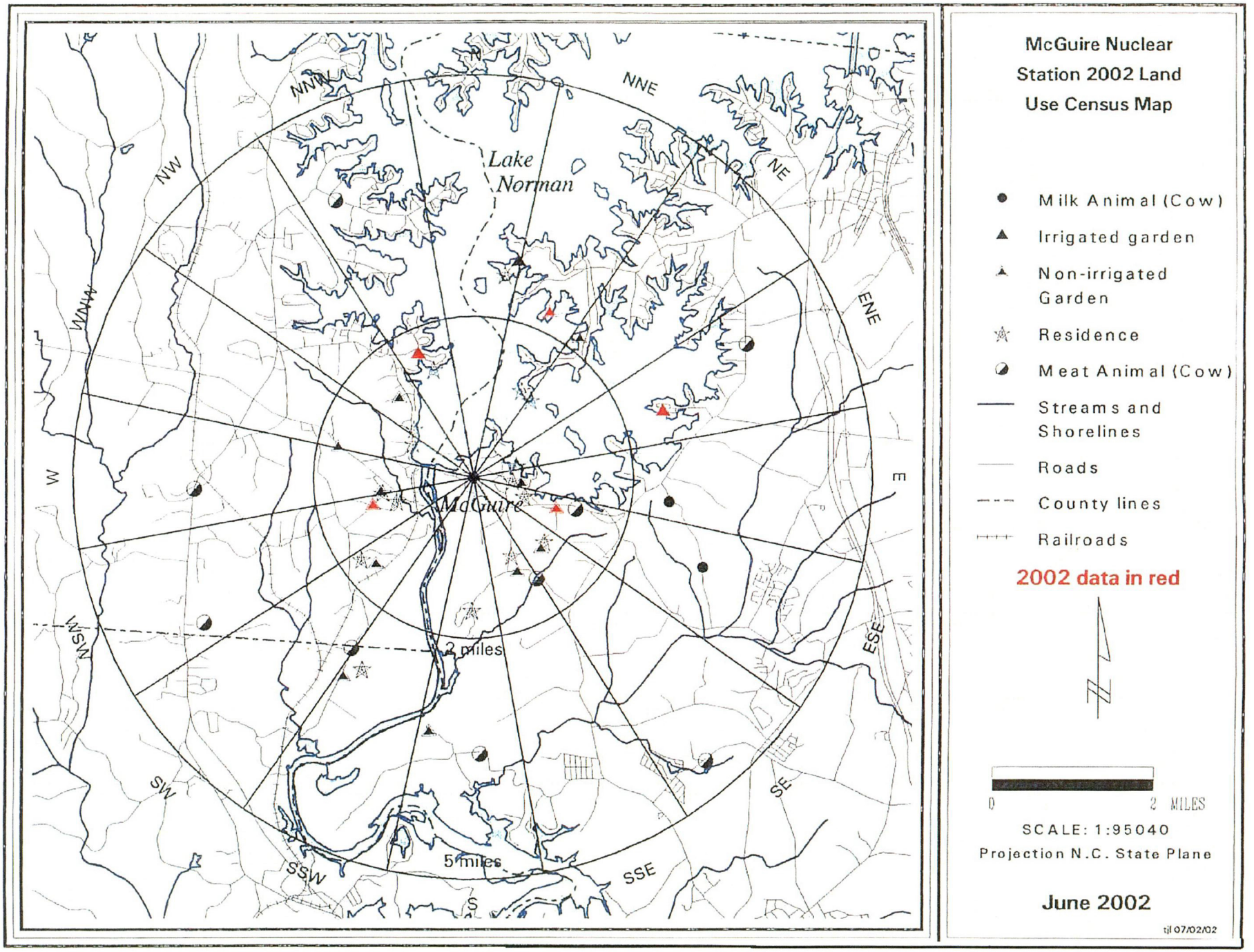
The land use census was conducted June 12 - June 14, 2001 as required by SLC 16.11.14. Table 3.10 summarizes census results. A map indicating identified locations is shown in Figure 3.10.

During the 2002 census, no new or closer irrigated gardens were identified. The nearest residence is located in the East sector at 0.48 miles. No program changes were required as a result of the 2002 land use census.

Table 3.10 McGuire 2002 Land Use Census Results

Sector		Distance (Miles)	Sector		Distance (Miles)
N	Nearest Residence	2.50	S	Nearest Residence	1.62
	Nearest Garden (irrigated)	2.79		Nearest Garden	3.18
	Nearest Milk Animal	-		Nearest Milk Animal	-
	Nearest Meat Animal	-		Nearest Meat Animal (Cow)	3.41
NNE	Nearest Residence	1.29	SSW	Nearest Residence	2.57
	Nearest Garden	2.34		Nearest Garden	2.93
	Nearest Milk Animal	-		Nearest Milk Animal	-
	Nearest Meat Animal	-		Nearest Meat Animal	-
NE	Nearest Residence	1.20	SW	Nearest Residence	1.80
	Nearest Garden	2.10		Nearest Garden	1.80
	Nearest Milk Animal	-		Nearest Milk Animal	-
	Nearest Meat Animal	-		Nearest Meat Animal (Cow)	2.59
ENE	Nearest Residence	0.56	WSW	Nearest Residence	1.01
	Nearest Garden (irrigated)	2.50		Nearest Garden	1.31
	Nearest Milk Animal	-		Nearest Milk Animal	-
	Nearest Meat Animal (Cow)	3.81		Nearest Meat Animal (Cow)	3.97
E	Nearest Residence	0.48	W	Nearest Residence	1.16
	Nearest Garden	0.48		Nearest Garden	1.22
	Nearest Milk Animal (Cow)	2.46		Nearest Milk Animal	-
	Nearest Meat Animal	-		Nearest Meat Animal (Cow)	3.47
ESE	Nearest Residence	0.63	WNW	Nearest Residence	0.89
	Nearest Garden	1.09		Nearest Garden	1.74
	Nearest Milk Animal (Cow)	3.07		Nearest Milk Animal	-
	Nearest Meat Animal (Cow)	1.30		Nearest Meat Animal	-
SE	Nearest Residence	1.17	NW	Nearest Residence	0.93
	Nearest Garden	1.21		Nearest Garden	1.37
	Nearest Milk Animal	-		Nearest Milk Animal	-
	Nearest Meat Animal (Cow)	4.56		Nearest Meat Animal	-
SSE	Nearest Residence	1.06	NNW	Nearest Residence	1.53
	Nearest Garden	1.26		Nearest Garden (irrigated)	1.69
	Nearest Milk Animal	-		Nearest Milk Animal	-
	Nearest Meat Animal (Cow)	1.48		Nearest Meat Animal (Cow)	3.86

"-" indicates no occurrences within the 5 mile radius


McGuire Nuclear
Station 2002 Land
Use Census Map
Milk Animal (Cow)
Irrigated garden
Non-irrigated
Garden
Residence
Meat Animal (Cow)
Streams and
Shorelines
Roads
County lines
Railroads
2002 data in red
0
2 MILES
SCALE: 1:95040
Projection N.C. State Plane
June 2002
tjl 07/02/02
Lake
Norman
McGuire
2 miles
5 miles
N
NNE
NE
ENE
E
ESE
SE
SSE
S
SSW
SW
WSW
W
WNW
NW
NNW

C10