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April 28, 2009

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

Subject: Duke Energy Carolinas, LLC  
McGuire Nuclear Station  
Docket Nos. 50-369 and 50-370  
2008 Annual Radioactive Effluent Release Report

Pursuant to the requirements of Technical Specification 5.6.3 and Section 16.11-17 of the McGuire Selected Licensee Commitments (SLC) Manual, attached is the Annual Radioactive Effluent Release Report. Also included in this report is the 2009 Offsite Dose Calculation Manual. There were no changes to Process Control Program (PCP) Manual in 2008.

The following Attachments form the contents of the report:

- Attachment 1 Radioactive Effluent Releases and Supplemental Information
- Attachment 2 Solid Waste Disposal Report
- Attachment 3 Unplanned Offsite Releases
- Attachment 4 Fuel Cycle Calculation
- Attachment 5 Inoperable Monitoring Equipment
- Attachment 6 Groundwater Protection Initiative

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

Bruce H. Hamilton

TE48  
A009  
HMR

NRC Document Control Desk  
April 28, 2009  
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U. S. Nuclear Regulatory Commission

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bx: RGC File  
Master File  
ECO50-ELL

**Attachment 1**

**Radioactive Effluent Releases and Supplemental Information**

McGUIRE NUCLEAR STATION

EFFLUENT RELEASE DATA

(January 1, 2008 through December 31, 2008)

This attachment includes a summary of the quantities of radioactive liquid and gaseous effluents as outlined in Regulatory Guide 1.21, Appendix B.

TABLE 1A

EFFLUENT AND WASTE DISPOSAL ANNUAL REPORT  
 PERIOD 1/1/08 TO 1/1/09  
 GASEOUS EFFLUENTS - SUMMATION OF ALL RELEASES

McGuire Nuclear Station Units 1 & 2

REPORT FOR 2008	Unit	QTR 1	QTR 2	QTR 3	QTR 4	YEAR
<b>A. Fission and Activation Gases</b>						
1. Total Release	Ci	6.56E-01	5.68E-01	6.32E-01	3.79E-01	2.24E+00
2. Avg. Release Rate	$\mu$ Ci/sec	8.35E-02	7.23E-02	7.96E-02	4.77E-02	7.07E-02
<b>B. Iodine-131</b>						
1. Total Release	Ci	2.23E-06	0.00E+00	3.06E-06	0.00E+00	5.29E-06
2. Avg. Release Rate	$\mu$ Ci/sec	2.84E-07	0.00E+00	3.85E-07	0.00E+00	1.67E-07
<b>C. Particulates Half Life <math>\geq</math> 8 days</b>						
1. Total Release	Ci	1.09E-05	1.60E-05	2.83E-05	1.15E-05	6.66E-05
2. Avg. Release Rate	$\mu$ Ci/sec	1.38E-06	2.03E-06	3.56E-06	1.45E-06	2.11E-06
<b>D. Tritium</b>						
1. Total Release	Ci	4.31E+01	5.14E+01	5.09E+01	8.10E+01	2.26E+02
2. Avg. Release Rate	$\mu$ Ci/sec	5.48E+00	6.54E+00	6.40E+00	1.02E+01	7.16E+00
<b>E. Gross Alpha Radioactivity</b>						
1. Total Release	Ci	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
2. Avg. Release Rate	$\mu$ Ci/sec	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

TABLE 1B

EFFLUENT AND WASTE DISPOSAL ANNUAL REPORT  
 PERIOD 1/1/08 TO 1/1/09  
 GASEOUS EFFLUENTS - ELEVATED RELEASES - CONTINUOUS MODE

McGuire Nuclear Station Units 1 & 2

REPORT FOR 2008	Unit	QTR 1	QTR 2	QTR 3	QTR 4	YEAR
1. Fission and Activation Gases						
** No Nuclide Activities **		.....	.....	.....	.....	.....
2. Iodines						
** No Nuclide Activities **		.....	.....	.....	.....	.....
3. Particulates Half Life >= 8 days						
** No Nuclide Activities **		.....	.....	.....	.....	.....
4. Tritium						
** No Nuclide Activities **		.....	.....	.....	.....	.....
5. Gross Alpha Radioactivity						
** No Nuclide Activities **		.....	.....	.....	.....	.....

TABLE 1B

EFFLUENT AND WASTE DISPOSAL ANNUAL REPORT  
 PERIOD 1/1/08 TO 1/1/09  
 GASEOUS EFFLUENTS - ELEVATED RELEASES - BATCH MODE

McGuire Nuclear Station Units 1 & 2

REPORT FOR 2008	Unit	QTR 1	QTR 2	QTR 3	QTR 4	YEAR
1. Fission and Activation Gases						
** No Nuclide Activities **		.....	.....	.....	.....	.....
2. Iodines						
** No Nuclide Activities **		.....	.....	.....	.....	.....
3. Particulates Half Life >= 8 days						
** No Nuclide Activities **		.....	.....	.....	.....	.....
4. Tritium						
** No Nuclide Activities **		.....	.....	.....	.....	.....
5. Gross Alpha Radioactivity						
** No Nuclide Activities **		.....	.....	.....	.....	.....



TABLE 1C

EFFLUENT AND WASTE DISPOSAL ANNUAL REPORT  
 PERIOD 1/1/08 TO 1/1/09  
 GASEOUS EFFLUENTS - GROUND RELEASES - CONTINUOUS MODE

McGuire Nuclear Station Units 1 & 2

REPORT FOR 2008	Unit	QTR 1	QTR 2	QTR 3	QTR 4	YEAR
1. Fission and Activation Gases						
XE-133	Ci	0.00E+00	0.00E+00	0.00E+00	1.85E-04	1.85E-04
Totals for Period...	Ci	0.00E+00	0.00E+00	0.00E+00	1.85E-04	1.85E-04
2. Iodines						
I-131	Ci	2.23E-06	0.00E+00	3.06E-06	0.00E+00	5.29E-06
I-133	Ci	0.00E+00	0.00E+00	6.93E-05	0.00E+00	6.93E-05
Totals for Period...	Ci	2.23E-06	0.00E+00	7.23E-05	0.00E+00	7.46E-05
3. Particulates Half Life >= 8 days						
BE-7	Ci	0.00E+00	0.00E+00	0.00E+00	3.56E-06	3.56E-06
CO-58	Ci	1.09E-05	1.60E-05	2.83E-05	7.95E-06	6.30E-05
Totals for Period...	Ci	1.09E-05	1.60E-05	2.83E-05	1.15E-05	6.66E-05
4. Tritium						
H-3	Ci	4.12E+01	5.12E+01	5.04E+01	7.63E+01	2.19E+02
Totals for Period...	Ci	4.12E+01	5.12E+01	5.04E+01	7.63E+01	2.19E+02
5. Gross Alpha Radioactivity						
** No Nuclide Activities **		.....	.....	.....	.....	.....

TABLE 1C

EFFLUENT AND WASTE DISPOSAL ANNUAL REPORT  
 PERIOD 1/1/08 TO 1/1/09  
 GASEOUS EFFLUENTS - GROUND RELEASES - BATCH MODE

McGuire Nuclear Station Units 1 & 2

REPORT FOR 2008	Unit	QTR 1	QTR 2	QTR 3	QTR 4	YEAR
1. Fission and Activation Gases						
AR-41	Ci	5.73E-01	5.58E-01	6.11E-01	3.64E-01	2.11E+00
C-11	Ci	2.48E-05	0.00E+00	0.00E+00	0.00E+00	2.48E-05
KR-85	Ci	6.51E-02	0.00E+00	8.43E-03	6.41E-03	7.99E-02
KR-85M	Ci	2.25E-05	0.00E+00	0.00E+00	0.00E+00	2.25E-05
KR-87	Ci	7.87E-06	0.00E+00	0.00E+00	0.00E+00	7.87E-06
KR-88	Ci	5.22E-05	0.00E+00	0.00E+00	0.00E+00	5.22E-05
XE-133	Ci	1.51E-02	9.65E-03	1.13E-02	8.33E-03	4.44E-02
XE-133M	Ci	7.87E-05	0.00E+00	0.00E+00	0.00E+00	7.87E-05
XE-135	Ci	3.19E-03	5.86E-05	1.54E-03	0.00E+00	4.79E-03
Totals for Period...	Ci	6.56E-01	5.68E-01	6.32E-01	3.79E-01	2.24E+00
2. Iodines						
** No Nuclide Activities **		.....	.....	.....	.....	.....
3. Particulates Half Life >= 8 days						
** No Nuclide Activities **		.....	.....	.....	.....	.....
4. Tritium						
H-3	Ci	1.85E+00	2.24E-01	4.30E-01	4.71E+00	7.21E+00
Totals for Period...	Ci	1.85E+00	2.24E-01	4.30E-01	4.71E+00	7.21E+00
5. Gross Alpha Radioactivity						
** No Nuclide Activities **		.....	.....	.....	.....	.....

TABLE 2A

EFFLUENT AND WASTE DISPOSAL ANNUAL REPORT  
 PERIOD 1/1/08 TO 1/1/09  
 LIQUID EFFLUENTS - SUMMATION OF ALL RELEASES

McGuire Nuclear Station Units 1 & 2

REPORT FOR 2008	Unit	QTR 1	QTR 2	QTR 3	QTR 4	YEAR
<b>A. Fission and Activation Products</b>						
1. Total Release	Ci	2.11E-02	2.38E-02	4.07E-02	2.93E-02	1.15E-01
2. Average Diluted Concentration						
a. Continuous Releases	μCi/ml	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
b. Batch Releases	μCi/ml	2.93E-11	2.51E-11	4.14E-11	3.50E-11	3.29E-11
<b>B. Tritium</b>						
1. Total Release	Ci	4.36E+02	2.88E+02	5.96E+02	3.09E+02	1.63E+03
2. Average Diluted Concentration						
a. Continuous Releases	μCi/ml	4.11E-07	4.07E-08	3.72E-08	2.55E-08	8.99E-08
b. Batch Releases	μCi/ml	5.96E-07	3.03E-07	6.05E-07	3.69E-07	4.65E-07
<b>C. Dissolved and Entrained Gases</b>						
1. Total Release	Ci	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
2. Average Diluted Concentration						
a. Continuous Releases	μCi/ml	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
b. Batch Releases	μCi/ml	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
<b>D. Gross Alpha Radioactivity</b>						
1. Total Release	Ci	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
2. Average Diluted Concentration						
a. Continuous Releases	μCi/ml	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
b. Batch Releases	μCi/ml	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
<b>E. Volume of Liquid Waste</b>						
1. Continuous Releases	liters	2.35E+08	7.17E+07	7.74E+07	8.57E+07	4.70E+08
2. Batch Releases	liters	1.46E+06	8.73E+05	2.17E+06	9.37E+05	5.44E+06
<b>F. Volume of Dilution Water</b>						
1. Continuous Releases	liters	1.28E+10	2.09E+10	2.12E+10	3.16E+10	8.65E+10
2. Batch Releases	liters	7.22E+11	9.49E+11	9.83E+11	8.36E+11	3.49E+12

TABLE 2B

EFFLUENT AND WASTE DISPOSAL ANNUAL REPORT  
 PERIOD 1/1/08 TO 1/1/09  
 LIQUID EFFLUENTS - CONTINUOUS MODE

McGuire Nuclear Station Units 1 & 2

REPORT FOR 2008	Unit	QTR 1	QTR 2	QTR 3	QTR 4	YEAR
-----						
1. Fission and Activation Products						
** No Nuclide Activities **		.....	.....	.....	.....	.....
2. Tritium						
H-3	Ci	5.36E+00	8.55E-01	7.92E-01	8.07E-01	7.82E+00
Totals for Period...	Ci	5.36E+00	8.55E-01	7.92E-01	8.07E-01	7.82E+00
-----						
3. Dissolved and Entrained Gases						
** No Nuclide Activities **		.....	.....	.....	.....	.....
4. Gross Alpha Radioactivity						
** No Nuclide Activities **		.....	.....	.....	.....	.....

TABLE 2B

EFFLUENT AND WASTE DISPOSAL ANNUAL REPORT  
 PERIOD 1/1/08 TO 1/1/09  
 LIQUID EFFLUENTS - BATCH MODE

McGuire Nuclear Station Units 1 & 2

REPORT FOR 2008	Unit	QTR 1	QTR 2	QTR 3	QTR 4	YEAR
<b>1. Fission and Activation Products</b>						
AG-108M	Ci	0.00E+00	2.86E-05	4.30E-05	1.08E-05	8.23E-05
AG-110M	Ci	4.39E-06	2.93E-05	4.12E-05	2.19E-05	9.68E-05
BE-7	Ci	1.68E-05	0.00E+00	8.22E-05	3.43E-04	4.42E-04
CO-57	Ci	2.25E-06	7.82E-07	6.30E-06	0.00E+00	9.33E-06
CO-58	Ci	1.91E-03	3.18E-03	7.74E-03	7.72E-03	2.06E-02
CO-60	Ci	9.14E-04	2.31E-03	4.29E-03	8.77E-04	8.39E-03
CR-51	Ci	1.28E-03	1.74E-03	1.62E-03	2.39E-03	7.04E-03
CS-134	Ci	4.66E-04	3.83E-04	7.81E-04	3.81E-04	2.01E-03
CS-137	Ci	1.75E-03	1.55E-03	3.18E-03	1.74E-03	8.22E-03
FE-59	Ci	7.67E-05	2.86E-04	2.91E-05	1.49E-04	5.42E-04
MN-54	Ci	5.81E-05	1.71E-04	4.45E-04	8.91E-05	7.64E-04
NA-24	Ci	0.00E+00	3.63E-06	0.00E+00	0.00E+00	3.63E-06
NB-95	Ci	9.99E-06	6.84E-05	2.09E-04	1.56E-04	4.43E-04
NB-97	Ci	2.72E-06	1.75E-05	2.60E-05	1.84E-05	6.46E-05
SB-122	Ci	1.14E-05	1.73E-05	4.68E-06	5.93E-06	3.93E-05
SB-124	Ci	0.00E+00	3.35E-04	4.63E-04	4.87E-04	1.28E-03
SB-125	Ci	1.46E-02	1.36E-02	2.17E-02	1.48E-02	6.48E-02
SR-92	Ci	0.00E+00	0.00E+00	0.00E+00	8.70E-07	8.70E-07
ZN-65	Ci	0.00E+00	0.00E+00	4.26E-06	0.00E+00	4.26E-06
ZR-95	Ci	2.02E-06	3.45E-05	1.04E-04	5.17E-05	1.92E-04
ZR-97	Ci	0.00E+00	0.00E+00	0.00E+00	1.19E-06	1.19E-06
Totals for Period...	Ci	2.11E-02	2.38E-02	4.07E-02	2.93E-02	1.15E-01
<b>2. Tritium</b>						
H-3	Ci	4.31E+02	2.87E+02	5.95E+02	3.09E+02	1.62E+03
Totals for Period...	Ci	4.31E+02	2.87E+02	5.95E+02	3.09E+02	1.62E+03
<b>3. Dissolved and Entrained Gases</b>						
** No Nuclide Activities **		.....	.....	.....	.....	.....
<b>4. Gross Alpha Radioactivity</b>						
** No Nuclide Activities **		.....	.....	.....	.....	.....

McGUIRE NUCLEAR STATION  
SUPPLEMENTAL INFORMATION

# McGUIRE NUCLEAR STATION

## 2008 EFFLUENT AND WASTE DISPOSAL SUPPLEMENTAL INFORMATION

### I. REGULATORY LIMITS - PER UNIT

#### A. NOBLE GASES - AIR DOSE

1. CALENDAR QUARTER - GAMMA DOSE = 5 MRAD
2. CALENDAR QUARTER - BETA DOSE = 10 MRAD
3. CALENDAR YEAR - GAMMA DOSE = 10 MRAD
4. CALENDAR YEAR - BETA DOSE = 20 MRAD

#### B. LIQUID EFFLUENTS - DOSE

1. CALENDAR QUARTER - TOTAL BODY DOSE = 1.5 MREM
2. CALENDAR QUARTER - ORGAN DOSE = 5 MREM
3. CALENDAR YEAR - TOTAL BODY DOSE = 3 MREM
4. CALENDAR YEAR - ORGAN DOSE = 10 MREM

#### C. GASEOUS EFFLUENTS - IODINE - 131 AND 133, TRITIUM, PARTICULATES W/T 1/2 > 8 DAYS - ORGAN DOSE

1. CALENDAR QUARTER = 7.5 MREM
2. CALENDAR YEAR = 15 MREM

### II. MAXIMUM PERMISSIBLE EFFLUENT CONCENTRATIONS

- A. GASEOUS EFFLUENTS - INFORMATION FOUND IN OFFSITE DOSE CALCULATION MANUAL
- B. LIQUID EFFLUENTS - INFORMATION FOUND IN 10CFR20, APPENDIX B, TABLE 2, COLUMN 2

### III. AVERAGE ENERGY - NOT APPLICABLE

### IV. MEASUREMENTS AND APPROXIMATIONS OF TOTAL RADIOACTIVITY

ANALYSES OF SPECIFIC RADIONUCLIDES IN SELECTED OR COMPOSITED SAMPLES AS DESCRIBED IN THE SELECTED LICENSEE COMMITMENTS ARE USED TO DETERMINE THE RADIONUCLIDE COMPOSITION OF THE EFFLUENT. SUPPLEMENTAL REPORT, PAGE 2, PROVIDES A SUMMARY DESCRIPTION OF THE METHOD USED FOR ESTIMATING OVERALL ERRORS ASSOCIATED WITH RADIOACTIVITY MEASUREMENTS.

### V. BATCH RELEASES

#### A. LIQUID EFFLUENT

1. 2.41E+02 = TOTAL NUMBER OF BATCH RELEASES
2. 2.06E+04 = TOTAL TIME (MIN.) FOR BATCH RELEASES.
3. 3.13E+03 = MAXIMUM TIME (MIN.) FOR A BATCH RELEASE.
4. 8.54E+01 = AVERAGE TIME (MIN.) FOR A BATCH RELEASE.
5. 5.00E+00 = MINIMUM TIME (MIN.) FOR A BATCH RELEASE.
6. 1.75E+06 = AVERAGE DILUTION WATER FLOW DURING RELEASES (GPM).

#### B. GASEOUS EFFLUENT

1. 4.40E+01 = TOTAL NUMBER OF BATCH RELEASES.
2. 1.04E+06 = TOTAL TIME (MIN.) FOR BATCH RELEASES.
3. 4.47E+04 = MAXIMUM TIME (MIN.) FOR A BATCH RELEASE.
4. 2.36E+04 = AVERAGE TIME (MIN.) FOR A BATCH RELEASE.
5. 1.00E+00 = MINIMUM TIME (MIN.) FOR A BATCH RELEASE.

### VI. ABNORMAL RELEASES

#### A. LIQUID

1. NUMBER OF RELEASES = 2
2. TOTAL ACTIVITY RELEASED (CURIES) = 1.77E-02 (Tritium) (see attachment for additional information)

#### B. GASEOUS

1. NUMBER OF RELEASES = 1
2. TOTAL ACTIVITY RELEASED (CURIES) = 3.15E-3 (Noble Gas) (see attachment for additional information)

## SUPPLEMENTAL REPORT PAGE 2

### McGUIRE NUCLEAR STATION

The estimated percentage of error for both Liquid and Gaseous effluent release data at McGuire Nuclear Station has been determined to be  $\pm 25.2\%$ . This value was derived by taking the square root of the sum of the squares of the following discrete individual estimates of error:

- (1) Flow rate determining devices =  $\pm 20\%$
- (2) Counting error =  $\pm 15\%$
- (3) Sample preparation error =  $\pm 3\%$



## McGUIRE NUCLEAR STATION

### Assessment of Radiation Dose from Radioactive Effluents and all Uranium Fuel Cycle Sources to Members of the Public

(January 1, 2008 through December 31, 2008)

This attachment includes an assessment of radiation doses to the maximum exposed member of the public due to radioactive liquid and gaseous effluents released from the site for each calendar quarter for the calendar year of this report, as well as the total dose for the calendar year. This attachment also includes an assessment of radiation doses to the maximum exposed member of the public from all uranium fuel cycle sources within 8 km of McGuire for the calendar year of this report to show conformance with 40 CFR 190. Methods for calculating the dose contribution from liquid and gaseous effluents are given in the ODCM.

EFFLUENT AND WASTE DISPOSAL ANNUAL REPORT  
 PERIOD 1/1/08 TO 1/1/09  
 GASEOUS ANNUAL DOSE SUMMARY REPORT

McGuire Nuclear Station Units 1 & 2

1<sup>st</sup> Quarter 2008

=== IODINE, H3, AND PARTICULATE DOSE LIMIT ANALYSIS===== Quarter 1 2008 ===

Period-Limit	Critical Group	Critical Organ	Dose (mrem)	Limit (mrem)	Max % of Limit
Q1 - Maximum Organ Dose	TEEN	THYROID	5.12E-02	1.50E+01	3.41E-01

Maximum Organ Dose Receptor Location: 0.5 Mile ENE  
 Critical Pathway: Inhalation

Major Isotopic Contributors (5% or greater to total)

Nuclide	Percentage
H-3	9.99E+01

=== NOBLE GAS DOSE LIMIT ANALYSIS===== Quarter 1 2008 ===

Period-Limit	Dose (mrad)	Limit (mrad)	% of Limit
Q1 - Maximum Gamma Air Dose	1.29E-02	1.00E+01	1.29E-01

Maximum Gamma Air Dose Receptor Location: 0.5 Mile NNE

Major Isotopic Contributors (5% or greater to total)

Nuclide	Percentage
AR-41	9.97E+01

Q1 - Maximum Beta Air Dose	4.90E-03	2.00E+01	2.45E-02
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Maximum Beta Air Dose Receptor Location: 0.5 Mile NNE

Major Isotopic Contributors (5% or greater to total)

Nuclide	Percentage
AR-41	9.26E+01
KR-85	6.25E+00

EFFLUENT AND WASTE DISPOSAL ANNUAL REPORT  
 PERIOD 1/1/08 TO 1/1/09  
 GASEOUS ANNUAL DOSE SUMMARY REPORT

McGuire Nuclear Station Units 1 & 2

2<sup>nd</sup> Quarter 2008

=== IODINE, H3, AND PARTICULATE DOSE LIMIT ANALYSIS===== Quarter 2 2008 ===  

Period-Limit	Critical Group	Critical Organ	Dose (mrem)	Limit (mrem)	Max % of Limit
-----					
Q2 - Maximum Organ Dose	TEEN	LUNG	6.11E-02	1.50E+01	4.07E-01

Maximum Organ Dose Receptor Location: 0.5 Mile ENE  
 Critical Pathway: Inhalation

Major Isotopic Contributors (5% or greater to total)  

Nuclide	Percentage
-----	
H-3	1.00E+02

=== NOBLE GAS DOSE LIMIT ANALYSIS===== Quarter 2 2008 ===  

Period-Limit	Dose (mrad)	Limit (mrad)	% of Limit
-----			
Q2 - Maximum Gamma Air Dose	1.25E-02	1.00E+01	1.25E-01

Maximum Gamma Air Dose Receptor Location: 0.5 Mile NNE

Major Isotopic Contributors (5% or greater to total)  

Nuclide	Percentage
-----	
AR-41	9.99E+01

Q2 - Maximum Beta Air Dose 4.44E-03 2.00E+01 2.22E-02

Maximum Beta Air Dose Receptor Location: 0.5 Mile NNE

Major Isotopic Contributors (5% or greater to total)  

Nuclide	Percentage
-----	
AR-41	9.94E+01

EFFLUENT AND WASTE DISPOSAL ANNUAL REPORT  
 PERIOD 1/1/08 TO 1/1/09  
 GASEOUS ANNUAL DOSE SUMMARY REPORT

McGuire Nuclear Station Units 1 & 2

3<sup>rd</sup> Quarter 2008

=== IODINE, H3, AND PARTICULATE DOSE LIMIT ANALYSIS===== Quarter 3 2008 ===

Period-Limit	Critical Group	Critical Organ	Dose (mrem)	Limit (mrem)	Max % of Limit
Q3 - Maximum Organ Dose	TEEN	THYROID	6.06E-02	1.50E+01	4.04E-01

Maximum Organ Dose Receptor Location: 0.5 Mile ENE  
 Critical Pathway: Inhalation

Major Isotopic Contributors (5% or greater to total)

Nuclide	Percentage
H-3	9.96E+01

=== NOBLE GAS DOSE LIMIT ANALYSIS===== Quarter 3 2008 ===

Period-Limit	Dose (mrad)	Limit (mrad)	% of Limit
Q3 - Maximum Gamma Air Dose	1.37E-02	1.00E+01	1.37E-01

Maximum Gamma Air Dose Receptor Location: 0.5 Mile NNE

Major Isotopic Contributors (5% or greater to total)

Nuclide	Percentage
AR-41	9.99E+01

Q3 - Maximum Beta Air Dose	4.91E-03	2.00E+01	2.46E-02
----------------------------	----------	----------	----------

Maximum Beta Air Dose Receptor Location: 0.5 Mile NNE

Major Isotopic Contributors (5% or greater to total)

Nuclide	Percentage
AR-41	9.84E+01

EFFLUENT AND WASTE DISPOSAL ANNUAL REPORT  
 PERIOD 1/1/08 TO 1/1/09  
 GASEOUS ANNUAL DOSE SUMMARY REPORT

McGuire Nuclear Station Units 1 & 2

4<sup>th</sup> Quarter 2008

=== IODINE, H3, AND PARTICULATE DOSE LIMIT ANALYSIS===== Quarter 4 2008 ===

Period-Limit	Critical Group	Critical Organ	Dose (mrem)	Limit (mrem)	Max % of Limit
-----	-----	-----	-----	-----	-----
Q4 - Maximum Organ Dose	TEEN	LUNG	9.62E-02	1.50E+01	6.41E-01

Maximum Organ Dose Receptor Location: 0.5 Mile ENE  
 Critical Pathway: Inhalation

Major Isotopic Contributors (5% or greater to total)

Nuclide	Percentage
-----	-----
H-3	1.00E+02

=== NOBLE GAS DOSE LIMIT ANALYSIS===== Quarter 4 2008 ===

Period-Limit	Dose (mrad)	Limit (mrad)	% of Limit
-----	-----	-----	-----
Q4 - Maximum Gamma Air Dose	8.18E-03	1.00E+01	8.18E-02

Maximum Gamma Air Dose Receptor Location: 0.5 Mile NNE

Major Isotopic Contributors (5% or greater to total)

Nuclide	Percentage
-----	-----
AR-41	9.99E+01

Q4 - Maximum Beta Air Dose	2.94E-03	2.00E+01	1.47E-02
----------------------------	----------	----------	----------

Maximum Beta Air Dose Receptor Location: 0.5 Mile NNE

Major Isotopic Contributors (5% or greater to total)

Nuclide	Percentage
-----	-----
AR-41	9.82E+01

EFFLUENT AND WASTE DISPOSAL ANNUAL REPORT  
 PERIOD 1/1/08 TO 1/1/09  
 GASEOUS ANNUAL DOSE SUMMARY REPORT

McGuire Nuclear Station Units 1 & 2

ANNUAL 2008

=== IODINE, H3, AND PARTICULATE DOSE LIMIT ANALYSIS===== Annual 2008 =====

Period-Limit	Critical Group	Critical Organ	Dose (mrem)	Limit (mrem)	Max % of Limit
Yr - Maximum Organ Dose	TEEN	THYROID	2.69E-01	3.00E+01	8.97E-01

Maximum Organ Dose Receptor Location: 0.5 Mile ENE  
 Critical Pathway: Inhalation

Major Isotopic Contributors (5% or greater to total)

Nuclide	Percentage
H-3	9.99E+01

=== NOBLE GAS DOSE LIMIT ANALYSIS===== Annual 2008 =====

Period-Limit	Dose (mrad)	Limit (mrad)	% of Limit
Yr - Maximum Gamma Air Dose	4.73E-02	2.00E+01	2.37E-01

Maximum Gamma Air Dose Receptor Location: 0.5 Mile NNE

Major Isotopic Contributors (5% or greater to total)

Nuclide	Percentage
AR-41	9.99E+01

Yr - Maximum Beta Air Dose	1.72E-02	4.00E+01	4.30E-02
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Maximum Beta Air Dose Receptor Location: 0.5 Mile NNE

Major Isotopic Contributors (5% or greater to total)

Nuclide	Percentage
AR-41	9.70E+01

EFFLUENT AND WASTE DISPOSAL ANNUAL REPORT  
 PERIOD 1/1/08 TO 1/1/09  
 LIQUID ANNUAL DOSE SUMMARY REPORT

McGuire Nuclear Station Units 1 & 2

1<sup>st</sup> Quarter 2008

=== BATCH LIQUID RELEASES ===				Quarter 1 2008	
Period-Limit	Critical Age	Critical Organ	Dose (mrem)	Limit (mrem)	Max % of Limit
Q1 - Maximum Organ Dose	CHILD	LIVER	7.66E-02	1.00E+01	7.66E-01
Q1 - Total Body Dose	CHILD		6.46E-02	3.00E+00	2.15E+00

Maximum Organ  
 Critical Pathway: Potable Water  
 Major Isotopic Contributors (5% or greater to total)

Nuclide	Percentage
H-3	8.12E+01
CS-137	1.41E+01

Total Body  
 Critical Pathway: Potable Water  
 Major Isotopic Contributors (5% or greater to total)

Nuclide	Percentage
H-3	9.63E+01

=== CONTINUOUS LIQUID RELEASES (WC) ===				Quarter 1 2008	
Period-Limit	Critical Age	Critical Organ	Dose (mrem)	Limit (mrem)	Max % of Limit
Q1 - Maximum Organ Dose	CHILD	LIVER	4.29E-02	1.00E+01	4.29E-01
Q1 - Total Body Dose	CHILD		4.29E-02	3.00E+00	1.43E+00

Maximum Organ  
 Critical Pathway: Potable Water  
 Major Isotopic Contributors (5% or greater to total)

Nuclide	Percentage
H-3	1.00E+02

Total Body  
 Critical Pathway: Potable Water  
 Major Isotopic Contributors (5% or greater to total)

Nuclide	Percentage
H-3	1.00E+02

EFFLUENT AND WASTE DISPOSAL ANNUAL REPORT  
 PERIOD 1/1/08 TO 1/1/09  
 LIQUID ANNUAL DOSE SUMMARY REPORT

McGuire Nuclear Station Units 1 & 2

2<sup>nd</sup> Quarter 2008

=== BATCH LIQUID RELEASES ===				Quarter 2 2008 =====	
Period-Limit	Critical Age	Critical Organ	Dose (mrem)	Limit (mrem)	Max % of Limit
Q2 - Maximum Organ Dose	CHILD	LIVER	4.12E-02	1.00E+01	4.12E-01
Q2 - Total Body Dose	CHILD		3.32E-02	3.00E+00	1.11E+00

Maximum Organ  
 Critical Pathway: Potable Water  
 Major Isotopic Contributors (5% or greater to total)

Nuclide	Percentage
H-3	7.67E+01
CS-137	1.77E+01
CS-134	5.36E+00

Total Body  
 Critical Pathway: Potable Water  
 Major Isotopic Contributors (5% or greater to total)

Nuclide	Percentage
H-3	9.51E+01

=== CONTINUOUS LIQUID RELEASES (WC) ===				Quarter 2 2008 =====	
Period-Limit	Critical Age	Critical Organ	Dose (mrem)	Limit (mrem)	Max % of Limit
Q2 - Maximum Organ Dose	CHILD	LIVER	4.25E-03	1.00E+01	4.25E-02
Q2 - Total Body Dose	CHILD		4.25E-03	3.00E+00	1.42E-01

Maximum Organ  
 Critical Pathway: Potable Water  
 Major Isotopic Contributors (5% or greater to total)

Nuclide	Percentage
H-3	1.00E+02

Total Body  
 Critical Pathway: Potable Water  
 Major Isotopic Contributors (5% or greater to total)

Nuclide	Percentage
H-3	1.00E+02



EFFLUENT AND WASTE DISPOSAL ANNUAL REPORT  
 PERIOD 1/1/08 TO 1/1/09  
 LIQUID ANNUAL DOSE SUMMARY REPORT

McGuire Nuclear Station Units 1 & 2

3<sup>rd</sup> Quarter 2008

=== BATCH LIQUID RELEASES ===				Quarter 3 2008	
Period-Limit	Critical Age	Critical Organ	Dose (mrem)	Limit (mrem)	Max % of Limit
Q3 - Maximum Organ Dose	CHILD	LIVER	8.30E-02	1.00E+01	8.30E-01
Q3 - Total Body Dose	CHILD		6.71E-02	3.00E+00	2.24E+00

Maximum Organ  
 Critical Pathway: Potable Water  
 Major Isotopic Contributors (5% or greater to total)

Nuclide	Percentage
H-3	7.70E+01
CS-137	1.76E+01
CS-134	5.30E+00

Total Body  
 Critical Pathway: Potable Water  
 Major Isotopic Contributors (5% or greater to total)

Nuclide	Percentage
H-3	9.51E+01

=== CONTINUOUS LIQUID RELEASES (WC) ===				Quarter 3 2008	
Period-Limit	Critical Age	Critical Organ	Dose (mrem)	Limit (mrem)	Max % of Limit
Q3 - Maximum Organ Dose	CHILD	LIVER	3.93E-03	1.00E+01	3.93E-02
Q3 - Total Body Dose	CHILD		3.93E-03	3.00E+00	1.31E-01

Maximum Organ  
 Critical Pathway: Potable Water  
 Major Isotopic Contributors (5% or greater to total)

Nuclide	Percentage
H-3	1.00E+02

Total Body  
 Critical Pathway: Potable Water  
 Major Isotopic Contributors (5% or greater to total)

Nuclide	Percentage
H-3	1.00E+02

EFFLUENT AND WASTE DISPOSAL ANNUAL REPORT  
 PERIOD 1/1/08 TO 1/1/09  
 LIQUID ANNUAL DOSE SUMMARY REPORT

McGuire Nuclear Station Units 1 & 2

4<sup>th</sup> Quarter 2008

=== BATCH LIQUID RELEASES ===				Quarter 4 2008	
Period-Limit	Critical Age	Critical Organ	Dose (mrem)	Limit (mrem)	Max % of Limit
Q4 - Maximum Organ Dose	CHILD	LIVER	5.09E-02	1.00E+01	5.09E-01
Q4 - Total Body Dose	CHILD		4.10E-02	3.00E+00	1.37E+00

Maximum Organ  
 Critical Pathway: Potable Water  
 Major Isotopic Contributors (5% or greater to total)

Nuclide	Percentage
H-3	7.65E+01
CS-137	1.84E+01

Total Body  
 Critical Pathway: Potable Water  
 Major Isotopic Contributors (5% or greater to total)

Nuclide	Percentage
H-3	9.51E+01

=== CONTINUOUS LIQUID RELEASES (WC) ===				Quarter 4 2008	
Period-Limit	Critical Age	Critical Organ	Dose (mrem)	Limit (mrem)	Max % of Limit
Q4 - Maximum Organ Dose	CHILD	LIVER	2.69E-03	1.00E+01	2.69E-02
Q4 - Total Body Dose	CHILD		2.69E-03	3.00E+00	8.95E-02

Maximum Organ  
 Critical Pathway: Potable Water  
 Major Isotopic Contributors (5% or greater to total)

Nuclide	Percentage
H-3	1.00E+02

Total Body  
 Critical Pathway: Potable Water  
 Major Isotopic Contributors (5% or greater to total)

Nuclide	Percentage
H-3	1.00E+02

EFFLUENT AND WASTE DISPOSAL ANNUAL REPORT  
 PERIOD 1/1/08 TO 1/1/09  
 LIQUID ANNUAL DOSE SUMMARY REPORT

McGuire Nuclear Station Units 1 & 2

ANNUAL 2008

=== BATCH LIQUID RELEASES ===			Annual 2008		
Period-Limit	Critical Age	Critical Organ	Dose (mrem)	Limit (mrem)	Max % of Limit
Yr - Maximum Organ Dose	CHILD	LIVER	2.50E-01	2.00E+01	1.25E+00
Yr - Total Body Dose	CHILD		2.04E-01	6.00E+00	3.41E+00

Maximum Organ  
 Critical Pathway: Potable Water  
 Major Isotopic Contributors (5% or greater to total)

Nuclide	Percentage
H-3	7.79E+01
CS-137	1.69E+01
CS-134	5.07E+00

Total Body  
 Critical Pathway: Potable Water  
 Major Isotopic Contributors (5% or greater to total)

Nuclide	Percentage
H-3	9.54E+01

=== CONTINUOUS LIQUID RELEASES (WC) ===			Annual 2008		
Period-Limit	Critical Age	Critical Organ	Dose (mrem)	Limit (mrem)	Max % of Limit
Yr - Maximum Organ Dose	CHILD	LIVER	3.77E-02	2.00E+01	1.89E-01
Yr - Total Body Dose	CHILD		3.77E-02	6.00E+00	6.29E-01

Maximum Organ  
 Critical Pathway: Potable Water  
 Major Isotopic Contributors (5% or greater to total)

Nuclide	Percentage
H-3	1.00E+02

Total Body  
 Critical Pathway: Potable Water  
 Major Isotopic Contributors (5% or greater to total)

Nuclide	Percentage
H-3	1.00E+02

**Attachment 2**

**Solid Waste Disposal Report**

REPORT PERIOD  
 JANUARY - DECEMBER 2008

McGUIRE NUCLEAR STATION  
 SOLID RADIOACTIVE WASTE SHIPPED TO DISPOSAL FACILITIES

TYPES OF WASTES SHIPPED	Number of Shipments	Number of Containers	Container Type	Disposal Volume ft <sup>3</sup>	Volume m <sup>3</sup>	Waste Class	Total Curies
<b>Waste from Liquid Systems</b>							
(A) dewatered powdex resin (brokered)	none						
(B) dewatered powdex resin	none						
(C) dewatered bead resin (brokered)	none						
(D) dewatered bead resin	none						
(E) dewatered radwaste system resin	none						
(F) dewatered primary bead resin	1	1	HIC	27.49	0.78	B	1.17E+02
(G) dewatered mechanical filter media	none						
(H) dewatered mechanical filter media (brokered)	3	24	HIC	42.78	1.21	C	3.44E+01
(I) solidified waste	none						
<b>Dry Solid Waste</b>							
(A) dry active waste (compacted)	none						
dry active waste (non-compacted)	none						
dry active waste (brokered/compacted)							
dry active waste (brokered/non-compacted)	25	81	DBP	4537.01	128.48	A/U	1.840E+00
(B) sealed sources/smoke detectors	none						
(C) sealed sources	none						
(D) irradiated components	none						
<b>Totals</b>	<b>29</b>	<b>106</b>		<b>4607.28</b>	<b>130.47</b>		<b>1.532E+02</b>

**MCGUIRE NUCLEAR SITE  
SUMMARY OF MAJOR RADIONUCLIDE COMPOSITION  
2008**

Type of waste	Nuclide	% Abundance
---------------	---------	-------------

1. Waste from liquid systems:
-------------------------------

- |   |                      |
|---|----------------------|
| A. Dewatered Powdex Resin (brokered)          | No shipments in 2008 |
| B. Dewatered Powdex Resin                     | No shipments in 2008 |
| C. Dewatered Bead Resin (brokered)            | No shipments in 2008 |
| D. Dewatered Bead Resin                       | No shipments in 2008 |
| E. Dewatered Radwaste System Resin (brokered) | No shipments in 2008 |
| F. Dewatered Primary Bead Resin (brokered)    |                      |

**2008 - 017**

<u>Nuclide</u>	<u>%Abundance</u>
Mn-54	2.55
Co-57	1.29
Co-58	6.98
Co-60	16.90
Cs-137	1.37
Cs-134	.29
Ni-63	52.12
Fe-55	17.52
Sb-125	.84
H-3	.01
Sr-90	.02
Zn-65	.11

- |                                      |                      |
|--------------------------------------|----------------------|
| G. Dewatered Mechanical Filter Media | No shipments in 2008 |
|--------------------------------------|----------------------|

H. Dewatered Mechanical Filter Media (brokered)

2008- 001

<u>Nuclide</u>	<u>%Abundance</u>
Mn-54	3.13
Co-57	.15
Co-58	.09
Co-60	28.32
Cs-137	1.82
Cs-134	.36
Fe-55	47.11
Ni-63	16.88
Tc-99	.57
C-14	.73
Sb-125	.63
Ce-144	.06
Zn-65	.14

2008- 004

<u>Nuclide</u>	<u>%Abundance</u>
Mn-54	6.82
Co-57	.39
Co-58	13.05
Co-60	21.53
Cs-137	1.24
Cs-134	.37
Fe-55	42.39
Fe-59	.03
Ni-63	11.33
Cr-51	.05
C-14	.48
Zr-95	.59
Sn-113	.10
Sb-125	.56
Ce-144	.15
Zn-65	.44
Tc-99	.38
Nb-95	.10

2008-006

<u>Nuclide</u>	<u>%Abundance</u>
Mn-54	3.96
Co-57	.22
Co-58	6.09
Co-60	26.12
Cs-137	1.78
Cs-134	.33
Fe-55	42.31
Fe-59	.01
Ni-63	16.60
Cr-51	.03
Zr-95	.28
Sn-113	.05
C-14	.72
Sb-125	.57
Ce-144	.08
Zn-65	.23
Tc-99	.56
Nb-95	.06

I. Solidified Waste

No shipments in 2008

2. Dry Solid Waste:

- A. Dry Active Waste (compacted)                      Compaction no longer performed on-site.  
Dry Active Waste (non-compacted)                      No shipments in 2008  
Dry Active Waste (brokered/compacted)                      No shipments in 2008  
Dry Active Waste (brokered/non-compacted)

2008-002

<u>Nuclide</u>	<u>%Abundance</u>
Mn-54	.02
H-3	98.26
Co-58	.12
Co-60	.42
Cs-137	.02
Fe-55	.77
Ni-63	.30
C-14	.04
Sb-125	.01
Zr-95	.01
Nb-95	.02



2008-003

<u>Nuclide</u>	<u>%Abundance</u>
Mn-54	.02
H-3	98.14
Co-58	.13
Co-60	.44
Cs-137	.02
Fe-55	.82
Ni-63	.32
C-14	.04
Zr-95	.01
Sb-125	.01
Nb-95	.02

2008-007

<u>Nuclide</u>	<u>%Abundance</u>
Mn-54	1.15
Co-57	.06
Co-58	6.88
Co-60	24.02
Cs-137	1.28
Fe-55	44.47
Ni-63	17.33
C-14	2.28
Zr-95	.43
Sb-125	.77
Sr-90	.18
Nb-95	1.14

2008-008

<u>Nuclide</u>	<u>%Abundance</u>
Mn-54	1.15
Co-57	.06
Co-58	6.55
Co-60	24.17
Cs-137	1.29
Ni-63	17.38
Fe-55	44.65
Zr-95	.41
C-14	2.29
Sb-125	.77
Sr-90	.18
Nb-95	1.02

2008-009

<u>Nuclide</u>	<u>%Abundance</u>
Mn-54	1.15
Co-57	.06
Co-58	7.03
Co-60	24.00
Cs-137	1.26
Fe-55	44.41
Ni-63	17.24
C-14	2.28
Zr-95	.44
Sb-125	.77
Sr-90	.18
Nb-95	1.17

2008-010

<u>Nuclide</u>	<u>%Abundance</u>
Mn-54	1.15
Co-57	.06
Co-58	7.06
Co-60	23.96
Cs-137	1.28
Fe-55	44.36
Ni-63	17.29
C-14	2.27
Zr-95	.44
Sb-125	.76
Sr-90	.18
Nb-95	1.19

2008-011

<u>Nuclide</u>	<u>%Abundance</u>
Mn-54	1.14
Co-57	.06
Co-58	6.63
Co-60	24.18
Cs-137	1.28
Fe-55	44.58
Ni-63	17.41
C-14	2.30
Zr-95	.41
Sb-125	.77
Sr-90	.18
Nb-95	1.04

2008-012

<u>Nuclide</u>	<u>%Abundance</u>
Mn-54	1.15
Co-57	.06
Co-58	6.61
Co-60	24.19
Cs-137	1.29
Fe-55	44.55
Ni-63	17.46
C-14	2.30
Zr-95	.41
Sb-125	.77
Sr-90	.18
Nb-95	1.03

2008-013

<u>Nuclide</u>	<u>%Abundance</u>
Mn-54	1.15
Co-57	.06
Co-58	6.79
Co-60	24.05
Cs-137	1.28
Fe-55	44.54
Ni-63	17.37
C-14	2.29
Zr-95	.42
Sb-125	.77
Sr-90	.18
Nb-95	1.09

2008-014

<u>Nuclide</u>	<u>%Abundance</u>
Mn-54	1.16
Co-57	.06
Co-58	7.28
Co-60	23.88
Cs-137	1.27
Fe-55	44.25
Ni-63	17.17
C-14	2.26
Zr-95	.46
Sb-125	.76
Sr-90	.18
Nb-95	1.27

2008-018

<u>Nuclide</u>	<u>%Abundance</u>
Mn-54	1.16
Co-57	.06
Co-58	7.29
Co-60	23.85
Cs-137	1.27
Fe-55	44.27
Ni-63	17.14
C-14	2.26
Zr-95	.46
Sb-125	.76
Sr-90	.18
Nb-95	1.30

2008-019

<u>Nuclide</u>	<u>%Abundance</u>
Mn-54	1.12
Co-57	.06
Co-58	5.27
Co-60	24.69
Cs-137	1.32
Fe-55	45.18
Ni-63	18.02
C-14	2.38
Zr-95	.32
Sb-125	.78
Sr-90	.19
Nb-95	.68

2008-020

<u>Nuclide</u>	<u>%Abundance</u>
Mn-54	1.15
Co-57	.06
Co-58	7.02
Co-60	23.98
Cs-137	1.27
Fe-55	44.40
Ni-63	17.27
C-14	2.28
Zr-95	.44
Sb-125	.76
Sr-90	.18
Nb-95	1.18

2008-021

<u>Nuclide</u>	<u>%Abundance</u>
Mn-54	1.14
Co-57	.06
Co-58	6.52
Co-60	24.17
Cs-137	1.29
Fe-55	44.67
Ni-63	17.48
C-14	2.30
Zr-95	.40
Sb-125	.77
Sr-90	.18
Nb-95	1.00

2008-024

<u>Nuclide</u>	<u>%Abundance</u>
Mn-54	1.14
Co-57	.06
Co-58	6.05
Co-60	24.45
Cs-137	1.30
Fe-55	44.84
Ni-63	17.65
C-14	2.33
Zr-95	.37
Sb-125	.77
Sr-90	.18
Nb-95	.85

2008-025

<u>Nuclide</u>	<u>%Abundance</u>
Mn-54	1.12
Co-57	.06
Co-58	5.38
Co-60	24.65
Cs-137	1.32
Fe-55	45.23
Ni-63	17.93
C-14	2.37
Zr-95	.33
Sb-125	.78
Sr-90	.19
Nb-95	.66

2008-027

<u>Nuclide</u>	<u>%Abundance</u>
Mn-54	1.16
Co-57	.06
Co-58	7.15
Co-60	23.90
Cs-137	1.27
Fe-55	44.32
Ni-63	17.26
C-14	2.27
Zr-95	.45
Sb-125	.76
Sr-90	.18
Nb-95	1.22

2008-028

<u>Nuclide</u>	<u>%Abundance</u>
Mn-54	1.15
Co-57	.06
Co-58	6.96
Co-60	24.03
Cs-137	1.28
Fe-55	44.39
Ni-63	17.31
C-14	2.28
Zr-95	.44
Sb-125	.76
Sr-90	.18
Nb-95	1.16

2008-030

<u>Nuclide</u>	<u>%Abundance</u>
Mn-54	1.16
Co-57	.06
Co-58	7.26
Co-60	23.84
Cs-137	1.27
Fe-55	44.32
Ni-63	17.17
C-14	2.26
Zr-95	.46
Sb-125	.76
Sr-90	.18
Nb-95	1.27

2008-034

<u>Nuclide</u>	<u>%Abundance</u>
Mn-54	1.16
Co-57	.06
Co-58	7.20
Co-60	23.87
Cs-137	1.27
Fe-55	44.33
Ni-63	17.20
C-14	2.27
Zr-95	.45
Sb-125	.76
Sr-90	.18
Nb-95	1.25

2008-037

<u>Nuclide</u>	<u>%Abundance</u>
Mn-54	1.16
Co-57	.06
Co-58	7.18
Co-60	23.92
Cs-137	1.27
Fe-55	44.31
Ni-63	17.20
C-14	2.27
Zr-95	.45
Sb-125	.76
Sr-90	.18
Nb-95	1.25

2008-038

<u>Nuclide</u>	<u>%Abundance</u>
Mn-54	2.77
Co-57	.10
Co-58	.12
Co-60	37.34
Cs-137	.02
Fe-55	38.87
Ni-63	17.17
C-14	.02
Zr-95	.33
Sb-125	1.49
Sr-90	.04
Sn-113	.07
Ce-144	.02
Pu-238	.01
Am-241	.01
Nb-95	.62

2008-039

<u>Nuclide</u>	<u>%Abundance</u>
Mn-54	2.88
Co-57	.11
Co-58	1.44
Co-60	36.79
Cs-137	.02
Fe-55	38.78
Ni-63	16.82
C-14	.02
Zr-95	.43
Sb-125	1.49
Sr-90	.04
Sn-113	.08
Ce-144	.02
Pu-238	.01
Am-241	.01
Nb-95	1.06

2008-041

<u>Nuclide</u>	<u>%Abundance</u>
Mn-54	1.19
Co-57	.06
Co-58	7.06
Co-60	24.15
Cs-137	1.24
Fe-55	44.26
Ni-63	17.16
C-14	2.22
Zr-95	.45
Sb-125	.78
Sr-90	.18
Nb-95	1.24

2008-042

<u>Nuclide</u>	<u>%Abundance</u>
Mn-54	2.81
Co-57	.10
Co-58	1.21
Co-60	37.18
Cs-137	.02
Fe-55	38.86
Ni-63	17.05
C-14	.02
Zr-95	.36
Sb-125	1.49
Sr-90	.04
Sn-113	.07
Ce-144	.02
Pu-238	.01
Am-241	.01
Nb-95	.74



B. Sealed Sources

No shipments in 2008

C. Sealed Sources/Smoke Detectors

No shipments in 2008

D. Irradiated Components

No shipments in 2008

**Attachment 3**

**Unplanned Offsite Releases**

McGUIRE NUCLEAR STATION

UNPLANNED RELEASES

(January 1, 2008 through December 31, 2008)

There were two unplanned liquid radioactive releases to the environment in 2008. There was one unplanned gaseous radioactive effluent release to the environment in 2008.

February 03, 2008

Memorandum To: Annual Radioactive Effluent Release Report

CC: Steve Mooneyhan, H. J. Sloan, Joyce Correll, C.D. Ingram, Jim Kammer, Ken Ashe, Kay Crane

From: William C. Spencer  
RP Staff  
Radiation Protection  
McGuire Nuclear Station

**Re: Unplanned release from the WC system Final Hold up Pond Reference PIP M-08-0585**

**Event Summary:**

See referenced PIP for details.

Assuming the water was leaked from the pond to the under surface of the ground and the total volume reached the Catawba River. A conservative calculation indicates  $5.0E-3$  curies of tritium were released from the FHP during this event. This would equate to a Total Body dose of  $5.39E-5$  mRem.

**Sequence of events:**

- 1/28/08 Water transfer from Mix pond B to the FHP was initiated to allow for treatment to resolve a foaming issue seen at outfall #002 during a normal WC pond release to Catawba river.
- 1/29/08 @ 1620 Gravity drain to FHP was secured. FHP placed in recirculation as part of the treatment plan to resolve the foaming issue. FHP level ~0.8 mg (million gallons).
- 2/1/08 @ 1020 FHP recirculation secured. FHP level ~0.75 mg. CHM suspected leak in recirculation piping. No evidence of uncontrolled discharge identified at outfall #002 (normal WC release path). FHP level was marked with tape to check for further decrease in level. (Recirculation pumps off and valves isolated.)
- 2/3/08 @ 0930 CHM verified FHP level @ ~0.66 mg. Notified EH&S on duty contact. Sampled FHP & initiated PIP M-08-00585. Started pumping FHP to "B" mix pond. CHM performed surveillance around and below the pond to identify any spill sites. None were found. No water was seen coming from the ground as a result of this event.
- 2/4/08 @ 0900 FHP level @ 0.43 mg. Secured FHP pumping to "B" mix pond. Sampled and started "A" mix pond discharge to river. CHM made decision to monitor level of FHP and if still dropping, secure discharge on 2/5/05 and pump FHP to in-service mix pond.
- 2/4/08 @ ~1100 sampling was requested from monitoring wells 84, 84R, 82, 103, 103R to identify ground water impact below the Pond.
- 2/4/08 @ 1600 No change in level of FHP noted since 0900. Started pumping FHP to "B" mix pond. Total volume lost from FHP conservatively estimated to be ~140K gallons.

The total liquid activity released was reported on Liquid Waste Release (LWR) # 2008014.

The unplanned activity was evaluated against off site dose limits using current ODCM methodology on the attached reports.

**Safety Significance:**

The health and safety of the public were not compromised by this event. The total activity released was insignificant. Calculated dose to the Total Body ( $5.39E-5$  mRem) is less than one tenth of one percent (<0.10%) of the dose limit specified by Selected Licensee Commitments and Code of Federal Regulations.

W.C. Spencer  
RP Staff Support  
Radiation Protection  
McGuire Nuclear Station

Joyce Correll  
General Supervisor  
Radiation Protection  
McGuire Nuclear Station

February 15, 2008

Memorandum To: Annual Radioactive Effluent Release Report

CC: Steve Mooneyhan, H. J. Sloan, Joyce Correll, C.D. Ingram, Jim Kammer, Ken Ashe, Kay Crane

From: William C. Spencer  
RP Staff  
Radiation Protection  
McGuire Nuclear Station

**Re: Unplanned release from the WC discharge pH analyzer Reference PIP M-08-0692**

**Event Summary:**

See referenced PIP for details.

Sample water from pH test probes was found to be released to the ground southwest of the WC system Final Holdup Pond (FHP). The flow from test probes is 1.3 gpm triggered by normal WC discharge to the Catawba River. This event was discovered via follow up investigation from loss of volume from the FHP. (See PIP M-08-0585) The WC release was secured stopping the pH sampler release.

Assuming the water discharged from the analyzer to the ground on site and the total annual volume reached the Catawba River. Using 2006 WC release data a conservative calculation indicates  $1.27E-2$  curies ( $8.35E-3$  Ci in 2007) of tritium was released to an area southwest of the (FHP). This would equate to a Total Body dose of  $1.36E-4$  mRem for the year. The highest total activity from the previous 3 years was used as the most conservative estimate.

The total liquid activity released each year from this path is insignificant and will not be included in the annual dose from effluents. Regulatory Guide 1.109 "Calculation of Annual Doses to Man From Routine Releases of Reactor Effluents for the Purpose of Evaluating Compliance with 10 CFR part 50, Appendix I" allows insignificant dose from pathways that are not more than 10% of the total from all pathways considered in the guide to be ignored. The annual dose from this event conservatively estimated is less than 1% of the total from all pathways.

The unplanned activity was evaluated against off site dose limits using current ODCM methodology on the attached reports.

Preliminary on site soil samples taken in the discharge plume identified Cs-137 at levels  $\sim 200$  pCi/L which are similar in concentration to REMP sediment samples normally obtained down stream of the WC discharge outfall. Follow up sampling activities will be reported in PIP M-08-0692.

**Safety Significance:**

The health and safety of the public have not been compromised by this event. The total activity released was insignificant. Calculated annual dose to the Total Body ( $1.36E-4$  mRem) is less than one tenth of one percent ( $<0.10\%$ ) of the dose limit specified by Selected Licensee Commitments and Code of Federal Regulations.

W.C. Spencer  
RP Staff Support  
Radiation Protection  
McGuire Nuclear Station

Joyce Correll  
General Supervisor  
Radiation Protection  
McGuire Nuclear Station

January 22, 2008

Memorandum To: Annual Radioactive Effluent Release Report

CC: Steve Mooneyhan, H. J. Sloan, Joyce Correll, C.D. Ingram, Jim Kammer, Ken Ashe, Kay Crane

From: William C. Spencer  
RP Staff  
Radiation Protection  
McGuire Nuclear Station

**Re: Unplanned release to the Unit 1 Vent Reference PIP M-08-0379**

**Event Summary:**

See referenced PIP for details.

On January 22, 2008 10:15, a normal WGDT-E release was initiated to the Unit 1 Vent. At initiation of the release a high rad trip occurred on 0EMF-50 immediately terminating the release. While investigating the trip actuation a pressure drop of ~0.5 psig from WGDT-B (in-service tank) was observed and a pressure increase of ~0.5 psig was seen in WGDT-E. Attempts to release WGDT-E were terminated. From trend analysis of 0 EMF 50, increased counts were seen from one ~76,000 cpm spike which caused the Trip 2 actuation (auto release termination). Trending the Unit Vent Monitor 1EMF-36 indicated no counts above normal background. No off site release limits were challenged.

A conservative calculation indicates  $3.15E-3$  curies of fission and activation gas (noble gas) were released to the Unit 1 Vent during this event. The source of the noble gas is suspected to be due to leak-by from 1 WG-288 (Hydrogen re-combiner isolation valve) into the WGDT-E tank and discharge line.

**Sequence of events:**

- On 1/21/08 WGDT-E was sampled for a planned release on 1/22/08.
- 1/22/08 10:15 WGDT-E release started.
- 10:15 an instantaneous spike was seen on 0 EMF 50 of ~ 76,000 cpm and the release was auto terminated.
- 10:15 release secured by Chemistry.
- Chemistry reported ~0.5 psig pressure drop (20 ft3) released from WGDT-B to Unit 1 Vent.
- WGDT-B sampled to account for activity released to the unit 1 vent.
- SRPMP 8-2 "Investigation of Unusual Radiological Occurrences" was completed to document the Unplanned Release investigation.
- HP/0/B/1003/050 RP procedure for WGDT release put on Technical Hold.

The total Noble gas activity released was reported on (GWR) Gaseous Waste Release # 2008004.

The unplanned activity was evaluated against off site dose limits using current ODCM methodology on the attached spreadsheet.

**Safety Significance:**

The health and safety of the public were not compromised by this event. The total activity released was insignificant. Calculated dose and dose rate to the Total Body, Skin, Gamma Air, and Beta Air were all less than one percent (<1.0%) of the limits specified by Selected Licensee Commitments and Code of Federal Regulations.

W.C. Spencer  
RP Staff Support  
Radiation Protection  
McGuire Nuclear Station

Joyce Correll  
General Supervisor  
Radiation Protection  
McGuire Nuclear Station

**Attachment 4**

**Fuel Cycle Calculation**

**McGuire Nuclear Station**  
**2008 Radioactive Effluent Releases**  
**40CFR190 Uranium Fuel Cycle Dose Calculation Results**

In accordance with the requirements of 40CFR190, the annual dose commitment to any member of the general public shall be calculated to assure that doses are limited to 25 millirems to the total body or any organ with the exception of the thyroid which is limited to 75 millirems. The fuel cycle dose assessment for McGuire Nuclear Station only includes liquid and gaseous effluent dose contributions from McGuire and direct and air-scatter dose from McGuire's onsite Independent Spent Fuel Storage Installation (ISFSI) since no other uranium fuel cycle facility contributes significantly to McGuire's maximum exposed individual. The combined dose to a maximum exposed individual from McGuire's effluent releases and direct and air-scatter dose from McGuire's ISFSI is well below 40CFR190 limits as shown by the following summary:

**I. 2008 McGuire 40CFR190 Effluent Dose Summary**

The 40CFR190 effluent dose analysis to the maximum exposed individual from liquid and gas releases includes the dose from noble gases (i.e., total body and skin).

**Maximum Total Body Dose = 4.72E-01 mrem**

Maximum Location: 0.5 Mile, East-Northeast Sector  
Critical Age: Adult  
Gas non-NG Contribution: 56%  
Gas NG Contribution: 4%  
Liquid Contribution: 40%

**Maximum Organ (other than TB) Dose = 4.87E-01 mrem**

Maximum Location: 0.5 Mile, East-Northeast Sector  
Critical Age: Child  
Critical Organ: Liver  
Gas Contribution: 49%  
Liquid Contribution: 51%

**II. 2008 McGuire 40CFR190 ISFSI Dose Summary**

Direct and air-scatter radiation dose contributions from the onsite Independent Spent Fuel Storage Installation (ISFSI) at McGuire have been calculated and documented in the "McGuire Nuclear Site 10CFR72.212 Written Evaluations" report. The maximum dose rate to the nearest resident from the McGuire ISFSI is conservatively calculated to be 14.5 mrem/year.

The attached excerpt from the "McGuire Nuclear Site 10CFR72.212 Written Evaluations" report is provided to document the method used to calculate the McGuire ISFSI 14.5 mrem/year dose estimate.



The following six pages are taken from the McGuire Nuclear Site, "Independent Spent Fuel Storage Installation", 10CFR72.212 Evaluation report.

### C. 10CFR72.212(b)(2)(i)(C) - Requirements of 72.104

#### Criterion

"...the requirements of 72.104 have been met."

#### Evaluation

##### Historical TLD Monitoring

Attachment 3 documents the actual radiological dose at the owner controlled fence on top of the berm overlooking the ISFSI. Actual dose to the public from the ISFSI is only available at this owner controlled fence. Therefore, a normalization factor is derived by comparing the actual dose to the calculated dose. The normalization factor is applied to the calculated values for the intake waterway and the exclusion area boundary to approximate the actual dose values from the ISFSI in those areas around the plant.

From Attachment 3, the greatest dose is 0.058 rems during a 97 day period in the second quarter of 2004 (TLD location #76). This is equivalent to 0.0249 mrem per hour for a total population of ten TN-32 casks. The calculated dose for this same location using conservative computer models is 0.744 mrem per hour. A normalization value is derived by dividing the actual dose by the calculated dose, which is  $0.0249/0.744 = 0.0335$ . Please note that the normalization factor will only be used for the TN-32 casks.

##### ISFSI Controlled Area Boundary (ISFSI and Site Operations)

It is stipulated in 10CFR72.104(a) that the annual dose equivalent to any real individual who is located beyond the controlled area of the ISFSI (as defined in 10CFR 72.3) must not exceed 25 mrem to the whole body, 75 mrem to the thyroid, and 25 mrem to any critical organ during normal operations and anticipated occurrences.<sup>3</sup> This dose equivalent must include contributions from planned releases to the environment, direct radiation from ISFSI operations, and any other radiation from uranium fuel cycle operations within the region.

The combined and skyshine dose rates at various distances for one cask stored with 7 year cooled fuel (inner) and 10 year cooled fuel (outer) were analyzed by Transnuclear.<sup>4</sup> The best-fit empirical equation for skyshine dose rate as a function of distance is  $y = 0.0156e^{-0.0112x}$  for gammas and  $y = 0.0274e^{-0.0129x}$  for neutrons, where y is dose rate (mrem/hr) and x is distance (meters), applicable from 20 to 1000 meters (page 22 of the calculation). Likewise, the best-fit empirical equation for total dose rate (direct and skyshine) as a function of distance is

<sup>3</sup> For McGuire, compliance with this regulation will also assure compliance with 40 CFR Part 190.

<sup>4</sup> TN Calc 1083-20, "TN-32 Cask for Duke Power, TN-32 MCMP Models for Determining Off-Site Doses," Rev. 0, dated 4/06/2000.

$y = 492.69x^{-2.1688}$  for gammas and  $y = 166.95x^{-2.0696}$  for neutrons, where y is dose rate (mrem/hr) and x is distance (meters), applicable from 20 to 80 meters (page 23 of the calculation).

Based upon conservative engineering judgment, the McGuire power generation contribution at the Exclusion Area Boundary (EAB) is determined to be 3 mrem per year. The 3 mrem per year is independent of the ISFSI.

The combined and skyshine dose rates at various distances for a 2x6 cask array with 5 year cooled fuel were analyzed by NAC.<sup>5</sup> Skyshine dose rates are located in Table 6-4 on page 12 of the calculation and combined dose rates are located in Table 6-6 on page 14 of the calculation. Both tables account for the effects of both gammas and neutrons.

The controlled area of the MNS ISFSI is defined to be coextensive with the McGuire Nuclear Site EAB. The annual dose for a maximally exposed individual at this boundary must be below 25 mrem in accordance with 10CFR72.104 (cited above). For a conservative estimate, the individual is assumed to have a 100% occupancy time (8760 hours per year) at the boundary. The individual is also considered to be occupying the point on the EAB closest to the ISFSI, which would be just south of the Cowans Ford Dam close to the river. This point on the EAB is determined to be 425 meters from the ISFSI and the calculated dose only considers skyshine radiation. Direct radiation from the casks is shielded by the ground due to the significant drop in elevation from the ISFSI to the river. The combination of calculated and actual dose to an individual due to the ISFSI is determined to be 14.5 mrem and the dose due to McGuire power generation is 3 mrem per year for a total dose of 17.5 mrem per year. Therefore, the ISFSI controlled area boundary radiation limits are met for the McGuire ISFSI.

The selection of an individual on the EAB south of the dam is totally arbitrary in order to choose the closest point on the EAB to the ISFSI. This location is owned by Duke Energy and no member of the public would be permitted to occupy this location continuously. The regulations speak of the "real individual" when addressing radiation exposure. Factually, this "real individual" is located beyond the EAB on the eastern side of the plant.

#### General Environment from Total Nuclear Fuel Cycle (ISFSI and Site Operations)

40CFR190 applies to radiation doses received by members of the public in the general environment and to radioactive materials introduced to the general environment as the result of all operations which are part of the Nuclear Fuel Cycle. The McGuire ISFSI is located in the immediate proximity of McGuire Nuclear Station and as such compliance with 40CFR190 must be demonstrated.

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<sup>5</sup> NAC Calc 12418-5001, "Skyshine Evaluation of McGuire ISFSI," Rev.0, dated 11/26/03.

The McGuire UFSAR (Section 2.1.2.2, "Boundaries for Establishing Effluent Release Limits") and Selected Licensee Commitments Manual (Section 16.11, "Radiological Effluents Control") defines "unrestricted areas" to be coextensive with the EAB and beyond. Likewise, "general environment" is defined to be coextensive with the EAB and beyond.

It is stipulated in 40CFR190.10(a) that the annual dose equivalent shall not exceed 25 mrem to the whole body, 75 mrem to the thyroid, and 25 mrem to any other organ of any member of the public as a result of exposures to planned discharges of radioactive materials, radon and its daughters excepted, to the general environment from uranium fuel cycle operations and to radiation from these operations. As illustrated previously in showing compliance with 10CFR 72.104(a), the calculated dose at the EAB is 17.5 mrem per year, within the 25 mrem allowable limit. The summation of the doses from the ISFSI and McGuire power generation to the General Environment are well within the allowable limits.

#### Dose Inside ISFSI Controlled Area (ISFSI Operations)

Regulations permit the controlled area to be traversed by public roads and waterways as cited in 10CFR72.106(c). Since the public is permitted access into the controlled area at McGuire, the dose rate must be below 2 mrem per hour and the annual dose must be below 100 mrem within the controlled area.<sup>6</sup>

A member of the public is postulated to be located between the owner controlled fence and the EAB at a point close to the security buoys near the intake structure of the nuclear station, the closest approach for such an individual to the ISFSI. This area is accessible as shoreline covered with large stones for erosion control and is not a location where individual members of the public would typically be found. Regulatory Guide 1.109, "Calculation of Annual Doses to Man From Routine Releases of Reactor Effluents for the Purpose of Evaluating Compliance with 10 CFR Part 50, Appendix I," provides a recommended value of 67 hours per year of "shoreline recreation" for the maximum exposed individual in the vicinity of a nuclear station. Although the shoreline area near McGuire is not recreational in nature, use of this value as an occupancy factor would be conservative. For additional conservatism the residence time was more than doubled to 150 hours and utilized in the dose calculations for an individual in the vicinity of the McGuire intake structure close to the ISFSI.

The maximum dose rate at the owner controlled fence closest to the ISFSI was determined to be 0.409 mrem per hour (direct radiation and skyshine), within the 2 mrem per hour allowable limit. Finally, the annual dose resulting from ISFSI to the public inside the McGuire EAB in the vicinity of the intake structure, using a

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<sup>6</sup> 10CFR20.1301(b). See also 10CFR20.1301(a)(2).

residence time of 150 hours, is determined to be 8.48 mrem (skyshine only - earthen berm acts as a shield), within the 100 mrem allowable limit.

These calculations show that the McGuire ISFSI containing ten TN-32A casks and up to 36 NAC UMS casks meets the radiological requirements of 10CFR72.104, 10CFR20.1301 and 40CFR190.

### **Tabulations**

#### **Normalization Factor (NF)**

##### **TN-32A Casks**

Actual radiological dose at the owner controlled fence divided by the calculated dose.

$$\text{Actual dose} = (0.058 \text{ rem} \times 1000 \text{ mrem/rem}) / (97 \text{ days} \times 24 \text{ hrs/day}) = 0.0249 \text{ mrem/hr}$$

$$\text{Calculated dose} = 0.744 \text{ mrem/hr}$$

(see "top of berm at owner controlled fence" below)

$$\text{NF} = 0.0249/0.744 = 0.0335$$

Due to the amount of conservatism utilized in the computer models, the actual measured dose at the owner controlled fence is only approximately 3% of the calculated values. Since historical TLD measurements are not available for the waterway and exclusion area boundary, the NF and calculated values are used to approximate the actual dose from the TN-32 casks for those two areas.

#### **Top of berm at owner controlled fence - 70 meters from ISFSI**

##### **TN-32A casks**

Using the previous equations for total dose and a distance of 70 meters the total dose rate (gammas and neutrons) for one cask is  $7.443 \text{ E}^{-02} \text{ mrem/hr}$ .

$$(10) \text{ Casks} \times 7.443 \text{ E}^{-02} \text{ mrem/hr} = 0.744 \text{ mrem per hour}$$

Actual measured dose rate for the first ten casks stored in the ISFSI = 0.0249 mrem per hour

### **NAC - UMS Casks**

Using the calculated value from the NAC evaluation located in Table 6-6, "2x6 Cask Array Combined Dose Rates", the total dose rate (gammas and neutrons) at a distance of 70 meters is 1125.6 mrem/yr. This equates to:

$$(1125.6 \text{ mrem/yr}) / (8760 \text{ hours per yr}) = 0.128 \text{ mrem per hour}$$

### **Total Expected Dose Rate at Owner Controlled Fence at Top of Berm**

Ten TN-32A Casks (actual) plus (3X) 2X6 Array NAC UMS Casks (calculated)

$$0.0249 \text{ mrem per hr} + 3(0.128) \text{ mrem per hr} = 0.409 \text{ mrem per hr}$$

### **Waterway beyond security buoys on other side of berm from ISFSI - 135 meters from ISFSI**

#### **TN-32A Casks**

Using the previous equations for skyshine and a distance of 135 meters the skyshine dose (gammas and neutrons) for one cask is  $8.24 \text{ E}^{-03} \text{ mrem/hr}$ .

$$(10) \text{ Casks} \times 8.24 \text{ E}^{-03} \text{ mrem/hr} \times 150 \text{ hrs (residence time/yr)} = 12.36 \text{ mrem per year}$$

$$\text{Normalized actual dose} = 0.0335 \times 12.36 \text{ mrem/yr} = 0.414 \text{ mrem per year}$$

Total expected dose for-ten TN-32A casks (actual)  
0.414 mrem per year

#### **NAC-UMS Casks**

Using the calculated value from the NAC evaluation located in Table 6-4, "2x6 Cask Array Scattered Dose Rates", the total dose rate (gammas and neutrons) at a distance of 135 meters is 157.3 mrem/yr. For a residence time of 150 hours this equates to :

$$(157.3 \text{ mrem/yr}) / (8760 \text{ hrs/yr}) \times 150 \text{ hrs (residence time/yr)} = 2.69 \text{ mrems / yr}$$

**Total Expected Dose at Waterway on Other Side of Berm**

Ten TN-32A Casks (actual) plus (3X) 2X6 Array NAC UMS Casks (calculated)

$$0.414 \text{ mrem per year} + 3(2.69) \text{ mrem per year} = 8.48 \text{ mrem per year}$$

**Individual Sited on Exclusion Area Boundary Below Dam - 425 meters from ISFSI**

**TN-32A Casks**

Using the previous equations for skyshine and a distance of 425 meters the skyshine dose (gammas and neutrons) for one cask is  $2.48 \text{ E}^{-04} \text{ mrem/hr}$ .

$$(10) \text{ Casks} \times 2.48 \text{ E}^{-04} \text{ mrem/hr} \times 8760 \text{ hours per year} = 21.7 \text{ mrem / yr}$$

$$\text{Normalized actual dose} = 0.0335 \times 21.7 \text{ mrem/yr} = 0.727 \text{ mrem / yr}$$

Total expected dose for ten TN-32A casks (actual)

$$0.727 \text{ mrem / yr}$$

**NAC-UMS Casks**

Using the calculated value from the NAC evaluation located in Table 6-4, "2x6 Cask Array Scattered Dose Rates", the total dose rate (gammas and neutrons) at a distance of 425 meters is 4.6 mrem/yr.

**Total Expected Dose at Exclusion Area Boundary**

Ten TN-32A Casks (actual) plus (3X) 2X6 Array NAC UMS Casks (calculated)

$$0.727 \text{ mrem per year} + 3(4.6) \text{ mrem per year} = 14.5 \text{ mrem per year}$$

McGUIRE NUCLEAR STATION

2008 METEOROLOGICAL JOINT FREQUENCY DISTRIBUTIONS

OF WIND SPEED, WIND DIRECTION, AND ATMOSPHERIC  
STABILITY

USING WINDS AT THE 10 METER LEVEL

(Hours of Occurrence)



McGuire NUCLEAR STN. METEOROLOGY (2008) PROG=XOQFREQ  
 10M WIND SPEED/DIRECTION/DELTA-T STABILITY  
 STABILITY CLASSES BASED ON DELTA-T BETWEEN UPPER-LOWER LEVELS

PASQUILL STABILITY A

SECTOR	WIND SPEED CLASS											TOTAL
	0.75- 0.99	1.00- 1.24	1.25- 1.49	1.50- 1.99	2.00- 2.99	3.00- 3.99	4.00- 4.99	5.00- 5.99	6.00- 7.99	8.00- 9.99	>9.99 M/S	
	NO.	NO.	NO.	NO.	NO.	NO.	NO.	NO.	NO.	NO.	NO.	
-N-	1	3	1	10	8	1	.	.	1	2	2	29
-NNE-	.	1	3	12	9	7	.	1	.	.	.	33
-NE-	.	.	2	7	11	2	4	1	.	.	.	27
-ENE-	.	.	1	4	8	15	3	.	.	.	.	31
-E-	.	.	.	3	8	5	1	.	.	.	.	17
-ESE-	.	.	.	3	7	.	.	.	.	.	.	10
-SE-	.	.	.	.	4	1	.	.	.	.	.	5
-SSE-	.	.	.	1	1	2	.	.	.	.	.	4
-S-	.	.	.	1	5	2	1	.	.	.	.	9
-SSW-	.	.	.	2	4	4	4	2	.	.	.	16
-SW-	.	1	.	.	19	9	6	1	.	.	.	36
-WSW-	.	.	1	8	14	4	.	1	1	.	.	29
-W-	.	.	.	1	9	.	.	.	.	.	.	10
-WNW-	.	.	2	4	1	1	.	1	1	.	.	10
-NW-	1	.	2	4	3	.	1	1	2	6	.	20
-NNW-	1	2	1	3	2	1	1	.	6	21	5	43
TOTAL	3	7	13	63	113	54	21	8	11	29	7	329

McGuire NUCLEAR STN. METEOROLOGY (2008) PROG=XOQFREQ  
 10M WIND SPEED/DIRECTION/DELTA-T STABILITY  
 STABILITY CLASSES BASED ON DELTA-T BETWEEN UPPER-LOWER LEVELS

PASQUILL STABILITY B

SECTOR	WIND SPEED CLASS												TOTAL
	0.45- 0.74	0.75- 0.99	1.00- 1.24	1.25- 1.49	1.50- 1.99	2.00- 2.99	3.00- 3.99	4.00- 4.99	5.00- 5.99	6.00- 7.99	8.00- 9.99	>9.99 M/S	
	NO.	NO.	NO.	NO.	NO.	NO.	NO.	NO.	NO.	NO.	NO.	NO.	
-N-	.	.	.	4	4	4	1	2	1	2	4	1	23
-NNE-	.	1	4	1	5	16	10	1	1	3	2	.	44
-NE-	2	.	1	2	4	6	6	7	5	2	.	.	35
-ENE-	.	.	.	1	3	11	13	4	1	.	.	.	33
-E-	.	.	.	.	.	5	8	2	1	.	.	.	16
-ESE-	.	.	.	1	1	4	3	2	.	.	.	.	11
-SSE-	.	.	.	1	1	5	1	.	.	.	.	.	8
-S-	.	.	.	.	3	7	4	.	.	.	.	.	14
-SSW-	.	.	.	.	.	13	8	8	8	.	.	.	37
-SW-	.	.	1	1	2	13	27	22	18	7	1	.	92
-WSW-	.	.	1	1	4	22	18	8	8	4	.	.	66
-W-	.	.	1	1	.	4	4	3	3	1	.	.	17
-WNW-	.	.	1	1	1	10	3	5	3	1	.	.	25
-NW-	.	.	2	1	3	6	1	2	8	11	8	.	42
-NNW-	.	1	.	.	7	1	1	2	7	23	10	.	52
TOTAL	2	2	11	15	38	127	108	68	64	54	25	1	515

McGuire NUCLEAR STN. METEOROLOGY (2008) PROG=XOQFREQ  
 10M WIND SPEED/DIRECTION/DELTA-T STABILITY  
 STABILITY CLASSES BASED ON DELTA-T BETWEEN UPPER-LOWER LEVELS

PASQUILL STABILITY C

SECTOR	WIND SPEED CLASS												TOTAL
	0.45- 0.74	0.75- 0.99	1.00- 1.24	1.25- 1.49	1.50- 1.99	2.00- 2.99	3.00- 3.99	4.00- 4.99	5.00- 5.99	6.00- 7.99	8.00- 9.99	>9.99 M/S	
	NO.	NO.	NO.	NO.	NO.	NO.	NO.	NO.	NO.	NO.	NO.	NO.	
-N-	.	1	2	1	14	17	8	2	5	10	8	.	68
-NNE-	.	.	1	2	7	19	18	11	6	10	4	1	79
-NE-	.	.	.	.	6	21	19	24	11	7	1	.	89
-ENE-	.	.	.	1	7	15	10	4	1	.	.	.	38
-E-	.	.	.	.	6	9	13	1	.	1	.	.	30
-ESE-	.	.	.	.	2	5	2	1	.	.	.	.	10
-SE-	1	.	1	.	.	1	1	1	.	.	.	.	5
-SSE-	.	.	.	.	2	4	1	.	.	.	.	.	7
-S-	.	.	.	.	1	5	1	1	.	.	.	.	8
-SSW-	.	1	.	.	7	9	17	5	5	.	.	.	44
-SW-	.	.	.	.	2	16	35	17	18	8	3	.	99
-WSW-	1	.	.	.	.	12	17	16	8	6	3	1	64
-W-	.	.	.	.	2	12	10	2	1	2	1	.	30
-WNW-	.	1	.	1	4	2	4	5	2	2	3	.	24
-NW-	.	2	2	.	1	3	2	6	6	19	14	.	55
-NNW-	1	2	1	4	2	5	5	1	12	25	10	3	71
TOTAL	3	7	7	9	63	155	163	97	75	90	47	5	721

McGuire NUCLEAR STN. METEOROLOGY (2008) PROG=XOQFREQ  
 10M WIND SPEED/DIRECTION/DELTA-T STABILITY  
 STABILITY CLASSES BASED ON DELTA-T BETWEEN UPPER-LOWER LEVELS

PASQUILL STABILITY D

SECTOR	WIND SPEED CLASS												TOTAL
	0.45- 0.74	0.75- 0.99	1.00- 1.24	1.25- 1.49	1.50- 1.99	2.00- 2.99	3.00- 3.99	4.00- 4.99	5.00- 5.99	6.00- 7.99	8.00- 9.99	>9.99 M/S	
	NO.	NO.	NO.	NO.	NO.	NO.	NO.	NO.	NO.	NO.	NO.	NO.	
-N-	.	.	6	6	33	52	36	56	28	20	1	.	238
-NNE-	2	1	5	6	29	70	86	70	75	27	2	.	373
-NE-	.	.	4	6	37	137	208	239	122	19	6	.	778
-ENE-	.	.	3	5	41	109	98	67	11	1	.	.	335
-E-	.	1	2	2	21	73	96	13	3	.	.	.	211
-ESE-	.	1	1	11	22	61	46	19	8	1	.	.	170
-SE-	1	.	6	13	31	79	42	5	2	1	.	.	180
-SSE-	1	5	8	14	42	42	16	.	.	.	.	.	128
-S-	1	2	4	20	36	59	25	8	1	2	.	.	158
-SSW-	1	3	2	6	26	83	108	59	25	12	.	.	325
-SW-	1	1	4	5	25	125	155	128	54	36	5	1	540
-WSW-	.	.	1	13	49	88	51	27	24	24	3	1	281
-W-	.	3	5	9	26	33	34	25	8	9	5	1	158
-WNW-	.	1	3	9	16	26	24	32	20	14	6	2	153
-NW-	1	4	7	9	10	35	43	32	28	29	8	2	208
-NNW-	.	3	8	10	15	29	41	41	24	25	7	2	205
-CALM-	3	.	.	.	.	.	.	.	.	.	.	.	3
TOTAL	11	25	69	144	459	1101	1109	821	433	220	43	9	4444

McGuire NUCLEAR STN. METEOROLOGY (2008) PROG=XOQFREQ  
 10M WIND SPEED/DIRECTION/DELTA-T STABILITY  
 STABILITY CLASSES BASED ON DELTA-T BETWEEN UPPER-LOWER LEVELS

PASQUILL STABILITY E

	WIND SPEED CLASS											TOTAL
	0.45- 0.74	0.75- 0.99	1.00- 1.24	1.25- 1.49	1.50- 1.99	2.00- 2.99	3.00- 3.99	4.00- 4.99	5.00- 5.99	6.00- 7.99	8.00- 9.99	
	NO.	NO.	NO.	NO.	NO.	NO.	NO.	NO.	NO.	NO.	NO.	
SECTOR												
-N-	1	2	.	4	7	8	4	1	.	.	.	27
-NNE-	.	.	1	6	3	10	2	3	.	1	.	26
-NE-	1	.	.	7	7	9	2	1	.	.	.	27
-ENE-	.	.	3	4	6	11	4	.	.	1	.	29
-E-	.	4	1	6	9	10	1	.	.	.	.	31
-ESE-	.	2	3	4	15	15	7	1	1	.	.	48
-SE-	1	8	4	12	18	54	15	.	.	.	.	112
-SSE-	1	4	8	18	39	33	2	1	.	.	.	106
-S-	.	12	6	13	45	117	5	1	1	2	.	202
-SSW-	8	3	15	10	33	151	39	3	1	2	.	265
-SW-	3	5	11	16	30	77	58	14	4	2	2	222
-WSW-	2	5	11	20	37	81	19	9	2	2	.	188
-W-	1	4	6	8	22	38	13	2	2	2	.	98
-WNW-	1	5	5	5	16	22	22	3	2	1	.	82
-NW-	.	1	4	4	6	11	15	10	3	2	2	58
-NNW-	1	.	1	1	3	10	4	1	2	3	1	27
-CALM-	3	.	.	.	.	.	.	.	.	.	.	3
TOTAL	23	55	79	138	296	657	212	50	18	18	5	1551

McGuire NUCLEAR STN. METEOROLOGY (2008) PROG=XOQFREQ  
 10M WIND SPEED/DIRECTION/DELTA-T STABILITY  
 STABILITY CLASSES BASED ON DELTA-T BETWEEN UPPER-LOWER LEVELS

PASQUILL STABILITY F

SECTOR	WIND SPEED CLASS									TOTAL
	0.45- 0.74	0.75- 0.99	1.00- 1.24	1.25- 1.49	1.50- 1.99	2.00- 2.99	3.00- 3.99	4.00- 4.99	5.00- 5.99	
	NO.	NO.	NO.	NO.	NO.	NO.	NO.	NO.	NO.	
-N-	1	1	1	.	1	2	1	.	.	7
-NNE-	.	.	1	.	.	.	.	.	.	1
-NE-	.	1	1	.	1	.	.	.	.	3
-E-	.	4	1	.	2	.	.	.	.	7
-ESE-	.	1	.	.	2	1	.	.	.	4
-SE-	.	2	.	2	3	2	.	.	.	9
-SSE-	2	3	2	7	11	7	.	1	.	33
-S-	2	11	12	13	24	48	2	.	.	112
-SSW-	3	13	15	24	31	23	1	1	.	111
-SW-	2	17	13	17	15	21	2	.	.	87
-WSW-	5	12	14	19	27	27	4	.	.	108
-W-	3	6	10	10	14	16	1	1	.	61
-WNW-	4	.	3	5	2	8	4	.	.	26
-NW-	.	3	3	1	1	.	1	.	1	10
-NNW-	1	3	1	.	.	1	.	.	.	6
-CALM-	1	.	.	.	.	.	.	.	.	1
TOTAL	24	77	77	98	134	156	16	3	1	586

McGuire NUCLEAR STN. METEOROLOGY (2008) PROG=XOQFREQ  
 10M WIND SPEED/DIRECTION/DELTA-T STABILITY  
 STABILITY CLASSES BASED ON DELTA-T BETWEEN UPPER-LOWER LEVELS

PASQUILL STABILITY G

SECTOR	WIND SPEED CLASS							TOTAL
	0.45- 0.74	0.75- 0.99	1.00- 1.24	1.25- 1.49	1.50- 1.99	2.00- 2.99	3.00- 3.99	
	NO.	NO.	NO.	NO.	NO.	NO.	NO.	
-N-	1	.	.	.	.	.	.	1
-NNE-	.	.	.	1	.	1	.	2
-E-	.	2	.	.	.	.	.	2
-SE-	1	.	1	.	.	.	.	2
-SSE-	1	2	1	.	2	1	.	7
-S-	3	4	3	5	10	2	.	27
-SSW-	18	25	36	10	9	3	.	101
-SW-	7	42	20	9	9	.	.	87
-WSW-	9	11	10	5	5	1	1	42
-W-	2	9	4	3	1	4	.	23
-WNW-	3	4	.	3	.	1	.	11
-NNW-	.	.	1	.	.	.	.	1
-CALM-	1	.	.	.	.	.	.	1
TOTAL	46	99	76	36	36	13	1	307

McGuire NUCLEAR STN. METEOROLOGY (2008) PROG=XOQFREQ  
 10M WIND SPEED/DIRECTION/DELTA-T STABILITY  
 STABILITY CLASSES BASED ON DELTA-T BETWEEN UPPER-LOWER LEVELS

ALL STABILITY CLASSES

SECTOR	WIND SPEED CLASS												TOTAL
	0.45- 0.74	0.75- 0.99	1.00- 1.24	1.25- 1.49	1.50- 1.99	2.00- 2.99	3.00- 3.99	4.00- 4.99	5.00- 5.99	6.00- 7.99	8.00- 9.99	>9.99 M/S	
	NO.	NO.	NO.	NO.	NO.	NO.	NO.	NO.	NO.	NO.	NO.	NO.	
-N-	3	5	12	16	69	91	51	61	34	33	15	3	393
-NNE-	2	2	13	19	56	125	123	85	83	41	8	1	558
-NE-	3	1	6	17	62	184	237	275	139	28	7	.	959
-ENE-	.	.	6	12	61	154	140	78	13	2	.	.	466
-E-	.	11	4	8	41	105	123	17	4	1	.	.	314
-ESE-	.	4	4	16	45	93	58	23	9	1	.	.	253
-SE-	4	10	12	27	52	140	59	6	2	1	.	.	313
-SSE-	5	14	19	40	98	93	22	2	.	.	.	.	293
-S-	6	29	25	51	120	243	39	11	2	4	.	.	530
-SSW-	30	45	68	50	108	286	177	80	41	14	.	.	899
-SW-	13	65	50	48	83	271	286	187	95	53	11	1	1163
-WSW-	17	28	37	59	130	245	114	60	43	37	6	2	778
-W-	6	22	26	31	66	116	62	33	14	14	6	1	397
-WNW-	8	11	12	26	43	70	58	45	28	19	9	2	331
-NW-	1	11	18	17	25	58	62	51	47	63	38	2	393
-NNW-	3	10	14	16	30	48	52	46	45	82	49	10	405
-CALM-	8	.	.	.	.	.	.	.	.	.	.	.	8
TOTAL	109	268	326	453	1089	2322	1663	1060	599	393	149	22	8453



**Attachment 5**

**Inoperable Monitoring Equipment**

McGuire Nuclear Station

Inoperable Monitoring Equipment

(January 1, 2008 through December 31, 2008)

There were no SLC related effluent monitoring instruments out of service greater than the SLC limits for operability.

**Attachment 6**

**Groundwater Protection Initiative**

McGUIRE NUCLEAR STATION

INFORMATION TO SUPPORT THE NUCLEAR ENERGY INSTITUTE (NEI)

GROUNDWATER PROTECTION INITIATIVE

ARERR Groundwater Well Data Section Rev. 1

Duke Energy implemented a Groundwater Protection Program in 2007. This program is designed to ensure timely and effective management of situations involving inadvertent releases of licensed material to ground water. As part of this program, McGuire Nuclear Station has sixty ground water monitoring wells. These wells are currently being sampled quarterly. All samples are being analyzed for tritium and gamma emitters, with selected wells being analyzed for Strontium 89 and 90. No gamma activity (other than naturally occurring radionuclides) or Strontium was identified in any of the well samples. Results from sampling during 2008 confirmed existing knowledge of tritium concentrations in the site ground water (shown in the table below). No new areas for investigation were identified.

Results from sampling during 2008 are shown in the table below.

<u>Well Name</u>	<u>Well Location</u>	<u>Avg. Tritium Conc.(pCi/l)</u>	<u>Conc. Range</u>	<u># of Samples</u>
M-20	South of Hwg. 73	647	577 - 738	5
M-20R	South of Hwg. 73	610	495 - 759	5
M-21	South of Hwg. 73	223	< - 229	5
M-22	South of Hwg. 73	176	< - 175	5
M-22R	South of Hwg. 73	565	422 - 857	5
M-23	South of Acs. Rd.	293	< - 293	5
M-30	WWCB	<	<	4
M-30R	WWCB	251	208 - 282	4
M-31	Access road	<	<	5
M-32	Main entrance	<	<	4
M-34R	Access road	<	<	4
M-34DR	Access road	167	< - 167	4
M-35	Access road	<	<	5
M-42	U-2 Rx. Bldg.	1,160	970 - 1,390	4
M-48	U-2 SFP	818	769 - 879	3
M-48R	U-2 SFP	808	747 - 884	4
M-48DR	U-2 SFP	689	589 - 753	4
M-53	North of plant	1,140	1,040 - 1,200	4
M-55	North Admin. Bldg.	243	< - 312	4
M-59	U-2 Doghouse	819	645 - 991	4
M-60	MOC Parking	194	< - 194	5
M-62	S of RWF	251	< - 251	4
M-64	Rdwst. Bldg.	588	505 - 644	4
M-66	S of SSF	561	405 - 707	4
M-66R	S of SSF	<	<	4
M-68	U-1 RMWST	1,073	843 - 1,280	4
M-70	U-1 SFP	361	301 - 405	4
M-70R	U-1 SFP	252	169 - 315	4
M-70DR	U-1 SFP	<	<	4

## ARERR Groundwater Well Data Section Rev. 1

M-72	Rdwst. Trench	635	541 - 799	4
M-76	West of U-1 SFP	469	277 - 936	4
M-82	River	1,601	1,590 - 1,820	13
M-84	River	5,174	4,890 - 6,150	14
M-84R	River	6,913	6,930 - 7,490	14
M-85	River	1,463	1,390 - 1,530	4
M-87	Landfarm	309	258 - 345	4
M-89	Landfarm	763	510 - 956	4
M-90	Landfarm	246	246	1
M-91	East of WC	294	242 - 356	5
M-91R	East of WC	276	185 - 543	5
M-92	N of WC Ponds	278	219 - 354	4
M-92R	N of WC Ponds	<	<	4
M-93	North of IHUP	298	249 - 343	4
M-93R	North of IHUP	330	276 - 446	4
M-94	SE of IHUP	<	<	4
M-95	Lower Parking	273	< - 385	4
M-95R	Lower Parking	<	<	4
M-96	West Parking	<	<	4
M-96R	West Parking	<	<	4
M-97	East Parking	245	< - 285	4
M-98	S of Admin. Bldg.	<	<	4
M-98R	S of Admin. Bldg.	<	<	4
M-100R	SE of WC	343	< - 393	4
M-101	SE of WC	282	174 - 358	4
M-102	SW of WC	7,895	7,610 - 8,200	4
M-103	South of WC	2,924	2,560 - 3,960	13
M-103R	South of WC	2,058	1,740 - 3,010	13
M-104R	West of WC	10,650	10,200 - 11,000	4
M-104DR	West of WC	5,753	5,480 - 6,030	4
M-105	Landfarm	387	387	1

pCi/l - pico curies per liter

< - less than minimum detectable activity, typically 250 pCi/liter

20,000 pCi/l - the Environmental Protection Agency drinking water standard for tritium. This standard applies only to water that is used for drinking.

1,000,000 pCi/l - the 10CFR20, Appendix B, Table 2, Column 2, Effluent Concentration limit for tritium.