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April 19, 2010

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
2009 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 Report. Also included in this report is the 2010 Offsite Dose Calculation Manual and the 2009 Process Control Program (PCP) manual.

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 Program

Questions concerning this report should be directed to Kay Crane, McGuire Regulatory Compliance at (980) 875-4306.

H D Brewer for

Regis T. Repko

A009
IE48
NRR

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Attachment 1

Radioactive Effluent Releases and Supplemental Information

McGUIRE NUCLEAR STATION

EFFLUENT RELEASE DATA

(January 1, 2009 through December 31, 2009)

This attachment includes a summary of the quantities of radioactive liquid and gaseous effluents as outlined in Regulatory Guide 1.21, Rev. 1, Appendix B. Radioactive liquid and gaseous wastes are sampled and analyzed per the requirements in Selected Licensee Commitment (SLC) Table 16.11.1-1, "Radioactive Liquid Waste Sampling and Analysis Program", and SLC Table 16.11.6-1, "Radioactive Gaseous Waste Sampling and Analysis Program".

TABLE 1A

EFFLUENT AND WASTE DISPOSAL ANNUAL REPORT
PERIOD 1/1/09 TO 1/1/10
GASEOUS EFFLUENTS - SUMMATION OF ALL RELEASES

McGuire Nuclear Station Units 1 & 2

REPORT FOR 2009	Unit	QTR 1	QTR 2	QTR 3	QTR 4	YEAR
A. Fission and Activation Gases						
1. Total Release	Ci	5.30E-01	6.42E-01	1.47E+00	6.17E-01	3.26E+00
2. Avg. Release Rate	µCi/sec	6.82E-02	8.16E-02	1.85E-01	7.77E-02	1.03E-01
B. Iodine-131						
1. Total Release	Ci	3.30E-07	4.27E-07	2.46E-06	5.21E-06	8.42E-06
2. Avg. Release Rate	µCi/sec	4.24E-08	5.43E-08	3.10E-07	6.55E-07	2.67E-07
C. Particulates Half Life >= 8 days						
1. Total Release	Ci	4.05E-06	1.99E-06	2.79E-06	8.59E-06	1.74E-05
2. Avg. Release Rate	µCi/sec	5.20E-07	2.53E-07	3.51E-07	1.08E-06	5.52E-07
D. Tritium						
1. Total Release	Ci	2.55E+01	3.03E+01	5.32E+01	5.74E+01	1.66E+02
2. Avg. Release Rate	µCi/sec	3.28E+00	3.86E+00	6.69E+00	7.22E+00	5.28E+00
E. Gross Alpha Radioactivity						
1. Total Release	Ci	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
2. Avg. Release Rate	µCi/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 1/1/09 TO 1/1/10
GASEOUS EFFLUENTS - ELEVATED RELEASES - CONTINUOUS MODE

McGuire Nuclear Station Units 1 & 2

REPORT FOR 2009	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 1/1/09 TO 1/1/10
GASEOUS EFFLUENTS - ELEVATED RELEASES - BATCH MODE

McGuire Nuclear Station Units 1 & 2

REPORT FOR 2009	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 1/1/09 TO 1/1/10
GASEOUS EFFLUENTS - GROUND RELEASES - CONTINUOUS MODE

McGuire Nuclear Station Units 1 & 2

REPORT FOR 2009	Unit	QTR 1	QTR 2	QTR 3	QTR 4	YEAR
1. Fission and Activation Gases						
AR-41	Ci	8.27E-05	0.00E+00	7.66E-01	0.00E+00	7.67E-01
C-11	Ci	4.41E-04	0.00E+00	0.00E+00	0.00E+00	4.41E-04
KR-85	Ci	0.00E+00	0.00E+00	8.32E-04	0.00E+00	8.32E-04
KR-85M	Ci	1.59E-04	0.00E+00	2.94E-03	0.00E+00	3.10E-03
KR-88	Ci	3.94E-04	0.00E+00	3.51E-03	0.00E+00	3.90E-03
XE-133	Ci	1.40E-02	0.00E+00	1.41E-02	0.00E+00	2.81E-02
XE-133M	Ci	4.33E-04	0.00E+00	0.00E+00	0.00E+00	4.33E-04
XE-135	Ci	3.85E-03	0.00E+00	2.69E-02	0.00E+00	3.08E-02
Totals for Period...	Ci	1.93E-02	0.00E+00	8.15E-01	0.00E+00	8.34E-01
2. Iodines						
I-131	Ci	3.30E-07	4.27E-07	2.46E-06	5.21E-06	8.42E-06
I-133	Ci	0.00E+00	0.00E+00	2.94E-05	0.00E+00	2.94E-05
Totals for Period...	Ci	3.30E-07	4.27E-07	3.19E-05	5.21E-06	3.78E-05
3. Particulates Half Life >= 8 days						
BE-7	Ci	0.00E+00	0.00E+00	0.00E+00	4.90E-06	4.90E-06
CO-58	Ci	4.05E-06	1.99E-06	2.79E-06	3.69E-06	1.25E-05
Totals for Period...	Ci	4.05E-06	1.99E-06	2.79E-06	8.59E-06	1.74E-05
4. Tritium						
H-3	Ci	2.53E+01	3.01E+01	5.20E+01	5.71E+01	1.65E+02
Totals for Period...	Ci	2.53E+01	3.01E+01	5.20E+01	5.71E+01	1.65E+02
5. Gross Alpha Radioactivity						
** No Nuclide Activities **		.....	.....	.....	.....	.....

TABLE 1C

EFFLUENT AND WASTE DISPOSAL ANNUAL REPORT
PERIOD 1/1/09 TO 1/1/10
GASEOUS EFFLUENTS - GROUND RELEASES - BATCH MODE

McGuire Nuclear Station Units 1 & 2

REPORT FOR 2009	Unit	QTR 1	QTR 2	QTR 3	QTR 4	YEAR
1. Fission and Activation Gases						
AR-41	Ci	4.99E-01	6.11E-01	6.40E-01	5.71E-01	2.32E+00
C-11	Ci	0.00E+00	0.00E+00	0.00E+00	2.88E-03	2.88E-03
KR-85	Ci	0.00E+00	1.87E-02	0.00E+00	9.92E-03	2.86E-02
XE-133	Ci	1.11E-02	1.06E-02	2.00E-02	3.32E-02	7.49E-02
XE-135	Ci	5.94E-04	1.36E-03	0.00E+00	2.40E-04	2.19E-03
Totals for Period...	Ci	5.11E-01	6.42E-01	6.60E-01	6.17E-01	2.43E+00
2. Iodines						
** No Nuclide Activities **		.....	.....	.....	.....	.....
3. Particulates Half Life >= 8 days						
** No Nuclide Activities **		.....	.....	.....	.....	.....
4. Tritium						
H-3	Ci	1.69E-01	2.13E-01	1.12E+00	3.13E-01	1.82E+00
Totals for Period...	Ci	1.69E-01	2.13E-01	1.12E+00	3.13E-01	1.82E+00
5. Gross Alpha Radioactivity						
** No Nuclide Activities **		.....	.....	.....	.....	.....

TABLE 2A

EFFLUENT AND WASTE DISPOSAL ANNUAL REPORT
PERIOD 1/1/09 TO 1/1/10
LIQUID EFFLUENTS - SUMMATION OF ALL RELEASES

McGuire Nuclear Station Units 1 & 2

REPORT FOR 2009	Unit	QTR 1	QTR 2	QTR 3	QTR 4	YEAR
A. Fission and Activation Products						
1. Total Release	Ci	3.41E-03	3.40E-03	9.44E-03	1.86E-02	3.49E-02
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	4.01E-12	3.56E-12	1.06E-11	2.01E-11	9.63E-12
B. Tritium						
1. Total Release	Ci	1.93E+02	4.05E+02	5.66E+02	3.31E+02	1.49E+03
2. Average Diluted Concentration						
a. Continuous Releases	µCi/ml	1.41E-08	4.72E-09	4.64E-08	9.48E-09	1.30E-08
b. Batch Releases	µCi/ml	2.26E-07	4.24E-07	6.33E-07	3.57E-07	4.12E-07
C. Dissolved and Entrained Gases						
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
D. Gross Alpha Radioactivity						
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
E. Volume of Liquid Waste						
1. Continuous Releases	liters	6.79E+07	5.98E+07	7.11E+07	7.35E+07	2.72E+08
2. Batch Releases	liters	4.89E+05	9.16E+05	2.84E+07	9.35E+06	3.92E+07
F. Volume of Dilution Water						
1. Continuous Releases	liters	3.70E+10	7.50E+10	2.56E+10	7.79E+10	2.16E+11
2. Batch Releases	liters	8.51E+11	9.54E+11	8.92E+11	9.25E+11	3.62E+12

TABLE 2B

EFFLUENT AND WASTE DISPOSAL ANNUAL REPORT
PERIOD 1/1/09 TO 1/1/10
LIQUID EFFLUENTS - CONTINUOUS MODE

McGuire Nuclear Station Units 1 & 2

REPORT FOR 2009	Unit	QTR 1	QTR 2	QTR 3	QTR 4	YEAR
1. Fission and Activation Products						
** No Nuclide Activities **		.....	.....	.....	.....	.....
2. Tritium						
H-3	Ci	5.22E-01	3.54E-01	1.19E+00	7.39E-01	2.81E+00
Totals for Period...	Ci	5.22E-01	3.54E-01	1.19E+00	7.39E-01	2.81E+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 1/1/09 TO 1/1/10
LIQUID EFFLUENTS - BATCH MODE

McGuire Nuclear Station Units 1 & 2

REPORT FOR 2009	Unit	QTR 1	QTR 2	QTR 3	QTR 4	YEAR
1. Fission and Activation Products						
AG-108M	Ci	3.20E-06	9.46E-06	1.09E-05	2.18E-05	4.54E-05
AG-110M	Ci	0.00E+00	5.98E-06	3.13E-06	4.81E-06	1.39E-05
BE-7	Ci	8.03E-05	5.71E-04	2.92E-05	3.74E-04	1.05E-03
CO-57	Ci	5.34E-06	1.24E-05	3.52E-05	2.69E-05	7.98E-05
CO-58	Ci	2.17E-03	1.62E-03	1.84E-03	5.98E-03	1.16E-02
CO-60	Ci	3.44E-04	8.68E-04	4.33E-03	3.00E-03	8.54E-03
CR-51	Ci	0.00E+00	0.00E+00	1.71E-03	6.60E-03	8.30E-03
CS-134	Ci	7.18E-05	6.55E-06	0.00E+00	3.34E-06	8.16E-05
CS-137	Ci	3.25E-04	1.04E-05	2.10E-05	9.94E-05	4.55E-04
FE-59	Ci	0.00E+00	0.00E+00	1.55E-04	5.03E-04	6.58E-04
MN-54	Ci	3.31E-05	9.72E-05	6.18E-04	4.26E-04	1.17E-03
NB-95	Ci	6.74E-06	2.50E-05	1.41E-04	4.28E-04	6.01E-04
NB-97	Ci	1.81E-06	2.15E-06	5.03E-06	8.97E-06	1.80E-05
SB-124	Ci	1.95E-05	0.00E+00	6.17E-06	2.00E-04	2.26E-04
SB-125	Ci	3.54E-04	1.38E-04	4.02E-04	7.03E-04	1.60E-03
SN-113	Ci	0.00E+00	1.29E-05	4.19E-05	3.34E-06	5.81E-05
ZN-65	Ci	0.00E+00	1.57E-05	3.78E-05	4.96E-05	1.03E-04
ZR-95	Ci	0.00E+00	5.78E-06	5.08E-05	1.98E-04	2.55E-04
		---	---	---	---	---
Totals for Period...	Ci	3.41E-03	3.40E-03	9.44E-03	1.86E-02	3.49E-02
2. Tritium						
H-3	Ci	1.92E+02	4.04E+02	5.64E+02	3.31E+02	1.49E+03
		---	---	---	---	---
Totals for Period...	Ci	1.92E+02	4.04E+02	5.64E+02	3.31E+02	1.49E+03
3. Dissolved and Entrained Gases						
** No Nuclide Activities **		.....	.....	.....	.....	.....
4. Gross Alpha Radioactivity						
** No Nuclide Activities **		.....	.....	.....	.....	.....

McGUIRE NUCLEAR STATION

SUPPLEMENTAL INFORMATION

McGUIRE NUCLEAR STATION

2009 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. 2.12E+02 = TOTAL NUMBER OF BATCH RELEASES
2. 4.34E+04 = TOTAL TIME (MIN.) FOR BATCH RELEASES.
3. 1.09E+04 = MAXIMUM TIME (MIN.) FOR A BATCH RELEASE.
4. 2.05E+02 = AVERAGE TIME (MIN.) FOR A BATCH RELEASE.
5. 8.00E+00 = MINIMUM TIME (MIN.) FOR A BATCH RELEASE.
6. 1.82E+06 = AVERAGE DILUTION WATER FLOW DURING RELEASES (GPM).

B. GASEOUS EFFLUENT
1. 3.60E+01 = TOTAL NUMBER OF BATCH RELEASES.
2. 1.05E+06 = TOTAL TIME (MIN.) FOR BATCH RELEASES.
3. 4.48E+04 = MAXIMUM TIME (MIN.) FOR A BATCH RELEASE.
4. 2.91E+04 = AVERAGE TIME (MIN.) FOR A BATCH RELEASE.
5. 1.92E+02 = MINIMUM TIME (MIN.) FOR A BATCH RELEASE.

VI. ABNORMAL RELEASES

A. LIQUID
1. NUMBER OF RELEASES = 0
2. TOTAL ACTIVITY RELEASED (CURIES) = 0

B. GASEOUS
1. NUMBER OF RELEASES = 4
2. TOTAL ACTIVITY RELEASED (CURIES) = 8.33E-1 (Noble Gas)(see "Unplanned Releases" attachment for additional information)

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 ± 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 = ± 20%

(2) Counting error = ± 15%

(3) Sample preparation error = ± 3%

McGUIRE NUCLEAR STATION

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

(January 1, 2009 through December 31, 2009)

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. The effluent dose calculations consider radionuclides identified as part of the liquid and gaseous wastes sample and analysis program. Radioactive liquid and gaseous wastes are sampled and analyzed per the requirements in Selected Licensee Commitment (SLC) Table 16.11.1-1, "Radioactive Liquid Waste Sampling and Analysis Program", and SLC Table 16.11.6-1, "Radioactive Gaseous Waste Sampling and Analysis Program". Attachment 4, "Fuel Cycle Calculation", 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 1/1/09 TO 1/1/10
GASEOUS ANNUAL DOSE SUMMARY REPORT

McGuire Nuclear Station Units 1 & 2

1st Quarter 2009

=== IODINE, H3, AND PARTICULATE DOSE LIMIT ANALYSIS======= Quarter 1 2009 ====

Period-Limit	Critical Group	Critical Organ	Dose (mrem)	Limit (mrem)	Max % of Limit
Q1 - Maximum Organ Dose	TEEN	LUNG	3.03E-02	1.50E+01	2.02E-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 1 2009 ====

Period-Limit	Dose (mrad)	Limit (mrad)	% of Limit
Q1 - Maximum Gamma Air Dose	1.13E-02	1.00E+01	1.13E-01

Maximum Gamma Air Dose Receptor Location: 0.5 Mile NNE

Major Isotopic Contributors (5% or greater to total)

Nuclide	Percentage
AR-41	9.95E+01

Q1 - Maximum Beta Air Dose	4.05E-03	2.00E+01	2.02E-02

Maximum Beta Air Dose Receptor Location: 0.5 Mile NNE

Major Isotopic Contributors (5% or greater to total)

Nuclide	Percentage
AR-41	9.77E+01

EFFLUENT AND WASTE DISPOSAL ANNUAL REPORT
PERIOD 1/1/09 TO 1/1/10
GASEOUS ANNUAL DOSE SUMMARY REPORT

McGuire Nuclear Station Units 1 & 2

2nd Quarter 2009

=== IODINE, H3, AND PARTICULATE DOSE LIMIT ANALYSIS======= Quarter 2 2009 ====

Period-Limit	Critical Group	Critical Organ	Dose (mrem)	Limit (mrem)	Max % of Limit
Q2 - Maximum Organ Dose	TEEN	THYROID	3.60E-02	1.50E+01	2.40E-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 2009 ====

Period-Limit	Dose (mrad)	Limit (mrad)	% of Limit
Q2 - 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

Q2 - Maximum Beta Air Dose	4.96E-03	2.00E+01	2.48E-02

Maximum Beta Air Dose Receptor Location: 0.5 Mile NNE

Major Isotopic Contributors (5% or greater to total)

Nuclide	Percentage
AR-41	9.75E+01

EFFLUENT AND WASTE DISPOSAL ANNUAL REPORT
PERIOD 1/1/09 TO 1/1/10
GASEOUS ANNUAL DOSE SUMMARY REPORT

McGuire Nuclear Station Units 1 & 2

3rd Quarter 2009

=== IODINE, H3, AND PARTICULATE DOSE LIMIT ANALYSIS======= Quarter 3 2009 ====

Period-Limit	Critical Group	Critical Organ	Dose (mrem)	Limit (mrem)	Max % of Limit
Q3 - Maximum Organ Dose	TEEN	THYROID	6.32E-02	1.50E+01	4.22E-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	9.98E+01

=== NOBLE GAS DOSE LIMIT ANALYSIS========== Quarter 3 2009 ====

Period-Limit	Dose (mrad)	Limit (mrad)	% of Limit
Q3 - Maximum Gamma Air Dose	3.18E-02	1.00E+01	3.18E-01

Maximum Gamma Air Dose Receptor Location: 0.5 Mile NNE

Major Isotopic Contributors (5% or greater to total)

Nuclide	Percentage
AR-41	9.91E+01

Q3 - Maximum Beta Air Dose	1.14E-02	2.00E+01	5.71E-02

Maximum Beta Air Dose Receptor Location: 0.5 Mile NNE

Major Isotopic Contributors (5% or greater to total)

Nuclide	Percentage
AR-41	9.75E+01

EFFLUENT AND WASTE DISPOSAL ANNUAL REPORT
PERIOD 1/1/09 TO 1/1/10
GASEOUS ANNUAL DOSE SUMMARY REPORT

McGuire Nuclear Station Units 1 & 2

4th Quarter 2009

=== IODINE, H3, AND PARTICULATE DOSE LIMIT ANALYSIS======= Quarter 4 2009 ====

Period-Limit	Critical Group	Critical Organ	Dose (mrem)	Limit (mrem)	Max % of Limit
Q4 - Maximum Organ Dose	TEEN	THYROID	6.83E-02	1.50E+01	4.55E-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 4 2009 ====

Period-Limit	Dose (mrad)	Limit (mrad)	% of Limit
Q4 - Maximum Gamma Air Dose	1.28E-02	1.00E+01	1.28E-01

Maximum Gamma Air Dose Receptor Location: 0.5 Mile NNE

Major Isotopic Contributors (5% or greater to total)

Nuclide	Percentage
AR-41	9.98E+01

Q4 - Maximum Beta Air Dose	4.65E-03	2.00E+01	2.33E-02

Maximum Beta Air Dose Receptor Location: 0.5 Mile NNE

Major Isotopic Contributors (5% or greater to total)

Nuclide	Percentage
AR-41	9.72E+01

EFFLUENT AND WASTE DISPOSAL ANNUAL REPORT
PERIOD 1/1/09 TO 1/1/10
GASEOUS ANNUAL DOSE SUMMARY REPORT

McGuire Nuclear Station Units 1 & 2

ANNUAL 2009

=== IODINE, H3, AND PARTICULATE DOSE LIMIT ANALYSIS======= Annual 2009 ========

Period-Limit	Critical Group	Critical Organ	Dose (mrem)	Limit (mrem)	Max % of Limit
Yr - Maximum Organ Dose	TEEN	THYROID	1.98E-01	3.00E+01	6.60E-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 2009 ========

Period-Limit	Dose (mrad)	Limit (mrad)	% of Limit
Yr - Maximum Gamma Air Dose	6.97E-02	2.00E+01	3.48E-01

Maximum Gamma Air Dose Receptor Location: 0.5 Mile NNE

Major Isotopic Contributors (5% or greater to total)

Nuclide	Percentage
AR-41	9.94E+01

Yr - Maximum Beta Air Dose	2.51E-02	4.00E+01	6.27E-02

Maximum Beta Air Dose Receptor Location: 0.5 Mile NNE

Major Isotopic Contributors (5% or greater to total)

Nuclide	Percentage
AR-41	9.75E+01

EFFLUENT AND WASTE DISPOSAL ANNUAL REPORT
PERIOD 1/1/09 TO 1/1/10
LIQUID ANNUAL DOSE SUMMARY REPORT

McGuire Nuclear Station Units 1 & 2

1st Quarter 2009

=== BATCH LIQUID RELEASES ========== Quarter 1 2009 ======

Period-Limit	Critical Age	Critical Organ	Dose (mrem)	Limit (mrem)	Max % of Limit
Q1 - Maximum Organ Dose	CHILD	LIVER	2.55E-02	1.00E+01	2.55E-01
Q1 - Total Body Dose	CHILD		2.37E-02	3.00E+00	7.90E-01

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

Nuclide	Percentage
H-3	9.16E+01
CS-137	6.61E+00

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

Nuclide	Percentage
H-3	9.84E+01

=== CONTINUOUS LIQUID RELEASES (WC) ========== Quarter 1 2009 ======

Period-Limit	Critical Age	Critical Organ	Dose (mrem)	Limit (mrem)	Max % of Limit
Q1 - Maximum Organ Dose	CHILD	LIVER	1.45E-03	1.00E+01	1.45E-02
Q1 - Total Body Dose	CHILD		1.45E-03	3.00E+00	4.84E-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 1/1/09 TO 1/1/10
LIQUID ANNUAL DOSE SUMMARY REPORT

McGuire Nuclear Station Units 1 & 2

2nd Quarter 2009

=== BATCH LIQUID RELEASES ========== Quarter 2 2009 ======

Period-Limit	Critical Age	Critical Organ	Dose (mrem)	Limit (mrem)	Max % of Limit
Q2 - Maximum Organ Dose	CHILD	GILLI	4.44E-02	1.00E+01	4.44E-01
Q2 - Total Body Dose	CHILD		4.43E-02	3.00E+00	1.48E+00

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

Nuclide	Percentage
H-3	9.97E+01

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

Nuclide	Percentage
H-3	9.99E+01

=== CONTINUOUS LIQUID RELEASES (WC) ========== Quarter 2 2009 ======

Period-Limit	Critical Age	Critical Organ	Dose (mrem)	Limit (mrem)	Max % of Limit
Q2 - Maximum Organ Dose	CHILD	LIVER	4.93E-04	1.00E+01	4.93E-03
Q2 - Total Body Dose	CHILD		4.93E-04	3.00E+00	1.64E-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 1/1/09 TO 1/1/10
LIQUID ANNUAL DOSE SUMMARY REPORT

McGuire Nuclear Station Units 1 & 2

3rd Quarter 2009

=== BATCH LIQUID RELEASES ========== Quarter 3 2009 ======

Period-Limit	Critical Age	Critical Organ	Dose (mrem)	Limit (mrem)	Max % of Limit
Q3 - Maximum Organ Dose	CHILD	GILLI	6.75E-02	1.00E+01	6.75E-01
Q3 - Total Body Dose	CHILD		6.69E-02	3.00E+00	2.23E+00

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

Nuclide	Percentage
H-3	9.89E+01

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

Nuclide	Percentage
H-3	9.97E+01

=== CONTINUOUS LIQUID RELEASES (WC) ========== Quarter 3 2009 ======

Period-Limit	Critical Age	Critical Organ	Dose (mrem)	Limit (mrem)	Max % of Limit
Q3 - Maximum Organ Dose	CHILD	LIVER	4.90E-03	1.00E+01	4.90E-02
Q3 - Total Body Dose	CHILD		4.90E-03	3.00E+00	1.63E-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 1/1/09 TO 1/1/10
LIQUID ANNUAL DOSE SUMMARY REPORT

McGuire Nuclear Station Units 1 & 2

4th Quarter 2009

=== BATCH LIQUID RELEASES ========== Quarter 4 2009 ======

Period-Limit	Critical Age	Critical Organ	Dose (mrem)	Limit (mrem)	Max % of Limit
Q4 - Maximum Organ Dose	CHILD	GILLI	3.95E-02	1.00E+01	3.95E-01
Q4 - Total Body Dose	CHILD		3.79E-02	3.00E+00	1.26E+00

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

Nuclide	Percentage
H-3	9.55E+01

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

Nuclide	Percentage
H-3	9.94E+01

=== CONTINUOUS LIQUID RELEASES (WC) ========== Quarter 4 2009 ======

Period-Limit	Critical Age	Critical Organ	Dose (mrem)	Limit (mrem)	Max % of Limit
Q4 - Maximum Organ Dose	CHILD	LIVER	1.00E-03	1.00E+01	1.00E-02
Q4 - Total Body Dose	CHILD		1.00E-03	3.00E+00	3.33E-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 1/1/09 TO 1/1/10
LIQUID ANNUAL DOSE SUMMARY REPORT

McGuire Nuclear Station Units 1 & 2

ANNUAL 2009

=== BATCH LIQUID RELEASES ========== Annual 2009 =========

Period-Limit	Critical Age	Critical Organ	Dose (mrem)	Limit (mrem)	Max % of Limit
Yr - Maximum Organ Dose	CHILD	LIVER	1.75E-01	2.00E+01	8.77E-01
Yr - Total Body Dose	CHILD		1.73E-01	6.00E+00	2.89E+00

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

Nuclide	Percentage
H-3	9.83E+01

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

Nuclide	Percentage
H-3	9.95E+01

=== CONTINUOUS LIQUID RELEASES (WC) ========== Annual 2009 =========

Period-Limit	Critical Age	Critical Organ	Dose (mrem)	Limit (mrem)	Max % of Limit
Yr - Maximum Organ Dose	CHILD	LIVER	5.45E-03	2.00E+01	2.72E-02
Yr - Total Body Dose	CHILD		5.45E-03	6.00E+00	9.08E-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

McGUIRE NUCLEAR STATION

2009 METEOROLOGICAL JOINT FREQUENCY DISTRIBUTIONS

OF WIND SPEED, WIND DIRECTION, AND ATMOSPHERIC STABILITY

USING WINDS AT THE 10 METER LEVEL

(Hours of Occurrence)

McGuire Nuclear Station

The SAS System

The FREQ Procedure

Table of STAB by CALM

STAB Frequency	CALM CALM	WIND	Total
1	0	596	596
2	0	462	462
3	0	487	487
4	1	4410	4411
5	1	1847	1848
6	3	529	532
7	7	240	247
Total	12	8571	8583

Frequency Missing = 177

		SECTOR															
		N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW
		No.	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.
STAB	WSCLS																
A	0.46-0.75	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0.75-1.00	0	0	1	0	0	0	0	0	0	1	0	0	1	2	0	1
	1.00-1.25	1	3	0	0	0	0	0	0	0	0	0	0	3	0	1	1
	1.25-1.50	6	7	1	1	0	0	0	1	0	1	1	1	0	1	4	4
	1.50-2.00	16	19	16	9	4	3	3	2	2	4	7	6	6	6	5	8
	2.00-3.00	17	24	22	20	13	4	5	7	6	13	11	14	10	6	3	7
	3.00-4.00	5	14	15	11	10	6	2	3	4	9	16	13	7	2	1	3
	4.00-5.00	3	3	6	7	4	1	0	0	1	4	6	4	1	0	0	3
	5.00-6.00	8	3	9	5	0	0	0	0	0	1	3	0	0	0	2	1
	6.00-8.00	12	6	3	4	0	0	0	0	0	0	4	1	0	0	3	10
	8.00-10.00	5	0	0	0	0	0	0	0	0	0	0	0	0	0	2	5
	10.01-99.99	2	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0
B	0.46-0.75	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0.75-1.00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	1.00-1.25	1	0	0	1	0	0	0	0	0	0	0	0	1	0	0	0
	1.25-1.50	1	0	1	0	0	0	1	0	0	0	1	1	1	0	0	0
	1.50-2.00	4	3	7	1	2	1	1	0	1	2	0	0	3	1	1	1
	2.00-3.00	5	13	9	10	4	8	6	2	4	5	9	17	1	3	4	1

	3.00-4.00	9	11	14	10	6	5	2	1	9	12	15	9	5	8	1	1
	4.00-5.00	3	7	15	7	4	1	0	0	1	7	18	9	2	3	2	5
	5.00-6.00	0	7	14	1	1	0	0	0	0	2	7	6	0	0	2	5
	6.00-8.00	13	8	9	1	0	0	0	0	0	0	6	5	0	0	4	19
	8.00-10.00	3	1	1	0	0	0	0	0	0	0	1	0	0	1	1	1
	10.01-99.99	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1	1
C	0.46-0.75	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0.75-1.00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	1.00-1.25	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
	1.25-1.50	0	0	2	0	0	0	1	1	0	1	1	0	2	0	0	0
	1.50-2.00	1	2	1	2	3	2	0	2	3	0	4	2	2	2	0	1
	2.00-3.00	10	8	7	7	5	2	4	7	2	4	9	8	3	2	1	1
	3.00-4.00	5	8	10	8	2	5	4	2	2	9	24	21	9	2	1	2
	4.00-5.00	5	6	28	8	5	0	1	0	0	9	14	11	1	1	0	5
	5.00-6.00	12	3	13	3	0	0	0	0	0	1	11	6	0	1	5	5
	6.00-8.00	10	9	8	2	0	0	0	0	0	1	5	4	5	3	8	12
	8.00-10.00	4	1	3	0	0	0	0	0	0	0	2	2	0	6	7	4
	10.01-99.99	0	4	0	0	0	0	0	0	0	0	0	0	0	0	2	1
D	0.46-0.75	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
	0.75-1.00	5	1	0	0	0	1	2	2	1	0	0	1	2	2	1	2
	1.00-1.25	5	8	1	0	2	1	4	4	5	4	5	4	4	5	2	1
	1.25-1.50	10	8	6	5	6	7	7	11	13	11	5	17	10	6	2	7

	1.50-2.00	30	29	30	20	17	17	45	49	32	14	37	32	39	16	16	15
	2.00-3.00	63	77	186	138	94	71	95	44	49	65	123	108	53	21	26	26
	3.00-4.00	52	75	248	152	60	52	40	11	25	84	181	61	31	19	31	38
	4.00-5.00	55	55	220	69	21	11	7	2	9	33	118	24	35	19	38	40
	5.00-6.00	38	44	67	4	3	0	0	1	4	14	55	19	11	13	23	19
	6.00-8.00	34	25	28	1	0	0	0	0	0	2	31	21	4	12	28	22
	8.00-10.00	1	22	10	0	0	0	0	0	0	1	4	5	1	2	21	3
	10.01-99.99	0	6	0	0	0	0	0	0	0	0	1	4	1	3	2	0
E	0.46-0.75	0	2	0	1	0	0	1	1	1	0	1	0	2	1	2	0
	0.75-1.00	0	2	0	0	4	1	3	4	4	9	7	4	4	3	3	0
	1.00-1.25	1	4	5	6	2	3	8	11	4	7	7	9	14	5	1	1
	1.25-1.50	4	5	7	3	4	2	14	25	23	22	28	25	19	4	4	2
	1.50-2.00	15	19	21	11	10	14	36	28	51	43	46	57	29	14	12	6
	2.00-3.00	10	12	17	24	29	29	71	24	81	143	149	72	21	23	23	11
	3.00-4.00	3	2	5	5	15	4	4	0	10	40	92	13	9	17	15	14
	4.00-5.00	1	0	4	0	7	0	0	0	5	1	13	14	5	5	5	7
	5.00-6.00	0	0	0	0	0	0	0	0	0	1	8	5	0	5	0	1
	6.00-8.00	2	1	0	0	0	0	0	0	0	3	2	7	0	2	2	1
	8.00-10.00	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0
	10.01-99.99	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
F	0.46-0.75	0	0	0	0	0	0	1	1	4	5	4	1	3	0	2	0
	0.75-1.00	2	1	0	2	0	0	0	2	6	12	14	13	1	1	0	1
	1.00-1.25	1	1	0	1	1	0	0	4	6	17	11	9	12	0	1	0

	1.25-1.50	0	1	1	0	2	0	1	5	16	23	11	10	7	2	2	0
	1.50-2.00	0	0	2	1	0	1	0	12	42	25	28	16	9	3	1	1
	2.00-3.00	0	1	0	0	0	0	1	9	39	34	22	23	19	4	3	0
	3.00-4.00	0	0	1	0	0	0	0	0	0	0	1	5	1	0	4	0
	4.00-5.00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	5.00-6.00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	6.00-8.00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	8.00-10.00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	10.01-99.99	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
G	0.46-0.75	1	0	0	0	1	1	1	1	2	16	12	3	1	1	0	0
	0.75-1.00	0	2	2	0	0	0	0	2	11	11	33	6	3	1	0	2
	1.00-1.25	0	2	0	0	0	0	0	0	3	17	13	5	1	0	0	0
	1.25-1.50	0	2	1	0	0	0	0	0	2	14	6	4	0	0	0	0
	1.50-2.00	0	3	1	0	0	0	0	1	14	11	8	5	0	0	1	0
	2.00-3.00	0	1	0	0	0	0	0	0	3	2	3	1	2	0	0	0
	3.00-4.00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
	4.00-5.00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	5.00-6.00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	6.00-8.00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	8.00-10.00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	10.01-99.99	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Attachment 2

Solid Waste Disposal Report

REPORT PERIOD
JANUARY - DECEMBER 2009

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^3	Disposal Volume m^3	Waste Class	Total Curies
Waste from Liquid Systems							
(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	none						
(G) dewatered mechanical filter media	none						
(H) dewatered mechanical filter media (brokered)	none						
(I) solidified waste	none						
Dry Solid Waste							
(A) dry active waste (compacted)	none						
dry active waste (non-compacted)	20	35	DBP	131102	3716.00	A/U	1.48E+02
dry active waste (brokered/compacted)	none						
dry active waste (brokered/non-compacted)	13	33	DBP	2750.6	77.96	A/U	4.605E+00
(B) sealed sources/smoke detectors	none						
(C) sealed sources	none						
(D) irradiated components	none						
Totals	**33**	**68**		**133852.6**	**3793.96**		**1.529E+02**

2/12/2010

MCGUIRE NUCLEAR SITE
SUMMARY OF MAJOR RADIONUCLIDE COMPOSITION
2009

Type of waste	Nuclide	% Abundance
1. Waste from liquid systems:		
A. Dewatered Powdex Resin (brokered)	No shipments in 2009	
B. Dewatered Powdex Resin	No shipments in 2009	
C. Dewatered Bead Resin (brokered)	No shipments in 2009	
D. Dewatered Bead Resin	No shipments in 2009	
E. Dewatered Radwaste System Resin (brokered)	No shipments in 2009	
F. Dewatered Primary Bead Resin (brokered)	No Shipments in 2009	
G. Dewatered Mechanical Filter Media	No shipments in 2009	
H. Dewatered Mechanical Filter Media (brokered)	No shipments in 2009	
I. Solidified Waste	No shipments in 2009	
2. Dry Solid Waste:		
A. Dry Active Waste (compacted)	Compaction no longer performed on-site.	
Dry Active Waste (non-compacted)		
Landfill 09-01	**Nuclide**	**%Abundance**
	Co-60	**.48**
	Cs-137	**2.06**
	H-3	**97.47**

2009- 0005

Nuclide	%Abundance
C-14	1.66
Co-60	85.70
Cs-137	.42
Fe-55	1.04
H-3	.13
I-129	.01
Nb-94	.23
Ni-59	.10
Ni-63	6.05
Pu-241	.04
Sb-125	.38
Sr-90	.01
Tc-99	4.22

2009- 0009

Nuclide	%Abundance
C-14	1.30
Co-60	86.87
Cs-137	.41
Fe-55	.95
H-3	.31
Nb-94	.39
Ni-59	.18
Ni-63	7.74
Pu-238	.01
Pu-239	.01
Pu-241	.05
Sb-125	.37
Sr-90	.01
Tc-99	1.39

2009- 0012

Nuclide	%Abundance
C-14	1.82
Co-60	81.76
Cs-137	.41
Fe-55	1.06
H-3	.09
I-129	.01
Nb-94	.43
Ni-59	.20
Ni-63	8.00
Pu-238	.01
Pu-239	.01
Pu-241	.06
Sb-125	.37
Sr-90	.01
Tc-99	5.76

2009- 0015

Nuclide	%Abundance
C-14	1.25
Co-60	82.00
Cs-137	.41
Fe-55	1.07
H-3	.38
I-129	.01
Nb-94	.44
Ni-59	.20
Ni-63	8.01
Pu-238	.01
Pu-239	.01
Pu-241	.06
Sb-125	.37
Sr-90	.01
Tc-99	5.77

2009- 0023

Nuclide	%Abundance
C-14	1.81
Co-60	81.56
Cs-137	.41
Fe-55	1.05
H-3	.37
I-129	.01
Nb-94	.43
Ni-59	.20
Ni-63	7.96
Pu-238	.01
Pu-239	.01
Pu-241	.06
Sb-125	.37
Sr-90	.01
Tc-99	5.73

2009- 0024

Nuclide	%Abundance
C-14	1.82
Co-60	81.54
Cs-137	.41
Fe-55	1.05
H-3	.38
I-129	.01
Nb-94	.43
Ni-59	.20
Ni-63	7.97
Pu-238	.01
Pu-239	.01
Pu-241	.06
Sb-125	.37
Sr-90	.01
Tc-99	5.74

2009- 0027

Nuclide	%Abundance
C-14	1.82
Co-60	81.56
Cs-137	.41
Fe-55	1.05
H-3	.38
I-129	.01
Nb-94	.43
Ni-59	.20
Ni-63	7.96
Pu-238	.01
Pu-239	.01
Pu-241	.05
Sb-125	.37
Sr-90	.01
Tc-99	5.74

2009- 0028

Nuclide	%Abundance
C-14	1.82
Co-60	81.52
Cs-137	.41
Fe-55	1.04
H-3	.37
I-129	.01
Nb-94	.43
Ni-59	.20
Ni-63	7.99
Pu-238	.01
Pu-239	.01
Pu-241	.06
Sb-125	.37
Sr-90	.01
Tc-99	5.74

2009- 0029

Nuclide	%Abundance
C-14	1.81
Co-60	81.55
Cs-137	.41
Fe-55	1.05
H-3	.37
I-129	.01
Nb-94	.43
Ni-59	.20
Ni-63	7.96
Pu-238	.01
Pu-239	.01
Pu-241	.06
Sb-125	.37
Sr-90	.01
Tc-99	5.74

2009- 0032

Nuclide	%Abundance
C-14	1.82
Co-60	81.52
Cs-137	.41
Fe-55	1.05
H-3	.37
I-129	.01
Nb-94	.43
Ni-59	.20
Ni-63	7.99
Pu-238	.01
Pu-239	.01
Pu-241	.06
Sb-125	.37
Sr-90	.01
Tc-99	5.73

2009- 0033

Nuclide	%Abundance
C-14	1.81
Co-60	81.57
Cs-137	.41
Fe-55	1.05
H-3	.37
I-129	.01
Nb-94	.43
Ni-59	.20
Ni-63	7.96
Pu-238	.01
Pu-239	.01
Pu-241	.06
Sb-125	.37
Sr-90	.01
Tc-99	5.72

2009- 0034

Nuclide	%Abundance
C-14	1.81
Co-60	81.55
Cs-137	.41
Fe-55	1.05
H-3	.37
I-129	.01
Nb-94	.43
Ni-59	.20
Ni-63	7.97
Pu-238	.01
Pu-239	.01
Pu-241	.06
Sb-125	.37
Sr-90	.01
Tc-99	5.73

2009- 0035

Nuclide	%Abundance
C-14	1.82
Co-60	81.62
Cs-137	.41
Fe-55	1.05
H-3	.36
I-129	.01
Nb-94	.43
Ni-59	.20
Ni-63	7.97
Pu-238	.01
Pu-239	.01
Pu-241	.06
Sb-125	.31
Sr-90	.01
Tc-99	5.73

2009- 0036

Nuclide	%Abundance
C-14	1.81
Co-60	81.57
Cs-137	.41
Fe-55	1.05
H-3	.37
I-129	.01
Nb-94	.43
Ni-59	.20
Ni-63	7.95
Pu-238	.01
Pu-239	.01
Pu-241	.06
Sb-125	.37
Sr-90	.01
Tc-99	5.73

2009- 0037

Nuclide	%Abundance
C-14	1.81
Co-60	81.56
Cs-137	.40
Fe-55	1.05
H-3	.37
I-129	.01
Nb-94	.43
Ni-59	.20
Ni-63	7.97
Pu-238	.01
Pu-239	.01
Pu-241	.06
Sb-125	.37
Sr-90	.01
Tc-99	5.72

2009- 0038

Nuclide	%Abundance
C-14	1.82
Co-60	81.53
Cs-137	.41
Fe-55	1.05
H-3	.37
I-129	.01
Nb-94	.43
Ni-59	.20
Ni-63	7.98
Pu-238	.01
Pu-239	.01
Pu-241	.05
Sb-125	.37
Sr-90	.01
Tc-99	5.73

2009- 0040

Nuclide	%Abundance
C-14	1.82
Co-60	81.51
Cs-137	.41
Fe-55	1.05
H-3	.38
I-129	.01
Nb-94	.43
Ni-59	.20
Ni-63	7.97
Pu-238	.01
Pu-239	.01
Pu-241	.06
Sb-125	.37
Sr-90	.01
Tc-99	5.76

2009- 0041

Nuclide	%Abundance
C-14	1.81
Co-60	81.57
Cs-137	.41
Fe-55	1.04
H-3	.37
I-129	.01
Nb-94	.43
Ni-59	.20
Ni-63	7.97
Pu-238	.01
Pu-239	.01
Pu-241	.06
Sb-125	.37
Sr-90	.01
Tc-99	5.72

2009- 0042	Nuclide	%Abundance
	C-14	1.82
	Co-60	81.53
	Cs-137	.41
	Fe-55	1.05
	H-3	.37
	I-129	.01
	Nb-94	.43
	Ni-59	.20
	Ni-63	7.98
	Pu-238	.01
	Pu-239	.01
	Pu-241	.06
	Sb-125	.37
	Sr-90	.01
	Tc-99	5.74

Dry Active Waste (brokered/compacted) No shipments in 2009

Dry Active Waste (brokered/non-compacted)

2009- 0002	Nuclide	%Abundance
	Mn-54	1.16
	Co-57	.06
	Co-58	7.21
	Co-60	23.91
	Cs-137	1.27
	Fe-55	44.30
	Ni-63	17.18
	C-14	2.27
	Zr-95	.45
	Sb-125	.76
	Sr-90	.18
	Nb-95	1.25

2009- 0003

Nuclide	%Abundance
Mn-54	2.81
Co-57	.10
Co-58	1.23
Co-60	37.14
Cs-137	.02
Fe-55	38.83
Ni-63	17.04
C-14	.02
Zr-95	.37
Sb-125	1.49
Sr-90	.04
Sn-113	.07
Ce-144	.02
Pu-238	.01
Am-241	.01
Nb-95	.80

2009- 0004

Nuclide	%Abundance
Mn-54	.05
Co-60	27.60
Cs-137	2.46
Fe-55	28.07
Ni-63	36.06
C-14	4.91
Sb-125	.50
Sr-90	.35

2009- 0006

Nuclide	%Abundance
Mn-54	2.85
Co-57	.11
Co-58	1.30
Co-60	37.00
Cs-137	.02
Fe-55	38.88
Ni-63	16.95
C-14	.02
Zr-95	.39
Sb-125	1.48
Sr-90	.04
Sn-113	.07
Ce-144	.02
Pu-238	.01
Am-241	.01
Nb-95	.86

2009- 0008

Nuclide	%Abundance
Mn-54	2.15
Co-57	.08
Co-58	.61
Co-60	35.86
Cs-137	.38
Fe-55	38.95
Ni-63	19.36
C-14	.70
Zr-95	.17
Sb-125	1.33
Sr-90	.08
Sn-113	.04
Ce-144	.02
Am-241	.01
Nb-95	.23

2009- 0010

Nuclide	%Abundance
Cr-51	22.64
Mn-54	1.47
Co-57	.12
Co-58	41.31
Co-60	5.82
Cs-137	.43
Fe-55	10.31
Fe-59	.99
Ni-63	3.88
C-14	.28
H-3	2.37
Zr-95	3.69
Sn-113	.15
Ce-144	.09
Zn-65	.22
Nb-95	6.22

2009- 0013

Nuclide	%Abundance
Cr-51	21.43
Mn-54	1.53
Co-57	.12
Co-58	41.62
Co-60	6.06
Cs-137	.45
Fe-55	10.79
Fe-59	.97
Ni-63	4.07
C-14	.30
H-3	2.48
Zr-95	3.70
Sn-113	.16
Ce-144	.09
Zn-65	.23
Nb-95	6.01

2009- 0014

Nuclide	%Abundance
Cr-51	23.88
Mn-54	1.42
Co-57	.12
Co-58	40.93
Co-60	5.55
Cs-137	.41
Fe-55	9.89
Fe-59	1.00
Ni-63	3.71
C-14	.27
H-3	2.27
Zr-95	3.68
Sn-113	.15
Ce-144	.08
Zn-65	.21
Nb-95	6.42

2009- 0016

Nuclide	%Abundance
Cr-51	23.52
Mn-54	1.4
Co-57	.12
Co-58	41.08
Co-60	5.62
Cs-137	.42
Fe-55	10.00
Fe-59	1.00
Ni-63	3.75
C-14	.27
H-3	2.29
Zr-95	3.69
Sn-113	.15
Ce-144	.08
Zn-65	.21
Nb-95	6.37

2009- 0019

Nuclide	%Abundance
Cr-51	21.4
Mn-54	1.53
Co-57	.12
Co-58	41.58
Co-60	6.07
Cs-137	.45
Fe-55	10.78
Fe-59	.97
Ni-63	4.06
C-14	.29
H-3	2.48
Zr-95	3.70
Sn-113	.16
Ce-144	.09
Zn-65	.23
Nb-95	6.03

2009- 0021

Nuclide	%Abundance
Cr-51	23.80
Mn-54	1.42
Co-57	.11
Co-58	41.08
Co-60	5.56
Cs-137	.41
Fe-55	9.87
Fe-59	1.00
Ni-63	3.70
C-14	.27
H-3	2.26
Zr-95	3.67
Sn-113	.15
Ce-144	.08
Zn-65	.21
Nb-95	6.40

2009- 0022

Nuclide	%Abundance
Cr-51	23.22
Mn-54	1.45
Co-57	.12
Co-58	41.18
Co-60	5.68
Cs-137	.42
Fe-55	10.09
Fe-59	.99
Ni-63	3.79
C-14	.28
H-3	2.31
Zr-95	3.69
Sn-113	.15
Ce-144	.08
Zn-65	.22
Nb-95	6.32

2009- 0026

Nuclide	%Abundance
Cr-51	23.83
Mn-54	1.42
Co-57	.12
Co-58	40.96
Co-60	5.56
Cs-137	.41
Fe-55	9.91
Fe-59	1.00
Ni-63	3.71
C-14	.27
H-3	2.26
Zr-95	3.68
Sn-113	.15
Ce-144	.08
Zn-65	.21
Nb-95	6.42

B. Sealed Sources	No shipments in 2009
C. Sealed Sources/Smoke Detectors	No shipments in 2009
D. Irradiated Components	No shipments in 2009

Attachment 3

Unplanned Offsite Releases

McGUIRE NUCLEAR STATION

UNPLANNED RELEASES

(January 1, 2009 through December 31, 2009)

There were no unplanned liquid radioactive releases to the environment in 2009. There were four unplanned gaseous radioactive effluent releases to the environment in 2009.

January 28, 2009

Memorandum To: Annual Radioactive Effluent Release Report

CC: Steve Mooneyhan, H. J. Sloan, Joyce Correll, C.D. Ingram, Duncan Brewer, Ken Ash, Kay Crane

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

Re: Unplanned release to the Unit 2 Vent Reference PIP M-09-0418

Event Summary:
See referenced PIP for details.
On January 26, 2009 19:45 to 20:45 hours, an unplanned WG release event occurred allowing 139cubic feet (cf) of noble gas to be release to the Auxiliary Bld ventilation (VA) system out to the Unit 2 Vent release path. Auxiliary Bld VA system gas monitor EMF 41 presented with a trip 2 alarm at ~20:00hrs. Both the Unit 2 Vent gas monitor 2EMF36 and EMF41 were trended with both indicating elevated counts. EMF41 peaked @ ~380cpm and 2EMF36 peaked @ ~35cpm. Both monitors indication were well below offsite limits with the release clearing to normal within an hour.

At initiation of the release a high rad trip occurred on EMF-41 point #11. This caused the VA system to be switched to the filtered mode. While investigating the trip actuation samples were obtained in the area of the Boron Recycle (NB) Evaporator which indicated residual noble gas. Initial investigation indicates WG compressor tripped causing the compressor suction line to become pressurized and push gas to the NB Evaporator which allowed gas to be leaked by evaporator seals and valve 1NB-158 to the Aux. Bldg ventilation duct to the Unit Vent.

No off site release limits were challenged. A conservative calculation indicates 1.94E-2 curies of fission and activation gas (noble gas) were released to the Unit 2 Vent during this event. The source of the noble gas was determined to be from (B in-service WGDT) which was sampled to document activity released.

Sequence of events:

- 19:45 WG- A compressor tripped and elevated counts were seen on 2 EMF36
- 20:10 EMF41 Point 11 trip 2 actuation
- 20:35 WG- A compressor restarted. A small drop in WGDT-B pressure was noted which indicates the activity source.
- 1/27/09 WGDT-B sampled to account for activity released to the unit 2 vent.
- 1/27/09 SRPMP 8-2 "Investigation of Unusual Radiological Occurrences" was initiated to document the Unplanned Release investigation.
- 1/27/09 Special meeting conducted to plan repair and restoration of the NB Evaporator.

The total Noble gas activity released was reported on (GWR) Gaseous Waste Release # 2009003.
The unplanned activity was evaluated against off site dose limits using current ODCM methodology on the attached spreadsheet and confirmed with RETDAS dose assessment software.

Safety Significance:
The health and safety of the public were not compromised by this event. The total activity released was insignificant. Calculated dose and doserate to the Total Body, Skin, Gamma Air, and Beta Air were all less than one tenth of one percent (<0.1%) of the limits specified by Selected Licensee Commitments and Code of Federal Regulations.

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

Harry Sloan
General Supervisor
Radiation Protection
McGuire Nuclear Station

September 4, 2009

Memorandum To: Annual Radioactive Effluent Release Report

CC: Steve Mooneyhan, H. J. Sloan, Joyce Correll, C.D. Ingram, Duncan Brewer, 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-09-4874

Event Summary:
See referenced PIP for details.
On September 4, 2009 at about 18:24 operations received an annunciator alarm on Auxiliary Bldg Ventilation (VA) monitor EMF 41, point #1 with a reading of 717 cpm. Radiation Protection was notified to investigate and sample Unit 1 Vent. The trip actuation caused Auxiliary Bldg VA filters to automatically be placed in service. Radwaste Chemistry staff was performing maintenance on the portable Orbisphere Analyzer which is used to support primary system degas operations. The Hydrogen probe had been removed and cleaned, the flow gauge was removed to remove water, and then was reattached. The probe and associated tubing was purged with inert gas for an extended period of time prior to re-attachment. After re-attaching the tubing, system gas from VCT was aligned. EMF-41 alarmed shortly following this evolution. Radwaste Chemistry staff re-tightened the tubing previously removed. Unit 1 Vent monitor 1 EMF-36 and EMF-41 elevated count rate returned to normal. The release lasted 80 min. The Unit 1 Vent had a 10 min average peak response of 200 cpm above background (30 cpm). This 200 cpm increase is 5% of the calculated maximum allowed 4100cpm. No off site release limits were challenged during this event. A sample was obtained from the B shut down WGDT which was representative of the activity released.

Sequence of Events:

- At 17:51 1EMF36L entered Trip 1 reading 113 cpm and peaked at 242 cpm at ~18:24. (Trip 1 Setpoint is 60 cpm and Trip 2 is set at 500 cpm)
- At 18:24, 0EMF41 entered Trip 2 on Point 1 at 757 cpm (Trip 1 is set at 150 cpm and Trip 2 is set at 200 cpm). Point 4 also went into Trip 2 alarm reading 1210 cpm.
- At 18:25, RP Shift initiated HP/0/B/1009/026 (EMF Alarm/Unusual Event Response) in response to the Trip 2 alarms on 0EMF41.
- At 18:27, 1EMF36L was sampled with the following results: Ar-41 at 1.496E-06 uCi/ml and Xe-135 at 3.585E-08 uCi/ml.
- At 18:30, RP S&C was notified and proceeded to restrict entry into the Auxiliary Building by posting guards at the north and south Aux. Bldg. entry turnstiles.
- At 18:35, Chemistry was called to inform them of the Trip 2 alarms on 0EMF41.
- At 18:55, RP verified with Operations that Unit 1 and 2 VA were in Filtered mode.

- At 19:08, the Control Room was notified by RP that 0EMF41 levels had returned to normal and that 0EMF41 could be reset.
- At 19:09, RP informed Chemistry that their recovery efforts were successful and EMF readings were returning to normal.
- At 19:13, 1EMF36L had returned to normal at ~22 cpm.
- At 19:13, RP S&C were informed that entry into the Aux. Bldg could now be resumed.
- At 19:43, RP verified with Operations that the Unit 1 & 2 VA Filtered Exhaust was now back in Bypass.

The total Noble gas activity released is reported on (GWR) Gaseous Waste Release # 2009056.
The unplanned activity was evaluated against off site dose limits using current ODCM methodology on the attached spreadsheet and confirmed with RETDAS dose assessment software.

Safety Significance:
The health and safety of the public were not compromised by this event. The total activity released was insignificant. Calculated dose and doserate to the Total Body, Skin, Gamma Air, and Beta Air were all less than limits specified by Selected Licensee Commitments and Code of Federal Regulations.

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

Harry Sloan
General Supervisor
Radiation Protection
McGuire Nuclear Station

September 11, 2009

Memorandum To: Annual Radioactive Effluent Release Report

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

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

Re: Unplanned release to the Unit 1 Vent from WGDT-C
Reference PIP M-09-05081

Event Summary:
See referenced PIP for details.
On September 9th, 2009 Radwaste Chemistry 7 day trending identified a pressure loss indication from the Waste Gas Decay Tank C (WGDT-C). Data trending indicated the pressure loss started on 8/29/09 around 01:15hrs and continued until 9/09/09 11:30hrs. Immediate contact with Radiation Protection was made and monitoring of Unit 1 vent 1EMF 36L and EMF 41Auxilliary building gas monitor was performed. No count rate increases were seen on either monitor during the period of pressure loss from WGDT-C. Since no count rate increase was seen on plant monitors it indicates that the activity in the WGDT-C was at a concentration below detection limits of the monitors. No pressure increases were seen in other WGDTs during the release period. Valves associated with WGDT-C were snooped with no visible leak seen. It is surmised that the gas escaped from the tank through a leaking component or valve into the auxiliary building ventilation and exhausted through the Unit 1 vent. Follow up leak investigation will be required to identify the leak site. Chemistry has calculated a 26 psi pressure loss or 1061 cubic ft of noble gas released over the period. Chemistry transferred the remaining tank contents into WGDT-A on 9/09/09 11:30hrs. The A tank was sampled to determine radioactivity released. The A tank had received several recent system inputs and it was found to contain a number of short lived nuclides not normally found in an aged WGDT. Further investigation shows the WGDT-C had been secured from system use on May 19, 2009. No additional inputs were received by the C tank until the leak occurred. Therefore using a conservative estimate of 112 day decay period (10 half lives), all short lived nuclides would have decayed leaving only KR-85 with a 10.72 year half life. The concentration of KR-85 in the WGDT-A tank was 2.77E-5 uci/ml. This value is used to estimate offsite release impact to the public.

The unplanned activity was evaluated against off site dose limits using current ODCM methodology on the attached spreadsheet and confirmed with RETDAS dose assessment software. No off site release limits were challenged. A conservative calculation indicates 8.32E-4 curies of KR-85 noble gas were released to the Unit 1 Vent during this event. The source of the noble gas was from WGDT-C. The total Noble gas activity released is reported and accounted for in (GWR) Gaseous Waste Release # 2009057.

Safety Significance:
The health and safety of the public were not compromised by this event. The total activity released was insignificant. Calculated dose and doserate to the Total Body, Skin, Gamma Air, and Beta Air were all less than one tenth of one percent (<0.1%) of the limits specified by Selected Licensee Commitments and Code of Federal Regulations.

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

Harry Sloan
General Supervisor
Radiation Protection
McGuire Nuclear Station

December 4, 2009

Memorandum To: Annual Radioactive Effluent Release Report

CC: Joe Smith, H. J. Sloan, Joyce Correll, C.D. Ingram,

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

Re: Abnormal release to the Unit 1 Vent from leaking 1WG-122 post maintenance
Reference PIP M-09-07303

Event Summary:
See referenced PIP for details.
Maintenance was performed on 1 WG-122 due to a leak previously identified during a waste gas decay tank (WGDT) loss of volume event involving WGDT-C. See PIP M-09-5081 event details.
After notification of ongoing leak, RP took the following actions in response to 1 WG-122 leak associated with planned maintenance.
EMF 41 (aux bld noble gas monitor) point # 4 and Unit 1 vent noble gas monitor 1 EMF 36 L were trended and evaluated for any response to the potential waste gas leak. No response was observed on either EMF.
The WGDT-C was initially pressurized at 12/3/09 15:52hrs. The leak check was performed around 17:30hrs and RP was notified that a small weeping leak was ongoing. Chemistry and RP maintained surveillance of the tank pressure and EMF response to ensure radiological conditions remained unchanged. The very small leak rate did not present a radiological hazard.
The area at and around the valve was checked and no contamination found.
The WGDT-C was sampled at 21:32 hrs and Kr-85 at 8.2E-6 uCi/ml concentration was identified. This compared well with expected residual activity remaining in the tank from the last noble gas transfer from the tank. RP prepared gaseous waste release permit (GWR) #2009081 in preparation for a WGDT-C release to relieve the pressure on the leaking valve in preparation for follow up valve maintenance and re-check of valve integrity. The WGDT-C release was initiated at 12/4/09 09:45hrs and terminated at 13:12hrs.
The KR-85 activity release during the period from 1WG-122 to the unit 1 vent was calculated to be 106.1 cubic ft (2.46E-5 curies). The average release rate was 0.1 cfm over 17.8 hours. No response above background was seen on unit vent or auxiliary building noble gas monitors during the period. No off site limits were jeopardized. GWR #2009082 was generated to document the Unit 1 vent abnormal release.

Safety Significance:
The health and safety of the public were not compromised by this event. The total activity released was insignificant.

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

Harry Sloan
General Supervisor
Radiation Protection
McGuire Nuclear Station

Attachment 4

Fuel Cycle Calculation

McGuire Nuclear Station
2009 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. 2009 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* = 3.73E-01 mrem

Maximum Location: 0.5 Mile, East-Northeast Sector
Critical Age: Child
Gas non-NG Contribution: 47%
Gas NG Contribution: 7%
Liquid Contribution: 46%

Maximum Organ (other than TB) Dose* = 3.50E-01 mrem

Maximum Location: 0.5 Mile, East-Northeast Sector
Critical Age: Child
Critical Organ: Liver
Gas Contribution: 50%
Liquid Contribution: 50%

II. 2009 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 effluent dose calculations consider radionuclides identified as part of the liquid and gaseous wastes sample and analysis program per SLC Table 16.11.1-1 and SLC Table 16.11.6-1.

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

6.0 *10 CFR 72.212(b)(2)(i)(C) - Radioactive Materials in Effluents and Direct Radiation*

6.1 Purpose

10 CFR 72.212(b)(2)(i)(C) requires the general licensee to perform written evaluations, prior to use, that establish that the requirements of 10 CFR 72.104 have been met. A copy of this record must be retained until spent fuel is no longer stored under the general license issued under 10 CFR 72.210.

10 CFR 72.104 provides the regulatory criteria for radioactive materials in effluents and direct radiation from an independent spent fuel storage installation (ISFSI) during normal operation and anticipated occurrences. Specifically, 10 CFR 72.104(a) limits the annual dose equivalent to any real individual who is located beyond the controlled area to 25 mrem to the whole body, 75 mrem to the thyroid, and 25 mrem to any other critical organ. This dose equivalent must include contributions from (1) planned discharges of radioactive materials (radon and its decay products excepted) to the general environment, (2) direct radiation from ISFSI operations, and (3) any other radiation from uranium fuel cycle operations within the region. In addition, 10 CFR 72.104(b) requires that operational restrictions be established to meet as low as is reasonably achievable (ALARA) objectives for radioactive materials in effluents and direct radiation levels associated with ISFSI operations. Also, 10 CFR 72.104(c) requires that operational limits be established for radioactive materials in effluents and direct radiation levels associated with ISFSI operations to meet the above-mentioned dose limits.

This section provides the written evaluation required by 10 CFR 72.212(b)(2)(i)(C) demonstrating Duke Energy's compliance with the requirements of 10 CFR 72.104 for the McGuire Nuclear Station (MNS) Independent Spent Fuel Storage Installation (ISFSI).

6.2 Evaluation

This evaluation addresses the radiological dose rate from a composite population of both the NAC-UMS® and the TN-32A casks.

6.2.1 §72.104(a) – Dose Limits

<u>Historical TLD Monitoring</u>

Attachment 2 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 2, 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-32A 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-32A 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. (For McGuire, compliance with this regulation will also assure compliance with 40 CFR Part 190.) 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 (Reference 1). 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 $y = 492.69x^{-2.1688}$ 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 (Reference 2). 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)

40 CFR 190 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.

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") define "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 40 CFR 190.10(a) that the annual dose equivalent shall not exceed 25 mrems to the whole body, 75 mrems to the thyroid, and 25 mrems 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 10 CFR 72.106(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 (10 CFR 20.1301(b); see also 10 CFR 20.1301(a)(2)).

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 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. Note that only 28 NAC-UMS® casks are included in the McGuire ISFSI.

Tabulations

Normalization Factor (NF)

TN-32A Casks

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

Actual dose =
(0.058 rem X 1000 mrem/rem) / (97 days X 24 hrs/day) =
0.0249 mrem/hr

Calculated dose = 0.744 mrem/hr
(see "top of berm at owner controlled fence" below)

NF = 0.0249/0.744 = 0.0335

Due to the amount of conservatisms 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-32A 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 E^{-02} mrem/hr.

(10) Casks X 7.443 E^{-02} mrem/hr = 0.744 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 mrem/yr) / (8760 hours per yr) = 0.128 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 mrem per hr + 3(0.128) mrem per hr = 0.409 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 E^{-03} mrem/hr.

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

Normalized actual dose = 0.0335 X 12.36 mrem/yr = 0.414 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 mrem/yr) / (8760 hrs/yr) x 150 hrs (residence time/yr) = 2.69 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 mrem per year + 3(2.69) mrem per year = 8.48 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 E^{-04} mrem/hr.

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

Normalized actual dose = 0.0335 X 21.7 mrem/yr = 0.727 mrem / yr

Total expected dose for ten TN-32A casks (actual)
0.727 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 mrem per year + 3(4.6) mrem per year = 14.5 mrem per year

6.2.2 §72.104(b) – Operational Restrictions

The ISFSI is sited in such a way that direct radiation to the surroundings are minimized due to the berm to the north and the fall of the land to the west, which are the two directions the ISFSI is closest to the public.

The station Radiation Protection Program limits for ISFSI boundary dose rates (as described in RPMP 7-8) are established to maintain dose rates surrounding the ISFSI and at the owner control fence north of the ISFSI ALARA. The dose rate limit of 0.05 mrem/hr at the owner control fence assumes an occupancy time of 2000 hours, which is far more conservative than the 150 hours used in the previous evaluation section for this area.

6.2.3 §72.104(c) – Operational Limits

Cask radiation limits are established by the NAC-UMS® Technical Specification (TS) LCO 3.2.2 (50 mrem/hr on cask side and top and 100 mrem/hr on vents) to meet the limits of 10 CFR 72.104(a). Site procedures are written in accordance with this TS and demonstrate compliance with each cask load by performance of the TS radiation survey exactly as prescribed by the TS.

6.3 Regulatory Compliance/Conclusion

The evaluation summarized above demonstrates that Duke meets the requirements of 10 CFR 72.212(b)(2)(i)(C) and 10 CFR 72.104 for the MNS ISFSI.

6.4 References

1. 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
2. NAC Calc 12418-5001, "Skyshine Evaluation of McGuire ISFSI," Rev.0, dated 11/26/03
3. NRC 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"
4. Duke Energy McGuire Nuclear Station Procedure No. RPMP 7-8, "Maintaining RCZs Associated with ISFSI"

Attachment 5

Inoperable Monitoring Equipment

McGuire Nuclear Station

Inoperable Monitoring Equipment

(January 1, 2009 through December 31, 2009)

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

Attachment 6

Groundwater Protection Program

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 2009 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 2009 are shown in the table below.

Well Name	Well Location	Avg. Tritium Conc.(pCi/l)	Conc. Range	# of Samples
M-20	South of Hwg. 73	568	436 - 658	4
M-20R	South of Hwg. 73	567	561 - 575	4
M-21	South of Hwg. 73	<	<	4
M-22	South of Hwg. 73	<	<	4
M-22R	South of Hwg. 73	219	< - 219	4
M-23	South of Acs. Rd.	<	<<	4
M-30	WWCB	<	<<	4
M-30R	WWCB	212	182 - 268	4
M-31	Access road	<	<	4
M-32	Main entrance	<	<	4
M-34R	Access road	<	<	4
M-34DR	Access road	<	<	4
M-35	Access road	<	<<	4
M-42	U-2 Rx. Bldg.	1680	1270 - 1870	4
M-48	U-2 SFP	*	*	0
M-48R	U-2 SFP	967	872 - 1010	4
M-48DR	U-2 SFP	581	503 - 678	4
M-53	North of plant	1265	1190 - 1420	4
M-55	North Admin. Bldg.	315	< - 315	4
M-59	U-2 Doghouse	1090	849 - 1180	4
M-60	MOC Parking	<	<	4
M-62	S of RWF	220	< - 220	4
M-64	Rdwst. Bldg.	640	558 - 746	4
M-66	S of SSF	586	474 - 661	4
M-66R	S of SSF	<	<<	4
M-68	U-1 RMWST	1056	810 - 1270	4
M-70	U-1 SFP	433	300 - 659	4
M-70R	U-1 SFP	280	< - 324	4
M-70DR	U-1 SFP	183	< - 191	4

M-72	Rdwst. Trench	668	549 - 793	4
M-76	West of U-1 SFP	396	251 - 489	4
M-82	River	2103	1770 - 2400	4
M-84	River	3910	2490 - 5050	4
M-84R	River	7498	7320 - 7800	4
M-85	River	1663	1500 - 1780	4
M-87	Landfarm	485	363 - 555	4
M-89	Landfarm	817	676 - 885	4
M-90	Landfarm	295	295	1
M-91	East of WC	272	< - 347	4
M-91R	East of WC	279	< - 388	4
M-92	N of WC Ponds	292	220 - 496	4
M-92R	N of WC Ponds	203	< - 203	4
M-93	North of IHUP	369	275 - 486	4
M-93R	North of IHUP	303	174 - 388	4
M-94	SE of IHUP	<	<	4
M-95	Lower Parking	<	<	4
M-95R	Lower Parking	<	<	4
M-96	West Parking	<	<	4
M-96R	West Parking	<	<	4
M-97	East Parking	279	179 - 339	3
M-98	S of Admin. Bldg.	<	<	4
M-98R	S of Admin. Bldg.	<	<	4
M-100R	SE of WC	243	210 - 268	4
M-101	SE of WC	324	253 - 423	4
M-102	SW of WC	7893	7810 - 8160	4
M-103	South of WC	3653	3270 - 4150	4
M-103R	South of WC	3305	2490 - 3620	4
M-104R	West of WC	8655	7590 - 9740	4
M-104DR	West of WC	5738	5350 - 6050	4
M-105	Landfarm	294	294	1

*Well dry; no sample available.

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.