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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
2010 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 a CD-Rom of the 2011 Offsite Dose Calculation Manual and the 2010 Process Control Program (PCP) manual.

The following Attachments form the contents of the report:

Attachment 1 - Summary of Gaseous and Liquid Effluents Report
Attachment 2 - Supplemental Information
Attachment 3 - Solid Waste Disposal Report
Attachment 4 - Meteorological Data
Attachment 5 - Unplanned Offsite Releases
Attachment 6 - Assessment of Radiation Dose from Radioactive Effluents to Members of the Public (Includes Fuel Cycle Dose Calculation Results)
Attachment 7 - Radioactive Waste Systems
Attachment 8 - Inoperable Monitoring Equipment
Attachment 9 - Groundwater Protection Program

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

Regis T. Repko

Attachments

A009
IE48
NRR

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Attachment 1

Summary of Gaseous and Liquid Effluents Report

McGUIRE NUCLEAR STATION

EFFLUENT RELEASE DATA

(January 1, 2010 through December 31, 2010)

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". Included in the gaseous effluent releases is an estimate of Carbon-14 radioactivity released in 2010 (Ref. *"Carbon-14 Supplemental Information"*, contained in the ARERR for further information).

TABLE 1A

EFFLUENT AND WASTE DISPOSAL ANNUAL REPORT
PERIOD 1/1/10 TO 1/1/11
GASEOUS EFFLUENTS - SUMMATION OF ALL RELEASES

McGuire Nuclear Station Units 1 & 2

REPORT FOR 2010	Unit	QTR 1	QTR 2	QTR 3	QTR 4	YEAR
A. Fission and Activation Gases						
1. Total Release	Ci	6.03E-01	4.90E-01	5.64E-01	6.10E-01	2.27E+00
2. Avg. Release Rate	µCi/sec	7.76E-02	6.23E-02	7.10E-02	7.68E-02	7.19E-02
B. Iodine-131						
1. Total Release	Ci	3.52E-06	0.00E+00	0.00E+00	0.00E+00	3.52E-06
2. Avg. Release Rate	µCi/sec	4.53E-07	0.00E+00	0.00E+00	0.00E+00	1.12E-07
C. Particulates Half Life >= 8 days						
1. Total Release	Ci	1.12E-05	8.73E-08	0.00E+00	1.48E-05	2.61E-05
2. Avg. Release Rate	µCi/sec	1.44E-06	1.11E-08	0.00E+00	1.86E-06	8.27E-07
D. Tritium						
1. Total Release	Ci	3.31E+01	3.81E+01	2.22E+01	3.07E+01	1.24E+02
2. Avg. Release Rate	µCi/sec	4.25E+00	4.85E+00	2.80E+00	3.86E+00	3.94E+00
E. Carbon-14						
1. Total Release	Ci	4.78E+00	4.61E+00	5.36E+00	5.48E+00	2.02E+01
2. Avg. Release Rate	µCi/sec	6.15E-01	5.86E-01	6.74E-01	6.89E-01	6.41E-01
F. 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 1/1/10 TO 1/1/11
GASEOUS EFFLUENTS - ELEVATED RELEASES - CONTINUOUS MODE

McGuire Nuclear Station Units 1 & 2

REPORT FOR 2010	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. Carbon-14						
** No Nuclide Activities **		.....	.....	.....	.....	.....
6. Gross Alpha Radioactivity						
** No Nuclide Activities **		.....	.....	.....	.....	.....

TABLE 1B

EFFLUENT AND WASTE DISPOSAL ANNUAL REPORT
PERIOD 1/1/10 TO 1/1/11
GASEOUS EFFLUENTS - ELEVATED RELEASES - BATCH MODE

McGuire Nuclear Station Units 1 & 2

REPORT FOR 2010	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. Carbon-14						
** No Nuclide Activities **		.....	.....	.....	.....	.....
6. Gross Alpha Radioactivity						
** No Nuclide Activities **		.....	.....	.....	.....	.....

TABLE 1C

EFFLUENT AND WASTE DISPOSAL ANNUAL REPORT
PERIOD 1/1/10 TO 1/1/11
GASEOUS EFFLUENTS - GROUND RELEASES - CONTINUOUS MODE

McGuire Nuclear Station Units 1 & 2

REPORT FOR 2010	Unit	QTR 1	QTR 2	QTR 3	QTR 4	YEAR
1. Fission and Activation Gases						
** No Nuclide Activities **		.....	.....	.....	.....	.....
2. Iodines						
I-131	Ci	3.52E-06	0.00E+00	0.00E+00	0.00E+00	3.52E-06
Totals for Period...	Ci	3.52E-06	0.00E+00	0.00E+00	0.00E+00	3.52E-06
3. Particulates Half Life >= 8 days						
CO-58	Ci	1.10E-05	8.73E-08	0.00E+00	8.54E-06	1.96E-05
CO-60	Ci	0.00E+00	0.00E+00	0.00E+00	4.50E-06	4.50E-06
MN-54	Ci	0.00E+00	0.00E+00	0.00E+00	1.74E-06	1.74E-06
Totals for Period...	Ci	1.10E-05	8.73E-08	0.00E+00	1.48E-05	2.58E-05
4. Tritium						
H-3	Ci	3.22E+01	3.70E+01	2.21E+01	3.04E+01	1.22E+02
Totals for Period...	Ci	3.22E+01	3.70E+01	2.21E+01	3.04E+01	1.22E+02
5. Carbon-14						
C-14	Ci	1.43E+00	1.38E+00	1.61E+00	1.64E+00	6.06E+00
Totals for Period...	Ci	1.43E+00	1.38E+00	1.61E+00	1.64E+00	6.06E+00
6. Gross Alpha Radioactivity						
** No Nuclide Activities **		.....	.....	.....	.....	.....

TABLE 1C

EFFLUENT AND WASTE DISPOSAL ANNUAL REPORT
PERIOD 1/1/10 TO 1/1/11
GASEOUS EFFLUENTS - GROUND RELEASES - BATCH MODE

McGuire Nuclear Station Units 1 & 2

REPORT FOR 2010	Unit	QTR 1	QTR 2	QTR 3	QTR 4	YEAR
1. Fission and Activation Gases						
C-11	Ci	0.00E+00	3.73E-04	0.00E+00	0.00E+00	3.73E-04
AR-41	Ci	5.51E-01	4.58E-01	5.38E-01	5.94E-01	2.14E+00
KR-85	Ci	0.00E+00	1.94E-03	1.93E-03	1.47E-03	5.34E-03
KR-85M	Ci	0.00E+00	2.47E-04	1.53E-04	0.00E+00	4.01E-04
KR-87	Ci	0.00E+00	6.91E-05	3.86E-05	0.00E+00	1.08E-04
KR-88	Ci	0.00E+00	3.71E-04	2.38E-04	0.00E+00	6.09E-04
XE-131M	Ci	0.00E+00	0.00E+00	0.00E+00	2.37E-05	2.37E-05
XE-133	Ci	4.99E-02	2.17E-02	2.06E-02	1.44E-02	1.07E-01
XE-133M	Ci	0.00E+00	0.00E+00	2.68E-04	0.00E+00	2.68E-04
XE-135	Ci	2.22E-03	7.35E-03	2.94E-03	0.00E+00	1.25E-02
Totals for Period...	Ci	6.03E-01	4.90E-01	5.64E-01	6.10E-01	2.27E+00
2. Iodines						
** No Nuclide Activities **		.....	.....	.....	.....	.....
3. Particulates Half Life >= 8 days						
CL-38	Ci	2.28E-07	0.00E+00	0.00E+00	0.00E+00	2.28E-07
Totals for Period...	Ci	2.28E-07	0.00E+00	0.00E+00	0.00E+00	2.28E-07
4. Tritium						
H-3	Ci	8.13E-01	1.10E+00	1.20E-01	2.46E-01	2.28E+00
Totals for Period...	Ci	8.13E-01	1.10E+00	1.20E-01	2.46E-01	2.28E+00
5. Carbon-14						
C-14	Ci	3.35E+00	3.23E+00	3.75E+00	3.84E+00	1.42E+01
Totals for Period...	Ci	3.35E+00	3.23E+00	3.75E+00	3.84E+00	1.42E+01
6. Gross Alpha Radioactivity						
** No Nuclide Activities **		.....	.....	.....	.....	.....

TABLE 2A

EFFLUENT AND WASTE DISPOSAL ANNUAL REPORT
PERIOD 1/1/10 TO 1/1/11
LIQUID EFFLUENTS - SUMMATION OF ALL RELEASES

McGuire Nuclear Station Units 1 & 2

REPORT FOR 2010	Unit	QTR 1	QTR 2	QTR 3	QTR 4	YEAR
A. Fission and Activation Products						
1. Total Release	Ci	1.48E-02	1.85E-02	7.43E-03	4.14E-03	4.48E-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	1.93E-11	2.09E-11	7.29E-12	4.18E-12	1.22E-11
B. Tritium						
1. Total Release	Ci	5.68E+02	1.28E+02	3.36E+02	1.76E+02	1.21E+03
2. Average Diluted Concentration						
a. Continuous Releases	µCi/ml	5.58E-09	1.14E-08	9.34E-09	6.08E-09	7.41E-09
b. Batch Releases	µCi/ml	7.41E-07	1.45E-07	3.29E-07	1.78E-07	3.30E-07
C. Dissolved and Entrained Gases						
1. Total Release	Ci	0.00E+00	1.43E-05	0.00E+00	0.00E+00	1.43E-05
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	1.62E-14	0.00E+00	0.00E+00	3.90E-15
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	8.96E+07	1.06E+08	8.61E+07	6.62E+07	3.48E+08
2. Batch Releases	liters	1.45E+06	9.02E+05	1.16E+06	5.89E+05	4.11E+06
F. Volume of Dilution Water						
1. Continuous Releases	liters	1.08E+11	4.40E+10	2.99E+10	2.65E+10	2.08E+11
2. Batch Releases	liters	7.66E+11	8.83E+11	1.02E+12	9.92E+11	3.66E+12

TABLE 2B

EFFLUENT AND WASTE DISPOSAL ANNUAL REPORT
PERIOD 1/1/10 TO 1/1/11
LIQUID EFFLUENTS - CONTINUOUS MODE

McGuire Nuclear Station Units 1 & 2

REPORT FOR 2010	Unit	QTR 1	QTR 2	QTR 3	QTR 4	YEAR
1. Fission and Activation Products						
** No Nuclide Activities **		.....	.....	.....	.....	.....
2. Tritium						
H-3	Ci	6.03E-01	5.03E-01	2.80E-01	1.62E-01	1.55E+00
Totals for Period...	Ci	6.03E-01	5.03E-01	2.80E-01	1.62E-01	1.55E+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 1/1/10 TO 1/1/11
LIQUID EFFLUENTS - BATCH MODE

McGuire Nuclear Station Units 1 & 2

REPORT FOR 2010	Unit	QTR 1	QTR 2	QTR 3	QTR 4	YEAR
1. Fission and Activation Products						
AG-108M	Ci	1.29E-05	4.43E-05	0.00E+00	4.49E-06	6.17E-05
AG-110M	Ci	1.29E-04	5.38E-05	0.00E+00	0.00E+00	1.82E-04
BE-7	Ci	2.97E-05	4.07E-04	0.00E+00	3.83E-04	8.20E-04
CO-57	Ci	4.00E-05	5.00E-05	3.93E-05	3.56E-05	1.65E-04
CO-58	Ci	6.82E-03	8.32E-03	4.36E-03	1.16E-03	2.07E-02
CO-60	Ci	4.00E-03	2.34E-03	1.34E-03	1.29E-03	8.96E-03
CR-51	Ci	1.57E-03	4.11E-03	0.00E+00	0.00E+00	5.68E-03
CS-134	Ci	6.44E-06	1.40E-04	1.83E-04	7.33E-05	4.02E-04
CS-137	Ci	2.14E-04	1.07E-03	1.37E-03	6.14E-04	3.27E-03
FE-59	Ci	2.05E-04	2.57E-04	0.00E+00	0.00E+00	4.61E-04
K-40	Ci	6.71E-06	2.37E-05	0.00E+00	0.00E+00	3.04E-05
MN-54	Ci	4.82E-04	1.72E-04	2.49E-06	1.12E-04	7.68E-04
NB-95	Ci	3.30E-04	1.46E-04	0.00E+00	0.00E+00	4.76E-04
NB-97	Ci	1.18E-05	2.02E-05	0.00E+00	0.00E+00	3.20E-05
SB-122	Ci	4.72E-06	0.00E+00	0.00E+00	0.00E+00	4.72E-06
SB-124	Ci	1.39E-04	3.03E-04	0.00E+00	2.75E-05	4.70E-04
SB-125	Ci	5.10E-04	8.92E-04	1.48E-04	4.21E-04	1.97E-03
SN-113	Ci	1.33E-05	2.21E-05	0.00E+00	0.00E+00	3.54E-05
SR-92	Ci	1.84E-06	1.46E-06	0.00E+00	0.00E+00	3.30E-06
ZN-65	Ci	1.26E-04	3.09E-05	1.62E-06	3.04E-05	1.89E-04
ZR-95	Ci	1.22E-04	5.30E-05	0.00E+00	0.00E+00	1.75E-04
Totals for Period...	Ci	1.48E-02	1.85E-02	7.43E-03	4.14E-03	4.48E-02
2. Tritium						
H-3	Ci	5.67E+02	1.28E+02	3.36E+02	1.76E+02	1.21E+03
Totals for Period...	Ci	5.67E+02	1.28E+02	3.36E+02	1.76E+02	1.21E+03
3. Dissolved and Entrained Gases						
XE-133	Ci	0.00E+00	1.43E-05	0.00E+00	0.00E+00	1.43E-05
Totals for Period...	Ci	0.00E+00	1.43E-05	0.00E+00	0.00E+00	1.43E-05
4. Gross Alpha Radioactivity						
** No Nuclide Activities **		.....	.....	.....	.....	.....

Attachment 2

Supplemental Information

McGUIRE NUCLEAR STATION

SUPPLEMENTAL INFORMATION

(January 1, 2010 through December 31, 2010)

This attachment includes:

(1) Carbon-14 Supplemental Information
(2) Regulatory Guide 1.21, Revision 1, Supplemental Information
(3) Overall Error Estimate for Liquid and Gaseous Effluent Release Data

McGuire 2010 ARERR - Carbon-14 Supplemental Information

Carbon-14 (C-14), with a half-life of 5730 years, is a naturally occurring isotope of carbon produced by cosmic ray interactions in the atmosphere. Nuclear weapons testing in the 1950s and 1960s significantly increased the amount of C-14 in the atmosphere. C-14 is also produced in commercial nuclear reactors, but the amounts produced are much less than those produced naturally or from weapons testing.

In Regulatory Guide 1.21, Revision 2, "Measuring, Evaluating, and Reporting Radioactive Material in Liquid and Gaseous Effluents and Solid Waste", the NRC has recommended that U.S. nuclear power plants evaluate whether C-14 is a "principal radionuclide", and if so, report the amount of C-14 released. At McGuire, improvements over the years in effluent management practices and fuel performance have resulted in a decrease in gaseous radionuclide (non-C-14) concentrations, and a change in the distribution of gaseous radionuclides released to the environment. As a result, C-14 has become a "principal radionuclide" for the gaseous effluent pathway at McGuire, as defined in Regulatory Guide 1.21, Rev. 2. McGuire's 2010 Annual Radioactive Effluent Release Report (ARERR) contains estimates of C-14 radioactivity released in 2010, and estimates of public dose resulting from the C-14 effluent.

Because the dose contribution of C-14 from liquid radioactive waste is much less than that contributed by gaseous radioactive waste, evaluation of C-14 in liquid radioactive waste at McGuire is not required (Ref. Reg. Guide 1.21, Rev. 2). The quantity of gaseous C-14 released to the environment can be estimated by use of a C-14 source term scaling factor based on power generation (Ref. Reg. Guide 1.21, Rev. 2). Many documents provide information related to the magnitude of C-14 in typical effluents from commercial nuclear power plants. Those documents suggest that nominal annual releases of C-14 in gaseous effluents are approximately 5 to 7.3 curies from PWRs (Ref. Reg. Guide 1.21, Rev. 2). A more recent study recommends a higher C-14 gaseous source term scaling factor of approximately 9.0 to 9.8 Ci/GWe-yr for a PWR (Westinghouse) (Ref. EPRI 1021106). For the 2010 McGuire ARERR a source term scaling factor of 9.4 Ci/GWe-yr is assumed. Using a source term scaling factor of 9.4 Ci/GWe-yr and actual electric generation (MWe-hrs) from McGuire in 2010 results in a site total C-14 gaseous release estimate to the environment of ~20 Curies. 70% of the C-14 gaseous effluent is assumed to be from batch releases (e.g. WGDTs), and 30% of C-14 gaseous effluent is assumed to be from continuous releases through the unit vents (ref. IAEA Technical Reports Series no. 421, "Management of Waste Containing Tritium and Carbon-14", 2004).

C-14 releases in PWRs occur primarily as a mix of organic carbon and carbon dioxide released from the waste gas system. Since the PWR operates with a reducing chemistry, most, if not all, of the C-14 species initially produced are organic (e.g., methane). As a general rule, C-14 in the primary coolant is essentially all organic with a large fraction as a gaseous species. Any time the RCS liquid or gas is exposed to an oxidizing environment (e.g. during shutdown or refueling), a slow transformation from an organic to an inorganic chemical form can occur. Various studies documenting measured C-14 releases from PWRs suggest a range of 70% to 95% organic with an average of 80% organic with the remainder being CO_2 (Ref. EPRI TR-105715). For the McGuire 2010 ARERR a value of 80% organic C-14 is assumed.

Public dose estimates from airborne C-14 are performed using dose models in NUREG-0133 and Regulatory Guide 1.109. The dose models and assumptions used are documented in the 2011 McGuire ODCM. The estimated C-14 dose impact on the maximum organ dose from airborne effluents released at McGuire in 2010 is well below the 10CFR50, Appendix I, ALARA design objective (i.e., 15 mrem/yr per unit).

McGUIRE NUCLEAR STATION

2010 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. 2.21E+02 = TOTAL NUMBER OF BATCH RELEASES
2. 1.54E+04 = TOTAL TIME (MIN.) FOR BATCH RELEASES.
3. 1.79E+02 = MAXIMUM TIME (MIN.) FOR A BATCH RELEASE.
4. 6.99E+01 = AVERAGE TIME (MIN.) FOR A BATCH RELEASE.
5. 1.00E+00 = MINIMUM TIME (MIN.) FOR A BATCH RELEASE.
6. 1.84E+06 = AVERAGE DILUTION WATER FLOW DURING RELEASES (GPM).

B. GASEOUS EFFLUENT
1. 3.50E+01 = TOTAL NUMBER OF BATCH RELEASES.
2. 1.05E+06 = TOTAL TIME (MIN.) FOR BATCH RELEASES.
3. 4.51E+04 = MAXIMUM TIME (MIN.) FOR A BATCH RELEASE.
4. 3.00E+04 = AVERAGE TIME (MIN.) FOR A BATCH RELEASE.
5. 9.00E+00 = MINIMUM TIME (MIN.) FOR A BATCH RELEASE.

VI. ABNORMAL RELEASES

(See "Unplanned Releases" Attachment)

McGUIRE NUCLEAR STATION

Overall Estimate of Error for Effluent Radioactivity Release Reported

The estimated percentage of overall error for both Liquid and Gaseous effluent release data at McGuire Nuclear Station has been determined to be ± 30.3%. 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 Statistical Error = ± 20%

(3) Calibration Error = ± 10%

(4) Calibration Source Error = ± 2.5%

(5) Sample Preparation Error = ± 3%

Attachment 3

Solid Waste Disposal Report

REPORT PERIOD
JANUARY - DECEMBER 2010

McGUIRE NUCLEAR STATION
SOLID RADIOACTIVE WASTE SHIPPED TO DISPOSAL FACILITIES

TYPES OF WASTES SHIPPED Waste from Liquid Systems	Number of Shipments	Number of Containers	Container Type	Disposal Volume ft^3	Disposal Volume m^3	Waste Class	Total Curies
(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	1	1	DBP	158.68	4.49	A/U	1.72E+01
(F) dewatered primary bead resin	none						
(G) dewatered mechanical filter media	none						
(H) dewatered mechanical filter media (brokered)	1	1	DBP	72.8	2.06	A/U	3.98E-01
(I) solidified waste	none						
Dry Solid Waste							
(A) dry active waste (compacted)	none						
dry active waste (non-compacted)	1	N/A	N/A	43,794	1240.11	N/A	3.24E-03
dry active waste (brokered/compacted)	none						
dry active waste (brokered/non-compacted)	16	44	DBP	3428.3428	97.02	A/U	9.212E-01
(B) sealed sources/smoke detectors	none						
(C) sealed sources	none						
(D) irradiated components	none						
Totals	**19**	**46**		**47453.8228**	**1343.68**		**1.852E+01**

2/22/2011

MCGUIRE NUCLEAR SITE
SUMMARY OF MAJOR RADIONUCLIDE COMPOSITION
2010

Type of waste	Nuclide	% Abundance

1. Waste from liquid systems:

A. Dewatered Powdex Resin (brokered) — No shipments in 2010

B. Dewatered Powdex Resin — No shipments in 2010

C. Dewatered Bead Resin (brokered) — No shipments in 2010

D. Dewatered Bead Resin — No shipments in 2010

E. Dewatered Radwaste System Resin (brokered)

2010- 0018A	Nuclide	%Abundance
	Mn-54	**.43**
	Co-57	**.01**
	Co-58	**.01**
	Co-60	**35.82**
	Cs-137	**.80**
	Cs-134	**.12**
	Fe-55	**36.40**
	Ni-63	**24.34**
	Ni-59	**.06**
	C-14	**.34**
	H-3	**.04**
	Sb-125	**1.28**
	Ag-108m	**.13**
	Ce-144	**.03**
	Sr-90	**.02**
	Tc-99	**.18**

F. Dewatered Primary Bead Resin (brokered) — No Shipments in 2010

G. Dewatered Mechanical Filter Media — No shipments in 2010

H. Dewatered Mechanical Filter Media (brokered)

2010- 0026	Nuclide	%Abundance
	Mn-54	**2.24**
	Co-57	**.10**
	Co-58	**.01**
	Co-60	**29.12**
	Cs-137	**1.99**
	Cs-134	**.34**
	Fe-55	**45.44**
	Ni-63	**18.58**
	C-14	**.80**
	Sb-125	**.61**
	Ce-144	**.04**
	Zn-65	**.09**
	Tc-99	**.63**

I. Solidified Waste — No shipments in 2010

2. Dry Solid Waste:

A. Dry Active Waste (compacted) — Compaction no longer performed on-site.

Dry Active Waste (non-compacted)

Landfill 10-01	Nuclide	%Abundance
	Co-60	**11.55**
	Cs-137	**7.25**
	H-3	**81.20**

Dry Active Waste (brokered/compacted) — No shipments in 2010

Dry Active Waste (brokered/non-compacted)

2010- 0001	Nuclide	%Abundance
	Cr-51	22.93
	Mn-54	1.46
	Co-57	.12
	Co-58	41.24
	Co-60	5.73
	Cs-137	.43
	Fe-55	10.23
	Fe-59	.99
	Ni-63	3.88
	H-3	2.35
	C-14	.28
	Zr-95	3.69
	Ce-144	.08
	Sn-113	.15
	Zn-65	.22
	Nb-95	6.27

2010- 0002	Nuclide	%Abundance
	Cr-51	23.85
	Mn-54	1.42
	Co-57	.11
	Co-58	41.00
	Co-60	5.55
	Cs-137	.41
	Fe-55	9.87
	Fe-59	1.00
	Ni-63	3.70
	H-3	2.26
	C-14	.27
	Zr-95	3.68
	Ce-144	.08
	Sn-113	.15
	Zn-65	.21
	Nb-95	6.42

2010- 0003	Nuclide	%Abundance
	Cr-51	23.82
	Mn-54	1.42
	Co-57	.11
	Co-58	41.03
	Co-60	5.55
	Cs-137	.41
	Fe-55	9.88
	Fe-59	1.00
	Ni-63	3.70
	H-3	2.27
	C-14	.27
	Zr-95	3.67
	Ce-144	.08
	Sn-113	.15
	Zn-65	.21
	Nb-95	6.42

2010- 0004	Nuclide	%Abundance
	Cr-51	23.54
	Mn-54	1.43
	Co-57	.12
	Co-58	41.10
	Co-60	5.61
	Cs-137	.42
	Fe-55	10.00
	Fe-59	1.00
	Ni-63	3.75
	H-3	2.28
	C-14	.27
	Zr-95	3.68
	Ce-144	.08
	Sn-113	.15
	Zn-65	.21
	Nb-95	6.37

2010- 0005	Nuclide	%Abundance
	Cr-51	25.64
	Mn-54	2.38
	Co-57	.10
	Co-58	21.12
	Co-60	7.97
	Cs-137	.02
	Fe-55	26.94
	Fe-59	1.82
	Ni-63	1.63
	H-3	.71
	Zr-95	4.40
	Ce-144	.06
	Sb-124	.10
	Sb-125	.30
	Ru-103	.03
	Sn-113	.22
	Zn-65	.57
	Hf-181	.04
	Nb-95	5.97

2010- 0006	Nuclide	%Abundance
	Cr-51	34.50
	Mn-54	1.91
	Co-57	.08
	Co-58	20.14
	Co-60	6.12
	Cs-137	.01
	Fe-55	20.89
	Fe-59	1.98
	Ni-63	1.24
	H-3	.54
	Zr-95	4.32
	Ce-144	.05
	Sb-124	.10
	Sb-125	.23
	Ru-103	.03
	Sn-113	.19
	Zn-65	.46
	Hf-181	.04
	Nb-95	7.15

2010- 0007

Nuclide	%Abundance
Cr-51	30.91
Mn-54	2.09
Co-57	.09
Co-58	20.65
Co-60	6.81
Cs-137	.02
Fe-55	23.24
Fe-59	1.93
Ni-63	1.38
H-3	.61
Zr-95	4.38
Ce-144	.05
Sb-124	.10
Sb-125	.26
Ru-103	.03
Sn-113	.20
Zn-65	.51
Hf-181	.04
Nb-95	6.70

2010- 0008

Nuclide	%Abundance
Cr-51	31.12
Mn-54	2.08
Co-57	.08
Co-58	20.63
Co-60	6.79
Cs-137	.02
Fe-55	23.05
Fe-59	1.93
Ni-63	1.38
H-3	.60
Zr-95	4.38
Ce-144	.05
Sb-124	.10
Sb-125	.26
Ru-103	.03
Sn-113	.20
Zn-65	.50
Hf-181	.04
Nb-95	6.73

2010- 0010

Nuclide	%Abundance
Cr-51	34.11
Mn-54	1.93
Co-57	.08
Co-58	20.20
Co-60	6.20
Cs-137	.01
Fe-55	21.15
Fe-59	1.97
Ni-63	1.26
H-3	.55
Zr-95	4.33
Ce-144	.05
Sb-124	.10
Sb-125	.24
Ru-103	.03
Sn-113	.19
Zn-65	.47
Hf-181	.04
Nb-95	7.08

2010- 0011

Nuclide	%Abundance
Cr-51	30.76
Mn-54	2.10
Co-57	.09
Co-58	20.68
Co-60	6.84
Cs-137	.02
Fe-55	23.33
Fe-59	1.92
Ni-63	1.40
H-3	.61
Zr-95	4.39
Ce-144	.05
Sb-124	.10
Sb-125	.26
Ru-103	.03
Sn-113	.20
Zn-65	.51
Hf-181	.04
Nb-95	6.68

2010- 0012

Nuclide	%Abundance
Cr-51	32.83
Mn-54	2.00
Co-57	.08
Co-58	20.42
Co-60	6.44
Cs-137	.02
Fe-55	21.93
Fe-59	1.96
Ni-63	1.31
H-3	.57
Zr-95	4.35
Ce-144	.05
Sb-124	.10
Sb-125	.25
Ru-103	.03
Sn-113	.20
Zn-65	.48
Hf-181	.04
Nb-95	6.94

2010- 0013

Nuclide	%Abundance
Cr-51	32.45
Mn-54	2.01
Co-57	.08
Co-58	20.49
Co-60	6.52
Cs-137	.02
Fe-55	22.17
Fe-59	1.95
Ni-63	1.33
H-3	.58
Zr-95	4.35
Ce-144	.05
Sb-124	.10
Sb-125	.25
Ru-103	.03
Sn-113	.20
Zn-65	.49
Hf-181	.04
Nb-95	6.90

2010- 0015

Nuclide	%Abundance
Cr-51	32.12
Mn-54	2.03
Co-57	.08
Co-58	20.52
Co-60	6.57
Cs-137	.02
Fe-55	22.40
Fe-59	1.95
Ni-63	1.34
H-3	.58
Zr-95	4.37
Ce-144	.05
Sb-124	.10
Sb-125	.25
Ru-103	.03
Sn-113	.20
Zn-65	.49
Hf-181	.04
Nb-95	6.85

2010- 0016

Nuclide	%Abundance
Cr-51	20.97
Mn-54	2.64
Co-57	.11
Co-58	21.19
Co-60	9.06
Cs-137	.02
Fe-55	30.61
Fe-59	1.69
Ni-63	1.87
H-3	.81
Zr-95	4.36
Ce-144	.06
Sb-124	.10
Sb-125	.34
Ru-103	.03
Sn-113	.23
Zn-65	.63
Hf-181	.04
Nb-95	5.24

2010- 0019

Nuclide	%Abundance
Cr-51	33.74
Mn-54	1.95
Co-57	.08
Co-58	20.28
Co-60	6.27
Cs-137	.02
Fe-55	21.36
Fe-59	1.97
Ni-63	1.27
H-3	.55
Zr-95	4.34
Ce-144	.05
Sb-124	.10
Sb-125	.24
Ru-103	.03
Sn-113	.19
Zn-65	.47
Hf-181	.04
Nb-95	7.05

2010- 0027

Nuclide	%Abundance
Cr-51	10.11
Mn-54	3.33
Co-57	.13
Co-58	19.40
Co-60	12.37
Cs-137	.03
Fe-55	41.05
Fe-59	1.21
Ni-63	2.59
H-3	1.11
Zr-95	3.83
Sn-113	.25
Ce-144	.08
Zn-65	.77
Sb-124	.09
Sb-125	.46
Ru-103	.02
Hf-181	.03
Nb-95	3.15

B. Sealed Sources — No shipments in 2010

C. Sealed Sources/Smoke Detectors — No shipments in 2010

D. Irradiated Components — No shipments in 2010

Attachment 4

Meteorological Data

McGUIRE NUCLEAR STATION

2010 METEOROLOGICAL JOINT FREQUENCY DISTRIBUTIONS

OF WIND SPEED, WIND DIRECTION, AND ATMOSPHERIC STABILITY

USING WINDS AT THE 10 METER LEVEL

(Hours of Occurrence)

The FREQ Procedure

Table of STAB by CALM

STAB	CALM		
Frequency	CALM	WIND	Total
1	0	53	53
2	0	214	215
3	0	606	606
4	0	5133	5133
5	0	1617	1617
6	0	560	560
7	2	435	437
Total	2	8618	8620

Frequency Missing = 140

The MEANS Procedure

Analysis Variable : WS

Maximum

13.3664960

		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(m/s)																
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	0	0	0	0	0	0	0
	1.00-1.25	3	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	1.25-1.50	1	1	0	0	0	0	0	0	0	0	0	0	0	0	1	0
	1.50-2.00	0	0	1	0	0	1	0	0	0	0	2	0	0	0	0	0
	2.00-3.00	0	0	0	2	1	0	0	2	0	0	1	0	0	0	0	0
	3.00-4.00	1	0	1	0	3	0	0	0	0	4	3	0	0	0	0	0
	4.00-5.00	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0
	5.00-6.00	0	0	0	0	0	0	0	0	0	1	3	2	0	0	0	1
	6.00-8.00	0	0	0	0	0	0	0	0	0	0	1	2	0	0	0	0
	8.00-10.00	2	1	0	0	0	0	0	0	0	0	0	0	0	0	4	0
	10.01-Max	2	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1
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	0	0	0	0	0	0	0	0	0	0	0	0	0
	1.25-1.50	1	1	0	0	0	0	0	0	1	0	0	0	0	0	0	1
	1.50-2.00	1	0	2	1	0	1	1	0	0	2	0	4	3	1	3	0

	2.00-3.00	1	1	6	9	3	0	1	1	3	7	5	4	2	1	0	0
	3.00-4.00	2	0	2	1	0	2	0	0	1	3	14	3	1	0	0	1
	4.00-5.00	0	1	2	1	1	0	0	1	0	2	19	9	0	0	0	0
	5.00-6.00	0	0	0	0	0	0	0	0	0	0	10	4	1	0	0	0
	6.00-8.00	5	1	0	0	0	0	0	0	0	0	8	2	0	2	8	10
	8.00-10.00	12	2	0	0	0	0	0	0	0	0	0	0	0	2	4	7
	10.01-Max	0	0	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	1	0	0	0	0	0	0	0
	1.25-1.50	0	4	1	1	0	0	0	0	0	0	1	0	0	0	1	2
	1.50-2.00	3	7	8	4	0	3	1	0	2	1	3	4	9	1	4	2
	2.00-3.00	8	12	17	16	12	4	3	4	7	14	21	22	5	7	2	1
	3.00-4.00	3	6	11	18	3	2	3	2	2	11	28	20	11	4	2	2
	4.00-5.00	5	3	3	3	1	0	0	0	0	1	18	13	7	1	2	3
	5.00-6.00	10	2	3	0	0	0	0	0	0	0	12	4	3	9	14	13
	6.00-8.00	28	8	6	0	0	0	0	0	0	0	4	1	3	5	24	31
	8.00-10.00	4	0	0	0	0	0	0	0	0	0	0	2	0	0	3	2
	10.01-Max	3	0	0	0	0	0	0	0	0	0	0	0	0	0	6	0
D	0.46-0.75	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0
	0.75-1.00	2	3	3	1	2	1	3	0	0	3	0	1	3	4	4	2
	1.00-1.25	9	7	1	1	2	3	1	6	5	4	6	6	10	7	7	9
	1.25-1.50	30	25	19	10	10	6	11	12	13	5	10	18	12	16	11	11
	1.50-2.00	73	74	68	25	28	20	32	49	40	35	34	43	33	26	27	29
	2.00-3.00	133	143	203	118	88	62	76	35	73	90	183	105	64	42	50	54
	3.00-4.00	73	110	215	125	72	32	33	10	20	69	183	75	65	50	72	54
	4.00-5.00	42	73	124	49	9	1	2	3	7	44	65	19	32	49	93	89
	5.00-6.00	59	49	39	11	1	0	0	6	9	9	40	16	11	12	56	76
	6.00-8.00	44	36	11	0	1	0	0	2	2	2	5	18	15	15	36	57
	8.00-10.00	7	5	0	0	0	0	0	0	0	0	0	3	0	1	7	9
	10.01-Max	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
E	0.46-0.75	0	0	0	0	0	0	2	0	2	1	1	0	0	0	0	0
	0.75-1.00	1	2	2	2	0	3	1	3	6	4	7	7	4	5	1	1
	1.00-1.25	3	0	3	1	2	3	9	2	13	18	8	8	11	4	1	1
	1.25-1.50	10	6	3	4	6	11	10	10	21	15	11	19	10	8	7	5
	1.50-2.00	20	13	11	8	11	13	13	34	44	42	43	45	26	15	18	9
	2.00-3.00	18	15	15	17	19	14	48	24	78	115	132	64	39	24	26	15
	3.00-4.00	3	8	17	3	8	4	8	5	5	15	35	11	17	10	26	12
	4.00-5.00	5	5	11	0	2	0	0	1	0	3	16	3	1	9	4	8
	5.00-6.00	0	1	6	0	0	0	0	2	1	0	9	0	0	0	5	4
	6.00-8.00	2	1	0	0	0	0	0	0	3	0	1	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-Max	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
F	0.46-0.75	1	0	0	0	0	0	1	1	2	3	3	0	0	1	2	0
	0.75-1.00	1	0	1	1	0	1	2	4	7	14	13	11	8	2	1	1
	1.00-1.25	2	0	3	0	0	1	4	0	12	25	20	8	7	4	2	0
	1.25-1.50	1	2	2	1	0	0	1	7	16	27	15	17	11	6	2	1
	1.50-2.00	0	1	4	0	1	0	4	4	34	36	24	11	9	8	4	3
	2.00-3.00	0	1	0	0	0	0	2	3	33	24	26	12	6	6	4	1
	3.00-4.00	0	1	0	0	1	0	0	0	0	2	0	1	2	4	1	0
	4.00-5.00	0	0	0	0	0	0	0	0	0	0	0	0	1	4	0	1
	5.00-6.00	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
	6.00-8.00	0	0	1	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-Max	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
G	0.46-0.75	0	0	0	0	0	0	0	4	4	14	13	3	5	3	3	2
	0.75-1.00	2	2	0	0	0	0	1	0	14	45	36	16	8	5	4	0
	1.00-1.25	1	0	0	0	0	0	0	1	6	32	36	16	4	2	2	2
	1.25-1.50	0	0	0	0	0	0	0	1	2	20	12	12	5	2	1	0
	1.50-2.00	0	0	0	0	0	0	0	2	10	18	19	8	2	1	1	0
	2.00-3.00	0	0	0	0	0	0	0	1	4	4	15	5	3	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-Max	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Attachment 5

Unplanned Offsite Releases

Memorandum To: 2010 Annual Radioactive Effluent Release Report

cc: Steve Mooneyhan, Joyce Correll, Caryl Ingram, Duncan Brewer, Ken Ashe, Kay Crane

From: Harry Sloan RP General Supervisor

Reference: Unplanned Gaseous Release PIP M-10-3672

Event Summary

On 5/17/10 at about 17:15 the Auxiliary Building Ventilation EMF41 Trip 2 alarm occurred at Point #11 reaching about 420 cpm above background and the Unit 2 Vent EMF36L increased about 30 cpm above background. Upon investigation the NB evaporator was being started when the alarm came in and was secured at Operations request. A valve (1NB-158) was found to be not fully closed by Radwaste. When the valve was closed, the EMFs began to return to normal values. Radwaste reported that 10 psig (408 cu. ft.) was lost from WGDT 'F'. Trending of 2EMF36L data showed an increase for about 30 minutes then a return to normal background after another 30 minutes.

Using HP/0/B/1003/008 2EMF36L 30 cpm increase represents only 0.3% of the SLC Limit of 500 mr/yr total body ; therefore, there is no reporting criteria. This was communicated to Operations at 18:45.

A sample from WGDT 'F' was used to evaluate the doserate and dose to the public. Based on the isotopic mix the calculations were 1.57 mrem/yr total body, 2.8 mrem/yr skin, 9.55E-5 mrad gamma air, and 9.08E-5 mrad beta air.

Gaseous Waste Release number 2010-032 was generated to account for the activity released.

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 the limits by Selected Licensee Commitments and the Code of Federal Regulations.

H J Sloan 5/25/10

Harry Sloan CHP

RP General Supervisor

McGuire Nuclear Station

Joyce C. Correll 5/26/10

Joyce Correll

RP Supervising Scientist

McGuire Nuclear Station

Memorandum To: McGuire Nuclear Station 2010 Annual Radioactive Effluent Release Report (August 2, 2010)

cc: Steve Mooneyhan, Joyce Correll, Caryl Ingram, Duncan Brewer, Ken Ashe, Kay Crane

From: William C Spencer RP Staff

Reference: Unplanned Gaseous Release (PIP M-10-4908)

Event Summary:

On 7/26/10 at about 16:24 the Auxiliary Building Ventilation EMF41 Trip 2 alarm occurred at Point #11 reaching about 900 cpm above background and the Unit 2 Vent EMF36L increased about 30 cpm above background. The duration of the release from the Unit 2 Vent is estimated to be 26 minutes based on the response seen on Unit 2 EMF36L.

Immediate investigation discovered that radwaste Chemistry was starting the NB evaporator when EMF 41 point 11 alarm came in and RP was notified by Operations. It is suspected that valve (1NB-158) was not fully closed or that an associated check valve 1NB-159 did not seat properly during alignment of the evaporator. A short time after 1NB-158 valve was checked closed; the affected EMFs began to return to normal values. Radwaste estimates that two (2) psig (81.63 cu. ft.) was lost from in-service WGDT 'B'. Trending of 2EMF36L data showed an increase for about 13 minutes then returned to normal background after another 13 minutes. Total time of release was 26 minutes.

Using HP/0/B/1003/008 2EMF36L 30 cpm increase represents only 0.13% of the SLC Limit of 500 mrem/yr total body; therefore, there are no reporting requirements necessary. This was communicated to Operations at 17:50hrs by RP Staff.

A follow up sample from WGDT 'B' was used to evaluate the doserate and dose to the public. Based on the isotopic mix from the WGDT sample, calculations indicate the following:

- 0.63 mrem/yr total body SLC Limit: 500 mrem/yr
- 1.22 mrem/yr skin SLC Limit: 3000 mrem/yr
- 3.35E-5 mrad gamma air SLC Limit: 40 mrad
- 4.3E-5 mrad beta air. SLC Limit: 20 mrad

Gaseous Waste Release number 2010049 was generated to account for the activity released from the Unit 2 Vent.

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 the limits of Selected Licensee Commitments and the Code of Federal Regulations.

Harry Sloan CHP
RP General Supervisor
McGuire Nuclear Station

William Spencer
RP Staff Scientist
McGuire Nuclear Station

Attachment 6

Assessment of Radiation Dose from Radioactive Effluents to Members of the Public

(Includes fuel cycle dose calculation results)

McGuire Nuclear Station
2010 Radioactive Effluent and ISFSI
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. Included in the gaseous effluent dose calculations is an estimate of the dose contributed by Carbon-14 (Ref. *"Carbon-14 Supplemental Information"*, contained in the ARERR for further information). The combined dose to a maximum exposed individual from McGuire's effluent releases and direct and air-scatter dose from McGuire's ISFSI is below 40CFR190 limits as shown by the following summary:

I. 2010 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 = 4.41E-01 mrem

Maximum Location: 1.5 Mile, Northeast Sector
Critical Age: Child
Gas non-NG Contribution: 67%
Gas NG Contribution: 1%
Liquid Contribution: 32%

Maximum Organ (other than TB) Dose = 9.37E-01 mrem

Maximum Location: 1.5 Mile, Northeast Sector
Critical Age: Child
Critical Organ: Bone
Gas Contribution: 98%
Liquid Contribution: 2%

II. 2010 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 seven pages are excerpted 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

Historical TLD Monitoring

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"

McGUIRE NUCLEAR STATION

ASSESSMENT OF RADIATION DOSE FROM RADIOACTIVE EFFLUENTS AND ALL URANIUM FUEL CYCLE SOURCES TO MEMBERS OF THE PUBLIC

(January 1, 2010 through December 31, 2010)

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 and for the calendar year of this report. 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". Included in the gaseous effluent dose calculations is an estimate of the dose contributed by Carbon-14 (Ref. *"Carbon-14 Supplemental Information"*, contained in the ARERR for further information). The "Fuel Cycle Calculation" 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 40CFR190. Methods for calculating the dose contribution from liquid and gaseous effluents are given in the ODCM.

EFFLUENT AND WASTE DISPOSAL ANNUAL REPORT
PERIOD 1/1/10 TO 1/1/11
GASEOUS ANNUAL DOSE SUMMARY REPORT

McGuire Nuclear Station Units 1 & 2

1st Quarter 2010

=== IODINE, H3, AND PARTICULATE DOSE LIMIT ANALYSIS======== Quarter 1 2010 ====

Period-Limit	Critical Group	Critical Organ	Dose (mrem)	Limit (mrem)	Max % of Limit
Q1 - Maximum Organ Dose	CHILD	BONE	2.17E-01	1.50E+01	1.45E+00

Maximum Organ Dose Receptor Location: 1.5 Mile NE
Critical Pathway: Vegetation

Major Isotopic Contributors (5% or greater to total)

Nuclide	Percentage
C-14	1.00E+02

=== NOBLE GAS DOSE LIMIT ANALYSIS========== Quarter 1 2010 ====

Period-Limit	Dose (mrad)	Limit (mrad)	% of Limit
Q1 - Maximum Gamma Air Dose	1.24E-02	1.00E+01	1.24E-01

Maximum Gamma Air Dose Receptor Location: 0.5 Mile NNE

Major Isotopic Contributors (5% or greater to total)

Nuclide	Percentage
AR-41	9.96E+01

Q1 - Maximum Beta Air Dose	4.50E-03	2.00E+01	2.25E-02

Maximum Beta Air Dose Receptor Location: 0.5 Mile NNE

Major Isotopic Contributors (5% or greater to total)

Nuclide	Percentage
AR-41	9.69E+01

EFFLUENT AND WASTE DISPOSAL ANNUAL REPORT
PERIOD 1/1/10 TO 1/1/11
GASEOUS ANNUAL DOSE SUMMARY REPORT

McGuire Nuclear Station Units 1 & 2

2nd Quarter 2010

=== IODINE, H3, AND PARTICULATE DOSE LIMIT ANALYSIS======= Quarter 2 2010 ====

Period-Limit	Critical Group	Critical Organ	Dose (mrem)	Limit (mrem)	Max % of Limit
Q2 - Maximum Organ Dose	CHILD	BONE	2.09E-01	1.50E+01	1.40E+00

Maximum Organ Dose Receptor Location: 1.5 Mile NE
Critical Pathway: Vegetation

Major Isotopic Contributors (5% or greater to total)

Nuclide	Percentage
C-14	1.00E+02

=== NOBLE GAS DOSE LIMIT ANALYSIS========== Quarter 2 2010 ====

Period-Limit	Dose (mrad)	Limit (mrad)	% of Limit
Q2 - Maximum Gamma Air Dose	1.03E-02	1.00E+01	1.03E-01

Maximum Gamma Air Dose Receptor Location: 0.5 Mile NNE

Major Isotopic Contributors (5% or greater to total)

Nuclide	Percentage
AR-41	9.93E+01

Q2 - Maximum Beta Air Dose	3.74E-03	2.00E+01	1.87E-02

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 1/1/10 TO 1/1/11
GASEOUS ANNUAL DOSE SUMMARY REPORT

McGuire Nuclear Station Units 1 & 2

3rd Quarter 2010

=== IODINE, H3, AND PARTICULATE DOSE LIMIT ANALYSIS======= Quarter 3 2010 ====

Period-Limit	Critical Group	Critical Organ	Dose (mrem)	Limit (mrem)	Max % of Limit
Q3 - Maximum Organ Dose	CHILD	BONE	2.43E-01	1.50E+01	1.62E+00

Maximum Organ Dose Receptor Location: 1.5 Mile NE
Critical Pathway: Vegetation

Major Isotopic Contributors (5% or greater to total)

Nuclide	Percentage
C-14	1.00E+02

=== NOBLE GAS DOSE LIMIT ANALYSIS========== Quarter 3 2010 ====

Period-Limit	Dose (mrad)	Limit (mrad)	% of Limit
Q3 - Maximum Gamma Air Dose	1.21E-02	1.00E+01	1.21E-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

Q3 - Maximum Beta Air Dose	4.34E-03	2.00E+01	2.17E-02

Maximum Beta Air Dose Receptor Location: 0.5 Mile NNE

Major Isotopic Contributors (5% or greater to total)

Nuclide	Percentage
AR-41	9.81E+01

EFFLUENT AND WASTE DISPOSAL ANNUAL REPORT
PERIOD 1/1/10 TO 1/1/11
GASEOUS ANNUAL DOSE SUMMARY REPORT

McGuire Nuclear Station Units 1 & 2

4th Quarter 2010

=== IODINE, H3, AND PARTICULATE DOSE LIMIT ANALYSIS======= Quarter 4 2010 ====

Period-Limit	Critical Group	Critical Organ	Dose (mrem)	Limit (mrem)	Max % of Limit
Q4 - Maximum Organ Dose	CHILD	BONE	2.49E-01	1.50E+01	1.66E+00

Maximum Organ Dose Receptor Location: 1.5 Mile NE
Critical Pathway: Vegetation

Major Isotopic Contributors (5% or greater to total)

Nuclide	Percentage
C-14	1.00E+02

=== NOBLE GAS DOSE LIMIT ANALYSIS========== Quarter 4 2010 ====

Period-Limit	Dose (mrad)	Limit (mrad)	% of Limit
Q4 - Maximum Gamma Air Dose	1.33E-02	1.00E+01	1.33E-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

Q4 - Maximum Beta Air Dose	4.75E-03	2.00E+01	2.37E-02

Maximum Beta Air Dose Receptor Location: 0.5 Mile NNE

Major Isotopic Contributors (5% or greater to total)

Nuclide	Percentage
AR-41	9.91E+01

EFFLUENT AND WASTE DISPOSAL ANNUAL REPORT
PERIOD 1/1/10 TO 1/1/11
GASEOUS ANNUAL DOSE SUMMARY REPORT

McGuire Nuclear Station Units 1 & 2

ANNUAL 2010

=== IODINE, H3, AND PARTICULATE DOSE LIMIT ANALYSIS======== Annual 2010 ========

Period-Limit	Critical Group	Critical Organ	Dose (mrem)	Limit (mrem)	Max % of Limit
Yr - Maximum Organ Dose	CHILD	BONE	9.18E-01	3.00E+01	3.06E+00

Maximum Organ Dose Receptor Location: 1.5 Mile NE
Critical Pathway: Vegetation

Major Isotopic Contributors (5% or greater to total)

Nuclide	Percentage
C-14	1.00E+02

=== NOBLE GAS DOSE LIMIT ANALYSIS========== Annual 2010 ========

Period-Limit	Dose (mrad)	Limit (mrad)	% of Limit
Yr - Maximum Gamma Air Dose	4.82E-02	2.00E+01	2.41E-01

Maximum Gamma Air Dose Receptor Location: 0.5 Mile NNE

Major Isotopic Contributors (5% or greater to total)

Nuclide	Percentage
AR-41	9.96E+01

Yr - Maximum Beta Air Dose	1.73E-02	4.00E+01	4.33E-02

Maximum Beta Air Dose Receptor Location: 0.5 Mile NNE

Major Isotopic Contributors (5% or greater to total)

Nuclide	Percentage
AR-41	9.78E+01

EFFLUENT AND WASTE DISPOSAL ANNUAL REPORT
PERIOD 1/1/10 TO 1/1/11
LIQUID ANNUAL DOSE SUMMARY REPORT

McGuire Nuclear Station Units 1 & 2

1st Quarter 2010

=== BATCH LIQUID RELEASES ========== Quarter 1 2010 ======

Period-Limit	Critical Age	Critical Organ	Dose (mrem)	Limit (mrem)	Max % of Limit
Q1 - Maximum Organ Dose	CHILD	GILLI	7.82E-02	1.00E+01	7.82E-01
Q1 - Total Body Dose	CHILD		7.69E-02	3.00E+00	2.56E+00

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

Nuclide	Percentage
H-3	9.78E+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 1 2010 ======

Period-Limit	Critical Age	Critical Organ	Dose (mrem)	Limit (mrem)	Max % of Limit
Q1 - Maximum Organ Dose	CHILD	LIVER	5.76E-04	1.00E+01	5.76E-03
Q1 - Total Body Dose	CHILD		5.76E-04	3.00E+00	1.92E-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 1/1/10 TO 1/1/11
LIQUID ANNUAL DOSE SUMMARY REPORT

McGuire Nuclear Station Units 1 & 2

2nd Quarter 2010

=== BATCH LIQUID RELEASES ========== Quarter 2 2010 ======

Period-Limit	Critical Age	Critical Organ	Dose (mrem)	Limit (mrem)	Max % of Limit
Q2 - Maximum Organ Dose	CHILD	LIVER	2.15E-02	1.00E+01	2.15E-01
Q2 - Total Body Dose	CHILD		1.62E-02	3.00E+00	5.40E-01

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

Nuclide	Percentage
H-3	7.03E+01
CS-137	2.52E+01

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

Nuclide	Percentage
H-3	9.31E+01

=== CONTINUOUS LIQUID RELEASES (WC) ========== Quarter 2 2010 ======

Period-Limit	Critical Age	Critical Organ	Dose (mrem)	Limit (mrem)	Max % of Limit
Q2 - Maximum Organ Dose	CHILD	LIVER	1.19E-03	1.00E+01	1.19E-02
Q2 - Total Body Dose	CHILD		1.19E-03	3.00E+00	3.96E-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 1/1/10 TO 1/1/11
LIQUID ANNUAL DOSE SUMMARY REPORT

McGuire Nuclear Station Units 1 & 2

3rd Quarter 2010

=== BATCH LIQUID RELEASES ========== Quarter 3 2010 ======

Period-Limit	Critical Age	Critical Organ	Dose (mrem)	Limit (mrem)	Max % of Limit
Q3 - Maximum Organ Dose	CHILD	LIVER	4.18E-02	1.00E+01	4.18E-01
Q3 - Total Body Dose	CHILD		3.59E-02	3.00E+00	1.20E+00

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

Nuclide	Percentage
H-3	8.31E+01
CS-137	1.45E+01

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

Nuclide	Percentage
H-3	9.678+01

=== CONTINUOUS LIQUID RELEASES (WC) ========== Quarter 3 2010 ======

Period-Limit	Critical Age	Critical Organ	Dose (mrem)	Limit (mrem)	Max % of Limit
Q3 - Maximum Organ Dose	CHILD	LIVER	9.85E-04	1.00E+01	9.85E-03
Q3 - Total Body Dose	CHILD		9.85E-04	3.00E+00	3.28E-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 1/1/10 TO 1/1/11
LIQUID ANNUAL DOSE SUMMARY REPORT

McGuire Nuclear Station Units 1 & 2

4th Quarter 2010

=== BATCH LIQUID RELEASES ========== Quarter 4 2010 ======

Period-Limit	Critical Age	Critical Organ	Dose (mrem)	Limit (mrem)	Max % of Limit
Q4 - Maximum Organ Dose	CHILD	LIVER	2.20E-02	1.00E+01	2.20E-01
Q4 - Total Body Dose	CHILD		1.93E-02	3.00E+00	6.43E-01

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

Nuclide	Percentage
H-3	8.52E+01
CS-137	1.27E+01

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

Nuclide	Percentage
H-3	9.71E+01

=== CONTINUOUS LIQUID RELEASES (WC) ========== Quarter 4 2010 ======

Period-Limit	Critical Age	Critical Organ	Dose (mrem)	Limit (mrem)	Max % of Limit
Q4 - Maximum Organ Dose	CHILD	LIVER	6.42E-04	1.00E+01	6.42E-03
Q4 - Total Body Dose	CHILD		6.42E-04	3.00E+00	2.14E-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 1/1/10 TO 1/1/11
LIQUID ANNUAL DOSE SUMMARY REPORT

McGuire Nuclear Station Units 1 & 2

ANNUAL 2010

=== BATCH LIQUID RELEASES ========== Annual 2010 ========

Period-Limit	Critical Age	Critical Organ	Dose (mrem)	Limit (mrem)	Max % of Limit
Yr - Maximum Organ Dose	CHILD	LIVER	1.57E-01	2.00E+01	7.83E-01
Yr - Total Body Dose	CHILD		1.41E-01	6.00E+00	2.35E+00

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

Nuclide	Percentage
H-3	8.80E+01
CS-137	1.02E+01

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

Nuclide	Percentage
H-3	9.76E+01

=== CONTINUOUS LIQUID RELEASES (WC) ========== Annual 2010 ========

Period-Limit	Critical Age	Critical Organ	Dose (mrem)	Limit (mrem)	Max % of Limit
Yr - Maximum Organ Dose	CHILD	LIVER	3.10E-03	2.00E+01	1.55E-02
Yr - Total Body Dose	CHILD		3.10E-03	6.00E+00	5.17E-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

Attachment 7

Radioactive Waste Systems

MEMO TO:

Annual Radioactive Effluent Release Report

Reference SLC 16.11.17 element to identify any licensee initiated major changes to Radioactive Waste Systems (liquid, gaseous, and solid) .

No major changes to design or function and no UFSAR updates resulting from major changes to the Radioactive Waste Systems (liquid, gaseous and solid) during the 2010 period.

Attachment 8

Inoperable Monitoring Equipment

Memo to: 2010 Annual Radiological Effluent Release Report

Subject: SLC 16.11.2 Radioactive Liquid Effluent Monitoring Instrumentation, TABLE 16.11.2-1, Item 1.c. Radiation Monitor EMF-44 Containment Ventilation Unit Condensate Line, Item 1.d. Radiation Monitor EMF-44 Minimum Flow Device, Item 3.a. Continuous Composite Sampler Containment Ventilation Unit Condensate Line, and Item 4.b. Containment Ventilation Unit Condensate Line Flow Rate Measurement Device. All of these instruments were considered inoperable due to 1WLLP-5900 flow was inoperable which affected the operability of all instruments.

Topic: The above instrument(s) exceeded the SLC condition E when the channel was NOT restored to OPERABLE status within 30 days. Condition G requires a report in the 2010 Annual Radioactive Effluent Report explaining why the inoperability was not corrected within the specified Completion Time. PIP M-10-4207 was generated to ensure the report is submitted as required per SLC.

Risk Assessment: The Containment Ventilation Unit Condensate Drain Tank (CVUCDT) receives drains from the VL units condensate and normally contain tritium and Cesium-137. Any reactor coolant leakage which becomes airborne will condensate and collect in the CVUCDT. Any suspected reactor coolant leakage is monitored closely. The design of the system is based on a continuous release with automatic pump down; however, the system is normally operated as a batch release since the input rate is very low. Procedurally, samples are obtained prior to release. Inoperable actions are to perform 12 hour grab sampling if in the continuous release mode; however, continuous releases were not required. Prior to release sampling was performed and sufficient radioactive accountability was maintained.

Summary of Cause for exceeding the 30 days requirement. Reference PIP M-10-4207 for more details. Other PIPs generated were M-10-1219, M-10-2498, M-10-3769.

On 5/19/10 a periodic test of the flow loop failed just outside the acceptable tolerance. At this time the loop was placed in TSAILS. A decision was made to clean the flow element which required a scaffold; however, the scaffold was not erected for about two weeks. Once the scaffold was erected additional testing failed. The unit experienced a forced shutdown due to control rod drop which caused resources to be redirected. Once the unit was back on line additional testing found that the flow loop needed a design/equipment modification change. Once this was completed the flow loop testing was satisfactory; however, the 30 day action was exceeded.

PIP M-10-4207 states that the cause was a lack of clear communication between I/O Coordinators, Work Window Managers and information provided in the Site Direction Meeting resulted in no one adequately tracking this event for resolution. Even though the loop was

tracked in the daily status OSM report under the Tech Spec action statements requiring action in less than 30 days, it did not elevate into a concern and remained a "I" priority until day 29. The work order was elevated to an E2 priority per Operations on day 29. This was too late to complete the repairs prior to the 30 day period expiring.

Harry Sloan

RP General Supervisor

McGuire Nuclear Station

3/22/11

Attachment 9

Groundwater Protection Program

Duke Energy implemented a Groundwater Protection Program in 2007. This program was developed 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 monitored sixty ground water wells during 2010.

Wells are sampled quarterly, semi-annually or annually. Ground water samples are regularly analyzed for tritium and gamma emitters, with selected wells being analyzed for difficult to detect radionuclides. No gamma or difficult to detect radionuclides (other than naturally occurring radionuclides) were identified in well samples during 2010. Results from sampling during 2010 confirmed existing knowledge of tritium concentrations in site ground water (shown in the table below).

Results from sampling during 2010 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	629	586 - 690	3
M-20R	South of Hwg. 73	554	507 - 610	3
M-21	South of Hwg. 73	209	194 - 224	3
M-22	South of Hwg. 73	<	<	3
M-22R	South of Hwg. 73	<	<	3
M-23	South of Acs. Rd.	<	<	3
M-30	WWCB	<	<	3
M-30R	WWCB	261	234 - 276	3
M-31	Access road	<	<	3
M-32	Main entrance	<	<	3
M-34R	Access road	<	<	3
M-34DR	Access road	<	<	4
M-35	Access road	<	<	4
M-42	U-2 Rx. Bldg.	1,893	1,830 - 1,960	4
M-48	U-2 SFP	*	*	0
M-48R	U-2 SFP	871	796 - 938	4
M-48DR	U-2 SFP	407	285 - 553	4
M-53	North of plant	1,143	1,040 - 1,220	4
M-55	North Admin. Bldg.	169	< - 169	4
M-59	U-2 Doghouse	1,423	1,280 - 1,550	4
M-60	MOC Parking	<	<	3
M-62	S of RWF	184	169 - 198	4
M-64	Rdwst. Bldg.	645	552 - 783	4
M-66	S of SSF	625	588 - 727	4
M-66R	S of SSF	<	<	4
M-68	U-1 RMWST	942	855 - 1,020	4
M-70	U-1 SFP	488	394 - 607	4
M-70R	U-1 SFP	209	< - 209	4

M-70DR	U-1 SFP	<	<	4
M-72	Rdwst. Trench	833	808 - 853	4
M-76	West of U-1 SFP	315	263 - 396	4
M-82	River	2,100	1,170 - 2,700	4
M-84	River	4,315	2,810 - 5,730	4
M-84R	River	7,638	7,510 - 7,710	4
M-85	River	1,548	1,320 - 1,700	4
M-87	Landfarm	402	205 - 495	4
M-89	Landfarm	887	553 - 1,040	4
M-90	Landfarm	380	380	1
M-91	East of WC	290	< - 334	4
M-91R	East of WC	326	< - 357	4
M-92	N of WC Ponds	378	< - 464	4
M-92R	N of WC Ponds	<	<	3
M-93	North of IHUP	477	404-539	3
M-93R	North of IHUP	211	< - 211	3
M-94	SE of IHUP	<	<	3
M-95	Lower Parking	<	<	3
M-95R	Lower Parking	<	<	3
M-96	West Parking	<	<	3
M-96R	West Parking	<	<	3
M-97	East Parking	241	175 - 323	3
M-98	S of Admin. Bldg.	<	<	3
M-98R	S of Admin. Bldg.	<	<	3
M-100R	SE of WC	293	252 - 348	4
M-101	SE of WC	304	242 - 355	4
M-102	SW of WC	7,885	7,580 - 8,220	4
M-103	South of WC	2,318	1,900 - 2,660	4
M-103R	South of WC	2,825	2,500 - 3 190	4
M-104R	West of WC	8,211	7,650 - 9,062	4
M-104DR	West of WC	4,963	4,590 - 5,450	4
M-105	Landfarm	352	352	1
MW-1	Landfill #1	<	<	2
MW-1D	Landfill #1	<	<	2
MW-2A	Landfill #1	<	<	2
MW-2D	Landfill #1	<	<	2
MW-3	Landfill #1	<	<	2
MW-3D	Landfill #1	<	<	2
MW-4	Landfill #1	<	<	2
MW-4D	Landfill #1	<	<	2
MW-11	Landfill #1	<	<	2
MW-11D	Landfill #1	<	<	2
MW-12	Landfill #1	<	<	2
MW-12D	Landfill #1	<	<	2
MW-5	Landfill #2	<	<	2

MW-5A	Landfill #2	<	<	2
MW-6	Landfill #2	<	<	2
MW-6A	Landfill #2	411	< - 411	2
MW-7	Landfill #2	296	< - 295	2
MW-7A	Landfill #2	<	<	2
MW-8	Landfill #2	<	<	2
MW-8A	Landfill #2	<	<	2
MW-9	Landfill #2	<	<	2
MW-9A	Landfill #2	<	<	2
MW-10A	Landfill #2	<	<	2

*Insufficient volume in well to sample.

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.