ENCLOSURE 3

TENNESSEE VALLEY AUTHORITY
BROWNS FERRY NUCLEAR PLANT (BFN)
UNITS 1, 2, AND 3

EFFLUENT AND WASTE DISPOSAL ANNUAL REPORT
2005

EFFLUENT AND WASTE DISPOSAL ANNUAL REPORT
YEAR 2005

I. Regulatory and BFN ODCM Limits

A. Fission and Activation Gases in Gaseous Effluent:

The release of fission and activation gases is regulated by the dose limits of 10 CFR 50 Appendix I and BFN Offsite Dose Calculation Manual (ODCM). The air dose to areas at and beyond the site boundary due to noble gases released in gaseous effluents per unit, shall be limited during any calendar quarter to $\leq$ 5 millirad (mrad) for gamma radiation and $\leq$ 10 mrad for beta radiation; and during any calendar year to $\leq$ 10 mrad for gamma radiation and $\leq$ 20 mrad for beta radiation.

B. Iodines and Particulates with Half-Lives Greater than Eight Days in Gaseous Effluents.

The release of iodines and particulates in gaseous effluent is regulated by the dose limits of 10 CFR 50 Appendix I and the BFN ODCM. The dose to a member of the public from radioiodines, radioactive materials in particulate form, and radionuclides other than noble gases with half-lives greater than eight days in gaseous effluent released per unit to areas at and beyond the site boundary shall be limited to any organ during any calendar quarter to $\leq$ 7.5 millirem (mrem), and during any calendar year to $\leq$ 15 mrem.

C. Liquid Effluents

The release of radioactive liquid effluents is regulated by the dose limits of 10 CFR 50 Appendix I and the BFN ODCM. The doses or dose commitment to a member of the public from radioactive materials in liquid effluents released from each unit to unrestricted areas shall be limited during any calendar quarter to $\leq$ 1.5 mrem to the total body and $\leq$5 mrem to any organ and during any calendar year to $\leq$ 3 mrem to the total body and $\leq$ 10 mrem to any organ.

II. Limitation on Dose Rate

A. Fission and Activation Gases in Gaseous Effluent:

1. The instantaneous release rate of fission and activation gases is based on the dose rate limits of 10 CFR 20.1301 and the BFN ODCM. The dose rate at any time to areas at and beyond the site boundary due to noble gases released in gaseous effluents from the site shall be limited to
$\leq$ 500 mrem per year to the total body and $\leq$ 3000 mrem per year to the skin.

2. The BFN ODCM Section 7.2 determines the maximum noble gas release rate.

II. Limitations on Dose Rate (Continued)

B. Iodines and Particulates with Half-Lives Greater than Eight Days in gaseous effluents.

1. The instantaneous release rate of particulates and iodines is regulated by the dose rate limits of the BFN ODCM. The dose rate at any time to areas at and beyond the site boundary, due to I-131, I-133, H-3 and particulates with greater than eight days half-lives released in gaseous effluents from the site, shall be limited to $\leq$ 1500 mrem per year to any organ.

2. The BFN ODCM Section 7.3 determines the maximum particulate and iodine dose rates.

C. Liquid Effluents

1. The concentration of radionuclides in liquid effluents released at any time from the site to unrestricted areas shall be limited to the concentrations specified in 10 CFR 20.1001 - 20.2402, Appendix B, Table 2, Column 2 for radionuclides other than dissolved or entrained noble gases.

2. For dissolved or entrained noble gases, the concentration shall be limited to 2E-4 μCi per milliliter (ml) total activity.

III. Measurements and Approximations of Total Radioactivity

A. Fission and Activation Gases:

1. Noble gases in the building vent and stack (elevated) gaseous effluents are continuously monitored. The flow rate of the stack is continuously monitored and the building vent effluent flow rates are calculated once a shift based on the configuration of operating exhaust fans. The vent flow is calculated for each release. Gas grab samples of the stack are taken and analyzed weekly. Gas grab samples of in-service vents are taken and analyzed monthly. The specific noble gas activity concentrations and total volume of the gases are used to calculate the total Curies of noble gases released.

2. The tritium concentration is determined by the analysis of a monthly grab sample for each release point.

III. Measurements and Approximations of Total Radioactivity (continued)

B. Iodines and Particulates

1. Iodines and particulates are continuously sampled on impregnated charcoal filters and particulate filters, respectively. The charcoal and particulate samples are replaced at least weekly and analyzed to determine specific activity concentrations. The specific activity concentrations and vent flow rate data are used weekly to verify that release rate limits were not exceeded. The specific activity concentrations and total volume of gaseous effluent are used on a monthly basis to determine the total Curies of each particulate and iodine released during the month.

2. The gross alpha concentration is determined by analysis of a monthly particulate filter composite sample and strontium -89 and -90 are determined by analysis of a quarterly particulate filter composite sample for each release point.

C. Liquid Effluents

1. The gamma ray emitting radionuclide concentrations are determined for each batch by gamma ray spectroscopy analysis of a grab sample. The allowable release rate is calculated for each batch based upon the known dilution flow. The flow rate of the liquid effluent is continuously monitored and the total volume released in each batch is determined. The total gamma activity released in each batch is determined by multiplying the radionuclide concentrations by the total volume discharged. The total gamma activity released during the month is then determined by summing the gamma activity content of each batch discharged during the month.

2. The gross alpha and tritium concentrations are measured on a monthly composite sample. The strontium -89 and -90 and iron -55 are measured on a quarterly composite sample.

D. The Radioactive Gaseous and Liquid Waste Monitoring Sampling and Analysis Program is specified in ODCM Sections 1/2.2.1 and 1/2.2.2.

EFFLUENT AND WASTE DISPOSAL ANNUAL REPORT
SUPPLEMENTAL INFORMATION
2005

IV. Batch

A. Liquid	Units	Quarter 1	Quarter 2	Quarter 3	Quarter 4
1. Number of batches released	Each	27	47	43	119
2. Total time for batches released	Minutes	7859	16065	12748	39603
3. Maximum time period for a batch release	Minutes	385	390	360	405
4. Average time period for a batch release	Minutes	291	342	296	333
5. Minimum time period for a batch release	Minutes	245	260	203	215
6. Average stream flow during period of release into a flowing stream	Cubic feet per second	56279	32891	35222	28674

B. Gaseous

None

C. Abnormal/Unplanned Releases*

Type	Number of Releases	Total Activity Releases (Curies)
Liquid	Three	3.75E-02
Gaseous	One	6.75E-02

* An explanation of any liquid or gaseous abnormal/unexplained release shall be documented in the summary.

EFFLUENT AND WASTE DISPOSAL ANNUAL REPORT
LIQUID EFFLUENTS - SUMMATION OF ALL RELEASES
YEAR 2005

		Units	Quarter 1	Quarter 2	Quarter 3	Quarter 4	Error %
A.	Fission and Activation Products (Does not include tritium, gases, Alpha)						
	1. Total Release	Curies	7.26E-02**	1.37E-01**	2.72E-01	9.30e-02**	9
	2. Average Diluted Concentration Released During Period	µCi/ml	2.95E-09**	3.68E-09**	6.13E-09	1.00E-09**	
	3. Percent of Applicable Limit	%	***	***	***	***	
B.	Tritium						
	1. Total Releases	Curies	6.07E+00**	1.56E+01	7.22E+00	1.95E+01**	6
	2. Average Diluted Concentration Released During Period	µCi/ml	2.46E-07**	4.20E-07	1.62E-07	2.10E-07**	
	3. Percent of Applicable Limit	%	***	***	***	***	
C.	Dissolved and Entrained Noble Gases						
	1. Total Releases	Curies	5.00E-04	1.19E-03	4.71E-04	2.42E-03	8
	2. Average Diluted Concentration Released During Period	µCi/ml	2.03E-11	3.20E-11	1.06E-11	2.60E-11	
	3. Percent of Applicable Limit	%	***	***	***	***	
D.	Gross Alpha Radioactivity						
	1. Total Releases	Curies	ND*	ND	ND	ND	48
	2. Average Diluted Concentration Released During Period	µCi/ml	ND	ND	ND	ND	
E.	Volume of Liquid Waste to Discharge Canal (Prior to dilution)	Liters	3.38E+06	6.36E+06	5.37E+06	1.51E+07	3
F.	Volume of Dilution Water for Period	Liters	2.46E+10	3.72E+10	4.45E+10	9.30E+10	10
G.	Total CCW	Gigagal.	1.70E+02	1.75E+02	1.91E+02	1.91E+02	

*ND -- Not Detected. Dilution flow was not determined for the abnormal release.
** Includes abnormal release. See documentation in the summary.
*** The applicable limit is expressed in terms of dose. See Enclosure 1, Tables 5 through 8.

EFFLUENT AND WASTE DISPOSAL ANNUAL REPORT
LIQUID RELEASES FOR YEAR 2005 - BATCH MODE

	CURIES Isotope (Required by Regulatory (REG) Guide 1.21)	Quarter 1**	Quarter 2**	Quarter 3	Quarter 4**
1.	Ba-140	ND*	ND	ND	ND
2.	Ce-141	ND	ND	ND	ND
3.	Co-58	2.19E-03	1.47E-03	2.70E-04	ND
4.	Co-60	1.96E-02	2.86E-02	2.89E-02	1.64E-02
5.	Cr-51	5.99E-03	1.62E-02	ND	3.42E-05
6.	Cs-134	7.91E-03	1.71E-02	7.85E-02	2.03E-02
7.	Cs-137	1.42E-02	3.28E-02	1.51E-01	4.73E-02
8.	Fe-59	1.03E-03	ND	ND	ND
9.	I-131	ND	ND	2.26E-05	ND
10.	La-140	ND	ND	ND	ND
11.	Mn-54	6.02E-03	5.74E-03	3.73E-03	8.15E-04
12.	Mo-99	2.11E-04	ND	ND	ND
13.	Nb-95	ND	ND	ND	ND
14.	Sr-89	ND	ND	ND	ND
15.	Sr-90	ND	ND	ND	ND
16.	Tc-99m	2.06E-04	ND	ND	ND
17.	Xe-133	4.87E-04	5.02E-04	2.43E-04	1.13E-03
18.	Xe-135	1.31E-05	6.87E-04	2.27E-04	1.28E-03
19.	Zn-65	1.27E-02	3.28E-02	3.21E-03	6.49E-03
20.	Zr-95	ND	ND	ND	ND

.* - Not Detected
** 1st, 2nd, and 4th quarters contain data from the abnormal releases. See documentation in the summary.

EFFLUENT AND WASTE DISPOSAL ANNUAL REPORT
LIQUID RELEASES FOR YEAR 2005 - BATCH MODE

	CURIES Isotope	Quarter 1**	Quarter 2**	Quarter 3	Quarter 4**
Others (Not Required by REG Guide 1.21)					
1.	Ag-110m	9.38E-04	2.39E-03	6.03E-04	1.01E-03
2.	As-76	ND*	ND	5.13E-05	6.80E-06
3.	Cu-64	ND	ND	8.45E-04	ND
4.	F-18	3.96E-06	1.22E-05	7.69E-04	2.90E-05
5	Fe-55	1.59E-04	ND	2.51E-04	4.73E-04
6	I-133	ND	4.19E-06	ND	ND
7	Mn-56	1.03E-03	ND	ND	8.11E-06
8	Na-24	ND	ND	2.68E-03	ND
9	Nb-97	5.35E-05	2.34E-05	4.75E-05	5.60E-05
10	Ru-106	ND	ND	1.41E-03	ND
11	Sr-92	ND	2.90E-05	5.65E-05	3.09E-05
12	Zn-69m	3.45E-04	ND	ND	1.76E-06

* ND – Not Detected
** Includes abnormal release.

EFFLUENT AND WASTE DISPOSAL ANNUAL REPORT
GASEOUS EFFLUENTS - SUMMATION OF ALL RELEASES
YEAR 2005

	Units	Quarter 1	Quarter 2	Quarter 3	Quarter 4	Error %
A. Fission and Activation Gases						
1. Total Releases	Curies	ND**	ND	ND	ND	45
2. Average Release Rate for Period	µCi/sec	ND	ND	ND	ND	
3. Percent of Applicable Limit	%	*	*	*	*	
B. Iodines						
1. Total Iodine-131	Curies	2.12E-03	5.36E-04	9.24E-04	8.73E-04	36
2. Average Release Rate for Period	µCi/sec	2.73E-04	6.82E-05	1.16E-04	1.10E-04	
3. Percent of Applicable Limit	%	*	*	*	*	
C. Particulates						
1. Particulates with half-lives > eight days	Curies	1.42E-03	1.60E-03	8.36E-04	1.41E-04	35
2. Average Release Rate for Period	µCi/sec	1.82E-04	2.03E-04	1.05E-04	1.77E-05	
3. Percent of Applicable Limit	%	*	*	*	*	
4. Gross Alpha Radioactivity	Curies	ND	ND	ND	ND	
D. Tritium						
1. Total Release	Curies	1.32E+01	1.49E+01	1.01E+01	5.57E+00	21
2. Average Release Rate for Period	µCi/sec	1.69E+00	1.90E+00	1.27E+00	7.01E-01	
3. Percent of Applicable Limit	%	*	*	*	*	

*Applicable Limits are expressed in terms of dose. See Enclosure 1, Tables 1 through 4.
**ND – Not Detected.

EFFLUENT AND WASTE DISPOSAL ANNUAL REPORT
YEAR 2005
GASEOUS EFFLUENTS - ELEVATED RELEASE

CURIES	Quarter 1	Quarter 2	Quarter 3	Quarter 4
1. Fission Gases				
Kr-85m	ND*	ND	ND	ND
Kr-85	ND	ND	ND	ND
Kr-87	ND	ND	ND	ND
Kr-88	ND	ND	ND	ND
Xe-133	ND	ND	ND	ND
Xe-135m	ND	ND	ND	ND
Xe-135	ND	ND	ND	ND
Xe-138	ND	ND	ND	ND
Others (specify)				
N-13	ND	ND	ND	ND
Total for Period	ND	ND	ND	ND
2. Iodines				
I-131	6.61E-04	1.47E-04	1.84E-04	3.32E-04
I-133	8.05E-04	1.47E-04	3.27E-04	1.46E-04
Total for Period	1.47E-03	2.93E-04	5.11E-04	4.78E-04

*ND – Not Detected.

EFFLUENT AND WASTE DISPOSAL ANNUAL REPORT
YEAR 2005
GASEOUS EFFLUENTS - ELEVATED RELEASE

	CURIES	Quarter 1	Quarter 2	Quarter 3	Quarter 4
3.	Particulates*				
	Sr-89	3.35E-05	1.49E-05	1.57E-05	1.85E-05
	Sr-90	ND**	ND	ND	ND
	Cs-134	ND	ND	ND	ND
	Cs-137	ND	ND	ND	ND
	Ba-140	1.84E-05	ND	3.14E-06	ND
	La-140	7.40E-06	ND	2.93E-06	ND
	Others (specify)				
	Rb-89	ND	ND	ND	7.68E-03
	Sr-91	8.77E-05	ND	ND	ND
	Y-91m	2.10E-04	7.97E-05	6.72E-05	6.40E-05
	Cs-138	1.33E-02	1.13E-02	3.22E-02	4.34E-02
	Ba-139	2.91E-02	1.22E-02	1.80E-02	1.65E-02
	Total for Period*	4.27E-02	2.36E-02	5.03E-02	6.77E-02
4.	Tritium	1.01E+00	5.92E-01	1.51E+00	3.30E-01

*Includes all nuclides, even those with less than an eight day half-life.
**ND – Not Detected.

EFFLUENT AND WASTE DISPOSAL ANNUAL REPORT
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GASEOUS EFFLUENTS - GROUND RELEASE

CURIES	Quarter 1	Quarter 2	Quarter 3	Quarter 4
1. Fission Gases				
Kr-85m	ND*	ND	ND	ND
Kr-85	ND	ND	ND	ND
Kr-87	ND	ND	ND	ND
Kr-88	ND	ND	ND	ND
Xe-133	ND	ND	ND	ND
Xe-135m	ND	ND	ND	ND
Xe-135	ND	ND	ND	ND
Xe-138	ND	ND	ND	ND
Others(specify)				
NONE				
Total for Period	ND	ND	ND	ND
2. Iodines				
I-131	9.48E-04	1.56E-04	1.52E-04	2.94E-04
I-132	ND	ND	ND	ND
I-133	2.63E-04	8.61E-06	1.07E-04	5.30E-04
I-135	ND	ND	ND	ND
Total for Period	1.21E-03	1.64E-04	2.59E-04	8.24E-04

*ND -- Not Detected.

EFFLUENT AND WASTE DISPOSAL ANNUAL REPORT
YEAR 2005
GASEOUS EFFLUENTS - GROUND RELEASE

CURIES	Quarter 1	Quarter 2	Quarter 3	Quarter 4
3. Particulates*				
Sr-89	ND**	ND	ND	ND
Sr-90	ND	ND	ND	ND
Cs-134	ND	ND	ND	ND
Cs-137	ND	ND	ND	ND
Ba-140	ND	ND	ND	ND
La-140	ND	ND	ND	ND
Others (specify)				
Y-91m	7.80E-05	ND	4.76E-06	6.02E-06
Cs-138	7.74E-03	ND	1.27E-03	3.41E-03
Ba-139	8.02E-03	9.67E-05	4.07E-03	6.17E-03
Total for Period*	1.58E-02	9.67E-05	5.34E-03	9.58E-03
4. Tritium	3.99E+00	2.79E+00	2.09E+00	9.51E-01

*Include all nuclides even those with less than an eight day half-life.
**ND – Not Detected.

EFFLUENT AND WASTE DISPOSAL ANNUAL REPORT
YEAR 2005
GASEOUS EFFLUENTS - MIXED MODE RELEASE*

	CURIES	Quarter 1	Quarter 2	Quarter 3	Quarter 4
1.	Fission Gases				
	Kr-85m	ND**	ND	ND	ND
	Kr-85	ND	ND	ND	ND
	Kr-87	ND	ND	ND	ND
	Kr-88	ND	ND	ND	ND
	Xe-133	ND	ND	ND	ND
	Xe-135m	ND	ND	ND	ND
	Xe-135	ND	ND	ND	ND
	Xe-138	ND	ND	ND	ND
	Others(specify)				
	NONE				
	Total for Period	ND	ND	ND	ND
2.	Iodines				
	I-131	5.10E-04	2.34E-04	5.88E-04	2.47E-04
	I-133	7.35E-04	4.01E-04	9.11E-04	2.71E-04
	I-135	ND	ND	ND	ND
	Total for Period	1.25E-03	6.35E-04	1.50E-03	5.17E-04

*The Reactor Building and Radwaste Building are treated as split-level releases.
**ND – Not Detected.

EFFLUENT AND WASTE DISPOSAL ANNUAL REPORT
YEAR 2005
GASEOUS EFFLUENTS - MIXED MODE RELEASE*

	CURIES	Quarter 1	Quarter 2	Quarter 3	Quarter 4
3.	Particulates**				
	Sr-89	ND***	ND	ND	ND
	Sr-90	ND	ND	ND	ND
	Cs-134	2.03E-04	2.16E-04	4.86E-05	1.13E-05
	Cs-137	4.57E-04	5.06E-04	2.14E-04	5.79E-05
	Ba-140	1.02E-05	ND	ND	ND
	La-140	8.46E-06	ND	ND	ND
	Others (specify)				
	Na-24	ND	2.95E-04	5.53E-05	ND
	Cr-51	3.85E-05	5.72E-05	ND	ND
	Mn-54	5.39E-05	1.21E-04	3.88E-05	1.35E-05
	Co-58	5.24E-06	1.74E-05	ND	3.72E-06
	Co-60	3.66E-04	4.69E-04	3.43E-04	3.60E-05
	Zn-65	6.70E-05	1.91E-04	1.58E-04	ND
	Se-75	ND	1.49E-06	1.46E-05	ND
	Y-91m	3.79E-04	ND	ND	3.22E-05

*The Reactor Building and Radwaste Building are treated as split-level releases.
**Includes all nuclides, even those with less than an eight day half-life.
***ND – Not Detected.

EFFLUENT AND WASTE DISPOSAL ANNUAL REPORT
YEAR 2005
GASEOUS EFFLUENTS - MIXED MODE RELEASE*

CURIES	Quarter	Quarter	Quarter	Quarter
Particulates** (Continued) Others (specify)	1	2	3	4
Mo-99	3.21E-06	4.09E-06	ND***	ND
Tc-99m	3.13E-06	3.99E-06	ND	ND
Ag-110m	1.63E-04	5.33E-06	ND	ND
Cs-138	ND	ND	ND	1.21E-03
Ba-139	4.74E-03	ND	ND	3.17E-03
Total for Period**	6.50E-03	1.89E-03	8.73E-04	4.53E-03
4. Tritium	8.18E+00	1.16E+01	6.50E+00	4.29E+00

*The Reactor Building and Radwaste Building are treated as split-level releases.
**Includes all nuclides, even those with less than an eight day half-life.
***ND – Not Detected.

BROWNS FERRY NUCLEAR PLANT
ANNUAL EFFLUENT AND WASTE DISPOSAL REPORT
2005
SOLID WASTE AND IRRADIATED FUEL

A. Solid Waste Shipped Off-site for Burial or Disposal (Not Irradiated Fuel)

1. Type of Waste		Units	Amount	Error %
a.	Spent resins, filters, filter sludge evaporator bottoms, etc.	m^3	2.87E+01	
		Ci	1.49E+03	+/-25.0
b.	Dry compressible waste, contaminated equipment, etc.			
	1. Shipped from site to processor	m^3	5.03E+03	
		Ci	6.46E+00	+/-25.0
	2. Estimated volume sent to burial by waste processor	m^3	3.11E+02	
		Ci	6.46E+00	+/-25.0
c.	Irradiated components, control rod blades & LPRMs with fission chambers	m^3	3.25E+00	
		Ci	4.69E+04	+/-25.0
d.	Other – Unit 1 CRDs, crane trolley and trolley parts and combined packages.	m^3	4.73E+02	
		Ci	1.51E+03	+/-25.0

2. Estimate of Major Nuclide Composition by Waste Type

a. Spent resins, filters, filter sludge, evaporator bottoms, etc.

	Nuclide	Percentage	Curies
1)	FE-55	5.17E+01	7.69E+02
2)	CO-60	1.80E+01	2.68E+02
3)	CS-137	9.40E+00	1.40E+02
4)	MN-54	5.99E+00	8.91E+01
5)	CS-134	5.72E+00	8.52E+01
6)	ZN-65	3.96E+00	5.90E+01
7)	CR-51	2.04E+00	3.04E+01
8)	AG-110M	1.44E+00	2.14E+01
9)	CO-58	7.39E-01	1.10E+01
10)	FE-59	6.68E-01	9.95E+00
11)	NI-63	2.96E-01	4.41E+00
12)	TC-99	3.51E-02	5.22E-01
13)	SR-90	2.14E-02	3.18E-01
14)	CE-144	7.99E-03	1.19E-01
15)	MO-99	4.78E-03	7.12E-02
16)	PU-241	4.33E-03	6.45E-02
17)	NB-95	3.71E-03	5.52E-02
18)	I-131	1.39E-03	2.07E-02
19)	CM-242	3.80E-05	5.66E-04
20)	SR-89	2.29E-05	3.41E-04
21)	CM-243	1.28E-05	1.91E-04
22)	CM-244	1.28E-05	1.91E-04
23)	PU-238	7.25E-06	1.08E-04
24)	NA-24	2.82E-06	4.20E-05

b. Dry compressible waste, contaminated equipment, etc.

	Nuclide	Percentage	Curies
1)	CO-60	2.75E+01	1.78E+00
2)	FE-55	2.49E+01	1.61E+00
3)	CS-137	2.04E+01	1.32E+00
4)	CS-134	1.16E+01	7.49E-01
5)	ZN-65	7.17E+00	4.63E-01
6)	NI-63	2.80E+00	1.81E-01
7)	MN-54	2.58E+00	1.67E-01
8)	CR-51	8.57E-01	5.54E-02
9)	PU-241	7.92E-01	5.12E-02
10)	AG-110M	7.04E-01	4.55E-02
11)	FE-59	2.38E-01	1.54E-02
12)	CO-58	2.00E-01	1.29E-02
13)	AM-241	4.61E-02	2.98E-03
14)	CE-144	3.36E-02	2.17E-03
15)	PU-238	2.15E-02	1.39E-03
16)	SB-124	1.56E-02	1.01E-03
17)	SR-89	1.44E-02	9.30E-04
18)	PU-239	8.84E-03	5.71E-04
19)	PU-240	8.84E-03	5.71E-04
20)	SR-90	6.30E-03	4.07E-04
21)	CM-243	5.18E-03	3.35E-04
22)	CM-244	5.18E-03	3.35E-04
23)	C-14	2.23E-04	1.44E-05
24)	CM-242	1.66E-04	1.07E-05

c. Irradiated components, Control Rod Blades & LPRMs with fission chambers

	Nuclide	Percentage	Curies
1)	FE-55	5.05E+01	2.37E+04
2)	CO-60	4.43E+01	2.08E+04
3)	NI-63	3.67E+00	1.72E+03
4)	MN-54	1.43E+00	6.73E+02
5)	NI-59	2.02E-02	9.47E+00
6)	CO-58	1.62E-02	7.58E+00
7)	ZN-65	1.18E-02	5.55E+00
8)	H-3	5.78E-03	2.71E+00
9)	C-14	5.50E-03	2.58E+00
10)	FE-59	1.26E-04	5.89E-02
11)	NB-94	8.63E-05	4.05E-02
12)	CS-134	3.45E-05	1.62E-02
13)	PU-238	3.43E-05	1.61E-02
14)	CS-137	3.37E-05	1.58E-02
15)	TC-99	2.66E-05	1.25E-02
16)	CR-51	1.54E-05	7.23E-03
17)	PU-241	5.99E-06	2.81E-03
18)	AG-110M	2.34E-06	1.10E-03
19)	CM-244	2.37E-07	1.11E-04
20)	CM-242	1.46E-07	6.86E-05
21)	SR-90	1.05E-07	4.93E-05
22)	PU-240	3.67E-08	1.72E-05
23)	AM-241	2.66E-08	1.25E-05
24)	PU-239	2.56E-08	1.20E-05
25)	SB-124	1.86E-08	8.71E-06
26)	SR-89	1.03E-08	4.85E-06
27)	CE-144	8.35E-09	3.92E-06
28)	NP-237	2.49E-09	1.17E-06
29)	CM-243	1.30E-09	6.08E-07
30)	AM-243	1.14E-09	5.34E-07
31)	ZR-95	1.25E-10	5.85E-08
32)	U-235	4.69E-11	2.20E-08

d. Other, Unit 1 CRDs, crane trolley and trolley parts, and combined packages.

	Nuclide	Percentage	Curies
1)	FE-55	5.25E+01	5.97E+02
2)	CO-60	1.91E+01	2.17E+02
3)	CS-137	1.20E+01	1.37E+02
4)	CS-134	9.67E+00	1.10E+02
5)	MN-54	2.97E+00	3.38E+01
6)	ZN-65	2.47E+00	2.81E+01
7)	NI-63	6.80E-01	7.73E+00
8)	AG-110M	4.55E-01	5.17E+00
9)	SR-90	3.44E-02	3.91E-01
10)	CR-51	2.66E-02	3.02E-01
11)	CO-58	1.81E-02	2.06E-01
12)	PU-241	1.50E-02	1.71E-01
13)	CE-144	7.95E-03	9.04E-02
14)	FE-59	3.43E-03	3.90E-02
15)	NI-59	3.02E-03	3.43E-02
16)	H-3	1.19E-03	1.35E-02
17)	LA-140	1.03E-03	1.17E-02
18)	C-14	5.99E-04	6.81E-03
19)	AM-241	4.57E-04	5.20E-03
20)	EU-152	4.56E-04	5.18E-03
21)	PU-238	2.74E-04	3.12E-03
22)	SB-124	2.06E-04	2.34E-03
23)	NB-95	1.48E-04	1.68E-03
24)	PU-239	1.44E-04	1.64E-03
25)	EU-154	1.39E-04	1.58E-03
26)	SB-125	1.04E-04	1.18E-03
27)	CM-243	9.85E-05	1.12E-03
28)	CM-242	5.99E-05	6.81E-04
29)	CM-244	3.46E-05	3.94E-04
30)	PU-240	2.89E-05	3.29E-04
31)	NB-94	1.30E-05	1.48E-04
32)	TC-99	6.63E-06	7.54E-05
33)	I-129	1.48E-09	1.68E-08

3. **Solid Waste Disposition**

Number of Shipments	Mode of Transportation	Destination
6	HIC/Cask, Sole Use Truck	Barnwell Waste Management Barnwell, SC
6	HIC/Cask, Sole Use Truck	Duratek Consolidation & Services Facility Barnwell, SC
70	64 - Sole Use Truck 6 - Non-Sole Use Truck	Duratek Oak Ridge, TN
23	23 -Non-Sole Use Truck	Duratek Kingston, TN
4	1 -Sole Use Truck 3 -Non-Sole Use Truck	Race, LLC Memphis, TN

NOTE: The 12 cask shipments consisted of the following:

Type of HIC	Number of Packages	Volume per Package (m^3)
14-170	1	4.84E+00
8-120	9	3.41E+00
3-55	2	1.63E+00

NOTE: The 97 shipments of waste packaged in strong tight packages consisted of the following:

Type of STC	Number of Packages	Volume of Packages (m^3)
40' "Sealand"	50	2.95E+03
20' "Sealand"	35	1.03E+03
Other (CRD box, crane trolley, sand blast booth, combined packages).	26	1.51E+03

B. Irradiated Fuel Disposition

Number of Shipments	Mode of Transportation	Destination
None	N/A	N/A

BROWNS FERRY NUCLEAR PLANT
EFFLUENT AND WASTE DISPOSAL ANNUAL REPORT
SUMMARY OF ABNORMAL/UNPLANNED RELEASES
2005

The release of radioactive material to the environment from Browns Ferry has been a small fraction of the 10 CFR 20 Appendix B and 10 CFR 50 Appendix I limits. There were no limits exceeded as specified in 10 CFR 20 Appendix B and 10 CFR 50 Appendix I.

One abnormal gaseous release and three abnormal liquid releases occurred in 2005. One abnormal liquid release was detected in March, 2005 when 2A Residual Heat Removal (RHR) heat exchanger was placed in service during the unit 2 refueling outage. A leak around the RHR heat exchanger floating head expansion joint resulted in contaminated water entering the RHR service water which is discharged to the Tennessee River. The heat exchanger was removed from service and repaired. Post maintenance testing of the heat exchanger resulted in a small release of radioactivity due to contamination of the Service Water side during the repair in May, 2005. This event resulted in 1.25E-02 Curies being released during first quarter, 2.47E-02 Curies during second quarter, and a maximum Effluent Concentration Limit (ECL) fraction of 8.67E-01. All doses associated with this abnormal release were less than 1% of the quarterly limit. Details of this abnormal release are given in Problem Evaluation Report (PER) 79143.

On March 20, 2005 contamination was discovered in the plant demineralized water system (PER 79075). This resulted in a liquid release during first quarter and an airborne tritium release during first and second quarter. A third liquid release occurred when the Auxiliary Decay Heat Removal (ADHR) secondary side was drained in October, 2005 (PER 90671). This system was filled with contaminated demineralized water in March. Since the last four monthly samples had not indicated any detectable radioactivity, the ADHR secondary loop was drained to the sewage lagoon (normal procedure for draining the ADHR secondary loop). A sample taken of the ADHR catch basin near the completion of the drain down indicated low concentrations of Co-60, Ag-110m, Cs-134, and Cs-137. None of the samples discharged indicated radioactivity, however, a release was calculated using the levels of radioactivity found in the bottom of the basin. Liquid releases were 9.79E-06 Curies for the first quarter and 3.10E-04 Curies for the fourth quarter. Airborne tritium releases were 2.07E-02 Curies for the first quarter and 3.10E-04 Curies for the second quarter. All doses associated with this abnormal release were less than 1% of the quarterly limit and no ODCM release rate limits were exceeded.

Radioactivity from the abnormal releases is included in the liquid and gaseous release tables and is included in dose calculations.

Onsite ground water monitoring locations were sampled during the year. These locations were not part of BFN Radiological Environmental Monitoring Program (REMP). The purpose of these shallow wells was to monitor for potential leaks from plant equipment. Trace levels of tritium were detected in two of these monitoring locations (PER's 96105 and 96242). The highest concentration for the year was 903 pCi/L. Investigations are ongoing to identify the source of the tritium and any potential release pathway.

In calendar year 2005, Browns Ferry had no changes to the radwaste system or the Process Control Program (PCP).

ENCLOSURE 4

TENNESSEE VALLEY AUTHORITY
BROWNS FERRY NUCLEAR PLANT (BFN)
UNITS 1, 2, AND 3

INOPERABLE RADIOLOGICAL EFFLUENT INSTRUMENTATION REPORT
2005

INOPERABLE RADIOLOGICAL EFFLUENT INSTRUMENTATION REPORT 2005

This report is to comply with Browns Ferry Nuclear Plant Offsite Dose Calculation Manual (Offsite Dose Calculation Manual (ODCM)) Sections 1/2.1.1 and 1/2.1.2. The ODCM requires the exertion of best efforts to return inoperable instruments to operable status within 30 days. Failure to return such instruments to an operable status within the prescribed interval requires a description in the Annual Radioactive Effluent Release Report.

During the reporting period, January 1 through December 31, 2005, one gaseous effluent monitor was out of service for greater than 30 days. Unit 3 Reactor/Turbine/Refuel Building Ventilation Monitor (3-RM-90-250) was inoperable from November 19, 2004 at 17:06 through the end of the reporting period. Monitor 3-RM-90-250 was retuned to service on February 1, 2005 at 18:30. This was previously reported in the 2004 Inoperable Radiological Effluent Instrument Report and is documented in PER 74315. The monitor's flow measuring system was inoperable. The flow system was obsolete and could not be replaced. New flow control systems were designed and installed. All compensatory measures were completed as required.

The liquid radwaste effluent flow rate instrument [(77-60 loop) ODCM Table 1.1-1] was out of service from February 17, 2005, to September 3, 2005 (PER 81265 and 89288). Browns Ferry Nuclear has not routinely released liquid effluents since 1997. After initiating releases in February 2005, the flow instrument was not declared operable due to inconsistencies in the flow totalizer readings. During all releases, the flow was estimated once per 4 hours as required by the ODCM. Two Raw Cooling Water effluent radiation monitors (1-RM-90-132D and 2-RM-90-132D) were out of service for greater than 30 days in 2005 due partially to low flow conditions. The 1-RM-90-132 monitor was out-of service from March 15, 2005 until April 27, 2005 and the 2-RM-90-132D monitor was out of service from February 11, 2005 until April 14, 2005. Piping was modified to remove ninety degree elbows to improve flow conditions. In addition, 1-RM-90-132D was out-of-service from July 9, 2005 until September 21, 2005. The downscale/inoperable alarm function was disabled during the performance of a work order and was discovered during a surveillance performed on September 20, 2005. Compensatory sampling was initiated and no radioactivity was identified. The alarm function was returned to service on September 21, 2005. There is no indication of release from this discharge point.

Some effluent monitors and flow instrumentation were placed in "out-of-service" status because these monitors' effluent streams were isolated. Therefore, these monitors are not included in this report.

ENCLOSURE 5

TENNESSEE VALLEY AUTHORITY
BROWNS FERRY NUCLEAR PLANT (BFN)
UNITS 1, 2, AND 3

CHANGES TO THE OFFSITE DOSE CALCULATION MANUAL
2005