NOV 20 1998

ENGINEERING DATA TRANSMITTAL

Page 1 of 1

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(G) Reason	(H) Disp.	(J) Name	(K) Signature	(L) Date	(M) MSIN	(G) Reason	(H) Disp.	(J) Name	(K) Signature	(L) Date	(M) MSIN
		Design Authority				1	1	RL Clawson	<i>[Signature]</i>	11/19/98	H1-14
		Design Agent				1	1	FDH: TA Frazier	<i>[Signature]</i>	11/19/98	T6-20
1	1	Cog.Eng.: WA McCormick	<i>[Signature]</i>	11/19/98	H1-15	1	1	RJ Smith	<i>[Signature]</i>	11/19/98	H1-15
1	1	Cog. Mgr.: JG Field	<i>[Signature]</i>	11/19/98	H1-15	1	1	WMH: JL Westcott	<i>[Signature]</i>	11/24/98	H1-04
1	1	QA: MR Turner	<i>[Signature]</i>	11/19/98	H1-15	1	1	D. W. McCall	<i>[Signature]</i>	11/19/98	H1-11
1	1	Safety: T Romano	<i>[Signature]</i>	11/19/98	H1-15						
1	1	Other Ind. Review: JG Field	<i>[Signature]</i>	11-19-98	H1-15						

18. W. A. McCormick Signature of EDT Originator 11/19/98 Date	19. Authorized Representative Date for Receiving Organization	20. J. G. Field Design Authority/ Cognizant Manager 11/19/98 Date	21. DOE APPROVAL (if required) Ctrl. No. ☐ Approved ☐ Approved w/comments ☐ Disapproved w/comments
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Safety Evaluation for Packaging (Onsite) Savannah River Sample Drums

W. A. McCormick

Waste Management Federal Services, Inc.,
Northwest Operations, Richland, WA 99352
for Fluor Daniel Hanford, Inc.
U.S. Department of Energy Contract DE-AC06-96RL13200

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Abstract: This safety evaluation for packaging (SEP) evaluates and documents the safe onsite transport of 208 L (55-gal) and 30 L (8-gal) drums containing Savannah River Site liquid samples to facilities in the 200 W Area.

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LIST OF TERMS

ALARA	as low as reasonably achievable
cm	centimeter
gal	gallon
in.	inch
kg	kilogram
L	liter
lb	pound
mrem/h	millirem per hour
mW	milliwatt

SAFETY EVALUATION FOR PACKAGING (ONSITE) SAVANNAH RIVER SAMPLE DRUMS

1.0 INTRODUCTION

1.1 GENERAL INFORMATION

The 222-S Laboratory is currently storing fourteen 208 L (55-gal) drums and three 30 L (8-gal) drums containing liquid samples in glass and/or polyethylene bottles. The original intent was to dispose of the sample material at the 222-S Laboratory; however, it has been determined that the chemical constituents of the material do not fall within the permit description for disposal at the laboratory. Consequently, the material requires disposal at the T Plant facility. As currently packaged, the amount of sample material contained in each drum may exceed the U.S. Department of Transportation limits for transport in the drums.

However, due to ALARA concerns, it is desired to transport the material to the T Plant or the Central Waste Complex as packaged rather than risk unnecessary worker exposure by repackaging the material. The radiological constituent source term for each of these drums falls well within the general limits prescribed in HNF-2209, *Safety Analysis Report for Packaging (Onsite) Steel Drum* (McCormick 1998). However, the method by which the sample bottles were packaged differs from the configuration described in McCormick (1998), and the presence of lead shielding in some of the drums is restricted by McCormick (1998). In addition, the packages are not vented; however, the total activity in each one is so low that this operation is unnecessary.

This safety evaluation for packaging authorizes the intra-area transport of these drums from the 222-S Laboratory to the T Plant or to the Central Waste Complex, as required.

1.2 SYSTEM DESCRIPTION

The basic component of each packaging consists of a U.S. Department of Transportation UN1A2 208 L (55-gal) or 30 L (8-gal) steel drum. Two separate methods were used to package the sample bottles in the 208 L (55-gal) drums. There are also three 30 L (8-gal) UN1A2 drums authorized by this safety evaluation for packaging. All drums are restricted to a maximum radioactive constituent source term of less than or equal to $2 A_2s$, as defined by the 49 CFR 173, "Shippers—General Requirements for Shipments and Packagings." Specific drum contents descriptions are given in Appendix A.

1.2.1 Configuration 1 (208 L Drum)

In this configuration, the sample bottles were placed in individual 30 L (8-gal) drums and separated using universal polyethylene material to provide dunnage and absorbency. Two 30 L (8-gal) drums were then placed in a single 208 L (55-gal) drum separated and supported by universal polypropylene material. In some cases, where dose rates necessitated, lead sheeting was added to the 30 L (8-gal) drums to attenuate gamma photon emissions prior to inserting them into the 208 L (55-gal) drum. In these cases approximately 1.3 cm ($\frac{1}{2}$ in.) of lead is present on the bottom of the drum and 0.95 cm ($\frac{3}{8}$ in.) on the sides.

1.2.2 Configuration 2 (208 L Drum)

In this configuration, an approximately 5.1 cm- (2-in.-) thick layer of polymer-polyacrylate type material was placed in the bottom of the 208 L (55-gal) drum, and then a 90-mil liner was placed in the drum. Sample bottles were then placed individually in the drum, separated by universal polypropylene material. Each layer of bottles is also separated by universal polypropylene material.

1.2.3 Configuration 3 (30 L Drum)

The three 30 L (8-gal) drums are packaged similarly to configuration 1; however, only drum number 9602705 contains additional lead shielding.

2.0 PACKAGING SYSTEM

2.1 CONTAINMENT BOUNDARY

The containment boundary is provided by the 208 L (55-gal) or 30 L (8-gal) drum body, lid, and gasket.

2.2 HEAT DISSIPATION

Heat dissipation is by passive and conductive thermal radiation. All of the drums contain less than 3 mW. Gas generation due to decay heat is not an issue. Venting is not required.

2.3 SHIELDING

Shielding is provided by the contents and the packaging and in some cases by the addition of lead sheeting to attenuate gamma photon emissions. Dose rates on the external surfaces of the drums shall be limited to 1 rem or less.

2.4 LIFTING DEVICES

There are no lifting devices or attachments integral to the packagings. Lifting devices and attachments used to lift individual 208 L (55-gal) drums shall have load ratings in excess of 670 kg (1450 lb) and load ratings in excess of 102 kg (225 lb) for the 30 L (8-gal) drums.

2.5 TIEDOWN DEVICES

There are no tiedown devices that are a structural part of the packaging systems. Drums shall be secured to the transport vehicle as specified in Part A, Section 4.2, of McCormick (1998).

3.0 PACKAGE CONTENTS

3.1 GENERAL DESCRIPTION

The chemical and radioactive material present in the liquid sample bottles is primarily derived from analytical activities performed at the Savannah River Site on Hanford tank farm material. Radionuclides listed on analytical result data sheets are ^{60}Co , ^{90}Sr , ^{90}Y , ^{99}Tc , ^{137}Cs , ^{154}Eu , ^{237}Np , ^{238}Pu , ^{239}Pu , ^{241}Pu , and ^{241}Am . All of the drums contain fissile excepted (49 CFR 173) quantities of fissile material. The pH of the material ranges from 1 to greater than 12.5; however, bases are separated from acids. Each drum contains material, packaged in glass or poly bottles, that is either in the low-to-neutral pH range or in the high pH range. No mixing of high and low pH material is present. The sample bottles range in size from 125 ml to 1 L. The largest amount of liquid material present in any single drum less than 40 L.

All but three of the drums contain less than a Type A quantity of radioactive material. The three drums that exceed Type A quantities do so by a very small amount. None of these drums contain more than two A_2 s, which is considerably less than the McCormick (1998) limit of 2,500 A_2 s. Table 3-1 shows a general description of the quantity of radioactive material and configuration for each package.

Table 3-1. Package Identification and Configuration.

Drum I.D. number	External dose rate (mrem/h)	Total number of A ₂ s	pH	Shielding present? (Y/N)
9601758	> 100	0.0890	2 – 6	Y
9601835	70	0.1200	Caustic	Y
9607625*	> 100	0.6000	>12.5	Y
9607979	1.3	0.0008	Organic	N
9607983	< 0.5	0.0006	1 – 7	N
9607984	4	0.0018	1 – 6	N
9608010	< 0.5	2.56E-4	Organic	N
9608011	< 0.5	0.0013	1 – 7	N
9608059	5	0.0004	1 – 7	N
9608064	0.5	0.1700	5 - >12.5	N
9608111	> 100	1.2700	>12.5	Y
9701835	> 100	1.0200	Caustic	Y
9701844	> 100	1.1900	1 – 2	Y
9703473	100	0.0609	1 – 2	N
9703517	100	0.0096	11 – 12.5	N
9802764*	<0.5	6.83E-4	Organic	N
9802658*	<0.5	0.0020	1 – 2	N

*30 L (8-gal) drum

3.1.1 Weight

The 208 L (55-gal) drums are limited to a maximum gross weight of 454 kg (1,000 lb). The 30 L (8-gal) drums are limited to a maximum gross weight of 96 kg (211 lb).

4.0 TRANSPORT SYSTEM

The transport system shall meet the requirements of Part A, Section 4.0, of McCormick (1998).

5.0 ACCEPTANCE OF THE PACKAGING FOR USE

The packaged drums shall meet the requirements of Part A, Section 5.2, of McCormick (1998) except for the exceptions stated in this safety evaluation for packaging.

6.0 OPERATING REQUIREMENTS

The operating requirements of Part A, Section 6.1, of McCormick (1998) shall be followed with the exception of item 4 of that section. Venting is not required for this operation.

7.0 QUALITY ASSURANCE

The quality assurance requirements of Part A, Section 7.0, of McCormick (1998) shall be met.

8.0 REFERENCES

49 CFR 173, “Shippers—General Requirements for Shipments and Packagings,” *Code of Federal Regulations*, as amended.

McCormick, W. A., *Safety Analysis Report for Packaging (Onsite) Steel Drum*, HNF-2209, Rev. 0, prepared by Waste Management Federal Services, Inc., Northwest Operations for Fluor Daniel Hanford, Inc., Richland, Washington.

APPENDIX A
EXCEL SPREADSHEETS

Prepared By: *W.A. McCornick*

Date: *4/19/98*

Checked By: *J.E. Cat*

Date: *4-19-98*

Savannah River Sample Drums

All Radionuclide Activities are listed in mCi (millicuries)

Drum #9608059

	Co60	Sr90	Y90	Tc99	Cs137	Eu164	Np237	Pu238	Pu239	Pu241	Am241	
A2 value (Ci)	10.8	2.7	1.00E+10	24.3	13.5	13.5	5.41E-03	5.41E-03	5.41E-03	0.27	5.41E-03	
# of A2s	3.57E-04	1.28E-06	5.26E-05	3.94E-15	8.78E-07	6.04E-05	5.42E-06	1.94E-07	5.01E-07	3.20E-05	5.65E-07	2.03E-04
Bottle#												
D-2-2	0.0037	0.038	0.0038	0.0055	0.0368	0.0196	2.80E-07	6.52E-07	5.63E-05	4.09E-05	0.0003	
D-3-2	0.0037	0.038	0.0038	0.0055	0.0368	0.0196	2.80E-07	6.52E-07	5.63E-05	4.09E-05	0.0003	
D-4-2	0.0037	0.038	0.0038	0.0055	0.0368	0.0196	2.80E-07	6.53E-07	5.63E-05	4.09E-05	0.0003	
D5-2	0.0027	0.0278	0.0278	0.004	0.0269	0.0144	2.10E-07	4.78E-07	4.13E-06	3.00E-05	0.0002	
B-1-2		3.70E-06	3.70E-06	3.00E-05	0.0269			9.75E-09	9.75E-09		3.30E-08	
B-2-2		3.70E-06	3.70E-06	3.00E-05	0.0269			9.75E-09	9.75E-09		3.30E-08	
B-3-2		7.80E-06	7.80E-06	4.00E-05	0.0368			1.33E-08	1.33E-08		4.40E-08	
B-4-2		3.70E-06	3.70E-06	3.00E-05	0.0269			9.75E-09	9.75E-09		3.30E-08	
B-5-2		7.80E-06	7.80E-06	4.00E-05	0.0368			1.33E-08	1.33E-08		4.40E-08	
B-6-2		1.20E-05	1.20E-05	6.20E-05	0.0364			2.04E-08	2.04E-08		6.80E-08	
B-7		7.80E-06	7.80E-06	4.00E-05	0.0368			1.33E-08	1.33E-08		4.40E-08	
B-8		7.80E-06	7.80E-06	4.00E-05	0.0368			1.33E-08	1.33E-08		4.40E-08	
B-9		7.80E-06	7.80E-06	4.00E-05	0.0368			1.33E-08	1.33E-08		4.40E-08	
B-10		5.70E-06	5.70E-06	3.00E-05	0.0269			9.75E-09	9.75E-09		3.30E-08	
B-11-2		7.80E-06	7.80E-06	4.00E-05	0.0368			1.33E-08	1.33E-08		4.40E-08	
B-12		1.20E-05	1.20E-05	6.20E-05	0.0364			2.04E-08	2.04E-08		6.80E-08	
B-13		7.80E-06	7.80E-06	4.00E-05	0.0368			1.33E-08	1.33E-08		4.40E-08	
B-14		7.80E-06	7.80E-06	4.00E-05	0.0368			1.33E-08	1.33E-08		4.40E-08	
B-15		1.20E-05	1.20E-05	6.20E-05	0.0364			2.04E-08	2.04E-08		6.80E-08	
B-16		1.20E-05	1.20E-05	6.20E-05	0.0364			2.04E-08	2.04E-08		6.80E-08	
B-17-2		7.80E-06	7.80E-06	4.00E-05	0.0368			1.33E-08	1.33E-08		4.40E-08	
B-18-2		1.20E-05	1.20E-05	6.20E-05	0.0364			2.04E-08	2.04E-08		6.80E-08	
B-19-2		7.80E-06	7.80E-06	4.00E-05	0.0368			1.33E-08	1.33E-08		4.40E-08	
Total	0.0138	0.1419548	0.039355	0.02133	0.8149	7.32E-02	1.05E-06	7.52E-07	1.73E-04	1.53E-04	0.001101	

Total
0.107798
0.107798
0.107798
0.103835
0.026937
0.026937
0.036856
0.026937
0.036856
0.036486
0.036856
0.036856
0.036856
0.026941
0.036856
0.036486
0.036856
0.036486
0.036856
0.056486
0.036856

Prepared By: WAFDate: 11/19/98Checked By: J.C.C.H. Date: 11-19-98

Drum #9608064

	Co60	Sr90	Y90	Tc99	Cs137	Eu154	Np237	Pu238	Pu239	Pu241	Am241	Total	
A2 value (Ci)	10.8	2.7	1.00E+10	24.3	13.5	13.5	5.41E-03	5.41E-03	5.41E-03	0.27	5.41E-03	Total	
# of A2s	1.67E-01	1.67E-07	6.93E-03	1.87E-12	1.16E-04	8.06E-03	7.15E-05	2.64E-05	2.51E-04	1.04E-01	1.54E-04	4.80E-02	
Bottle#													
BNFL-Vit-156			0.4036	0.4036	0.0586	0.3906	0.0208	3.00E-06	2.86E-05	1.24E-04	8.98E-04	0.0056	1.283853
BNFL-Vit-155					0.0003	0.2334			8.45E-08	8.45E-08			0.2337
BNFL-B-Filtrate-6			0.0167	0.0167	0.0862	78.6571			2.85E-05	2.85E-05	0.0001		78.77686
BNFL-B-4			0.0025	0.0025	0.0129	11.8131			4.28E-06	4.28E-06			11.83101
BNFL-Vit-163		0.0018	18.2966	18.2966	2.6567	17.7111	0.9441	1.40E-04	1.30E-03	5.61E-01	4.07E-02	0.254	58.76363
D-1-2 Organic ???													
Total		0.0018	18.7194	18.7194	2.8147	108.8053	0.9649	1.43E-04	1.36E-03	5.61E-01	4.16E-02	0.2597	150.889

Drum #9607984

	Co60	Sr90	Y90	Tc99	Cs137	Eu154	Np237	Pu238	Pu239	Pu241	Am241	Total
A2 value (Ci)	10.8	2.7	1.00E+10	24.3	13.5	13.5	5.41E-03	5.41E-03	5.41E-03	0.27	5.41E-03	
# of A2s	1.75E-03	8.13E-06	3.37E-04	9.09E-14	5.47E-06	1.33E-04	3.48E-05	1.25E-06	2.95E-06	2.50E-05	3.62E-06	1.20E-03
Bottle#												
D-1	0.0027	0.0278	0.0278	0.004	0.0269	0.0144	2.10E-07	4.78E-07	4.13E-06	3.00E-05	0.0002	0.103835
D-2	0.0027	0.0278	0.0278	0.004	0.0269	0.0144	2.10E-07	4.78E-07	4.13E-06	3.00E-05	0.0002	0.103835
D-3	0.0056	0.0583	0.0583	0.0085	0.0564	3.01E-02	4.30E-07	1.00E-06	8.64E-06	6.27E-05	0.0004	0.217673
D-4	0.0056	0.0583	0.0583	0.0085	0.0564	3.01E-02	4.30E-07	1.00E-06	8.64E-06	6.27E-05	0.0004	0.217673
D-6	0.0027	0.0278	0.0278	0.004	0.0269	0.0144	2.10E-07	4.78E-07	4.13E-06	3.00E-05	0.0002	0.103835
D-7	0.0027	0.0278	0.0278	0.004	0.0269	0.0144	2.10E-07	4.78E-07	4.13E-06	3.00E-05	0.0002	0.103835
D-8	0.0037	0.038	0.038	0.0055	0.0368	0.0196	2.80E-07	6.52E-07	5.63E-06	4.09E-05	0.0003	0.141947
D-9	0.0027	0.0278	0.0278	0.004	0.0269	0.0144	2.10E-07	4.78E-07	4.13E-06	3.00E-05	0.0002	0.103835
D-11	0.0027	0.0278	0.0278	0.004	0.0269	0.0144	2.10E-07	4.78E-07	4.13E-06	3.00E-05	0.0002	0.103835
D-12	0.0027	0.0278	0.0278	0.004	0.0269	0.0144	2.10E-07	4.78E-07	4.13E-06	3.00E-05	0.0002	0.103835
D-13	0.0056	0.0583	0.0583	0.0085	0.0564	3.01E-02	4.30E-07	1.00E-06	8.64E-06	6.27E-05	0.0004	0.217673
D-14	0.0056	0.0583	0.0583	0.0085	0.0564	3.01E-02	4.30E-07	1.00E-06	8.64E-06	6.27E-05	0.0004	0.217673
D-15	0.0037	0.038	0.038	0.0055	0.0368	0.0196	2.80E-07	6.52E-07	5.63E-06	4.09E-05	0.0003	0.141947
D-16	0.0037	0.038	0.038	0.0055	0.0368	0.0196	2.80E-07	6.52E-07	5.63E-06	4.09E-05	0.0003	0.141947

Prepared By:

WAF

Date:

1/10/98

Checked By:

J.E.G.

Date:

11-19-98

D-17	0.0056	0.0583	0.0583	0.0085	0.0564	3.01E-02	4.30E-07	1.00E-06	8.64E-06	6.27E-05	0.0004	0.217673
D-18	0.0056	0.0583	0.0583	0.0085	0.0564	3.01E-02	4.30E-07	1.00E-06	8.64E-06	6.27E-05	0.0004	0.217673
D-18A	0.0056	0.0583	0.0583	0.0085	0.0564	3.01E-02	4.30E-07	1.00E-06	8.64E-06	6.27E-05	0.0004	0.217673
D-18B	0.0056	0.0583	0.0583	0.0085	0.0564	3.01E-02	4.30E-07	1.00E-06	8.64E-06	6.27E-05	0.0004	0.217673
D-18C	0.0037	0.038	0.038	0.0055	0.0368	0.0196	2.80E-07	6.52E-07	5.63E-06	4.09E-05	0.0003	0.141947
D-18D	0.0037	0.038	0.038	0.0055	0.0368	0.0196	2.80E-07	6.52E-07	5.63E-06	4.09E-05	0.0003	0.141947
D-19	0.0056	0.0583	0.0583	0.0085	0.0564	3.01E-02	4.30E-07	1.00E-06	8.64E-06	6.27E-05	0.0004	0.217673
B-1		1.20E-05	1.20E-05	6.20E-05	0.0564			2.04E-08	2.04E-08		6.80E-08	0.056486
B-2		1.20E-05	1.20E-05	6.20E-05	0.0564			2.04E-08	2.04E-08		6.80E-08	0.056486
B-3		1.20E-05	1.20E-05	6.20E-05	0.0564			2.04E-08	2.04E-08		6.80E-08	0.056486
B-3A		1.20E-05	1.20E-05	6.20E-05	0.0564			2.04E-08	2.04E-08		6.80E-08	0.056486
B-4		1.20E-05	1.20E-05	6.20E-05	0.0564			2.04E-08	2.04E-08		6.80E-08	0.056486
B-4A		1.20E-05	1.20E-05	6.20E-05	0.0564			2.04E-08	2.04E-08		6.80E-08	0.056486
B-6		1.20E-05	1.20E-05	6.20E-05	0.0564			2.04E-08	2.04E-08		6.80E-08	0.056486
B-6A		1.20E-05	1.20E-05	6.20E-05	0.0564			2.04E-08	2.04E-08		6.80E-08	0.056486
B-6B		7.80E-06	7.80E-06	4.00E-05	0.0368			1.33E-08	1.33E-08		4.40E-08	0.036856
B-6C		1.20E-05	1.20E-05	6.20E-05	0.0564			2.04E-08	2.04E-08		6.80E-08	0.056486
B-7		1.20E-05	1.20E-05	6.20E-05	0.0564			2.04E-08	2.04E-08		6.80E-08	0.056486
B-7A		1.20E-05	1.20E-05	6.20E-05	0.0564			2.04E-08	2.04E-08		6.80E-08	0.056486
B-8		1.20E-05	1.20E-05	6.20E-05	0.0564			2.04E-08	2.04E-08		6.80E-08	0.056486
B-9		1.20E-05	1.20E-05	6.20E-05	0.0564			2.04E-08	2.04E-08		6.80E-08	0.056486
B-10		1.20E-05	1.20E-05	6.20E-05	0.0564			2.04E-08	2.04E-08		6.80E-08	0.056486
B-11		1.20E-05	1.20E-05	6.20E-05	0.0564			2.04E-08	2.04E-08		6.80E-08	0.056486
B-12		5.70E-06	5.70E-06	3.00E-05	0.0269			9.75E-09	9.75E-09		3.30E-08	0.026941
Total	0.0878	0.9094935	0.909494	0.133	1.7896	0.4697	6.74E-06	1.59E-05	1.35E-04	9.79E-04	0.006501	4.306725

Drum #9607979

	Co60	Sr90	Y90	Tc99	Cs137	Eu154	Np237	Pu238	Pu239	Pu241	Am241	
A2 value (Ci)	10.8	2.7	1.00E+10	24.3	13.5	13.5	5.41E-03	5.41E-03	5.41E-03	0.27	5.41E-03	
# of A2s	8.07E-04	5.19E-07	3.29E-05	8.87E-15	5.17E-07	1.67E-05	2.23E-06	7.95E-08	1.98E-06	1.21E-05	2.32E-07	7.39E-04

Bottle#

A-13		0.0152	0.0152	0.002	0.0564			4.79E-06	2.83E-05			0.088833
A-14		0.0152	0.0152	0.002	0.0564			4.79E-06	2.83E-05			0.088833
D-10	0.0056	0.0583	0.0583	0.0085	0.0564	0.0301	4.30E-07	1.00E-06	8.64E-06	6.27E-05	0.004	0.221273
B-5		1.20E-05	1.20E-05	6.20E-05	0.0564			2.04E-08	2.04E-08			0.056486
Total	0.0056	0.088712	0.088712	0.012562	0.2256	0.0301	4.3E-07	1.06E-05	6.53E-05	6.27E-05	0.004	0.455425

Drum #9601758

	Co60	Sr90	Y90	Tc99	Cs137	Eu154	Np237	Pu238	Pu239	Pu241	Am241
A2 value (Ci)	10.8	2.7	1.00E+10	24.3	13.5	13.5	5.41E-03	5.41E-03	5.41E-03	0.27	5.41E-03

Prepared By: WAWDate: 4/12/98Checked By: J.E. Galt Date: 11-19-98

of A2s 8.88E-02 6.19E-05 2.56E-03 6.92E-13 4.13E-05 5.03E-04 2.64E-04 4.60E-05 2.06E-04 1.83E-03 2.67E-04 8.30E-02

Bottle#

BNFL-Vit144	0.028	0.307	0.307	0.0445	0.395	0.15	0.0002	1.00E-03	8.90E-03	6.50E-02	0.405	Total	1.7116
BNFL-Vit145	0.0509	0.5254	0.5254	0.0763	0.5086	0.2711	3.90E-06	9.02E-06	7.79E-05	5.66E-04	0.0035		1.961856
BNFL-Vit148	0.2585	2.6702	2.6702	0.3877	2.5848	1.3778	2.00E-05	4.59E-05	3.96E-04	2.87E-03	0.0179		9.970436
BNFL-Vit149	0.0641	0.6623	0.6623	0.0962	0.6411	0.3417	4.90E-06	1.14E-05	9.82E-05	7.19E-04	0.0044		2.472934
BNFL-Vit150	0.0641	0.6623	0.6623	0.0962	0.6411	0.3417	4.90E-06	1.14E-05	9.82E-05	7.19E-04	0.0044		2.472934
BNFL-Vit151	0.0385	0.3974	0.3974	0.0577	0.3847	0.205	2.90E-06	6.82E-06	5.89E-05	4.28E-04	0.0027		1.483896
BNFL-Vit152	0.0641	0.6623	0.6623	0.0962	0.6411	0.3417	4.90E-06	1.14E-05	9.82E-05	7.19E-04	0.0044		2.472934
BNFL-Vit147	0.1	1.0332	1.0332	0.15	1.0001	0.5331	7.60E-06	1.77E-05	1.53E-04	1.11E-03	0.0069		3.857791
Total	0.6682	6.9201	6.9201	1.0048	6.7965	3.5621	0.000249	1.11E-03	9.88E-03	7.21E-02	0.4492		26.40438

Drum #9601835

A2 value (Ci)	Co60	Sr90	Y90	Tc99	Cs137	Eu154	Np237	Pu238	Pu239	Pu241	Am241	
# of A2s	1.21E-01	10.8	2.7	1.00E+10	24.3	13.5	5.41E-03	5.41E-03	5.41E-03	0.27	5.41E-03	
	1.21E-01	0.00E+00	3.19E-02	8.62E-12	4.58E-04	2.37E-02	0.00E+00	0.00E+00	5.03E-03	2.97E-02	0.00E+00	2.97E-02

Bottle#

BNF-A-Alk-2		4.2366	4.2366	0.547	15.7451			1.34E-03	7.90E-03		0.0079	Total	24.78244
BNF-A-Filtrate-1		33.8931	33.8931	4.3757	125.9608			1.07E-02	6.32E-02		0.0632		198.2598
BNF-A-Filtrate-3		33.8931	33.8931	4.3757	125.9608			1.07E-02	6.32E-02		0.0632		198.2598
BNF-A-1-Alk		6.8817	6.8817	0.8885	25.5751			2.17E-03	1.28E-02		0.0128		40.25481
BNF-A-2-Alk-2		2.1206	2.1206	0.2738	7.8811			6.69E-04	3.96E-03		0.004		12.40473
BNF-A-3-Alk		0.5336	0.5336	0.0689	1.9831			1.68E-04	9.96E-04		0.001		3.121364
BNF-A-Prod		0.121	0.121	0.0156	0.4496			3.82E-05	2.26E-04		0.0002		0.707664
BNF-A-5-Alk		0.2638	0.2638	0.0341	0.9804			8.33E-05	4.92E-04		0.0005		1.543175
BNF-A-4-Alk-1		4.2366	4.2366	0.547	15.7451			1.34E-03	7.90E-03		0.0079		24.78244
Total		86.1801	86.1801	11.1263	320.2811			2.72E-02	1.61E-01		0.1607		504.1163

Drum #9701835

A2 value (Ci)	Co60	Sr90	Y90	Tc99	Cs137	Eu154	Np237	Pu238	Pu239	Pu241	Am241	
# of A2s	1.02E+00	10.8	2.7	1.00E+10	24.3	13.5	5.41E-03	5.41E-03	5.41E-03	0.27	5.41E-03	
	1.02E+00	0.00E+00	2.81E-02	7.59E-12	0.00E+00	1.96E-02	0.00E+00	0.00E+00	2.55E-02	1.03E-01	0.00E+00	8.42E-01

Bottle#

15285-036		12.654	12.654		44.174			0.023	0.0933		0.7592	Total	70.3575
13251-062		12.654	12.654		44.174			0.023	0.0933		0.7592		70.3575
15291-090		12.654	12.654		44.174			0.023	0.0933		0.7592		70.3575

Prepared By: W. A. W.Date: 11/19/98Checked By: J. E. L.Date: 11/19/98

13174-070	12.654	12.654	44.174	0.023	0.0933	0.7592	70.3575
15053-023	12.654	12.654	44.174	0.023	0.0933	0.7592	70.3575
15285-038	12.654	12.654	44.174	0.023	0.0933	0.7592	70.3575
Total	75.924	75.924	265.044	0.138	0.5598	4.5552	422.145

Drum #9701844

A2 value (Ci)	Co60	Sr90	Y90	Tc99	Cs137	Eu154	Np237	Pu238	Pu239	Pu241	Am241
# of A2s	1.19E+00	0.00E+00	2.7	1.00E+10	24.3	13.5	5.41E-03	5.41E-03	5.41E-03	0.27	5.41E-03

Bottle#

BNFL-Vit-112	15.8175	15.8175	55.2175	2.88E-02	0.0933	0.7592	Total
BNF-C-13-ELU-1	23.7263	23.7263	82.8236	4.30E-02	1.40E-01	1.138	87.7338
BNF-C-13-ELU-2	23.7263	22.7263	82.8236	4.30E-02	1.40E-01	1.138	131.5972
BNF C-2-NEU-1	9.1742	9.1742	32.0262	1.70E-02	5.40E-02	0.4403	130.5972
BNF-CP-1-ELU	6.327	6.327	22.087	1.20E-02	3.70E-02	0.3037	50.8859
BNF-CP-2-ELU	7.9088	7.9088	27.6088	0.014	4.70E-02	3.80E-01	35.0937
BNF-C-9-NEU	3.1637	3.1637	11.044	0.0058	0.1582	0.1898	43.867
11	0.2253	0.2253	0.7864	4.14E-04	1.13E-02	0.0135	17.7252
13	0.2253	0.2253	0.7864	4.14E-04	1.13E-01	0.0135	1.252174
19	0.0354	0.0354	0.1236	6.52E-05	1.77E-03	0.0021	1.363914
23	0.0734	0.0734	0.2562	1.35E-04	3.67E-03	0.0044	0.198336
14	0.0987	0.0987	0.3446	1.82E-04	4.94E-03	0.0059	0.411204
BNF-C-5-ELU	1.5818	1.5818	5.5218	3.00E-03	9.00E-03	0.759	0.553017
Total	92.0837	91.0837	321.4497	1.68E-01	0.813135	5.147	9.4564

Drum #9608111

A2 value (Ci)	Co60	Sr90	Y90	Tc99	Cs137	Eu154	Np237	Pu238	Pu239	Pu241	Am241
# of A2s	1.27E+00	0.00E+00	2.7	1.00E+10	24.3	13.5	5.41E-03	5.41E-03	5.41E-03	0.27	5.41E-03

Bottle#

BNF-C-6-ALK	31.637	31.637	110.44	5.75E-02	1.582	1.898	Total
BNF-C-7-ALK	4.7456	4.7456	16.566	0.0086	0.2373	0.2847	177.2515
BNF-C-8-NEU	4.7456	4.7456	16.566	0.0086	0.2373	0.2847	26.5878
BNF-C-P-3-ALK	6.327	6.327	22.087	1.20E-02	3.70E-02	0.3037	26.5878
BNF-CP-4-ALK	6.327	6.327	22.087	1.20E-02	3.70E-02	0.3037	35.0937
BNF-C-2-NEU-2	7.9088	7.9088	27.6088	1.40E-02	4.70E-02	0.3796	35.0937
BNF-C-3-ALK	0.2253	0.2253	0.7864	1.00E-04	1.13E-01	0.135	43.867
BNF-C-4-ALK	7.9088	7.9088	27.6088	1.40E-02	4.70E-02	0.3796	1.4851
							43.867

Prepared By: WAFDate: 11/19/98Checked By: J.E. GaltDate: 11-19-98

BNF-C-11-ALK	3.1635	3.1635	11.04	6.00E-03	1.90E-02	0.1518	17.5438
BNF-C-12-ALK	0.5536	0.5536	1.9326	1.00E-03	3.00E-03	0.0266	3.0704
Total	73.5422	73.5422	256.7226	1.34E-01	2.3596	4.1474	410.4478

Drum #9607625 (8 Gallon)

	Co60	Sr90	Y90	Tc99	Cs137	Eu154	Np237	Pu238	Pu239	Pu241	Am241	Total
A2 value (Ci)	10.8	2.7	1.00E+10	24.3	13.5	13.5	5.41E-03	5.41E-03	5.41E-03	0.27	5.41E-03	
# of A2s	6.01E-01	0.00E+00	1.14E-02	3.09E-12	0.00E+00	7.99E-03	0.00E+00	0.00E+00	1.04E-02	2.41E-01	0.00E+00	3.30E-01
Bottle#												
BNF-C-1-ALK		2.3726	2.3726		8.2826			4.00E-03	1.40E-02		0.1139	13.1597
BNF-C-10-ALK		3.1635	3.1635		11.04			6.00E-03	1.90E-02		0.1518	17.5438
ENV-C-H-3		12.683	12.683		44.274			2.31E-02	0.6341		0.761	71.0582
ENV-C-H-2		12.683	12.683		44.274			2.31E-02	0.6341		0.761	71.0582
Total		30.9021	30.9021		107.8706			5.62E-02	1.30E+00		1.7877	172.8199

Drum #9608011

	Co60	Sr90	Y90	Tc99	Cs137	Eu154	Np237	Pu238	Pu239	Pu241	Am241	Total
A2 value (Ci)	10.8	2.7	1.00E+10	24.3	13.5	13.5	5.41E-03	5.41E-03	5.41E-03	0.27	5.41E-03	
# of A2s	1.32E-03	0.00E+00	2.40E-05	6.48E-15	0.00E+00	1.65E-05	0.00E+00	0.00E+00	2.17E-05	5.91E-04	0.00E+00	6.65E-04
Bottle#												
1		0.0018	0.0018		0.0062			3.27E-06	8.88E-05		0.0001	0.009992
2		0.0018	0.0018		0.0062			3.27E-06	8.88E-05		0.0001	0.009992
3		0.0018	0.0018		0.0062			3.27E-06	8.88E-05		0.0001	0.009992
4		0.0018	0.0018		0.0062			3.27E-06	8.88E-05		0.0001	0.009992
5		0.0018	0.0018		0.0062			3.27E-06	8.88E-05		0.0001	0.009992
6		0.0018	0.0018		0.0062			3.27E-06	8.88E-05		0.0001	0.009992
7		0.0018	0.0018		0.0062			3.27E-06	8.88E-05		0.0001	0.009992
8		0.0018	0.0018		0.0062			3.27E-06	8.88E-05		0.0001	0.009992
9		0.0018	0.0018		0.0062			3.27E-06	8.88E-05		0.0001	0.009992
10		0.0018	0.0018		0.0062			3.27E-06	8.88E-05		0.0001	0.009992
12		0.0018	0.0018		0.0062			3.27E-06	8.88E-05		0.0001	0.009992
15		0.0018	0.0018		0.0062			3.27E-06	8.88E-05		0.0001	0.009992
17		0.0018	0.0018		0.0062			3.27E-06	8.88E-05		0.0001	0.009992
18		0.0018	0.0018		0.0062			3.27E-06	8.88E-05		0.0001	0.009992
20		0.0018	0.0018		0.0062			3.27E-06	8.88E-05		0.0001	0.009992
21		0.0018	0.0018		0.0062			3.27E-06	8.88E-05		0.0001	0.009992
22		0.0018	0.0018		0.0062			3.27E-06	8.88E-05		0.0001	0.009992

Prepared By:

WAM

Date:

11/19/98

Checked By:

J.E. Galt

Date:

11-19-98

24	0.0018	0.0018	0.0062	3.27E-06	8.88E-05	0.0001	0.009992
27	0.0018	0.0018	0.0062	3.27E-06	8.88E-05	0.0001	0.009992
29	0.0018	0.0018	0.0062	3.27E-06	8.88E-05	0.0001	0.009992
28A	0.0018	0.0018	0.0062	3.27E-06	8.88E-05	0.0001	0.009992
31	0.0018	0.0018	0.0062	3.27E-06	8.88E-05	0.0001	0.009992
32	0.0018	0.0018	0.0062	3.27E-06	8.88E-05	0.0001	0.009992
33	0.0018	0.0018	0.0062	3.27E-06	8.88E-05	0.0001	0.009992
34	0.0018	0.0018	0.0062	3.27E-06	8.88E-05	0.0001	0.009992
35	0.0018	0.0018	0.0062	3.27E-06	8.88E-05	0.0001	0.009992
36	0.0018	0.0018	0.0062	3.27E-06	8.88E-05	0.0001	0.009992
37	0.0018	0.0018	0.0062	3.27E-06	8.88E-05	0.0001	0.009992
38	0.0018	0.0018	0.0062	3.27E-06	8.88E-05	0.0001	0.009992
39	0.0018	0.0018	0.0062	3.27E-06	8.88E-05	0.0001	0.009992
42	0.0018	0.0018	0.0062	3.27E-06	8.88E-05	0.0001	0.009992
43	0.0018	0.0018	0.0062	3.27E-06	8.88E-05	0.0001	0.009992
44	0.0018	0.0018	0.0062	3.27E-06	8.88E-05	0.0001	0.009992
45	0.0018	0.0018	0.0062	3.27E-06	8.88E-05	0.0001	0.009992
46	0.0018	0.0018	0.0062	3.27E-06	8.88E-05	0.0001	0.009992
48	0.0018	0.0018	0.0062	3.27E-06	8.88E-05	0.0001	0.009992
Total	0.0648	0.0648	0.2232	1.18E-04	3.20E-03	0.0036	0.359714

Drum #9607983

	Co60	Sr90	Y90	Tc99	Cs137	Eu154	Np237	Pu238	Pu239	Pu241	Am241	
A2 value (Ci)	10.8	2.7	1.00E+10	24.3	13.5	13.5	5.41E-03	5.41E-03	5.41E-03	0.27	5.41E-03	
# of A2s	5.60E-04	0.00E+00	1.49E-04	4.02E-14	2.18E-06	1.11E-04	0.00E+00	0.00E+00	2.34E-05	1.39E-04	0.00E+00	1.36E-04

Bottle#

Bottle#	Co60	Sr90	Y90	Tc99	Cs137	Eu154	Np237	Pu238	Pu239	Pu241	Am241	Total
A-1	0.0152	0.0152	0.002	0.0564	4.79E-06	2.83E-05	2.80E-05	0.088861				
A-2	0.0099	0.0099	0.0013	0.0368	3.12E-06	1.85E-05	1.80E-05	0.05794				
A-3	0.0152	0.0152	0.002	0.0564	4.79E-06	2.83E-05	2.80E-05	0.088861				
A-4	0.0099	0.0099	0.0013	0.0368	3.12E-06	1.85E-05	1.80E-05	0.05794				
A-5	0.0152	0.0152	0.002	0.0564	4.79E-06	2.83E-05	2.80E-05	0.088861				
A-6	0.0099	0.0099	0.0013	0.0368	3.12E-06	1.85E-05	1.80E-05	0.05794				
A-7	0.0152	0.0152	0.002	0.0564	4.79E-06	2.83E-05	2.80E-05	0.088861				
A-8	0.0099	0.0099	0.0013	0.0368	3.12E-06	1.85E-05	1.80E-05	0.05794				
A-9	0.0152	0.0152	0.002	0.0564	4.79E-06	2.83E-05	2.80E-05	0.088861				
A-10	0.0152	0.0152	0.002	0.0564	4.79E-06	2.83E-05	2.80E-05	0.088861				
A-10A	0.0099	0.0099	0.0013	0.0368	3.12E-06	1.85E-05	1.80E-05	0.05794				
A-10B	0.0099	0.0099	0.0013	0.0368	3.12E-06	1.85E-05	1.80E-05	0.05794				
A-11	0.0152	0.0152	0.002	0.0564	4.79E-06	2.83E-05	2.80E-05	0.088861				
A-11A	0.0152	0.0152	0.002	0.0564	4.79E-06	2.83E-05	2.80E-05	0.088861				
A-11B	0.0152	0.0152	0.002	0.0564	4.79E-06	2.83E-05	2.80E-05	0.088861				

Prepared By:

Date:

Checked By:

Date:

A-11C	0.0152	0.0152	0.002	0.0564	4.79E-06	2.83E-05	2.80E-05	0.088861
A-12	0.0152	0.0152	0.002	0.0564	4.79E-06	2.83E-05	2.80E-05	0.088861
A-15	0.0099	0.0099	0.0013	0.0368	3.12E-06	1.85E-05	1.80E-05	0.05794
A-16	0.0152	0.0152	0.002	0.0564	4.79E-06	2.83E-05	2.80E-05	0.088861
A-17	0.0099	0.0099	0.0013	0.0368	3.12E-06	1.85E-05	1.80E-05	0.05794
A-18	0.0099	0.0099	0.0013	0.0368	3.12E-06	1.85E-05	1.80E-05	0.05794
A-19	0.0152	0.0152	0.002	0.0564	4.79E-06	2.83E-05	2.80E-05	0.088861
A-20	0.0152	0.0152	0.002	0.0564	4.79E-06	2.83E-05	2.80E-05	0.088861
A-21	0.0152	0.0152	0.002	0.0564	4.79E-06	2.83E-05	2.80E-05	0.088861
A-22	0.0152	0.0152	0.002	0.0564	4.79E-06	2.83E-05	2.80E-05	0.088861
A-23	0.0099	0.0099	0.0013	0.0368	3.12E-06	1.85E-05	1.80E-05	0.05794
A-24	0.0099	0.0099	0.0013	0.0368	3.12E-06	1.85E-05	1.80E-05	0.05794
A-25	0.0152	0.0152	0.002	0.0564	4.79E-06	2.83E-05	2.80E-05	0.088861
A-27	0.0099	0.0099	0.0013	0.0368	3.12E-06	1.85E-05	1.80E-05	0.05794
A-26	0.0099	0.0099	0.0013	0.0368	3.12E-06	1.85E-05	1.80E-05	0.05794
A-28	0.0152	0.0152	0.002	0.0564	4.79E-06	2.83E-05	2.80E-05	0.088861
Total	0.4023	0.4023	0.0529	1.4936	1.27E-04	7.50E-04	7.38E-04	2.352714

Drum #9608010

A-8

	Co60	Sr90	Y90	Tc99	Cs137	Eu154	Np237	Pu238	Pu239	Pu241	Am241	
A2 value (Ci)	10.8	2.7	1.00E+10		24.3	13.5	13.5	5.41E-03	5.41E-03	5.41E-03	0.27	5.41E-03
# of A2s	0	4.66667E-06	1.26E-15		0	3.215E-06	0	0.00E+00	4.23E-06	1.15E-04	0	1.29E-04
Bottle#												
25		0.0018	0.0018		0.0062			3.27E-06	8.88E-05		0.0001	
26		0.0018	0.0018		0.0062			3.27E-06	8.88E-05		0.0001	
41		0.0018	0.0018		0.0062			3.27E-06	8.88E-05		0.0001	
30		0.0018	0.0018		0.0062			3.27E-06	8.88E-05		0.0001	
40		0.0018	0.0018		0.0062			3.27E-06	8.88E-05		0.0001	
28		0.0018	0.0018		0.0062			3.27E-06	8.88E-05		0.0001	
16		0.0018	0.0018		0.0062			3.27E-06	8.88E-05		0.0001	
Total		0.0126	0.0126		0.0434			2.29E-05	6.22E-04		0.0007	

Drum #9802764

	Co60	Sr90	Y90	Tc99	Cs137	Eu154	Np237	Pu238	Pu239	Pu241	Am241	
A2 value (Ci)	10.8	2.7	1.00E+10		24.3	13.5	13.5	5.41E-03	5.41E-03	5.41E-03	0.27	5.41E-03
# of A2s	0	0.000012	1.13E-14		0	0.0000024	0	0.00E+00	1.09E-15	2.99E-04	0	3.70E-04
Bottle#												
6		0.0162	0.0564		0.0162			2.94E-15	8.08E-04		0.001	
BNFL-VIT-146		0.0162	0.0564		0.0162			2.94E-15	8.08E-04		0.001	

Prepared By: LMHDate: 11/19/98Checked By: J.E. GaltDate: 11-19-98

Total	0.0324	0.1128	0.0324	5.88E-15	1.62E-03	0.002	0.181216
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Drum #9802658

	Co60	Sr90	Y90	Tc99	Cs137	Eu154	Np237	Pu238	Pu239	Pu241	Am241
A2 value (Ci)	10.8	2.7	1.00E+10	24.3	13.5	13.5	5.41E-03	5.41E-03	5.41E-03	0.27	5.41E-03
# of A2s	0	0.000036	3.38E-14	0	0.0000072	0	0.00E+00	3.26E-15	8.96E-04	0	1.11E-03
Bottle#											

1		0.0162	0.0564		0.0162			2.94E-15	8.08E-04		0.001	0.090608
2		0.0162	0.0564		0.0162			2.94E-15	8.08E-04		0.001	0.090608
3		0.0162	0.0564		0.0162			2.94E-15	8.08E-04		0.001	0.090608
4		0.0162	0.0564		0.0162			2.94E-15	8.08E-04		0.001	0.090608
5		0.0162	0.0564		0.0162			2.94E-15	8.08E-04		0.001	0.090608
7		0.0162	0.0564		0.0162			2.94E-15	8.08E-04		0.001	0.090608

Total	0.0972	0.3384		0.0972				1.76E-14	4.85E-03		0.006	0.543649
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Drum #9703517

	Co60	Sr90	Y90	Tc99	Cs137	Eu154	Np237	Pu238	Pu239	Pu241	Am241
A2 value (Ci)	10.8	2.7	1.00E+10	24.3	13.5	13.5	5.41E-03	5.41E-03	5.41E-03	0.27	5.41E-03
# of A2s	0	1.00707E-05	2.72E-15	5.78584E-06	0.0095144	0	0.00E+00	8.60E-06	8.60E-06	0	2.81E-05
Bottle#											

BNF-B-1-ALK				0.0001	0.0564			2.04E-08	2.04E-08			0.0565
BNF-B-FILT-4		0.0001	0.0001	0.0004	0.4103			1.49E-07	1.48E-07			0.4109
BNF-B-FILT-3		0.0001	0.0001	0.0004	0.4103			1.49E-07	1.48E-07			0.4109
BNF-B-FILT-2		0.0001	0.0001	0.0004	0.4103			1.49E-07	1.49E-07			0.4109
BNF-B-FILT-5		0.0001	0.0001	0.0006	0.5086			1.84E-07	1.84E-07			0.5094
BNF-B-2-ALK				0.0001	0.1154			4.18E-08	4.18E-08			0.1155
BNF-B-FILT-1		0.0001	0.0001	0.0004	0.4103			1.49E-07	1.49E-07			0.4109
BNFL-B-3		0.002504	0.002504	0.012947	11.8131			4.28E-06	4.28E-06	1.42E-05		11.83108
BNF-B-3-ALK				0.0002	0.2137			7.74E-08	7.74E-08			0.2139
BNFL-Filtrate6		0.016675	0.016675	0.086208	78.6571			2.85E-05	2.85E-05	9.50E-05		78.77681
BNFL-B-2		0.002504	0.002504	0.012947	11.8131			4.28E-06	4.28E-06	1.42E-05		11.83108
BNFL-B-4		0.002504	0.002504	0.012947	11.8131			4.28E-06	4.28E-06	1.42E-05		11.83108
BNFL-B-1		0.002504	0.002504	0.012947	11.8131			4.28E-06	4.28E-06	1.42E-05		11.83108

Total	0.027191	0.027191	0.140596	128.4448				4.65E-05	4.65E-05	0.000152		128.64
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HNF-3622, Rev. 0

Prepared By: WBMDate: 11/12/98Checked By: J.E. Galt Date: 11-19-98

Drum #9703473

	Co60	Sr90	Y90	Tc99	Cs137	Eu154	Np237	Pu238	Pu239	Pu241	Am241	
A2 value (Ci)	10.8	2.7	1.00E+10	24.3	13.5	13.5	5.41E-03	5.41E-03	5.41E-03	0.27	5.41E-03	
# of A2s	0.060861036	1.86861E-05	0.007691479	2.08E-12	0.000124182	0.0016703	0.00015	2.83E-05	3.11E-04	1.11E-03	0.000162	4.96E-02

Bottle#

												Total
BNF-B-ELU-3		0.0002	0.0002	0.0007	1.0001			3.62E-07	3.62E-07			1.001201
BNFL-Vit-153	0.1	1.0332	1.0332	0.15	1.0001	0.5331	7.60E-06	1.77E-04	1.31E-04	1.11E-03	0.0069	3.857928
BNFL-B-ELU-2		0.0001	0.0001	0.0007	0.6069			2.20E-07	2.20E-07			0.6078
BNFL-Vit-154	0.1	1.0332	1.0332	0.15	1.0001	0.5331	7.60E-06	1.77E-04	1.31E-04	1.11E-03	0.0069	3.857928
BNF-B-ELU-1		0.0001	0.0001	0.0007	0.6069			2.20E-07	2.20E-07			0.6078
BNFL-Vit-163A	0.001771	18.29659	18.29659	2.656665	17.7111	0.944104	0.000135	0.001298	0.005606	0.040692	0.253957	58.20851
BNFL-Vit-155A		4.95E-05	4.95E-05	0.000256	0.23336			8.45E-08	8.45E-08		2.82E-07	0.233715
BNFL-Vit-156A	3.91E-05	0.403554	0.403554	0.058596	0.39064	0.020823	2.99E-06	2.86E-05	0.000124	0.000898	0.00056	1.28E+00
Total	0.2018101	20.7669935	20.76699	3.017617	22.5492	2.031127	0.000153	1.68E-03	5.99E-03	0.043814	0.268317	69.6537

A-10

HNF-3622, Rev. 0

APPENDIX B
RADCALC FILE

HNF-3622, Rev. 0

Radcalc for Windows 2.01

Date: 11-19-98 09:27

Performed By: *W.A. McGinnis* 11/19/98

Checked By: *J.E. Calver* 11/19/98

Input File: SAV_WATT.RAD - Initial Source
Isotope Data Output File: SAV_WATT.DAT

ISOTOPE	ACTIVITY (Bq)	ACTIVITY (Ci)	SPECIFIC ACTIVITY (Ci/g)	QUANTITY (g)	HEAT PROD FACTOR (Watts/Ci)	DECAY HEAT (Watts)	A2 (Ci)	# of A2s
Sr-90	3.40E+009	9.20E-002	1.41E+002	6.52E-004	1.16E-003	1.07E-004	2.70E+000	3.41E-002
+Y-90	3.37E+009	9.10E-002	5.43E+005	1.68E-007	5.54E-003	5.04E-004	daughter	daughter
Cs-137	1.19E+010	3.21E-001	8.70E+001	3.69E-003	1.11E-003	3.57E-004	1.35E+001	2.38E-002
+Ba-137m	1.12E+010	3.04E-001	5.38E+008	5.65E-010	3.93E-003	1.19E-003	daughter	daughter
***Pu-238	6.22E+006	1.68E-004	1.70E+001	9.88E-006	3.31E-002	5.57E-006	5.41E-003	3.11E-002
***Pu-239	3.00E+007	8.10E-004	6.20E-002	1.31E-002	3.11E-002	2.52E-005	5.41E-003	1.50E-001
*Am-241	1.89E+008	5.10E-003	3.43E+000	1.49E-003	3.34E-002	1.70E-004	5.41E-003	9.43E-001
TOTALS:	3.01E+010	8.14E-001		1.89E-002		2.36E-003		1.18E+000
	1.55E+010	4.19E-001	(excluding daughters)					
Total Fissile Radionuclides				1.31E-002 g				

+ Daughter

* TRU Radionuclide

*** TRU and Fissile Radionuclides

Shipping papers and labels:

ISOTOPE	Number of A2s	Fraction of Total A2s	Cumulative Total A2s
* Am-241	9.43E-001	7.98E-001	0.798000
* Pu-239	1.50E-001	1.27E-001	0.924741
* Sr-90	3.41E-002	2.88E-002	0.953585
Pu-238	3.11E-002	2.63E-002	0.979872
Cs-137	2.38E-002	2.01E-002	1.00000
Y-90	0.00E+000	0.00E+000	1.00000
Ba-137m	0.00E+000	0.00E+000	1.00000

* Contains 95% of the total number of A2s and must be included per 49 CFR 173.433.

DISTRIBUTION SHEET

To	From	Page 1 of 1
Distribution	Packaging Engineering	Date Nov. 19, 1998
Project Title/Work Order		EDT No. 622971
Safety Evaluation for Packaging (Onsite) Savannah River Sample Drums (HNF-3622, Rev. 0)		ECN No. NA

Name	MSIN	Text With All Attach.	Text Only	Attach./ Appendix Only	EDT/ECN Only
R. L. Clawson	H1-14	X			
J. G. Field	H1-15	X			
T. A. Frazier	T6-20	X			
W. A. McCormick	H1-15	X			
J. E. Mercado	H1-15	X			
T. Romano	H1-15	X			
R. J. Smith	H1-15	X			
M. R. Turner	H1-15	X			
J. L. Westcott	T3-04	X			
HNF-2622 File	H1-15	X			
RL Reading Room	H2-53	X			
Work Control (D. Kelly)	H1-15				X
Central Files	B1-07	X			