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Feed Composition For The Sodium-Bearing Waste Treatment Process

C. M. Barnes

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Idaho National Engineering and Environmental Laboratory
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Idaho National Engineering and Environmental Laboratory
High-Level Waste Program Division
Idaho Falls, Idaho 83415

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ABSTRACT

Treatment of sodium-bearing waste (SBW) at the Idaho Nuclear Technology and Engineering Center (INTEC) within the Idaho National Engineering and Environmental Laboratory is mandated by the Settlement Agreement between the Department of Energy and the State of Idaho. One of the requirements of the Settlement Agreement is to complete treatment of SBW by December 31, 2012. To support both design and development studies for the SBW treatment process, detailed feed compositions are needed. This report presents the expected compositions of these feed streams and the sources and methods used in determining them.

SUMMARY

A sodium-bearing waste (SBW) treatment facility will treat liquid wastes contained in existing and new tanks at the Idaho Nuclear Technology and Engineering Center (INTEC). Unless removed before treatment, a small amount of solids will be entrained in these liquid feed streams. The treatment facility may also treat solids that have settled to the bottom or collected on the sides of existing tanks. Based on current plans these wastes will be treated by vitrification.

This report presents the most recent compilation of volumes and compositions of these feed streams. As new characterization data are received and as changes are made in INTEC Tank Farm management plans, this report will be updated. The report identifies the assumptions and source documents used in calculating the treatment process feed compositions.

Current management plans show that the vitrification facility will treat waste that has been collected in a New Tank Farm. Liquid waste from most existing tanks are planned to be transferred to new tanks in 2010. Waste transferred from three tanks—WM-180, WM-188, and WM-189—will constitute more than 80% of the total tank waste processed in the vitrification facility. Wastes from other tanks and concentrated newly generated liquid waste constitutes the balance of the vitrification facility's liquid feed.

A study is in progress to determine the number of tanks and size of tanks for the New Tank Farm. It is expected, though not certain, that when waste is transferred to the New Tank Farm, wastes from existing tanks will be blended to produce a nearly homogeneous composition of waste that will be fed to the treatment facility.

Fewer data are available for tank solid compositions and quantities than for SBW liquid compositions and quantities. Heel solids compositions are based on samples from three of the ten existing Tank Farm tanks. Recent data for the composition of undissolved solids suspended in liquid transferred out of the Tank Farm are available for only one tank.

Projections have been made of the volumes of newly generated liquid waste (NGLW) streams generated prior to and during operation of the vitrification facility. For some of these NGLW streams, chemical composition data are available and have been used in generating vitrification facility feed compositions. However, data for radionuclide concentrations in NGLW are extremely limited. Thus, radionuclide concentrations in vitrification feeds are based solely on data from existing tanks.

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TABLES

ACRONYMS

ANN	aluminum nitrate nonahydrate
HLLWE	High-Level Liquid Waste Evaporator
INTEC	Idaho Nuclear Technology and Engineering Center
LDUA	light-duty utility arm
NGLW	newly generated liquid waste
NWCF	New Waste Calcining Facility
PEW	process equipment waste
PEWE	Process Equipment Waste Evaporator
SBW	sodium-bearing waste
UDS	undissolved solids

Feed Composition for the Sodium-Bearing Waste Treatment Process

1. INTRODUCTION

Radioactive liquid waste has been generated over the last five decades at the Idaho Nuclear Technology and Engineering Center (INTEC), formerly called the Idaho Chemical Processing Plant (ICPP), as a result of reprocessing activities. From December 1963 until May 2000, the liquid waste was processed by the Waste Calcining Facility (WCF) and the New Waste Calcining Facility (NWCF) into a granular, solid form. As of April 30, 2001, approximately 1.1 million gallons of liquid waste remains in INTEC tanks. Additional liquid waste will be generated in the future as a result of filter leach operations, equipment and building decontamination activities, Resource Conservation and Recovery Act (RCRA) closure activities, and other operations at the Idaho National Engineering and Environmental Laboratory (INEEL).

An Environmental Impact Statement and Record of Decision addressing this liquid waste is expected to be completed later this year and specify vitrification as the preferred treatment process for the waste. To support both design and development studies for this treatment process, detailed feed compositions are needed. This report presents the expected compositions of these feed streams and the sources and methods used in estimating them.

1.1 Primary Sources and Methods

The primary sources of information used in generating projected feedstock compositions are presented below.

Tank Farm management plans, including planned tank farm operations, present tank volumes, and waste generation volumes:

1. W. B. Palmer, W. B. McNaught, C. B. Millet, M. D. Staiger, F. S. Ward, *INTEC Waste Management Through 2070*, INEEL/EXT-2000-01005, December, 2000.

2. C. B. Millet, unpublished Excel spreadsheet, "IPABS-2001-DirVit of SBW in 2012B.xls," May 31, 2001.

3. C. B. Millet, unpublished Excel spreadsheet, "DirVit of SBW in 2016-for-2070rev1b.xls," May 30, 2001.

Present Tank Farm compositions:

4. M. D. Staiger, C. B. Millet, R. A. Nichelson, R. A. Wood, A. Chambers, "Tank Farm Facility, Tank and Waste Data," Engineering Design File EDF-1598, February 27, 2001.

5. J. D. Christian, Composition and Simulation of Tank WM-180 Sodium-Bearing Waste at the Idaho Nuclear Technology and Engineering Center, INEEL/EXT-2001-00600, May, 2001.

6. M. Patterson, Light Duty Utility Arm Deployment in Tank WM-188, INEEL/EXT-99-01302, December, 1999.

7. A. Poloski, "Solids Characterization," Engineering Design File EDF-TST-001, September 20, 2000.

Newly Generated Liquid Waste Compositions:

8. J. L. Tripp, Supporting Information for the INEEL Liquid Waste Management Plan, Appendix B, INEEL/EXT-98-00730, July, 1998.

9. H. C. Wood, "Results of Balance of Plant Sampling in FY-99 and FY-00," INEEL Interoffice Memorandum HCW-01-00, September 27, 2000.

The general procedure used in calculating feed compositions was to compile compositions of wastes in existing tanks from References 4 through 7 and in newly generated liquid waste (NGLW) streams from References 8 and 9. Based on projected volumes for NGLW and planned events such as tank farm transfers, tank flushes, and waste evaporations given in References 2 and 3, the total volume of vitrification facility feed was broken into fractions of source wastes. Compositions of the final tank wastes were then calculated by blending the appropriate source wastes. ASPEN Plus, the process steady-state simulation program, was used to simulate evaporation of NGLW streams and Tank Farm wastes. The model used in the ASPEN simulations was similar to that used by Schindler[10] and used property data determined by Schindler to simulate INTEC evaporator operations.[11]

1.2 Feeds to the Vitrification Treatment Process

This section discusses feeds to the vitrification treatment process based on two processing scenarios: (a) processing liquid waste from October 2011 through November 2013 and processing additional liquid waste April 2016 through July 2016 and (b) processing all waste in the New Tank Farm without interruption from June 2016 through July 2018. The first of these scenarios is referred to as the *2012 Schedule*, the second as the *2016 Schedule*. Feeds will be supplied to the vitrification facility from tanks in the New Tank Farm. According to either the 2012 Schedule or the 2016 Schedule, wastes from existing tanks will be transferred to the new tanks in 2010. Several configurations of new tanks (number and sizes) are presently being evaluated. Section 2.6 briefly discusses possible feed blending and compositional variation due to transfers to the New Tank Farm.

1.2.1 Feeds Based on the 2012 Schedule (Reference 2)

During October 2011 through November 2013, the vitrification facility will process about 931,000 gallons of concentrated waste from the New Tank Farm. At the beginning of the vitrification campaign, the New Tank Farm will contain approximately 967,000 gallons. During the vitrification campaign, about 8,000 gallons of concentrated waste will be added to the tank farm; thus, about 44,000 gallons of concentrated wastes will remain in the New Tank Farm at the end of the first vitrification campaign.

In the second vitrification campaign, April 2016 through July 2016, the vitrification facility will process an additional 119,000 gallons to complete the processing of liquid waste in the New Tank Farm. At this time, the new solids tank will contain approximately 75,000 gal of 15 wt% solids, which will be processed in a third campaign or held for processing later with calcine.

In this scenario, the vitrification facility would be designed for three feeds: (1) 931,000 gallons that will contain a high percentage of SBW and a small fraction of NGLW, (2) 119,000 gallons of waste that will contain a small fraction of SBW and a large fraction of NGLW, and (3) 75,000 gallons of slurry containing tank solids and dilute interstitial liquid waste.

1.2.2 Feeds for the 2016 Schedule (Reference 3)

Based on the 2016 schedule, the new tanks will contain approximately 1,025,000 gallons of concentrated waste plus 75,000 gallons of solids slurry at the start of the vitrification facility hot operation in June 2016. During waste treatment, about 36,000 gallons of concentrated waste (NGLW plus final heel pump-out from WM-187, -188, -189 and -190) are added to the New Tank Farm. The vitrification facility will process about 1,060,000 gallons of concentrated liquid waste plus the 75,000 gallons of slurry. For this scenario, the treatment facility will need to be designed for two types of feed, the concentrated liquid waste that will vary slightly in compositions due to additions of waste during the campaign, and the heel solids slurry.

2. LIQUID WASTE COMPOSITION

This section discusses the sources and amounts of wastes that will be in tanks fed to the treatment process. It also projects compositions of the liquid in these tanks and the basis for calculating these compositions.

2.1 Source Streams

Tables 1 through 10 show volumes of waste in the present Tank Farm, from July 1999 until closure activities have been completed. July 1999 was chosen as the beginning date to be consistent with M. D. Staigers' Tank Farm Composition database.[4] Three sets of volumes are shown. The first two sets are based on C. Millet's Tank Farm planning spreadsheets for the 2012 schedule and the 2016 schedule.[2,3] The third set of volumes, "Barnes Adjusted" was used in projecting future tank waste compositions. Adjustments from the volumes in Millet's spreadsheets were made for two reasons. First, ASPEN Plus results of certain evaporations showed different concentration factors than assumed by Millet. Second, Millet assumes 15,000 gallons of heel remaining in WM-187 and WM-188 after flushing; this document assumes only 5,000 gallons. This reduced volume is consistent with the heel volume after flushing for the other tanks. Also, the estimated volume of heel solids that will be in WM-187 is about 2900 gallons and in WM-188 only 200 gallons. Millet perhaps increased the heel volume in these two tanks to account for heel solids. However, because of the large uncertainties in heel solids volume estimates and because the estimated volumes are negligibly small compared to liquid waste volumes, all volumes shown in the tables below under "Barnes Adjusted" represent liquid only.

Tables 1 through 10 also show stream identifiers for each unique waste composition. For several of the tanks, all three sets of volumes are identical.

Green indicates additions to tanks.

Red indicates waste removed.

Blue indicates volumes of waste sent to evaporators.

Gray shade indicates differences between the 2012 and 2016 planning estimates.

Yellow shade indicates volumes adjusted from Millet's estimates.

Table 1. WM-180 waste volumes and composition identifiers.

Description	Millet 2016 (gal)	Millet 2012 (gal)	Barnes Adjusted (gal)	Composition Identifier	
				Liquids	Solids
Volume July 1999	278,600	278,600	278,600	WM-180-1	WM-180-H
Transfer to NWCF for sampling June 2000	2,600	2,600	2,600	WM-180-1	
Volume July 2000	276,000	276,000	276,000	WM-180-1	WM-180-H
Transfer to New Tank Farm 1, March 2010	271,000	271,000	271,000	WM-180-1	
Volume April 2010	5,000	5,000	5,000	WM-180-1	WM-180-H
Flush water added, March 2011	100,000	100,000	100,000	Water	
Flush water removed, March 2011	100,000	100,000	100,000	WM-180-F	WM-180-H
(Flushed to New TF 3, then evaporated and New TF 1)	5,000	5,000	5,000	WM-180-FH	
sent to New TF 1)					
Pump out to New TF 2 Oct 2012 - March 2013	5,000	5,000	5,000	WM-180-FH	
	0	0	0		

The composition in tank WM-180 will remain unchanged until after the tank contents are transferred to the New Tank Farm, and the tank is flushed. A total of four compositions represent waste, present and future, in or from WM-180: the existing liquid waste composition, the solids composition, the waste flushed from the tank, and the liquid heel remaining in the tank after flushing.

Table 2. WM-181 waste volumes and composition identifiers.

Description	Millet 2016 (gal)	Millet 2012 (gal)	Barnes Adjusted (gal)	Composition Identifier	
				Liquids	Solids
Volume July 1999	275,900	275,900	275,900	WM-181-1	WM-181-H
Actual volume September 2000	271,000	271,000	271,000	WM-181-1	WM-181-H
WM-181/WM-186 evaporation, 2001	134,100	134,100	134,100	WM-181-1	
WM-181/WM-184 evaporation, 2001	131,900	131,900	131,900	WM-181-1	
Volume October 2001	5,000	5,000	5,000	WM-181-1	WM-181-H
Flush water from WM-183, March 2003	100,000	100,000	100,000	WM-183-F	WM-183-H
Volume, March, 2003	105,000	105,000	105,000	WM-181-2	WM-181-H2
Evaporation, May 2003	99,947	99,947	99,947	WM-181-2	
(assume solids stay in tank during transfer of liquid to evaporator)	5,053	5,053	5,053	WM-181-2	WM-181-H2
NGLW added July 2004 - March 2005	20,587	15,099	20,587	NGLW 1	
Flush water from WM-185, March 2005	100,000	100,000	100,000	WM-185-F	WM-185-H
Volume, March, 2005	125,640	120,152	125,640	WM-181-3	WM-181-H3
Evaporation, May 2005	115,579	115,579	115,579	WM-181-3	
(assume solids stay in tank during transfer of liquid to evaporator)	10,061	4,573	10,061	WM-181-3	WM-181-H3
Flush water from WM-186, March 2006	100,000	100,000	100,000	WM-186-F	WM-186-H
Volume, March 2006	110,061	104,573	110,061	WM-181-4	WM-181-H4
Evaporation, May 2006	104,779	99,572	104,779	WM-181-4	
(assume solids stay in tank during transfer of liquid to evaporator)	5,282	5,001	5,282	WM-181-4	WM-181-H4
From pump-out of WM-184	4,890	4,890	4,890	WM-184-F	
From pump-out of WM-185	5,000	5,000	5,000	WM-185-F	
From pump-out of WM-186	5,000	5,000	5,000	WM-186-F	
Volume, April 2007	20,172	19,891	20,172	WM-181-5	WM-181-H4
Transfer to New Tank Farm via solids tank, August 2010	15,172	14,891	15,172	WM-181-5	WM-181-H4
Volume, September 2010	5,000	5,000	5,000	WM-181-5	WM-181-H4
Flush water added, March 2012	100,000	100,000	100,000	Water	
Flush water removed, March 2012	100,000	100,000	100,000	WM-181-F	WM-181-H4
(Flushed to New TF 3 then evaporated and sent to New TF 1)	5,000	5,000	5,000	WM-181-FH	
Pump out of final heel, Oct 2012 - March 2013 (to New TF 2)	5,000	5,000	5,000	WM-181-FH	
	0	0	0		

Waste in WM-181 is being evaporated in the HLLWE in 2001. Once emptied to heel level, the tank will receive flushes from other tanks, plus some NGLW. Periodically, the dilute wastes in WM-181 will be evaporated. It is assumed that when waste is transferred to the HLLWE, negligible solids are carried with the dilute liquid waste to the evaporator. Hence, solids will build up in WM-181 as the flushes from other tanks are received. In 2010, about 15,000 gallons of liquid waste in WM-181 will be transferred to the New Tank Farm. The solids in WM-181 will be flushed later to the solids tank in the New Tank Farm. Owing to the additions to WM-181 and transfers to evaporators, 11 distinct compositions will be present at different times in the tank: 7 liquid waste compositions and 4 solids compositions.

Table 3. WM-182 waste volumes and composition identifiers.

Description	Millet 2016 (gal)	Millet 2012 (gal)	Barnes Adjusted (gal)	Composition Identifier	
				Liquids	Solids
Volume July 1999	6,400	6,400	6,400	WM-182-1	WM-182-H
Corrected to actual volume, June 2000	7,300	7,300	7,300	WM-182-1	WM-182-H
Transfer to WM-187, April 2001	2,300	2,300	2,300	WM-182-1	
(assume no solids transferred)	5,000	5,000	5,000		
Flush water added, March 2002	100,000	100,000	100,000	Water	
Flush water removed, March 2002	100,000	100,000	100,000	WM-182-F	WM-182-H
(Flushed to WM-187)	5,000	5,000	5,000	WM-182-FH	
Pump out of final heel, October 2002 - March 2003	5,000	5,000	5,000	WM-182-FH	
(to WM-187)	0	0	0		

Tank WM-182 will be flushed in 2002 and closed in early 2003. Like WM-180, four compositions represent the waste, present or future, in or from WM-182.

Table 4. WM-183 waste volumes and composition identifiers.

Description	Millet 2016 (gal)	Millet 2012 (gal)	Barnes Adjusted (gal)	Composition Identifier	
				Liquids	Solids
Volume July 1999	30,900	30,900	30,900	WM-183-1	WM-183-H
Transfer to WM-185, December 1999	18,500	18,501	18,502	WM-183-1	
(assume no solids transferred)	12,400	12,399	12,398	WM-183-1	WM-183-H
Corrected to actual volume, June 2000	13,000	13,000	13,000	WM-183-1	WM-183-H
Transfer to WM-187, May 2001	8,000	8,000	8,000	WM-183-1	
(assume no solids transferred)	5,000	5,000	5,000	WM-183-1	WM-183-H
Flush water added, March 2003	100,000	100,000	100,000	Water	
Flush water removed, March 2003 (Flushed to WM-181)	100,000	100,000	100,000	WM-183-F	WM-183-H
	5,000	5,000	5,000	WM-183-FH	
Pump out of final heel, October 2003 - March 2004	5,000	5,000	5,000	WM-183-FH	
(to WM-187)	0	0	0		

Table 5. WM-184 waste volumes and composition identifiers.

Description	Millet 2016 (gal)	Millet 2012 (gal)	Barnes Adjusted (gal)	Composition Identifier	
				Liquids	Solids
Volume July 1999	262,600	262,600	262,600	WM-184-1	WM-184-H
Sent to HLLWE, 2001	257,710	257,710	257,710	WM-184-1	
	4,890	4,890	4,890	WM-184-1	WM-184-H
Flush water added, March 2004	100,000	100,000	100,000	Water	
Flush water removed, March 2004	100,000	100,000	100,000	WM-184-F	WM-184-H
(Flushed to WM-187)	4,890	4,890	4,890	WM-184-FH	
Pump out to WM-181 Oct, 2006 - March 2007	4,890	4,890	4,890	WM-184-FH	
	0	0	0		

Table 6. WM-185 waste volumes and composition identifiers.

Description	Millet 2016 (gal)	Millet 2012 (gal)	Barnes Adjusted (gal)	Composition Identifier	
				Liquids	Solids
Volume July 1999	20,600	20,600	20,600	WM-185-1	WM-185-H
Received from WM-183, December 1999	22,300	22,300	22,300	WM-183-1D	
	42,900	42,900	42,900	WM-185-2	WM-185-H
Corrected to actual volume, February 2000	43,100	43,100	43,100	WM-185-2	WM-185-H
Transferred to WM-187, November 2001	38,100	38,100	38,100	WM-185-2	
	5,000	5,000	5,000	WM-185-2	WM-185-H
Flush water added, March 2005	100,000	100,000	100,000	Water	
Flush water removed, March 2005	100,000	100,000	100,000	WM-185-F	WM-185-H
(Flushed to WM-181)	5,000	5,000	5,000	WM-185-FH	
Pump out to WM-181 October 2006 - March 2007	5,000	5,000	5,000	WM-185-FH	
	0	0	0		

Table 7. WM-186 waste volumes and composition identifiers.

Description	Millet 2016 (gal)	Millet 2012 (gal)	Barnes Adjusted (gal)	Composition Identifier	
				Liquids	Solids
Volume July 1999	281,500	281,500	281,500	WM-186-1	WM-186-H
Sent to HLLWE, 2001	276,500	276,500	276,500	WM-186-1	
	5,000	5,000	5,000	WM-186-1	WM-186-H
Flush water added, March 2006	100,000	100,000	100,000	Water	
Flush water removed, March 2006	100,000	100,000	100,000	WM-186-F	WM-186-H
(Flushed to WM-181)	5,000	5,000	5,000	WM-186-FH	
Pump out to WM-181 October 2006 - March 2007	5,000	5,000	5,000	WM-186-FH	
	0	0	0		

Tables 4, 5, 6, and 7 show, four distinct waste compositions, present or future, in or from each of tanks WM-183, -184, -185 and -186. The composition of stream WM-183-1D, a transfer of waste from WM-183 to WM-185, is calculated assuming a 5% steam jet dilution.

In present Tank Farm management plans, tank WM-187 receives most of the NGLW generated through 2005 and also receives heel flushes from WM-182 and WM-184.

The single difference between the 2012 and 2016 schedule spreadsheets (References 2 and 3) in terms of tank volumes up until 2012 is the destination of a portion of NGLW generated in 2005. In the 2016 schedule, about 5500 gallons of the 2005 NGLW is sent to WM-187, while in the 2012 schedule, the same waste is sent to WM-181. If sent to WM-181, this NGLW is part of waste that is evaporated, and the concentrate sent to WM-187. If sent to WM-187, the NGLW is not evaporated, as no evaporation of waste in WM-187 is planned after 2004.

Adjustments to Millets' volumes include the following:

- The volume of waste transferred from WM-185 to WM-187 in November 2001 was increased to account for steam jet dilution
- The volume of WM-187 waste evaporated in late 2001 was increased by 1.4%
- The volume of waste returned to WM-187 from the 2004 WM-187 evaporation was increased from 12,000 to 26,487 gallons. This change was necessitated because a volume limit was reached in the previous destination of this waste, WM-189. If insufficient surge capacity is available to hold this waste prior to its return to WM-187, additional changes could be made to convert WM-187 to a concentrated waste tank early, sending previously planned dilute wastes to WM-181 instead of WM-187.
- The volume of waste transferred from WM-187 to the New Tank Farm concentrated waste tanks was increased, leaving a heel in WM-187 of 5000 gallons as liquid.

Table 8. WM-187 waste volumes and composition identifiers.

Description	Millet 2016 (gal)	Millet 2012 (gal)	Barnes Adjusted (gal)	Composition Identifier	
				Liquids	Solids
Volume July 1999	49,600	49,600	49,600	WM-187-1	WM-187-H
Received from WM-185, November 2001	38,100	38,100	40,005	WM-185-2D	
	87,700	87,700	89,605	WM-187-2	WM-187-H
NGLW, 1999-2000	119,685	119,685	119,685	NGLW 2	
	207,385	207,385	209,290	WM-187-3	WM-187-H
Sent to HLLWE, November -Dec, 2001	191,700	191,700	194,290	WM-187-3	
	15,685	15,685	15,000	WM-187-3	WM-187-H
Flush from WM-182	100,000	100,000	100,000	WM-182-F	WM-182-H
NGLW, 2002	39,531	39,531	39,531	NGLW 3	
	155,216	155,216	154,531	WM-187-4	WM-187-H2
Sent to HLLWE, June-July 2002	135,110	135,110	135,110	WM-187-4	
	20,106	20,106	19,421		
Pump-out from WM-182, 2003	5,000	5,000	5,000	WM-182-FH	
Pump-out from WM-183, 2004	5,000	5,000	5,000	WM-183-FH	
Flush from WM-184	100,000	100,000	100,000	WM-184-F	WM-184-H
NGLW, 2002-2004	41,298	41,298	41,298	NGLW-4	
	171,404	171,404	170,719	WM-187-5	WM-187-H3
Sent to HLLWE, June-July, 2004	143,189	143,189	143,189	WM-187-5	
	28,215	28,215	27,530	WM-187-5	WM-187-H3
Concentrate returned from 2004 evaporation	12,000	12,000	26,487	AS-5Conc	
Concentrate from WM-181 evap, 2005	2,842	2,842	2,842	AS-7Conc	
Concentrate from WM-181 evap, 2006	5,239	4,979	5,239	AS-8Conc	
NGLW, 2005	166	5,654	166	NGLW-5	
	48,462	53,690	62,264	WM-187-6	WM-187-H3
Transfer to New TF 1, June 2010	33,462	38,690	57,264	WM-187-6	
	15,000	15,000	5,000		
Flush water added, March 2014	100,000	100,000	100,000	Water	
Flush water removed, March 2014	100,000	100,000	100,000	WM-187-F	WM-187-H3
(Flushed to New Tank Farm)	15,000	15,000	5,000	WM-187-FH	
Pump out of final heel, Oct 2016 - March 2017	15,000	15,000	5,000	WM-187-FH	
	0	0	0		

Table 9. WM-188 waste volumes and composition identifiers.

Description	Millet 2016 (gal)	Millet 2012 (gal)	Barnes Adjusted (gal)	Composition Identifier	
				Liquids	Solids
Volume July 1999	13,500	13,500	13,500	WM-188-1	WM-188-H
Corrected to actual volume, January 2000	13,600	13,600	13,600	WM-188-1	WM-188-H
Concentrate from WM-181/186 evap	70,882	70,882	70,882	AS-1Conc	
Concentrate from WM-181/184 evap	73,753	73,753	73,753	AS-2Conc	
Concentrate from WM-187 evap, 2001	95,850	95,850	95,850	AS-3Conc	
Concentrate from WM-187 evap, 2002	25,310	25,310	25,310	AS-4Conc	
Concentrate from WM-181 evap, 2005	2,937	2,937	2,937	AS-7Conc	
NGLW, 2000-2005	1,335	1,335	1,335	NGLW-6	
	283,667	283,667	283,667	WM-188-2	WM-188-H
Transfer to New TF 1, April 2010	268,667	268,667	278,667	WM-188-2	
	15,000	15,000	5,000	WM-188-2	WM-188-H
Flush water added, March 2014	100,000	100,000	100,000	Water	
Flush water removed, March 2014	100,000	100,000	100,000	WM-188-F	WM-188-H
	15,000	15,000	5,000	WM-188-FH	
Pump out of final heel, Oct 2016 - March 2017	15,000	15,000	5,000	WM-188-FH	
	0	0	0		

Tank WM-188 receives evaporator concentrates from other tanks. The only adjustment made in volume estimates was to increase the volume of transfer to the New Tank Farm, leaving a heel of 5,000 rather than 15,000 gallons. Assuming negligible heel solids present in evaporator concentrates added to WM-188, the solids that will be present in WM-188 are expected to add only a negligible volume to the heel.

Like WM-188, tank WM-189 receives evaporator concentrates from other tanks and highly concentrated NGLW. Results of an ASPEN Plus simulation of WM-181/WM-184 evaporation indicates that the concentration factor assumed by Millet for this evaporation may not be achievable. Based on the ASPEN results, the volume of concentrate sent to WM-189 from the WM-181/-184 evaporation was increased. To keep the total waste in WM-189 within the specified volume limit for this tank, the volume of concentrate from the 2005 evaporation of waste from WM-187 sent to WM-189 was reduced to zero.

Table 10. WM-189 waste volumes and composition identifiers.

Description	Millet 2016 (gal)	Millet 2012 (gal)	Barnes Adjusted (gal)	Composition Identifier	
				Liquids	Solids
Volume July 1999	100,400	100,400	100,400	WM-189-1	WM-189-H
Processed in NWCF, 2000	85,500	85,500	85,500	WM-189-1	
NGLW, 1999-2000	5,200	5,200	5,200	NGLW-7	
Transfer from WM-180 sampling	2,500	2,500	2,500	WM-180-1D	
	22,600	22,600	22,600	WM-189-2	WM-189-H
Concentrate from WM-181/186 evap	117,817	117,817	117,817	AS-1Conc	
Concentrate from WM-181/184 evap	114,646	114,646	133,597	AS-2Conc	
Concentrate from WM-181 evap, 2003	4,998	4,998	4,998	AS-6Conc	
Concentrate from WM-181 evap, 2005	21,389	21,389	0	AS-5Conc	
NGLW, 2000-2005	1,000	1,000	1,000	NGLW-6	
	282,450	282,450	280,012	WM-189-3	WM-189-H
Transfer to New TF 1, May 2010	277,450	277,450	275,012	WM-189-3	
	5,000	5,000	5,000	WM-189-3	WM-189-H
Flush water added, March 2015	100,000	100,000	100,000	Water	
Flush water removed, March 2015	100,000	100,000	100,000	WM-189-F	WM-189-H
	5,000	5,000	5,000	WM-189-FH	
Pump out of final heel, Oct 2016 - March 2017	5,000	5,000	5,000	WM-189-FH	
	0	0	0		

Table 11. WM-100/101/102 waste volumes and composition identifiers.

Description	Millet 2016 (gal)	Millet 2012 (gal)	Barnes Adjusted (gal)	Composition Identifier	
				Liquids	Solids
NGLW, 2000-2010	35,298	35,298	35,298	WM-100-1	
Transfer to New TF 1, July 2010	35,298	35,298	35,298	WM-100-1	
	0	0	0		

Tanks WM-100, -101, and -102 receive NGLW. As of 2005, the total volume of wastes in these three tanks is about 3,200 gallons. Millet assumes the waste sent to these three tanks is periodically evaporated and returned to the same set of tanks. In 2010, all the waste in these three tanks is transferred to the concentrated waste tanks in the New Tank Farm.

The New Tank Farm will include three types of tanks: tanks for concentrated wastes, tanks for dilute wastes and a tank for solids, which will be stored as a slurry. Tables 12 through 14 show estimates of volumes in the concentrated waste tanks (called *New TF 1*), dilute waste tanks (*New TF 2*) and solids tank (*New TF 3*). Only wastes generated through 2012 are shown in Tables 12-13.

Table 12. Concentrated waste tanks in the New Tank Farm: waste volumes and composition identifiers.

Description	Millet 2016 (gal)	Millet 2012 (gal)	Barnes Adjusted (gal)	Composition Identifier (Liquids)
Transfer from WM-180, March 2010	284,550	284,550	284,550	WM-180-1D
Transfer from WM-188, April 2010	282,100	282,100	292,600	WM-188-2D
Transfer from WM-189, May 2010	291,323	291,323	288,763	WM-189-3D
Transfer from WM-187, June 2010	35,135	40,625	60,127	WM-187-6D
Transfer from WM-100/1/2, July 2010	37,063	37,063	37,063	WM-100-1D
Transfer from WM-181, August 2010	15,931	15,636	15,931	WM-181-5D
NGLW, 2010-2013	2,000	2,000	2,000	NGLW-8
Evaporation of New TF-2, 2011	14,799	14,799	7,841	AS-9Conc
Evaporation of New TF-2, 2012	7,267	7,267	4,560	AS-10Conc
	970,167	975,362	993,435	Vit-1
Vitrification Feed 1		931,085	960,000	Vit-1
		44,277	33,435	Vit-1

Table 12 shows that the initial feed to the vitrification facility is a blend of feeds from nine sources. Based on ASPEN results, much higher concentration factors were achieved for the 2011 and 2012 evaporations of dilute waste than assumed by Millet, and hence these evaporator concentrate volumes were adjusted.

Table 13. Dilute waste tank in the New Tank Farm: waste volumes and composition identifiers.

Description	Millet 2016 or 2012 (gal)	Solids to New TF-3 (gal)	Liquid to New TF-2 (gal)	Composition Identifier (Liquids)
WM-180 Flush	100,000	9,179	90,821	WM-180-F
NGLW 2009-11	25,118		25,118	NGLW-9
	125,118	9,179	115,939	NT 2-1
To evaporation, 2011	111,337		111,337	NT 2-1
	13,781	9,179	4,602	NT 2-1
NGLW, 2011-12	15,635		15,635	NGLW-10
WM-181 Flush	100,000	44,877	55,123	WM-180-F
	129,416	54,056	75,360	NT 2-2
To evaporation, 2012	115,195		64,146	NT 2-2
	14,221		11,214	NT 2-2

Table 14. Solids waste tank in the New Tank Farm: waste volumes and composition identifiers.

Solids in	From Tanks	Date Transferred	Equivalent Depth (in.)	Fraction	Solids (gal)	Volume As Slurry (gal)	Cumulative New Slurry Tank Volume (gal)
-180	-180	2011	4.5	0.122	1,400	9,200	9,200
-181	-181, 183, 185, 186	2012	22.0	0.592	6,700	44,900	54,100
-187	-182, 184, 187	2014	9.5	0.257	2,900	19,400	73,500
-188	-188	2014 2015	0.5	0.0135	150	1,000	74,500
-189	-189	2015	0.5	0.0135	150	1,000	75,500

Table 15. Post 2015 waste volumes and composition identifiers.

Description	2016 Schedule (gal)	2012 Schedule (gal)	Composition Identifier
Residual in TF 1	993,435	33,435	Vit-1
Residual in TF 2, after evaporation	797	797	AS-10Conc
Residual in TF 3, 15% slurry			
Final heel from WM-187 (Conc.)	41	41	WM-187-6
Final heel from WM-188 (Conc.)	41	41	WM-188-2
Final heel from WM-189 (Conc.)	41	41	WM-189-3
Conc 2013 NGLW	7122	7,122	NGLW-13
Conc 2014 NGLW	18224	18,224	NGLW-14
Conc 2015 NGLW	33924	33,924	NGLW-15
Conc 2016 NGLW	6899	6,899	NGLW-16
Conc 2017 NGLW	6899	6,899	NGLW-17
Conc 2018 NGLW	6949	6,949	NGLW-18
Vit Feed 2 for 2012 schedule		114,372	Vit-2
Vit Feed for 2016 schedule	1,074,372		Vit-3

Table 15 shows that for the 2016 schedule, the total volume of vitrification feed would be about 1,074,000 gallons. For the 2012 schedule, 960,000 gallons of feed would be processed in 2012-13 (see Table 12), and about 110,000 gallons processed in 2016. Solids in the slurry tank (Table 14) would be processed later.

2.2 Newly Generated Liquid Wastes

Tables 1 through 15 show 18 distinct NGLW streams. Millet[2,3] projects volumes of NGLW by stream type and by year. Table 16 shows the breakdown of the total NGLW by stream source over the period 2000 – 2013. Table 16 also identifies whether compositional data are available for each NGLW stream.

Table 16. Breakdown of 2000-2013 NGLW by type.

Rank	Percent of Total	Cumulative Percent	Stream Name	Stream Number (J. Tripp)	Basis for Composition (J. Tripp)	Basis for Composition (H. Wood)
1	20.44	20.44	LET&D Bottoms		No	RCRA only
2	15.67	36.11	Tank Farm Vessel Flushes	0h	No	
3	15.56	51.67	Facility Closure (Undefined)	7e	No	
4	10.11	61.78	NWCF Decon Facility	4d	Yes	RCRA only
5	7.57	69.35	Filter Leach (1st leach)	0k	No	RCRA only
6	3.89	73.24	NWCF Bed Dissolution	0c	No	
7	4.00	77.24	NWCF Ops-Deep Recycle	0d	No	RCRA only
8	3.11	80.35	Tank Farm Line Flushes	0i	No	
9	3.03	83.38	Filter Leach	0l	No	RCRA only
10	2.67	86.04	NWCF Ops-Adsorber Washes	0e	No	RCRA only
11	2.46	88.51	CPP-601 (Lab Drains)	4b	Chemical only	RCRA only
12	2.28	90.78	Calciner Closure Flush-2	0g	No	
13	2.02	92.81	NWCF Turnaround Conc.	0a	No	
14	1.47	94.27	CPP-601/627/640 Deactivation	4e	Chemical only	
15	1.24	95.52	PEW Descale	5f	Chemical only	
16	1.12	96.64	Vault Flush		No	
17	0.77	97.41	Misc. Balance of Plant	7a	No	
18	0.67	98.08	CPP-603 Deactivation	4f	Yes	RCRA only
19	0.44	98.52	TRA-689 Decon Solution	5e	No	
20	0.33	98.85	CPP-603 Basin Water	1k	Yes	
21	0.31	99.17	Deep Tanks Direct	4c	Chemical only	
22	0.16	99.32	Calciner Closure Flush-3	4a	Yes	
23	0.15	99.47	NWCF Turnaround Dilute	0b	No	
24	0.13	99.61	Misc. Deactivation Rinses		No	
25	0.12	99.72	LET&D	3	No	
26	0.11	99.83	Tank Farm Sumps	2b	Yes	
27	0.04	99.88	Pilot Plant	6b	No	
28	0.03	99.91	FAST Operations	1i	No	
29	0.03	99.94	NWCF Ops (NCC-122)	0j	No	
30	0.01	99.95	CPP-603 Operations	1l	Yes	
31	0.01	99.96	PBF Reactor Vessel	1c	No	
32	0.01	99.97	PBF Knockout Drum	1g	No	
33	0.01	99.97	PBF D&D	1f	No	
34	0.01	99.98	PBF Canal	1b	No	
35	0.01	99.99	CPP-604 Sumps	2a	No	
36	0.005	99.99	RCRA Wells (Except Well 18)	1m	Yes	
37	0.005	100.00	NWCF Utility Tunnel	1n	No	

Table 17 shows the fraction of NGLW for which compositional data are available and, with Table 16, forms the basis for assumptions used in estimating NGLW compositions. These assumptions are as follows:

1. Radionuclide concentrations in tank waste containing NGLW are the same as the same tank waste without NGLW. As shown in Table 17, radionuclide data are available for as little as 5.7% and as much as 23.6% of the NGLW of a given year. These low fractions, plus the fact that even the data available include a very limited number of radionuclides, form the basis for this assumption.

2. Chemical compositions of NGLW can be calculated based on, at most, the eighteen streams of highest proportion shown in Table 16. Table 16 shows that eighteen streams constitute 98% of the NGLW produced in the period 2000 through 2013. Table 16 shows that, depending on the year, streams 19–37 contribute from 0.3% to 5.4% to the total NGLW. Thus, data for streams 19 through 37 are not used in composition estimates.

3. The total NGLW chemical composition for any period is estimated based on the known compositions of seven waste streams, along with estimates of Tank Farm flushes. The list of seven known streams was expanded to ten by assuming the three NGLW wastes for which no data were available could be adequately estimated based on data from other NGLW streams. Table 17 shows that these ten wastes contribute between 12.5 to 82% to the total waste. However, when the Tank Farm flush waste is included in the fraction, for which the composition is estimated separately, the fraction for which data are available rises to an average 65% and a range of 42 to 82%. The magnitude of these percentages is too high to justify totally ignoring the available data, although to the degree that they are less than unity, uncertainty is introduced into the resulting composition estimates.

NGLW compositional data from both Tripp[8] and Wood[9] were used to obtain dilute NGLW compositions for these seven waste streams. When both sources contained concentrations for the same chemical species, the concentrations were averaged. Neither source of data included concentrations for a few species expected to be present in the waste, such as iron or calcium. If not available in the data, concentrations for Cl, Fe, K Ca, Na, B, Zr, SO_4 and PO_4 were estimated based on the total dissolved solids in the NGLW and the ratio of each of these species to total dissolved solids in the average present tank farm waste.

Compositions of each of these seven NGLW streams when concentrated were estimated based on ASPEN plus simulations to determine the fractions of nitric acid, chlorides, and mercury that would remain in the concentrated waste. Previous ASPEN simulations have shown that nearly all fluorides are complexed with aluminum and remain in the concentrate. Hence, it was assumed that all fluorides remain in the concentrate. NGLW compositions by year were determined using the compositions of these seven NGLW streams and normalized fractions of the generation volumes of each of these wastes relative to the total NGLW. These compositions are shown in Table 18. The compositions in the table have not been corrected to achieve charge balance or the neutralization reaction that would occur between bicarbonate and acid when the different NGLW streams are mixed.

The 18 NGLW streams needed to calculate tank compositions were then calculated from the compositions shown in Table 18. If a particular NGLW stream was generated over multiple years, the compositions for those years were averaged. Then, if the NGLW stream added to a particular tank was dilute, that is, concentrated by the PEWE but not the HLLWE, the composition was adjusted by doubling the volume and adding the estimated amount of nitric acid, chloride, fluoride, and mercury that would be expected to be lost in the HLLWE evaporation.

Table 17. Availability of newly generated liquid waste compositional data by year.

Year	Fraction for Which Both Chemical and Radiological Data Are Available (%)	Fraction for Which Chemical Data Are Available (%)	Chemical Data Available Plus Tank Farm Vessel Flushes (%)	Total vol% for Streams 19–37 (%)
2000	9.18	81.98	81.98	0.97
2001	6.87	65.13	65.85	0.30
2002	7.22	61.62	71.95	3.26
2003	9.37	48.18	76.64	3.92
2004	10.97	43.10	76.44	0.79
2005	10.98	43.14	76.52	0.69
2006	12.67	34.38	72.90	0.80
2007	21.59	58.57	58.57	1.36
2008	21.59	58.57	58.57	1.36
2009	21.59	58.57	58.57	1.36
2010	21.59	58.57	58.57	1.36
2011	12.58	30.30	68.52	5.38
2012	13.05	31.44	71.10	1.81
2013	23.10	55.66	55.66	1.45
2014	8.93	21.65	76.52	5.41
2015	5.68	12.52	41.99	4.08
2016	23.59	57.20	57.20	1.16
2017	23.59	57.20	57.20	1.16
2018	23.42	56.79	56.79	1.15
Minimum	5.68	12.52	41.99	0.30
Maximum	23.59	81.98	81.98	5.41

Based on a single ASPEN Plus run, the assumed losses to the condensate expressed as fractions of the feed, are as follows:

HNO_3	0.2
HCl	0.15
HF	0.005
Hg	0.02.

Table 18. Newly generated liquid waste compositions by year.

	2000	2001	2002	2003	2004	2005	2006	2007
	mol/liter	mol/liter	mol/liter	mol/liter	mol/liter	mol/liter	mol/liter	mol/liter
H+	3.46E+00	8.20E+00	6.82E+00	5.84E+00	6.11E+00	6.11E+00	5.20E+00	5.39E+00
Al	6.47E-01	8.52E-02	1.68E-01	1.20E-01	1.25E-01	1.25E-01	1.35E-01	1.33E-01
As	3.24E-05	1.33E-06	9.25E-07	2.04E-06	7.82E-07	7.83E-07	5.68E-07	6.13E-07
Ba	1.27E-05	1.61E-05	2.54E-05	1.84E-05	2.00E-05	2.00E-05	2.30E-05	2.24E-05
Be	6.76E-06	2.26E-06	3.94E-06	4.86E-06	3.90E-06	3.90E-06	4.38E-06	4.28E-06
B	1.91E-02	1.71E-03	6.39E-03	1.40E-03	1.99E-03	1.99E-03	2.04E-03	2.03E-03
Br	0.00E+00	4.00E-05	2.27E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Cd	2.60E-04	2.77E-05	1.05E-04	5.30E-05	5.48E-05	5.48E-05	6.32E-05	6.15E-05
Ca	5.79E-03	2.20E-03	4.09E-03	7.35E-04	1.04E-03	1.04E-03	1.07E-03	1.06E-03
Cr	9.88E-04	1.42E-03	1.47E-03	1.08E-03	1.39E-03	1.39E-03	1.34E-03	1.35E-03
Co	1.03E-05	9.40E-05	7.08E-05	3.65E-05	3.66E-05	3.66E-05	1.53E-05	1.98E-05
Cu	2.35E-04	2.95E-04	2.78E-04	4.24E-04	5.24E-04	5.24E-04	5.91E-04	5.77E-04
Ge	0.00E+00	8.99E-08	5.09E-08	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
I	0.00E+00	4.65E-06	2.63E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Fe	1.90E-02	2.13E-03	8.03E-03	1.76E-03	2.50E-03	2.50E-03	2.57E-03	2.55E-03
Pb	1.27E-04	5.51E-05	1.02E-04	8.62E-05	1.06E-04	1.06E-04	1.23E-04	1.19E-04
Hg	6.18E-02	2.14E-04	1.01E-02	2.23E-04	2.46E-04	2.46E-04	2.51E-04	2.50E-04
Mg	0.00E+00	8.94E-05	5.06E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Mn	3.67E-03	3.74E-03	2.98E-03	5.28E-03	7.63E-03	7.63E-03	8.80E-03	8.55E-03
Mo	0.00E+00	2.28E-07	1.29E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Ni	3.12E-04	1.21E-03	1.10E-03	6.51E-04	7.02E-04	7.02E-04	5.11E-04	5.51E-04
K	6.94E-02	1.33E-02	4.17E-02	1.21E-02	1.73E-02	1.73E-02	1.84E-02	1.82E-02
Sb	1.61E-05	2.22E-05	1.26E-05	3.05E-05	4.48E-05	4.48E-05	5.15E-05	5.01E-05
Sc	0.00E+00	5.53E-07	3.13E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Se	4.14E-07	4.31E-07	2.44E-07	1.25E-06	3.03E-07	3.03E-07	3.49E-07	3.39E-07
Ag	6.16E-06	6.32E-06	3.59E-06	1.10E-05	1.28E-05	1.28E-05	1.48E-05	1.44E-05
Si	0.00E+00	5.59E-04	3.17E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Na	3.63E-01	3.04E-01	4.53E-01	1.32E-01	1.36E-01	1.36E-01	1.44E-01	1.42E-01
Sr	0.00E+00	2.05E-06	1.16E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Tl	1.51E-07	8.52E-07	5.91E-07	6.48E-07	3.38E-07	3.38E-07	1.80E-07	2.13E-07
Ti	0.00E+00	4.97E-07	2.81E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
W	0.00E+00	1.51E-07	8.54E-08	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
U	4.75E-05	4.27E-05	3.43E-05	5.74E-05	7.93E-05	7.93E-05	9.15E-05	8.89E-05
V	6.04E-06	9.33E-06	5.54E-06	8.70E-06	1.25E-05	1.25E-05	1.39E-05	1.36E-05
Zn	1.16E-03	1.40E-03	1.40E-03	2.12E-03	2.86E-03	2.86E-03	3.30E-03	3.20E-03
Zr	4.81E-04	1.32E-03	4.97E-03	1.09E-03	1.55E-03	1.55E-03	1.59E-03	1.58E-03
Cl	3.82E-02	6.55E-03	5.58E-03	1.09E-03	1.11E-03	1.11E-03	1.03E-03	1.05E-03
F	5.73E-02	5.65E-02	5.09E-02	4.02E-02	5.09E-02	5.09E-02	5.81E-02	5.66E-02
PO_4	3.52E-03	2.35E-04	1.52E-04	1.95E-04	2.77E-04	2.77E-04	2.84E-04	2.82E-04
SO_4	4.44E-02	9.37E-03	5.50E-03	1.39E-02	1.55E-02	1.55E-02	1.75E-02	1.71E-02
NO_3	5.91E+00	8.57E+00	7.78E+00	6.30E+00	6.60E+00	6.60E+00	5.72E+00	5.91E+00
HCO_3	8.23E-04	1.55E-01	8.79E-02	1.55E-03	2.28E-03	2.28E-03	2.63E-03	2.56E-03
	g/liter	g/liter	g/liter	g/liter	g/liter	g/liter	g/liter	g/liter
TOC	3.84E-01	6.20E-01	4.59E-01	7.90E-01	1.06E+00	1.06E+00	1.19E+00	1.16E+00
UDS	2.37E+00	2.86E+00	1.62E+00	4.85E+00	5.86E+00	5.86E+00	6.76E+00	6.57E+00

Table 18 (continued).

	2008	2009	2010	2011	2012	2013	2014
	mol/liter	mol/liter	mol/liter	mol/liter	mol/liter	mol/liter	mol/liter
H+	5.39E+00	5.39E+00	5.39E+00	4.92E+00	4.92E+00	4.92E+00	4.92E+00
Al	1.33E-01	1.33E-01	1.33E-01	1.39E-01	1.39E-01	1.39E-01	1.39E-01
As	6.13E-07	6.13E-07	6.13E-07	5.04E-07	5.04E-07	5.04E-07	5.04E-07
Ba	2.24E-05	2.24E-05	2.24E-05	2.39E-05	2.39E-05	2.39E-05	2.39E-05
Be	4.28E-06	4.28E-06	4.28E-06	4.52E-06	4.52E-06	4.52E-06	4.52E-06
B	2.03E-03	2.03E-03	2.03E-03	2.06E-03	2.06E-03	2.06E-03	2.06E-03
Br	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Cd	6.15E-05	6.15E-05	6.15E-05	6.58E-05	6.58E-05	6.58E-05	6.58E-05
Ca	1.06E-03	1.06E-03	1.06E-03	1.08E-03	1.08E-03	1.08E-03	1.08E-03
Cr	1.35E-03	1.35E-03	1.35E-03	1.33E-03	1.33E-03	1.33E-03	1.33E-03
Co	1.98E-05	1.98E-05	1.98E-05	8.90E-06	8.90E-06	8.90E-06	8.90E-06
Cu	5.77E-04	5.77E-04	5.77E-04	6.12E-04	6.12E-04	6.12E-04	6.12E-04
Ge	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
I	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Fe	2.55E-03	2.55E-03	2.55E-03	2.59E-03	2.59E-03	2.59E-03	2.59E-03
Pb	1.19E-04	1.19E-04	1.19E-04	1.27E-04	1.27E-04	1.27E-04	1.27E-04
Hg	2.50E-04	2.50E-04	2.50E-04	2.52E-04	2.52E-04	2.52E-04	2.52E-04
Mg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Mn	8.55E-03	8.55E-03	8.55E-03	9.15E-03	9.15E-03	9.15E-03	9.15E-03
Mo	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Ni	5.51E-04	5.51E-04	5.51E-04	4.54E-04	4.54E-04	4.54E-04	4.54E-04
K	1.82E-02	1.82E-02	1.82E-02	1.87E-02	1.87E-02	1.87E-02	1.87E-02
Sb	5.01E-05	5.01E-05	5.01E-05	5.36E-05	5.36E-05	5.36E-05	5.36E-05
Sc	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Se	3.39E-07	3.39E-07	3.39E-07	3.63E-07	3.63E-07	3.63E-07	3.63E-07
Ag	1.44E-05	1.44E-05	1.44E-05	1.54E-05	1.54E-05	1.54E-05	1.54E-05
Si	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Na	1.42E-01	1.42E-01	1.42E-01	1.46E-01	1.46E-01	1.46E-01	1.46E-01
Sr	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Tl	2.13E-07	2.13E-07	2.13E-07	1.32E-07	1.32E-07	1.32E-07	1.32E-07
Ti	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
W	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
U	8.89E-05	8.89E-05	8.89E-05	9.51E-05	9.51E-05	9.51E-05	9.51E-05
V	1.36E-05	1.36E-05	1.36E-05	1.43E-05	1.43E-05	1.43E-05	1.43E-05
Zn	3.20E-03	3.20E-03	3.20E-03	3.43E-03	3.43E-03	3.43E-03	3.43E-03
Zr	1.58E-03	1.58E-03	1.58E-03	1.60E-03	1.60E-03	1.60E-03	1.60E-03
Cl	1.05E-03	1.05E-03	1.05E-03	1.01E-03	1.01E-03	1.01E-03	1.01E-03
F	5.66E-02	5.66E-02	5.66E-02	6.02E-02	6.02E-02	6.02E-02	6.02E-02
PO_4	2.82E-04	2.82E-04	2.82E-04	2.86E-04	2.86E-04	2.86E-04	2.86E-04
SO_4	1.71E-02	1.71E-02	1.71E-02	1.81E-02	1.81E-02	1.81E-02	1.81E-02
NO_3	5.91E+00	5.91E+00	5.91E+00	5.46E+00	5.46E+00	5.46E+00	5.46E+00
HCO_3	2.56E-03	2.56E-03	2.56E-03	2.74E-03	2.74E-03	2.74E-03	2.74E-03
	g/liter	g/liter	g/liter	g/liter	g/liter	g/liter	g/liter
TOC	1.16E+00	1.16E+00	1.16E+00	1.23E+00	1.23E+00	1.23E+00	1.23E+00
UDS	6.57E+00	6.57E+00	6.57E+00	7.03E+00	7.03E+00	7.03E+00	7.03E+00

Table 18 (continued).

	2015	2016	2017	2018	Average 2000-18	Minimum	Maximum
	mol/liter	mol/liter	mol/liter	mol/liter	mol/liter	mol/liter	mol/liter
H+	4.92E+00	4.92E+00	4.92E+00	4.92E+00	5.40E+00	3.46E+00	8.20E+00
Al	1.39E-01	1.39E-01	1.39E-01	1.39E-01	1.60E-01	8.52E-02	6.47E-01
As	5.04E-07	5.04E-07	5.04E-07	5.04E-07	2.38E-06	5.04E-07	3.24E-05
Ba	2.39E-05	2.39E-05	2.39E-05	2.39E-05	2.19E-05	1.27E-05	2.54E-05
Be	4.52E-06	4.52E-06	4.52E-06	4.52E-06	4.38E-06	2.26E-06	6.76E-06
B	2.06E-03	2.06E-03	2.06E-03	2.06E-03	3.11E-03	1.40E-03	1.91E-02
Br	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.30E-06	0.00E+00	4.00E-05
Cd	6.58E-05	6.58E-05	6.58E-05	6.58E-05	7.32E-05	2.77E-05	2.60E-04
Ca	1.08E-03	1.08E-03	1.08E-03	1.08E-03	1.52E-03	7.35E-04	5.79E-03
Cr	1.33E-03	1.33E-03	1.33E-03	1.33E-03	1.32E-03	9.88E-04	1.47E-03
Co	8.90E-06	8.90E-06	8.90E-06	8.90E-06	2.37E-05	8.90E-06	9.40E-05
Cu	6.12E-04	6.12E-04	6.12E-04	6.12E-04	5.30E-04	2.35E-04	6.12E-04
Ge	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.41E-09	0.00E+00	8.99E-08
I	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.83E-07	0.00E+00	4.65E-06
Fe	2.59E-03	2.59E-03	2.59E-03	2.59E-03	3.65E-03	1.76E-03	1.90E-02
Pb	1.27E-04	1.27E-04	1.27E-04	1.27E-04	1.16E-04	5.51E-05	1.27E-04
Hg	2.52E-04	2.52E-04	2.52E-04	2.52E-04	4.00E-03	2.14E-04	6.18E-02
Mg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.37E-06	0.00E+00	8.94E-05
Mn	9.15E-03	9.15E-03	9.15E-03	9.15E-03	7.74E-03	2.98E-03	9.15E-03
Mo	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.88E-08	0.00E+00	2.28E-07
Ni	4.54E-04	4.54E-04	4.54E-04	4.54E-04	5.80E-04	3.12E-04	1.21E-03
K	1.87E-02	1.87E-02	1.87E-02	1.87E-02	2.17E-02	1.21E-02	6.94E-02
Sb	5.36E-05	5.36E-05	5.36E-05	5.36E-05	4.48E-05	1.26E-05	5.36E-05
Sc	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.56E-08	0.00E+00	5.53E-07
Se	3.63E-07	3.63E-07	3.63E-07	3.63E-07	3.98E-07	2.44E-07	1.25E-06
Ag	1.54E-05	1.54E-05	1.54E-05	1.54E-05	1.31E-05	3.59E-06	1.54E-05
Si	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.61E-05	0.00E+00	5.59E-04
Na	1.46E-01	1.46E-01	1.46E-01	1.46E-01	1.79E-01	1.32E-01	4.53E-01
Sr	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.69E-07	0.00E+00	2.05E-06
Tl	1.32E-07	1.32E-07	1.32E-07	1.32E-07	2.64E-07	1.32E-07	8.52E-07
Ti	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.10E-08	0.00E+00	4.97E-07
W	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.24E-08	0.00E+00	1.51E-07
U	9.51E-05	9.51E-05	9.51E-05	9.51E-05	8.15E-05	3.43E-05	9.51E-05
V	1.43E-05	1.43E-05	1.43E-05	1.43E-05	1.25E-05	5.54E-06	1.43E-05
Zn	3.43E-03	3.43E-03	3.43E-03	3.43E-03	2.91E-03	1.16E-03	3.43E-03
Zr	1.60E-03	1.60E-03	1.60E-03	1.60E-03	1.67E-03	4.81E-04	4.97E-03
Cl	1.01E-03	1.01E-03	1.01E-03	1.01E-03	3.53E-03	1.01E-03	3.82E-02
F	6.02E-02	6.02E-02	6.02E-02	6.02E-02	5.65E-02	4.02E-02	6.02E-02
PO_4	2.86E-04	2.86E-04	2.86E-04	2.86E-04	4.40E-04	1.52E-04	3.52E-03
SO_4	1.81E-02	1.81E-02	1.81E-02	1.81E-02	1.76E-02	5.50E-03	4.44E-02
NO_3	5.46E+00	5.46E+00	5.46E+00	5.46E+00	6.04E+00	5.46E+00	8.57E+00
HCO_3	2.74E-03	2.74E-03	2.74E-03	2.74E-03	1.50E-02	8.23E-04	1.55E-01
	g/liter	g/liter	g/liter	g/liter	g/liter	g/liter	g/liter
TOC	1.23E+00	1.23E+00	1.23E+00	1.23E+00	1.05E+00	3.84E-01	1.23E+00
UDS	7.03E+00	7.03E+00	7.03E+00	7.03E+00	5.93E+00	1.62E+00	7.03E+00

2.3 Liquid Waste Evaporation

ASPEN PLUS simulations were made for evaporation of blended WM-181/184 waste; blended WM-181/186 waste; WM-187 waste evaporated in 2001, 2002, and 2004; WM-181 waste evaporated in 2003, 2005, and 2006; and dilute waste in the New Tank Farm evaporated in 2011 and 2012. Table 19 shows some of the results of these simulations.

Table 19. ASPEN Plus simulations.

				Fraction of feed in concentrate			
Simulation Name	Year	Waste Source	Concentration Factor	HNO3	Cl	F	Hg
AS-1	2001	WM-181 & -186	2.10	0.8449	0.899	0.9973	0.9783
AS-2	2001	WM-181 & -184	1.88	0.7381	0.8355	0.9976	0.952
AS-3	2001	WM-187	2.03	0.8024	0.876	0.993	0.983
AS-4	2002	WM-187	5.34	0.661	0.325	0.981	0.982
AS-5	2004	WM-187	5.41	0.7057	0.369	0.98	0.985
AS-6	2003	WM-181	20.00	0.44	0.671	0.976	0.884
AS-7	2005	WM-181	20.00	0.2456	0.129	0.96	0.891
AS-8	2006	WM-181	20.00	0.528	0.776	0.979	0.891
AS-9	2011	New Tank Farm	14.20	0.35	0.236	0.972	0.91
AS-10	2012	New Tank Farm	14.07	0.547	0.157	0.947	0.97

2.4 Liquid Concentrations of Heel Flushes and Flush Heels

According to the Tank Farm management plan,[2,3] most of the Tank Farm tanks will be drawn down to an assumed heel of 5,000 gallons, then flushed with 100,000 gallons of water. To estimate the composition of the resulting heel after flushing and the flush discharge, two 50,000-gallon flushes of each tank were assumed. While in practice there may be more than two flushes using less flush water per flush, the assumption of two flushes compensates for mixing inefficiencies in each flush. Theoretically, two 50,000 flushes would result in 99.2% removal of waste contaminants:

$1 - (5000/55000)^2 = 0.992$.

If multiple flushes are performed, the discharge flushes will have different compositions. However, since these discharge flushes are combined in a single receiving tank, a single composition can accurately represent the combined mix flush discharge. Appendix A presents Tank flush discharge and liquid heel compositions.

2.5 Compositions of Concentrated Wastes Before and After Transfer to the New Tank Farm

Tables 20 and 21 show compositions of wastes before transfer to new tanks. Table 22 shows compositions of wastes after transfer to new tanks. Table 20 shows non-NGLW streams. Table 21 shows NGLW streams. No radionuclide concentrations were estimated for the NGLW streams, as discussed in Section 2.2.

Table 20. Composition of tank wastes prior to transfer to New Tank Farm.

Element	Stream WM-180-1 (276,000 gal)	WM-188-2 (283,667 gal)	WM-189-3 (280,012 gal)	WM-187-6 (57,264 gal)	WM-181-5 (19,891 gal)
	g/liter	g/liter	g/liter	g/liter	g/liter
TOC	2.12E-01	4.62E-01	4.03E-01	3.78E-01	6.03E-03
UDS	2.46E-01	4.01E+00	4.16E+00	2.07E+00	5.31E-02
	mol/liter	mol/liter	mol/liter	mol/liter	mol/liter
H+	1.06	3.56	2.43	2.73	0.05
Al	6.98E-01	5.72E-01	6.64E-01	1.81E-01	9.38E-03
Am	7.60E-08	1.33E-07	1.22E-07	3.40E-08	1.87E-09
Sb	6.71E-05	7.31E-06	2.50E-06	1.23E-05	9.37E-08
As	5.25E-04	3.78E-05	3.38E-05	9.09E-07	1.56E-08
Ba	5.87E-05	8.64E-05	1.06E-04	2.44E-05	1.25E-06
Be	8.17E-06	1.78E-06	9.15E-07	2.09E-06	1.61E-08
B	1.29E-02	2.33E-02	2.84E-02	5.07E-03	2.70E-04
Br	1.53E-07	7.38E-06	3.62E-07	5.69E-06	3.75E-09
Cd	7.94E-04	6.32E-03	9.00E-03	8.59E-04	7.73E-05
Ca	4.97E-02	6.01E-02	7.32E-02	6.44E-03	4.61E-04
Ce	4.98E-05	2.17E-05	1.80E-05	3.15E-06	2.07E-07
Cs	8.14E-06	2.21E-05	1.73E-05	3.55E-06	2.15E-07
Cl	3.16E-02	2.30E-02	3.07E-02	3.85E-03	4.72E-04
Cr	3.53E-03	5.87E-03	6.97E-03	1.00E-03	8.17E-05
Co	2.03E-05	1.69E-04	1.12E-04	1.92E-04	2.16E-06
Cu	7.34E-04	8.77E-04	1.17E-03	1.45E-04	1.22E-05
Dy	3.15E-10	7.95E-10	6.23E-10	1.28E-10	7.73E-12
Eu	3.09E-09	9.53E-09	9.37E-09	1.05E-09	6.67E-11
F	4.99E-02	1.17E-01	1.10E-01	3.21E-02	7.84E-04
Gd	1.87E-04	4.58E-05	1.38E-05	1.80E-05	9.47E-07
Ge	4.45E-09	2.69E-08	8.93E-09	1.44E-08	1.09E-10
In	6.74E-07	1.70E-06	1.33E-06	2.73E-07	1.65E-08
I	5.87E-07	3.69E-06	3.16E-06	1.46E-06	5.84E-08
Fe	2.29E-02	2.50E-02	2.76E-02	6.32E-03	3.18E-04
La	4.54E-06	1.14E-05	8.98E-06	1.84E-06	1.11E-07
Pb	1.38E-03	6.09E-03	1.16E-03	2.79E-03	8.12E-06
Li	3.57E-04	3.42E-04	4.72E-04	5.29E-05	4.55E-06
Mg	1.27E-02	7.79E-03	1.06E-02	1.27E-03	1.07E-04
Mn	1.48E-02	1.63E-02	2.07E-02	4.57E-03	2.10E-04
Hg	2.12E-03	6.97E-03	2.37E-03	2.90E-03	1.99E-05

Table 20. (continued).

Element	Stream WM-180-1 (276,000 gal)	WM-188-2 (283,667 gal)	WM-189-3 (280,012 gal)	WM-187-6 (57,264 gal)	WM-181-5 (19,891 gal)
	mol/liter	mol/liter	mol/liter	mol/liter	mol/liter
Mo	2.03E-04	3.95E-04	4.81E-05	4.51E-04	3.08E-06
Nd	1.50E-05	3.79E-05	2.97E-05	6.10E-06	3.69E-07
Np	1.66E-05	2.29E-05	1.46E-05	4.61E-06	1.81E-07
Ni	1.55E-03	4.14E-03	5.81E-03	7.87E-04	7.25E-05
Nb	1.63E-05	4.74E-06	1.01E-06	1.13E-06	6.48E-08
NO_3	5.59E+00	6.99E+00	6.83E+00	3.75E+00	1.02E-01
Pd	2.47E-05	4.44E-06	3.71E-06	6.98E-07	4.35E-08
PO_4	1.44E-02	4.16E-03	6.92E-03	1.77E-03	1.48E-04
Pu	5.53E-06	7.19E-06	5.31E-06	1.72E-06	8.88E-08
K	2.07E-01	1.54E-01	2.18E-01	3.35E-02	1.84E-03
Pr	4.20E-06	1.06E-05	8.29E-06	1.70E-06	1.03E-07
Pm	1.53E-09	3.86E-09	3.03E-09	6.22E-10	3.76E-11
Rh	1.84E-06	4.63E-06	3.63E-06	7.46E-07	4.51E-08
Rb	3.64E-06	9.59E-06	7.47E-06	1.59E-06	9.37E-08
Ru	1.31E-04	3.18E-05	1.90E-05	4.88E-06	2.87E-07
Sm	2.88E-06	7.27E-06	5.70E-06	1.17E-06	7.07E-08
Se	1.54E-04	1.08E-06	1.77E-06	4.53E-07	1.76E-08
Si	3.18E-07	3.20E-03	4.19E-03	5.81E-04	4.27E-05
Ag	5.57E-06	2.24E-05	2.12E-05	6.02E-06	1.70E-07
Na	2.17E+00	1.29E+00	1.88E+00	3.90E-01	2.24E-02
Sr	1.25E-04	2.46E-05	1.94E-05	4.51E-06	2.55E-07
SO_4	7.35E-02	4.48E-02	5.84E-02	1.08E-02	5.54E-04
Tc	2.82E-06	1.31E-05	5.76E-06	2.03E-06	8.32E-08
Te	1.45E-06	3.66E-06	2.87E-06	5.89E-07	3.56E-08
Tb	1.07E-09	2.69E-09	2.11E-09	4.33E-10	2.62E-11
Tl	4.31E-05	9.46E-06	1.44E-05	1.68E-06	1.28E-07
Th	9.39E-11	3.74E-10	1.93E-10	6.22E-11	2.47E-12
Sn	4.32E-05	1.17E-06	8.61E-07	3.96E-07	1.73E-08
Ti	6.08E-05	4.85E-05	6.62E-05	7.91E-06	6.65E-07
U	3.54E-04	6.52E-04	5.88E-04	7.94E-05	4.73E-06
V	9.72E-04	1.09E-04	1.52E-04	2.21E-05	1.44E-06
Y	3.46E-06	8.71E-06	6.84E-06	1.40E-06	8.48E-08
Zn	1.10E-03	1.67E-03	1.51E-03	1.68E-03	1.82E-05
Zr	6.66E-05	1.95E-02	2.06E-02	4.30E-03	2.10E-04

Table 20. (continued).

Element	Stream WM-180-1 (276,000 gal)	WM-188-2 (283,667 gal)	WM-189-3 (280,012 gal)	WM-187-6 (57,264 gal)	WM-181-5 (19,891 gal)
	Ci/liter Jan, 2016	Ci/liter Jan, 2016	Ci/liter Jan, 2016	Ci/liter Jan, 2016	Ci/liter Jan, 2016
Tl-207	2.76E-11	1.06E-10	5.47E-11	1.77E-11	7.02E-13
Tl-208	3.35E-10	1.29E-09	6.65E-10	2.14E-10	8.52E-12
Pb-209	1.45E-13	5.57E-13	2.87E-13	9.26E-14	3.68E-15
Pb-210	2.64E-12	1.02E-11	5.24E-12	1.69E-12	6.72E-14
Pb-211	2.76E-11	1.06E-10	5.47E-11	1.77E-11	7.02E-13
Pb-212	9.46E-10	3.64E-09	1.88E-09	6.05E-10	2.41E-11
Pb-214	6.31E-12	2.43E-11	1.25E-11	4.04E-12	1.60E-13
Bi-210	2.64E-12	1.02E-11	5.24E-12	1.69E-12	6.72E-14
Bi-211	2.76E-11	1.06E-10	5.47E-11	1.77E-11	7.02E-13
Bi-212	9.46E-10	3.64E-09	1.88E-09	6.05E-10	2.41E-11
Bi-213	1.89E-13	7.28E-13	3.75E-13	1.21E-13	4.81E-15
Bi-214	6.31E-12	2.43E-11	1.25E-11	4.04E-12	1.60E-13
Po-210	2.64E-12	1.02E-11	5.24E-12	1.69E-12	6.72E-14
Po-213	8.28E-14	3.18E-13	1.64E-13	5.30E-14	2.10E-15
Po-214	3.39E-12	1.30E-11	6.72E-12	2.17E-12	8.62E-14
Po-215	1.58E-11	6.06E-11	3.13E-11	1.01E-11	4.01E-13
Po-216	9.46E-10	3.64E-09	1.88E-09	6.05E-10	2.41E-11
Po-218	6.31E-12	2.43E-11	1.25E-11	4.04E-12	1.60E-13
At-217	8.28E-14	3.18E-13	1.64E-13	5.30E-14	2.10E-15
Rn-219	2.76E-11	1.06E-10	5.47E-11	1.77E-11	7.02E-13
Rn-220	9.46E-10	3.64E-09	1.88E-09	6.05E-10	2.41E-11
Rn-222	6.31E-12	2.43E-11	1.25E-11	4.04E-12	1.60E-13
Fr-221	1.89E-13	7.28E-13	3.75E-13	1.21E-13	4.81E-15
Fr-223	3.82E-13	1.47E-12	7.59E-13	2.45E-13	9.72E-15
Ra-223	2.76E-11	1.06E-10	5.47E-11	1.77E-11	7.02E-13
Ra-224	9.46E-10	3.64E-09	1.88E-09	6.05E-10	2.41E-11
Ra-225	1.89E-13	7.28E-13	3.75E-13	1.21E-13	4.81E-15
Ra-226	6.31E-12	2.43E-11	1.25E-11	4.04E-12	1.60E-13
Ac-225	1.89E-13	7.28E-13	3.75E-13	1.21E-13	4.81E-15
Ac-227	2.76E-11	1.06E-10	5.47E-11	1.77E-11	7.02E-13
Th-227	2.72E-11	1.05E-10	5.40E-11	1.74E-11	6.92E-13
Th-228	9.46E-10	3.64E-09	1.88E-09	6.05E-10	2.41E-11
Th-229	1.89E-13	7.28E-13	3.75E-13	1.21E-13	4.81E-15
Th-230	4.72E-10	1.81E-09	9.36E-10	3.02E-10	1.20E-11
Th-231	1.02E-08	3.94E-08	2.03E-08	6.56E-09	2.61E-10
Th-234	1.02E-08	3.94E-08	2.03E-08	6.56E-09	2.61E-10
Pa-231	4.73E-11	1.82E-10	9.38E-11	3.03E-11	1.20E-12

Table 20. (continued).

Element	Stream				
	WM-180-1 (276,000 gal)	WM-188-2 (283,667 gal)	WM-189-3 (280,012 gal)	WM-187-6 (57,264 gal)	WM-181-5 (19,891 gal)
	Ci/liter Jan, 2016	Ci/liter Jan, 2016	Ci/liter Jan, 2016	Ci/liter Jan, 2016	Ci/liter Jan, 2016
Pa-233	1.42E-06	5.46E-06	2.82E-06	9.08E-07	3.61E-08
Pa-234m	1.02E-08	3.94E-08	2.03E-08	6.56E-09	2.61E-10
Pa-234	1.30E-11	5.00E-11	2.58E-11	8.32E-12	3.31E-13
U-232	2.10E-09	9.68E-09	9.72E-09	6.39E-10	5.05E-11
U-233	2.74E-10	1.26E-09	1.27E-09	8.34E-11	6.59E-12
U-234	9.14E-07	1.51E-06	1.31E-06	3.27E-07	1.87E-08
U-235	2.38E-08	3.90E-08	3.54E-08	8.04E-09	4.81E-10
U-236	3.75E-08	5.78E-08	5.98E-08	1.40E-08	8.75E-10
U-237	3.93E-09	1.81E-08	1.82E-08	1.20E-09	9.45E-11
U-238	2.38E-08	4.57E-08	4.11E-08	5.00E-09	2.97E-10
Np-237	4.99E-07	3.82E-06	2.44E-06	7.70E-07	3.02E-08
Np-238	3.51E-11	1.35E-10	6.96E-11	2.24E-11	8.92E-13
Np-239	1.02E-08	3.94E-08	2.03E-08	6.56E-09	2.61E-10
Pu-236	5.52E-11	2.12E-10	1.09E-10	3.53E-11	1.40E-12
Pu-238	5.95E-04	7.79E-04	6.63E-04	1.43E-04	6.90E-06
Pu-239	9.91E-05	9.79E-05	7.36E-05	2.41E-05	1.26E-06
Pu-240	5.12E-06	1.90E-05	9.26E-06	3.23E-06	1.28E-07
Pu-241	6.70E-05	3.53E-04	2.13E-04	5.46E-05	2.20E-06
Pu-242	3.86E-09	4.42E-08	1.06E-08	2.72E-09	1.08E-10
Am-241	8.99E-05	1.10E-04	1.01E-04	2.80E-05	1.54E-06
Am-242m	7.09E-09	2.73E-08	1.41E-08	4.54E-09	1.80E-10
Am-242	7.09E-09	2.73E-08	1.41E-08	4.54E-09	1.80E-10
Am-243	1.02E-08	3.94E-08	2.03E-08	6.56E-09	2.61E-10
Cm-242	5.91E-09	2.27E-08	1.17E-08	3.78E-09	1.50E-10
Cm-243	1.02E-08	3.94E-08	2.03E-08	6.56E-09	2.61E-10
Cm-244	2.71E-06	1.97E-06	1.04E-06	3.28E-07	1.30E-08
Cm-245	1.46E-10	5.61E-10	2.89E-10	9.33E-11	3.71E-12
Cm-246	9.46E-12	3.64E-11	1.88E-11	6.05E-12	2.41E-13
H-3	1.02E-05	1.43E-05	1.03E-05	1.70E-06	6.12E-08
Be-10	1.46E-12	5.61E-12	2.89E-12	9.33E-13	3.71E-14
C-14	5.91E-11	3.94E-06	1.17E-10	3.78E-11	1.50E-12
Se-79	2.13E-07	8.19E-07	4.22E-07	1.36E-07	5.41E-09
Rb-87	1.42E-11	5.40E-11	2.82E-11	9.08E-12	3.61E-13
Sr-90	9.75E-03	6.44E-02	3.15E-02	1.11E-02	4.15E-04
Y-90	9.75E-03	6.44E-02	3.15E-02	1.11E-02	4.15E-04

Table 20. (continued).

Element	Stream				
	WM-180-1 (276,000 gal)	WM-188-2 (283,667 gal)	WM-189-3 (280,012 gal)	WM-187-6 (57,264 gal)	WM-181-5 (19,891 gal)
	Ci/liter Jan, 2016	Ci/liter Jan, 2016	Ci/liter Jan, 2016	Ci/liter Jan, 2016	Ci/liter Jan, 2016
Zr-93	1.06E-06	4.09E-06	2.11E-06	6.81E-07	2.71E-08
Nb-93m	9.07E-07	3.49E-06	1.80E-06	5.80E-07	2.31E-08
Nb-94	5.52E-07	2.12E-06	1.09E-06	3.53E-07	1.40E-08
Tc-98	1.26E-12	4.85E-12	2.50E-12	8.07E-13	3.21E-14
Tc-99	1.05E-05	2.20E-05	9.66E-06	3.41E-06	1.40E-07
Ru-106	5.91E-11	1.77E-10	9.38E-11	2.94E-11	1.14E-12
Rh-102	1.89E-11	7.28E-11	3.75E-11	1.21E-11	4.81E-13
Rh-106	5.91E-11	1.77E-10	9.38E-11	2.94E-11	1.14E-12
Pd-107	7.88E-09	3.03E-08	1.56E-08	5.04E-09	2.00E-10
Cd-113m	8.67E-07	3.33E-06	1.72E-06	5.55E-07	2.21E-08
In-115	4.73E-17	1.82E-16	9.38E-17	3.03E-17	1.20E-18
Sn-121m	2.72E-08	1.05E-07	5.40E-08	1.74E-08	6.92E-10
Sn-126	2.01E-07	7.73E-07	3.99E-07	1.29E-07	5.11E-09
Sb-125	2.44E-07	1.22E-06	1.01E-06	1.47E-07	6.26E-09
Sb-126m	2.01E-07	7.73E-07	3.99E-07	1.29E-07	5.11E-09
Sb-126	2.80E-08	1.08E-07	5.55E-08	1.79E-08	7.12E-10
Te-125m	5.91E-08	2.27E-07	1.17E-07	3.78E-08	1.50E-09
I-129	1.34E-08	9.99E-08	7.21E-08	2.59E-08	1.35E-09
Cs-134	5.06E-08	7.04E-07	6.17E-07	6.95E-08	2.37E-09
Cs-135	4.34E-07	1.67E-06	8.60E-07	2.77E-07	1.10E-08
Cs-137	2.17E-02	6.97E-02	3.60E-02	1.16E-02	4.61E-04
Ba-137m	1.71E-02	6.56E-02	3.39E-02	1.09E-02	4.34E-04
Ce-142	1.46E-11	5.61E-11	2.89E-11	9.33E-12	3.71E-13
Ce-144	2.88E-12	8.32E-12	4.05E-12	1.42E-12	5.54E-14
Pr-144	2.88E-12	8.32E-12	4.05E-12	1.42E-12	5.54E-14
Pm-146	4.73E-09	1.82E-08	9.38E-09	3.03E-09	1.20E-10
Pm-147	2.68E-06	1.03E-05	5.32E-06	1.72E-06	6.82E-08
Sm-146	1.34E-13	5.15E-13	2.66E-13	8.58E-14	3.41E-15
Sm-147	3.59E-12	1.38E-11	7.12E-12	2.30E-12	9.12E-14
Sm-151	1.50E-04	5.76E-04	2.97E-04	9.58E-05	3.81E-06
Eu-150	5.52E-12	2.12E-11	1.09E-11	3.53E-12	1.40E-13
Eu-152	6.31E-07	2.43E-06	1.25E-06	4.04E-07	1.60E-08
Eu-154	1.93E-05	1.13E-04	7.70E-05	1.33E-05	5.08E-07
Eu-155	1.30E-05	2.34E-05	1.74E-05	3.35E-06	1.59E-07
Ho-166m	2.25E-11	8.64E-11	4.46E-11	1.44E-11	5.71E-13
Co-60	8.31E-07	1.16E-05	1.16E-05	1.15E-06	6.38E-08
Ni-63	2.21E-05	6.59E-05	5.06E-05	8.92E-06	3.53E-07

Table 21. Composition of NGLW tank wastes prior to transfer to the New Tank Farm.

	Stream			
	WM-100-1 (35,298 gal)	NGLW-8 (2,000 gal)	AS-9Conc (7,841 gal)	AS-10Conc (4,560 gal)
	g/liter	g/liter	g/liter	g/liter
TOC	0.77	1.21	1.82	1.19
UDS	4.00	6.94	9.80	6.79
	mol/liter	mol/liter	mol/liter	mol/liter
H+	6.17	5.01	3.43	4.58
Al	1.79E-01	1.38E-01	5.86E-01	1.49E-01
Am	—	—	4.28E-08	2.10E-09
Sb	2.99E-05	5.29E-05	1.11E-04	5.26E-05
As	3.94E-06	5.24E-07	2.97E-04	8.21E-06
Ba	2.04E-05	2.36E-05	6.59E-05	2.46E-05
Be	4.06E-06	4.48E-06	1.09E-05	4.48E-06
B	4.60E-03	2.05E-03	1.02E-02	2.33E-03
Br	1.30E-05	—	8.61E-08	4.45E-09
Cd	8.32E-05	6.50E-05	5.37E-04	1.20E-04
Ca	2.44E-03	1.08E-03	2.95E-02	2.04E-03
Ce	—	—	2.80E-05	8.52E-07
Cs	—	—	4.58E-06	2.46E-07
Cl	6.67E-03	1.01E-03	4.60E-03	2.96E-04
Cr	4.91E-05	1.10E-05	2.01E-03	1.09E-04
Co	3.97E-04	6.05E-04	8.57E-04	5.90E-04
Cu	2.91E-08	—	4.13E-04	1.79E-05
Dy	—	—	1.77E-10	9.17E-12
Eu	—	—	1.74E-09	8.45E-11
F	5.29E-02	5.95E-02	1.08E-01	5.63E-02
Gd	—	—	1.05E-04	3.29E-06
Ge	2.91E-08	—	2.51E-09	1.29E-10
In	—	—	3.79E-07	1.96E-08
I	1.51E-06	—	3.30E-07	4.29E-08
Fe	5.31E-03	2.58E-03	1.65E-02	3.01E-03
La	—	—	2.56E-06	1.32E-07
Pb	8.62E-03	2.52E-04	1.14E-03	2.73E-04
Li	—	—	2.01E-04	7.98E-06
Mg	2.90E-05	—	7.13E-03	2.49E-04
Mn	5.40E-03	9.03E-03	2.09E-02	9.14E-03
Mo	8.15E-04	4.72E-04	8.36E-04	4.44E-04
Nd	—	—	8.46E-06	4.37E-07
Np	—	—	9.34E-06	3.46E-07

Table 21. (continued).

	Stream			
	WM-100-1 (35,298 gal)	NGLW-8 (2,000 gal)	AS-9Conc (7,841 gal)	AS-10Conc (4,560 gal)
	mol/liter	mol/liter	mol/liter	mol/liter
Hg	8.45E-03	2.52E-04	1.42E-03	2.82E-04
Ni	—	—	8.71E-04	6.53E-05
Nb	—	—	9.20E-06	2.78E-07
NO_3	7.04E+00	5.55E+00	6.77E+00	5.21E+00
Pd	—	—	1.39E-05	3.88E-07
PO_4	5.34E-04	2.85E-04	8.52E-03	5.74E-04
Pu	—	—	3.11E-06	1.33E-07
K	2.73E-02	1.86E-02	1.43E-01	2.21E-02
Pr	—	—	2.36E-06	1.22E-07
Pm	—	—	8.63E-10	4.46E-11
Rh	—	—	1.03E-06	5.35E-08
Rb	—	—	2.05E-06	1.08E-07
Ru	—	—	7.39E-05	2.09E-06
Sm	—	—	1.62E-06	8.39E-08
Se	4.17E-07	3.59E-07	8.70E-05	2.62E-06
Si	1.81E-04	—	1.79E-07	2.51E-05
Ag	8.91E-06	1.52E-05	2.43E-05	1.50E-05
Na	2.69E-01	1.45E-01	1.42E+00	1.86E-01
Sr	6.65E-07	—	7.06E-05	1.99E-06
SO_4	1.48E-02	1.79E-02	6.64E-02	1.88E-02
Tc	—	—	1.59E-06	8.83E-08
Te	—	—	8.17E-07	4.22E-08
Tb	—	—	6.00E-10	3.10E-11
Tl	4.75E-07	1.48E-07	2.45E-05	8.36E-07
Th	—	—	5.29E-11	2.73E-12
Sn	—	—	2.43E-05	6.45E-07
Ti	1.61E-07	—	3.42E-05	1.28E-06
U	5.87E-05	9.40E-05	3.30E-04	9.95E-05
V	9.49E-06	1.42E-05	5.67E-04	2.89E-05
Y	—	—	1.95E-06	1.01E-07
Zn	2.23E-03	1.60E-03	2.89E-03	1.57E-03
Zr	7.85E-03	1.01E-03	1.76E-03	1.27E-03

Streams shown in Tables 20 and 21 have been adjusted to ensure charge balance and consistency between radionuclide activities and chemical concentrations. Nitrate concentrations were adjusted to obtain charge balance. To check for consistency between radionuclide activities and chemical concentrations, activities of radionuclides were converted to molar concentrations and compared to concentrations as calculated for the chemical species. If the sum of the concentrations of all isotopes of an element, converted from activities, was greater than the chemical concentration for that element, the

Table 22. Composition of Vitrification Facility Feeds.[a]

	Stream				Stream		
	VIT-1 (960,000 gal)	VIT-2 (114,372 gal)	VIT-3 (1,074,372 gal)		VIT-1 (960,000 gal)	VIT-2 (114,372 gal)	VIT-3 (1,074,372 gal)
	g/liter	g/liter	g/liter		mol/liter	mol/liter	mol/liter
TOC	0.37	1.03	0.44	Hg	3.67E-03	1.27E-03	3.42E-03
UDS	2.73	6.10	3.09	Mo	2.44E-04	4.14E-04	2.62E-04
				Nd	2.34E-05	6.86E-06	2.16E-05
	mol/liter	mol/liter	mol/liter	Np	1.20E-05	3.72E-06	1.20E-05
H+	2.40	4.42	2.61	Ni	3.25E-03	9.53E-04	3.00E-03
				Nb	6.21E-06	1.82E-06	5.74E-06
Al	5.57E-01	2.68E-01	5.26E-01	NO_3	5.93E+00	5.87E+00	5.93E+00
Am	1.08E-07	2.26E-08	1.07E-07	Pd	9.16E-06	2.69E-06	8.47E-06
Sb	2.40E-05	4.74E-05	2.65E-05	PO_4	7.21E-03	2.33E-03	6.69E-03
As	1.66E-04	4.90E-05	1.53E-04	Pu	5.73E-06	1.31E-06	5.73E-06
Ba	7.24E-05	3.93E-05	6.89E-05	K	1.64E-01	6.22E-02	1.53E-01
Be	3.36E-06	4.40E-06	3.47E-06	Pr	6.53E-06	1.92E-06	6.03E-06
B	1.85E-02	6.98E-03	1.73E-02	Pm	2.39E-09	7.00E-10	2.21E-09
Br	3.00E-06	8.82E-07	2.78E-06	Rh	2.86E-06	8.39E-07	2.64E-06
Cd	4.54E-03	1.38E-03	4.20E-03	Rb	5.86E-06	1.72E-06	5.42E-06
Ca	5.14E-02	1.59E-02	4.76E-02	Ru	5.09E-05	1.49E-05	4.70E-05
Ce	2.50E-05	7.34E-06	2.31E-05	Sm	4.48E-06	1.32E-06	4.15E-06
Cs	1.34E-05	3.95E-06	1.24E-05	Se	4.35E-05	1.30E-05	4.02E-05
Cl	2.41E-02	7.81E-03	2.23E-02	Si	2.10E-03	6.17E-04	1.94E-03
Cr	4.62E-03	1.36E-03	4.27E-03	Ag	1.46E-05	1.59E-05	1.48E-05
Co	1.20E-04	4.97E-04	1.60E-04	Na	1.52E+00	5.55E-01	1.41E+00
Cu	7.81E-04	2.29E-04	7.22E-04	Sr	4.73E-05	1.39E-05	4.38E-05
Dy	4.90E-10	1.44E-10	4.54E-10	SO_4	5.06E-02	2.85E-02	4.82E-02
Eu	6.19E-09	1.82E-09	5.72E-09	Tc	7.41E-06	1.43E-06	7.40E-06
F	8.18E-02	6.94E-02	8.05E-02	Te	2.26E-06	6.63E-07	2.09E-06
Gd	6.94E-05	2.04E-05	6.42E-05	Tb	1.66E-09	4.87E-10	1.53E-09
Ge	1.31E-08	3.86E-09	1.21E-08	Tl	1.87E-05	5.58E-06	1.73E-05
In	1.05E-06	3.08E-07	9.69E-07	Th	1.96E-10	4.29E-11	1.96E-10
I	2.21E-06	6.49E-07	2.04E-06	Sn	1.26E-05	3.68E-06	1.16E-05
Fe	2.16E-02	8.29E-03	2.02E-02	Ti	4.93E-05	1.45E-05	4.56E-05
La	7.06E-06	2.07E-06	6.53E-06	U	4.64E-04	1.93E-04	4.64E-04
Pb	2.88E-03	1.04E-03	2.69E-03	V	3.44E-04	1.12E-04	3.19E-04
Li	3.29E-04	9.65E-05	3.04E-04	Y	5.38E-06	1.58E-06	4.97E-06
Mg	8.72E-03	2.56E-03	8.06E-03	Zn	1.40E-03	1.62E-03	1.42E-03
Mn	1.50E-02	1.13E-02	1.46E-02	Zr	1.17E-02	4.21E-03	1.09E-02

Table 22. (continued).

	Stream				Stream		
	VIT-1 (960,000 gal)	VIT-2 (114,372 gal)	VIT-3 (1,074,372 gal)		VIT-1 (960,000 gal)	VIT-2 (114,372 gal)	VIT-3 (1,074,372 gal)
	Ci/liter Jan, 2016		Ci/liter Jan, 2016		Ci/liter Jan, 2016		Ci/liter Jan, 2016
Tl-207	5.57E-11		5.57E-11	Pa-234m	2.07E-08		2.07E-08
Tl-208	6.77E-10		6.76E-10	Pa-234	2.63E-11		2.62E-11
Pb-209	2.92E-13		2.92E-13	U-232	6.26E-09		6.26E-09
Pb-210	5.33E-12		5.33E-12	U-233	8.17E-10		8.16E-10
Pb-211	5.57E-11		5.57E-11	U-234	1.10E-06		1.10E-06
Pb-212	1.91E-09		1.91E-09	U-235	2.89E-08		2.89E-08
Pb-214	1.27E-11		1.27E-11	U-236	4.57E-08		4.57E-08
Bi-210	5.33E-12		5.33E-12	U-237	1.17E-08		1.17E-08
Bi-211	5.57E-11		5.57E-11	U-238	3.23E-08		3.23E-08
Bi-212	1.91E-09		1.91E-09	Np-237	2.01E-06		2.00E-06
Bi-213	3.82E-13		3.82E-13	Np-238	7.08E-11		7.08E-11
Bi-214	1.27E-11		1.27E-11	Np-239	2.07E-08		2.07E-08
Po-210	5.33E-12		5.33E-12	Pu-236	1.11E-10		1.11E-10
Po-213	1.67E-13		1.67E-13	Pu-238	5.99E-04		5.98E-04
Po-214	6.85E-12		6.84E-12	Pu-239	7.99E-05		7.98E-05
Po-215	3.18E-11		3.18E-11	Pu-240	9.88E-06		9.87E-06
Po-216	1.91E-09		1.91E-09	Pu-241	1.87E-04		1.87E-04
Po-218	1.27E-11		1.27E-11	Pu-242	1.72E-08		1.72E-08
At-217	1.67E-13		1.67E-13	Am-241	8.86E-05		8.85E-05
Rn-219	5.57E-11		5.57E-11	Am-242m	1.43E-08		1.43E-08
Rn-220	1.91E-09		1.91E-09	Am-242	1.43E-08		1.43E-08
Rn-222	1.27E-11		1.27E-11	Am-243	2.07E-08		2.07E-08
Fr-221	3.82E-13		3.82E-13	Cm-242	1.19E-08		1.19E-08
Fr-223	7.72E-13		7.72E-13	Cm-243	2.07E-08		2.07E-08
Ra-223	5.57E-11		5.57E-11	Cm-244	1.68E-06		1.68E-06
Ra-224	1.91E-09		1.91E-09	Cm-245	2.95E-10		2.94E-10
Ra-225	3.82E-13		3.82E-13	Cm-246	1.91E-11		1.91E-11
Ra-226	1.27E-11		1.27E-11	H-3	1.02E-05		1.02E-05
Ac-225	3.82E-13		3.82E-13	Be-10	2.95E-12		2.94E-12
Ac-227	5.57E-11		5.57E-11	C-14	1.15E-06		1.15E-06
Th-227	5.49E-11		5.49E-11	Se-79	4.30E-07		4.30E-07
Th-228	1.91E-09		1.91E-09	Rb-87	2.87E-11		2.86E-11
Th-229	3.82E-13		3.82E-13	Sr-90	3.13E-02		3.13E-02
Th-230	9.53E-10		9.52E-10	Y-90	3.13E-02		3.13E-02
Th-231	2.07E-08		2.07E-08	Zr-93	2.15E-06		2.15E-06
Th-234	2.07E-08		2.07E-08	Nb-93m	1.83E-06		1.83E-06
Pa-231	9.55E-11		9.55E-11	Nb-94	1.11E-06		1.11E-06
Pa-233	2.87E-06		2.86E-06	Tc-98	2.55E-12		2.55E-12

Table 22. (continued).

	Stream				Stream		
	VIT-1 (960,000 gal)	VIT-2 (114,372 gal)	VIT-3 (1,074,372 gal)		VIT-1 (960,000 gal)	VIT-2 (114,372 gal)	VIT-3 (1,074,372 gal)
	Ci/liter Jan, 2016		Ci/liter Jan, 2016		Ci/liter Jan, 2016		Ci/liter Jan, 2016
Tc-99	1.24E-05		1.24E-05	Ba-137m	3.45E-02		3.44E-02
Ru-106	9.76E-11		9.75E-11	Ce-142	2.95E-11		2.94E-11
Rh-102	3.82E-11		3.82E-11	Ce-144	4.51E-12		4.51E-12
Rh-106	9.76E-11		9.75E-11	Pr-144	4.51E-12		4.51E-12
Pd-107	1.59E-08		1.59E-08	Pm-146	9.55E-09		9.55E-09
Cd-113m	1.75E-06		1.75E-06	Pm-147	5.41E-06		5.41E-06
In-115	9.55E-17		9.55E-17	Sm-146	2.71E-13		2.70E-13
Sn-121m	5.49E-08		5.49E-08	Sm-147	7.24E-12		7.24E-12
Sn-126	4.06E-07		4.06E-07	Sm-151	3.03E-04		3.02E-04
Sb-125	7.24E-07		7.24E-07	Eu-150	1.11E-11		1.11E-11
Sb-126m	4.06E-07		4.06E-07	Eu-152	1.27E-06		1.27E-06
Sb-126	5.65E-08		5.65E-08	Eu-154	6.14E-05		6.13E-05
Te-125m	1.19E-07		1.19E-07	Eu-155	1.58E-05		1.58E-05
I-129	5.53E-08		5.52E-08	Ho-166m	4.54E-11		4.53E-11
Cs-134	4.01E-07		4.01E-07	Co-60	7.04E-06		7.04E-06
Cs-135	8.76E-07		8.75E-07	Ni-63	4.07E-05		4.07E-05
Cs-137	3.77E-02		3.76E-02				

a. Concentrations shown are of waste in the new tanks. No jet dilution has been added to account for transfer to vitrification facility tanks.

chemical concentration was replaced by that sum.[a] For example, if the concentration of Americium, as calculated by conversion of ^{241}Am, ^{242m}Am, ^{242}Am, and ^{243}Am concentrations in curies per liter to moles per liter and summed was greater than the molar concentration of Am calculated as a chemical species, then the sum of the isotopes was used as the concentration.

The vitrification feeds shown in Table 22 are average concentrations. VIT-1 is the average composition of the waste to be fed to the vitrification facility during the first two years of processing based on the 2012 processing schedule. VIT-2 is the average composition of the liquid feed to be processed in a later campaign in mid-2016. VIT-3 is the average composition of the liquid feed that would be processed based on the 2016 processing. Theoretically, for the 2016 schedule, the vitrification feed could vary between the compositions of VIT-1 and VIT-2. Additional feed compositional variation would result from uneven blending of waste transferred to the New Tank Farm. The compositions shown in Table 22 were not adjusted to account for any jet dilution that may be added to transfer waste from the new tanks to the Vitrification Facility.

a. In most cases, the chemical concentration is greater than that of the same species calculated from isotopic concentrations because of nonradioactive isotopes.

Table 23 shows vitrification feed converted to oxides.

Table 23. Tank liquid compositions converted to an oxide basis.

	VIT-1 Weight Fraction	VIT-2 Weight Fraction	VIT-3 Weight Fraction		VIT-1 Weight Fraction	VIT-2 Weight Fraction	VIT-3 Weight Fraction
Al_2O_3	3.01E-01	3.56E-01	3.03E-01	K_2O	8.18E-02	7.64E-02	8.15E-02
AmO_2	3.11E-07	1.61E-07	2.20E-07	PrO_2	1.19E-05	8.64E-06	1.18E-05
Sb_2O_5	4.12E-05	2.00E-04	4.85E-05	Pm_2O_3	4.32E-09	3.12E-09	4.26E-09
As_2O_5	2.02E-04	1.47E-04	1.99E-04	RhO_2	4.08E-06	2.95E-06	4.03E-06
BaO	1.18E-04	1.57E-04	1.19E-04	Rb_2O	5.80E-06	4.19E-06	5.72E-06
BeO	8.90E-07	2.87E-06	9.82E-07	Ru_2O_3	6.74E-05	4.86E-05	6.65E-05
B_2O_3	6.81E-03	6.34E-03	6.79E-03	Sm_2O_3	8.28E-06	5.99E-06	8.17E-06
CdO	6.17E-03	4.63E-03	6.10E-03	SeO	4.37E-05	3.22E-05	4.32E-05
CaO	3.05E-02	2.32E-02	3.02E-02	SiO_2	1.34E-03	9.66E-04	1.32E-03
CeO_2	4.56E-05	3.29E-05	4.50E-05	Ag_2O	1.79E-05	4.80E-05	1.93E-05
Cs_2O	2.01E-05	1.45E-05	1.98E-05	Na_2O	4.98E-01	4.49E-01	4.95E-01
Cr_2O_3	3.72E-03	2.70E-03	3.67E-03	SrO	2.60E-05	1.87E-05	2.56E-05
CoO	9.49E-05	9.70E-04	1.35E-04	Tc_2O_7	1.20E-05	5.72E-06	7.82E-06
CuO	6.58E-04	4.75E-04	6.49E-04	TeO_3	4.20E-06	3.04E-06	4.14E-06
Dy_2O_3	9.68E-10	7.00E-10	9.56E-10	TbO_2	3.35E-09	2.42E-09	3.31E-09
Eu_2O_3	1.15E-08	8.33E-09	1.14E-08	Tl_2O_3	4.52E-05	3.32E-05	4.47E-05
Gd_2O_3	1.33E-04	9.62E-05	1.32E-04	ThO_2	5.49E-10	2.95E-10	4.03E-10
GeO_2	1.45E-08	1.05E-08	1.44E-08	SnO_2	2.01E-05	1.45E-05	1.98E-05
In_2O_3	1.54E-06	1.11E-06	1.52E-06	TiO_2	4.17E-05	3.01E-05	4.11E-05
Fe_2O_3	1.83E-02	1.73E-02	1.82E-02	UO_2	1.33E-03	1.36E-03	1.19E-03
La_2O_3	1.22E-05	8.81E-06	1.20E-05	V_2O_5	3.31E-04	2.65E-04	3.28E-04
PbO	6.81E-03	6.04E-03	6.78E-03	Y_2O_3	6.43E-06	4.65E-06	6.35E-06
Li_2O	5.20E-05	3.76E-05	5.14E-05	ZnO	1.20E-03	3.43E-03	1.31E-03
MgO	3.72E-03	2.69E-03	3.67E-03	ZrO_2	1.53E-02	1.35E-02	1.52E-02
MnO_2	1.38E-02	2.56E-02	1.44E-02	Total	1.0000	1.0000	1.0000
MoO_3	3.72E-04	1.55E-03	4.27E-04	Br	2.54E-06	1.84E-06	2.51E-06
Nd_2O_3	4.16E-05	3.01E-05	4.11E-05	Cl	9.03E-03	7.22E-03	8.95E-03
NpO_2	3.42E-05	2.61E-05	3.56E-05	F	1.65E-02	3.44E-02	1.73E-02
NiO	2.57E-03	1.86E-03	2.53E-03	I	2.97E-06	2.15E-06	2.93E-06
Nb_2O_5	8.74E-06	6.31E-06	8.63E-06	Hg	7.80E-03	6.63E-03	7.74E-03
PdO_2	1.34E-05	9.69E-06	1.33E-05	SO_4	5.15E-02	7.13E-02	5.24E-02
P_2O_5	5.42E-03	4.31E-03	5.37E-03	Total	1.09	1.12	1.09
PuO_2	4.64E-04	2.60E-04	3.56E-04				

2.6 Feed Variability Based on New Tank Farm Scenarios

Three alternative configurations are presently being evaluated for the New Tank Farm. These alternatives are shown in Table 24.

Table 24. New Tank Farm configuration alternatives.

	Concentrated Waste Tanks		Dilute Waste Tank Size (gal)	Slurry Tank Size (gal)
Alternative	Number	Size (gal)		
1	3	630,000	200,000	100,000
2	4	420,000	200,000	100,000
3	5	320,000	200,000	100,000

In light of the present uncertainties in the New Tank Farm configuration, new tank waste composition calculations were performed for only one case. As New Tank Farm plans become more definitive, additional cases can be calculated to better determine the potential vitrification plant feed variability. The variability was only estimated for stream VIT-1.

Assumptions used for the one case calculated are as follows:

1. ±5% transfer from WM-180, -188, and -189 to three new tanks in the New Tank Farm. Thus, for each tank (WM-180, -188, and –189), one-third of the waste volume minus 5%, one-third of the waste volume, and one-third of the waste volume plus 5% were transferred to three tanks in the New Tank Farm. This case could apply to either New Tank Farm Alternative 1 or 2. The new tanks each receive the one-third of the waste from one existing tank, one-third plus 5% from a different tank, and one-third minus 5% from the third tank.
2. Other transfers to the New Tank Farm were assumed to be received by a single tank.

Volumes of waste transferred to each new tank for this case are shown in Table 25.

Table 25. New Tank Farm feed variation case definition.

	VIT-1a (gal)	VIT-1b (gal)	VIT-1c (gal)
Transfer from WM-180, March 2010	99,593	90,108	94,850
Transfer from WM-188, April 2010	92,657	102,410	97,533
Transfer from WM-189, May 2010	96,254	91,441	101,067
Transfer from WM-187, June 2010	60,127	0	0
Transfer from WM-100/1/2, July 2010	0	37,063	0
Transfer from WM-181, August 2010	0	0	15,931
NGLW, 2010-2013	0	0	2,000
From evaporation of New TF-2, 2011	0	0	7,841
From evaporation of New TF-2, 2012	0	0	4,560
Total	348,631	321,022	323,782

The compositions for the three tanks are shown in Table 26.

Table 26. Estimate of New Tank Farm feed composition variation.

	VIT-1a	VIT-1b	VIT-1c	Minimum	Maximum	Max/Min
	g/liter	g/liter	g/liter	g/liter	g/liter	g/g
TOC	0.34	0.39	1.14	0.34	0.39	1.14
UDS	2.52	2.85	1.13	2.52	2.85	1.13
	mol/liter	mol/liter	mol/liter	mol/liter	mol/liter	mol/mol
H+	2.28	2.71	2.22	2.22	2.71	1.22
Al	5.39E-01	5.60E-01	5.74E-01	5.39E-01	5.74E-01	1.06
Am	7.52E-08	7.64E-08	7.99E-08	7.52E-08	7.99E-08	1.06
Sb	2.28E-05	2.41E-05	2.53E-05	2.28E-05	2.53E-05	1.11
As	1.62E-04	1.62E-04	1.75E-04	1.62E-04	1.75E-04	1.08
Ba	6.97E-05	7.29E-05	7.48E-05	6.97E-05	7.48E-05	1.07
Be	3.26E-06	3.42E-06	3.42E-06	3.26E-06	3.42E-06	1.05
B	1.77E-02	1.88E-02	1.91E-02	1.77E-02	1.91E-02	1.07
Br	2.94E-06	3.81E-06	2.27E-06	2.27E-06	3.81E-06	1.68
Cd	4.32E-03	4.58E-03	4.73E-03	4.32E-03	4.73E-03	1.09
Ca	4.90E-02	5.17E-02	5.36E-02	4.90E-02	5.36E-02	1.09
Ce	2.43E-05	2.48E-05	2.61E-05	2.43E-05	2.61E-05	1.08
Cs	1.29E-05	1.36E-05	1.39E-05	1.29E-05	1.39E-05	1.07
Cl	2.31E-02	2.45E-02	2.47E-02	2.31E-02	2.47E-02	1.07
Cr	4.45E-03	4.63E-03	4.80E-03	4.45E-03	4.80E-03	1.08
Co	1.09E-04	1.31E-04	1.20E-04	1.09E-04	1.31E-04	1.20
Cu	7.52E-04	7.79E-04	8.14E-04	7.52E-04	8.14E-04	1.08
Dy	4.72E-10	4.95E-10	5.06E-10	4.72E-10	5.06E-10	1.07
Eu	5.89E-09	6.26E-09	6.43E-09	5.89E-09	6.43E-09	1.09
F	7.73E-02	8.45E-02	8.40E-02	7.73E-02	8.45E-02	1.09
Gd	6.89E-05	6.75E-05	7.19E-05	6.75E-05	7.19E-05	1.07
Ge	1.27E-08	1.50E-08	1.17E-08	1.17E-08	1.50E-08	1.28
In	1.01E-06	1.06E-06	1.08E-06	1.01E-06	1.08E-06	1.07
I	2.16E-06	2.30E-06	2.17E-06	2.70E-04	2.89E-04	1.07
Fe	2.08E-02	2.18E-02	2.22E-02	2.08E-02	2.22E-02	1.07
La	6.79E-06	7.12E-06	7.29E-06	6.79E-06	7.29E-06	1.07
Pb	2.68E-03	3.48E-03	2.51E-03	2.51E-03	3.48E-03	1.39
Li	3.17E-04	3.28E-04	3.43E-04	3.17E-04	3.43E-04	1.08
Mg	8.42E-03	8.64E-03	9.11E-03	8.42E-03	9.11E-03	1.08
Mn	1.44E-02	1.51E-02	1.57E-02	1.44E-02	1.57E-02	1.09
Hg	3.44E-03	4.26E-03	3.34E-03	3.34E-03	4.26E-03	1.28
Mo	2.42E-04	2.77E-04	2.14E-04	2.14E-04	2.77E-04	1.30
Nd	2.25E-05	2.36E-05	2.41E-05	2.25E-05	2.41E-05	1.07

Table 26. (continued).

	VIT-1a	VIT-1b	VIT-1c	Minimum	Maximum	Max/Min
	mol/liter	mol/liter	mol/liter	mol/liter	mol/liter	mol/mol
Np	1.23E-05	1.26E-05	1.32E-05	1.23E-05	1.32E-05	1.07
Ni	3.13E-03	3.25E-03	3.37E-03	3.13E-03	3.37E-03	1.08
Nb	6.10E-06	6.08E-06	6.45E-06	6.08E-06	6.45E-06	1.06
NO_3	5.70E+00	6.25E+00	5.87E+00	5.70E+00	6.25E+00	1.10
Pd	8.94E-06	8.96E-06	9.61E-06	8.94E-06	9.61E-06	1.08
PO_4	7.09E-03	7.05E-03	7.50E-03	7.05E-03	7.50E-03	1.06
Pu	4.34E-06	4.41E-06	4.61E-06	4.34E-06	4.61E-06	1.06
K	1.58E-01	1.64E-01	1.70E-01	1.58E-01	1.70E-01	1.08
Pr	6.28E-06	6.58E-06	6.73E-06	6.28E-06	6.73E-06	1.07
Pm	2.29E-09	2.41E-09	2.46E-09	2.29E-09	2.46E-09	1.07
Rh	2.75E-06	2.88E-06	2.95E-06	2.75E-06	2.95E-06	1.07
Rb	5.64E-06	5.91E-06	6.04E-06	5.64E-06	6.04E-06	1.07
Ru	4.96E-05	4.99E-05	5.32E-05	4.96E-05	5.32E-05	1.07
Sm	4.31E-06	4.52E-06	4.63E-06	4.31E-06	4.63E-06	1.07
Se	4.26E-05	4.19E-05	4.59E-05	4.19E-05	4.59E-05	1.09
Si	2.01E-03	2.13E-03	2.17E-03	2.01E-03	2.17E-03	1.08
Ag	1.37E-05	1.50E-05	1.52E-05	1.37E-05	1.52E-05	1.10
Na	1.47E+00	1.51E+00	1.57E+00	1.47E+00	1.57E+00	1.07
Sr	4.62E-05	4.63E-05	4.96E-05	4.62E-05	4.96E-05	1.07
SO_4	4.85E-02	5.07E-02	5.27E-02	4.85E-02	5.27E-02	1.09
Tc	4.69E-06	4.95E-06	5.03E-06	4.69E-06	5.03E-06	1.07
Te	2.17E-06	2.28E-06	2.33E-06	2.17E-06	2.33E-06	1.07
Tb	1.60E-09	1.67E-09	1.71E-09	1.60E-09	1.71E-09	1.07
Tl	1.82E-05	1.83E-05	1.96E-05	1.82E-05	1.96E-05	1.08
Th	1.41E-10	1.47E-10	1.51E-10	1.41E-10	1.51E-10	1.07
Sn	1.24E-05	1.21E-05	1.33E-05	1.21E-05	1.33E-05	1.09
Ti	4.75E-05	4.90E-05	5.14E-05	4.75E-05	5.14E-05	1.08
U	3.94E-04	4.17E-04	4.31E-04	3.94E-04	4.31E-04	1.09
V	3.36E-04	3.35E-04	3.62E-04	3.35E-04	3.62E-04	1.08
Y	5.17E-06	5.43E-06	5.55E-06	5.17E-06	5.55E-06	1.07
Zn	1.40E-03	1.46E-03	1.34E-03	1.34E-03	1.46E-03	1.09
Zr	1.11E-02	1.24E-02	1.18E-02	1.11E-02	1.24E-02	1.12

3. SOLID WASTE COMPOSITION

3.1 Tank Heel Solids

Based on analyses of light-duty utility arm samples, Table 27 shows the composition of heel solids in tanks WM-182, -183, and -188.

Table 27. Composition of heel solids in tanks WM-182, -183, and -188.

	WM-182	WM-183	WM-188		WM-182	WM-183	WM-188
	mg/kg	mg/kg	mg/kg		mg/kg	mg/kg	mg/kg
Al	21,880	24,911	35,406	Sr	9	11	
Sb	14	32	33	SO_4	33,240	13,647	
As	281	56	351	S	8,743	2,849	
Ba	127	24	12,542	Tc		0	
Be	1	1	0.2	Tl	17	14	783
B	150	182	482	Sn	4,072	1,466	
Cd	325	142	1,189	Ti	650	711	
Ca	1,765	1,868	5,630	U	4.62E+01	1.93E-01	
Ce	21	20		V	13	11	6
Cs	42	9		Zn	179	148	126
Cl	2,015	1,308		Zr	101,470	34,867	64,844
Cr	552	949	1,341	Total	467,177	500,167	157,952
Co	9	9	9	TOC			12
Cu	298	166					
F	14,800	4,373			mCi/g	mCi/g	mCi/g
Gd	53	170		Am-241	8.46E-04	2.45E-04	2.11E-04
Fe	4,476	17,967	5,769	Sb-125	5.77E-02	2.90E-03	1.12E-02
Pb	369	274	647	Cs-134	6.64E-03	5.89E-04	7.97E-03
Li	6	4		Cs-137	4.50E+00	8.68E-01	2.44E+00
Mg	410	434		Co-60	2.14E-04		6.30E-04
Mn	565	740	758	Cm-244	2.84E-06		
Hg	310	324	1,566	Eu-154	1.48E-03	7.56E-04	5.43E-04
Mo	2,495	694	2,518	I-129	2.22E-07	9.03E-08	9.51E-04
Ni	309	417	427	Np-237	1.68E-06	1.76E-06	2.85E-06
Nb	1,279	623	5,101	Nb-95			3.68E-03
NO_3	70,720	174,955		Pu-238	1.93E-02	4.00E-03	7.56E-03
Pd	5,766	1,444		Pu-239	1.47E-03	1.25E-03	4.30E-04
PO_4	97,806	139,740		Sr-90	2.29E-01	1.82E-01	5.46E+00
P	9,586	4,607	16,422	Tc-99	2.63E-03	3.29E-05	4.49E-03
K	7,050	10,900		H-3	1.15E-05		
Ru	829	2,126	273	U-234	2.40E-06	3.30E-06	2.00E-05
Se	91	13	1,720	U-235	2.61E-07	9.29E-08	1.97E-07
Si	43,920	35,344		U-236	3.05E-07	3.40E-08	2.07E-07
Ag	65	220	9	U-238	3.83E-08	6.91E-08	1.18E-07
Na	30,400	21,400					

Weight fractions on an oxide basis were obtained from the concentrations in Table 27. However, since the solids sample from WM-188 was not analyzed for the elements Si, Na, or K, the weighted average WM-182 and -183 analyses for these species was assumed for WM-188. With this assumption, Table 28 shows the oxide composition.

Table 28. Oxide composition for WM-182, -183, and -188.

	WM-182 (%)	WM-183 (%)	WM-188 (%)		WM-182 (%)	WM-183 (%)	WM-188 (%)
Al_2O_3	9.63	13.09	18.33	Nb_2O_5	0.43	0.25	2.00
Sb_2O_5	0.00	0.01	0.01	Pd_2O_3	1.65	0.49	—
As_2O_3	0.09	0.02	0.13	P_2O_5	17.03	29.04	10.31
BaO	0.03	0.01	3.84	K_2O	1.98	3.65	3.09
BeO	0.0007	0.0007	0.0002	Ru_2O_3	0.24	0.73	0.09
B_2O_3	0.11	0.16	0.43	SeO_2	0.03	0.01	0.66
CdO	0.09	0.05	0.37	SiO_2	21.90	21.03	21.32
CaO	0.58	0.73	2.16	Ag_2O	0.02	0.07	0.003
CeO_2	0.006	0.007	—	Na_2O	9.55	8.02	8.53
Cs_2O	0.010	0.003	—	SrO	0.003	0.004	—
Cr_2O_3	0.19	0.39	0.54	Tl_2O_3	0.004	0.004	0.24
CoO	0.003	0.003	0.003	SnO_2	1.20	0.52	—
CuO	0.09	0.06	—	TiO_2	0.25	0.33	—
Gd_2O_3	0.01	0.05	—	V_2O_5	0.01	0.01	0.003
Fe_2O_3	1.49	7.14	2.26	ZnO	0.05	0.05	0.04
PbO	0.09	0.08	0.19	ZrO_2	31.94	13.10	24.00
Li_2O	0.003	0.002	—	Total	100.00	100.00	100.00
MgO	0.16	0.20	—	Cl	0.47	0.36	—
MnO	0.17	0.27	0.27	F	3.45	1.22	—
MoO_3	0.87	0.29	1.03	Hg	0.07	0.09	0.64
NiO	0.09	0.15	0.15	SO_4	7.75	3.80	—

Estimates of the amount of solids are shown in Table 29.

Table 29. Estimated solids quantities (equivalent inches of sludge).[7]

Tank	Sludge Height (in.)	Sludge on Walls (equiv. in.)	Total Sludge (equiv. in.)
WM-180 (like WM-182)	4.00	0.50	4.5
WM-181 (like WM-182)	4.00	0.50	4.5
WM-182	4.00	0.50	4.5
WM-183	8.00	0.50	8.5
WM-184 (like WM-182)	4.00	0.50	4.5
WM-185 (like WM-182)	4.00	0.50	4.5
WM-186 (like WM-182)	4.00	0.50	4.5
WM-187 (like WM-188)	0.25	0.25	0.5
WM-188	0.25	0.25	0.5
WM-189 (like WM-188)	0.25	0.25	0.5
WM-190 (empty)	0.00	0.00	0.0
Total	32.75	4.25	37.0

The values shown in Table 25 for WM-182, -183, and -188 are based on video footage obtained during light-duty utility arm sampling. Values for the other tanks are estimates with an uncertainty that is likely high but cannot be quantified.

Other assumptions regarding the quantity of heel solids in the tanks are as follows:[7]

1. The sludge is 25 vol% solids and 75 vol% liquid

2. The solids particle density is 2 g/cm^3.

With the above assumptions, the total quantity of heel solids is

37-in * (π * 50^2/4) ft^2 /12 in/ft * 0.25 * 7.48 gal/ft^3 * 3.785 l/gal * 2 kg/l = 85,700 kg .

Note that based on WM-182 and -183 analyses, about 50% of the total solids mass is unaccounted for. This unaccounted for mass is thought to be residual water and water of hydration.

3.2 Suspended or Entrained Solids

Some tank liquid samples contain small amounts of solids, often referred to as *undissolved solids* or UDS. These may be suspended solids, or they may include heel solids entrained during jetting liquid from tanks. Table 30 shows the estimated quantity of these solids.

Table 30. Estimated amounts of undissolved solids in tanks.

Tank[a]	UDS Concentration (g/liter)	Volume (gal)[b]	Suspended Solids (kg)
WM-180	0.23[e]	278,600	247
WM-181	0.17[c]	275,900	178
WM-184	1.61[d]	262,600	1,600
WM-185	4.12[b]	20,600	321
WM-186	5.05[d]	281,500	5,381
WM-187	1.99[d]	49,600	364
Total[a]		1,168,800	8,091

a. Contribution of tanks not listed are negligible, because their liquid volumes are at or near heel level.

b. Volumes as of July 1999 as taken from Excel file, "Tank Farm Composition Database".[4]

c. From Compositions of Wastes in Tank Farm.[14]

d. From Tank Farm Inventory – June 1994.[15]

e. From Composition and Simulation of Tank WM-180 Sodium-Bearing Waste at the Idaho Nuclear Technology and Engineering Center.[5]

The average composition of the UDS was estimated by Arlin Olson primarily based on data contained in *Historical Tank Farm Sample Results.*[16] Table 31 shows this estimated composition. Table 32 shows the average UDS composition converted to oxides.

Table 31. Estimated average composition of undissolved solids.

	Wt%	Likely Forms
Al	2.01	$AlPO_4$
B	3.34	B_2O_3
Ca	1.02	CaF_2
Cr	0.26	Cr_2O_3
Fe	2.79	$FePO_4$-$2H_2O$
Hg	0.66	$HgCl_2$
K	1.79	$KNbO_3$, KCl
Mn	0.44	MnO_2
Na	4.88	NaCl, Na_3PO_4
Nb	0.17	$KNbO_3$
Ni	1.64	NiO
Si	4.58	SiO_2
Zr	15.62	ZrO_2, $Zr(SO_4)_2$-$4H_2O$
Cl	3.05	NaCl, KCl, $HgCl_2$
F	2.98	CaF_2, NaF
PO_4	14.07	$AlPO_4$, Na_3PO_4, $FePO_4$-$2H_2O$
SO_4	16.45	$Zr(SO_4)_2$-$4H_2O$
H_2O	7.97	as per above hydrate
O	16.29	as per above oxides
	100.00	

Table 32. Average undissolved solids composition converted to oxides.

Chemical-Specific Compound	Wt%
Al_2O_3	5.17
B_2O_3	14.64
CaO	1.94
Cr_2O_3	0.51
Fe_2O_3	5.43
K_2O	2.94
MnO_2	0.94
Na_2O	8.94
Nb_2O_5	0.34
NiO	2.83
SiO_2	13.32
ZrO_2	28.70
P_2O_5	14.30
Total	100.00
Cl	4.14
F	4.05
SO_4	22.37
Hg	0.90

More recent data for UDS was obtained from samples of waste from tank WM-180. The solids composition of these samples is shown in Table 33. The value for oxygen shown in Table 32 was calculated by charge balance. The value for water was calculated by subtracting the sum of all other species from unity. The elemental composition shown in Table 32 was taken from Table 4 of Reference 5.

Table 33 shows the radionuclide concentrations in WM-180 solids, also taken from Reference 5. Table 34 shows the values corrected for interstitial liquid radionuclides.

Table 33. Estimated average composition of undissolved solids from WM-180.

Element	As Elements (dry basis, wt%)	As Elements (with hydrated water, wt %)	As Compounds after Vitrification (wt%)	
Al	5.846	4.81E+00	Al_2O_3	1.72E+01
Sb	0.004	3.29E-03	Sb_2O_5	8.29E-03
As	< 0.000711	< 5.85E-04	As_2O_5	1.70E-03
Ba	0.0034	2.80E-03	BaO	5.92E-03
Be	< 0.00019	< 1.56E-04	BeO	8.22E-04
B	< 0.0511	< 4.21E-02	B_2O_3	2.57E-01
Cd	0.0177	1.46E-02	CdO	3.15E-02
Ca	0.4303	3.54E-01	CaO	9.39E-01

Table 33. (continued).

Element	As Elements (dry basis, wt%)	As Elements (with hydrated water, wt %)	As Compounds after Vitrification (wt%)	
Cl	0.0909	7.48E-02	CeO_2	1.15E+00
Ce	0.0043	3.54E-03	Cs_2O	1.15E+01
Cs	0.0524	4.31E-02	Cr_2O_3	8.07E+00
Cr	0.0681	5.61E-02	CoO	2.97E-03
Co	< 0.0015	< 1.23E-03	CuO	2.65E-02
Cu	0.0136	1.12E-02	Gd_2O_3	1.46E-02
F	0.0033	2.72E-03	Fe_2O_3	4.49E+00
Gd	0.0081	6.67E-03	PbO	8.80E-02
Fe	2.012	1.66E+00	Li_2O	5.37E-02
Pb	0.0524	4.31E-02	MgO	3.58E-01
Li	< 0.016	< 1.32E-02	MnO_2	3.87E-01
Mg	0.1383	1.14E-01	MoO_3	8.33E-02
Mn	0.1568	1.29E-01	NiO	5.48E-02
Hg	< 0.8904	< 7.33E-01	Nb_2O_5	2.24E+00
Mo	0.0356	2.93E-02	Pd_2O_3	1.45E-01
Ni	0.0276	2.27E-02	P_2O_5	1.94E+01
Nb	< 1.004	< 8.26E-01	K_2O	2.76E+00
NO_3	43.43	3.58E+01	Ru_2O_3	6.93E-02
Pd	< 0.076	< 6.26E-02	SeO_2	2.80E-01
PO_4	16.659	1.37E+01	SiO_2	6.98E+00
K	1.471	1.21E+00	Ag_2O	8.21E-03
Ru	0.0359	2.96E-02	Na_2O	1.64E+01
Se	< 0.1279	< 1.05E-01	SrO	4.06E-03
Si	2.092	1.72E+00	Tl_2O_3	2.37E-01
Ag	0.0049	4.03E-03	SnO_2	4.20E-01
Na	7.816	6.43E+00	TiO_2	2.50E-01
Sr	0.0022	1.81E-03	UO_2	6.16E-02
SO_4	1.514	1.25E+00	V_2O_5	2.78E-03
Tl	< 0.1359	< 1.12E-01	ZnO	3.80E-02
Sn	0.212	1.75E-01	ZrO_2	5.89E+00
Ti	0.0959	7.89E-02		
U	0.0348	2.86E-02	Total	100.00
V	< 0.001	< 8.23E-04		
Zn	0.0196	1.61E-02	Cl	1.42E-01
Zr	2.797	2.30E+00	F	5.15E-03
Total	87.454	72.0	Hg	1.39E+00
Oxygen	(balance)	3.0 (est)	SO_4	2.36E+00
Water	(dry basis)	25.0		
Total		100.0	Total	103.90

Table 34. WM-180 undissolved solids radionuclide concentrations.

Radionuclide	Ci/g Solids
Am-241	3.13E-07
Co-60	3.55E-08
Cs-134	2.59E-07
Cs-137	2.61E-04
Eu-154	4.30E-07
I-129	0
Np-237	3.37E-09
Pu-238	8.75E-05
Pu-239	1.30E-05
Sb-125	3.37E-06
Total Sr	6.16E-05
Tc-99	2.35E-08
U-234	4.31E-09
U-235	8.88E-11
U-236	1.67E-10
U-238	3.79E-11

4. UNCERTAINTIES

Uncertainties are present in some of the compositions shown in this report due to inadequate analyses or unverified assumptions. These include the following:

- The amount and composition of tank heel solids contain major uncertainties
- The basis for some of the NGLW stream compositions is inadequate for chemical composition, radiological composition, or both
- Volumes of flush water that will be used in tank closure activities are uncertain and could affect the proportions of different wastes in the different tanks
- Concentrations of undissolved solids in some tanks are uncertain, and whether the UDS are entrained heel solids or suspended solids with different properties and compositions is unknown
- The assumed degree of concentration of NGLW in the Process Equipment Waste Evaporator and Tank Farm wastes in the HLLWE needs to be verified
- The number and size of tanks in a New Tank Farm, or even whether any new tanks will be constructed prior to construction of the vitrification facility is uncertain and will affect the composition of waste fed to the vitrification facility.

5. REFERENCES

1. W. B. Palmer, W. B. McNaught, C. B. Millet, M. D. Staiger, F. S. Ward, *INTEC Waste Management Through 2070*, INEEL/EXT-2000-01005, December, 2000.

2. C. B. Millet, unpublished Excel spreadsheet "IPABS-2001-DirVit of SBW in 2012B.xls," May 31, 2001.

3. C. B. Millet, unpublished Excel spreadsheet, "DirVit of SBW in 2016-for-2070Rev1b.xls," May 30, 2001.

4. M. D. Staiger, C. B. Millet, R. A. Nichelson, R. A. Wood, A. Chambers, "Tank Farm Facility,Tank and Waste Data," *Engineering Design File EDF-1598*, February 27, 2001.

5. J. D. Christian, *Composition and Simulation of Tank WM-180 Sodium-Bearing Waste at the Idaho Nuclear Technology and Engineering Center,* INEEL/EXT-2001-00600, May, 2001.

6. M. Patterson, *Light Duty Utility Arm Deployment in Tank WM-188*, INEEL/EXT-99-01302, December, 1999.

7. A. Poloski, "Solids Characterization," *Engineering Design File EDF-TST-001*, September 20, 2000.

8. J. L. Tripp, *Supporting Information for the INEEL Liquid Waste Management Plan, Appendix B*, INEEL/EXT-98-00730, July, 1998.

9. H. C. Wood, "Results of Balance of Plant Sampling in FY-99 and FY-00*," INEEL Interoffice Memorandum HCW-01-00*, September 27, 2000.

10. R. E. Schindler, *Management of HLLWE Condensates*, Schi-21-98, September 23, 1998.

11. R. E. Schindler, *Status Report on Development of and ASPEN Electrolyte NRTL Parameter Set for Process Simulation of INTEC Aqueous Wastes*, INEEL/INT-2000-0025, January, 2000..

12. D. R. Wenzel, *Calculation of 1999 Radionuclide Inventory for Sodium Bearing Waste*, Wen-20-99, May 18, 1999.

13. R. A. Wood, *Updated Aluminum Nitrate/WM-189 Blend Calculations for 500°C and 600°C Operations During NWCF RUN H4*, RAW-01-00, February 14, 2000.

14. R. E. Schindler, *Compositions of Wastes in Tank Farm*, Schi-4-99, February 11, 1999.

15. K. J. Rebish and J. A. Nenni, *Tank Farm Inventory – June, 1994*, KJR-02-94/JAN-03-94, June 23, 1994.

16. M. C. Swenson, *Historical Tank Farm Sample Results*, MCS-27-92, December 17, 1992.

APPENDIX A

TANK FARM STREAM COMPOSITIONS

APPENDIX A

TANK FARM STREAM COMPOSITIONS

This appendix contains estimates of compositions of tank waste at different times prior to vitrification, and corresponding to composition identifiers shown in Tables 1–15. The table below identifies which waste compositions are included in the appendix. Values in Table A1 have been adjusted to obtain charge balance and consistency between radionuclide and chemical concentrations. Values in all other tables in this appendix have not.

Table A1	Tables A2, A3	Tables A4,A5 5	Not Included	Not Included	Table A6	Table A7, A8	Not Included
Jul-99 Tank Liquid Compositions	Subsequent Tank Liquid Compositions	Tank Flush Compositions	Diluted Tank Liquid Compositions	Tank Heel Solids	Evaporator Concentrates	NGLW Stream Compositions	New Tank Farm Compositions
WM-180-1	WM-181-2	WM-180-F	WM-183-1D	WM-180-H	AS-1Conc	NGLW-1	Vit-1
WM-181-1	WM-181-3	WM-181-F	WM-180-1D	WM-181-H	AS-2Conc	NGLW-2	Vit-2
WM-182-1	WM-181-4	WM-182-F	WM-188-2D	WM-182-H	AS-3Conc	NGLW-3	Vit-3
WM-183-1	WM-181-5	WM-183-F	WM-189-3D	WM-183-H	AS-4Conc	NGLW-4	
WM-184-1	WM-185-2	WM-184-F	WM-187-6D	WM-184-H	AS-5Conc	NGLW-5	
WM-185-1	WM-187-2	WM-185-F	WM-100-1D	WM-185-H	AS-6Conc	NGLW-6	(See Table 21
WM-186-1	WM-187-3	WM-186-F	WM-181-5D	WM-186-H	AS-7Conc	NGLW-8	in Report)
WM-187-1	WM-187-4	WM-187-F		WM-187-H	AS-8Conc	NGLW-9	
WM-188-1	WM-187-5	WM-188-F		WM-188-H	AS-9Conc	WM-100-1	
WM-189-1	WM-187-6	WM-189-F	(These	WM-189-H	AS10Conc	NGLW-10	
	WM-188-2		streams are	WM-181-H2		NGLW-13-18	
	WM-189-2	WM-180-FH	equivalent to	WM-181-H3			
	WM-189-3	WM-181-FH	the corres-	WM-181-H4			
		WM-182-FH	ponding tank	WM-187-H2			
		WM-183-FH	liquid stream	WM-187-H3			
		WM-184-FH	diluted by				
		WM-185-FH	5%)	(Compositions			
		WM-186-FH		of solids in			
		WM-187-FH		some tanks			
		WM-188-FH		are unknown -			
		WM-189-FH		see Section 3			
				of report)			

Table A1. Tank Farm Concentrations as of July 1999.

Name: As of July 1999	WM-180-1 278,600 gal	WM-181-1 275,900 gal	WM-182-1 6,400 gal	WM-183-1 30,900 gal	WM-184-1 262,600 gal	WM-185-1 20,600 gal	WM-186-1 281,500 gal	WM-187-1 49,600 gal	WM-188-1 13,500 gal	WM-189-1 100,400 gal
	g/liter	g/liter	g/liter	g/liter	g/liter	g/liter	g/liter	g/liter	g/liter	g/liter
TOC	0.21	0.21	0.17	0.21	0.21	0.21	0.21	0.26	0.21	0.21
UDS	0.25	0.17	0.89	2.34	1.61	4.12	5.05	1.99	2.16	1.08
SG	1.26	1.15	1.10	1.19	1.22	1.26	1.16	1.13	1.31	1.31
	mol/liter	mol/liter	mol/liter	mol/liter	mol/liter	mol/liter	mol/liter	mol/liter	mol/liter	mol/liter
H+	1.06E+00	1.64E+00	5.29E-01	2.48E+00	1.67E+00	1.66E+00	1.36E+00	1.78E+00	2.57E+00	2.57E+00
Al	6.98E-01	2.11E-01	2.90E-01	4.29E-01	5.07E-01	7.06E-01	2.64E-01	3.23E-01	8.01E-01	8.88E-01
Am	7.60E-08	4.40E-08	1.63E-07	1.74E-07	9.20E-08	8.32E-08	2.70E-08	5.16E-08	8.86E-08	1.30E-07
Sb	6.71E-05	3.27E-08	2.82E-06	4.00E-06	2.03E-08	1.32E-07	3.03E-08	5.79E-08	2.34E-05	2.41E-05
As	5.25E-04	3.82E-05	2.95E-06	7.74E-06	7.59E-10	1.40E-06	1.13E-09	2.17E-09	4.51E-04	7.91E-05
Ba	5.87E-05	3.69E-05	2.51E-05	4.78E-05	6.40E-05	8.88E-05	6.40E-05	6.40E-05	1.10E-04	8.80E-05
Be	8.17E-06	8.39E-12	3.36E-06	6.38E-06	5.21E-12	3.39E-11	7.77E-12	1.49E-11	4.57E-06	1.01E-05
B	1.29E-02	1.61E-02	4.16E-03	9.04E-03	1.39E-02	2.33E-02	1.39E-02	1.42E-02	3.76E-02	2.51E-02
Br	1.53E-07	1.54E-07	8.65E-07	9.25E-07	9.59E-08	6.23E-07	1.43E-07	2.74E-07	1.92E-06	6.87E-07
Cd	7.94E-04	5.01E-03	5.37E-04	7.01E-04	4.70E-03	1.06E-03	4.70E-03	4.70E-03	9.98E-03	4.77E-03
Ca	4.97E-02	4.46E-02	1.27E-02	2.60E-02	1.60E-02	6.88E-02	4.98E-02	4.56E-02	1.46E-01	8.41E-02
Ce	4.98E-05	9.09E-06	2.72E-05	4.37E-05	5.65E-06	3.67E-05	8.42E-06	1.61E-05	1.13E-04	4.05E-05
Cs	8.14E-06	8.84E-06	4.95E-05	5.30E-05	5.49E-06	3.57E-05	8.19E-06	1.57E-05	1.10E-04	3.94E-05
Cl	3.16E-02	1.01E-02	8.30E-03	8.21E-03	2.75E-02	2.89E-02	1.80E-02	3.49E-03	1.40E-02	2.42E-02
Cr	3.53E-03	2.72E-03	1.90E-03	7.80E-03	4.00E-03	5.18E-03	4.13E-03	4.01E-03	1.33E-02	4.61E-03
Co	2.03E-05	5.88E-05	1.47E-05	8.90E-05	5.88E-05	5.88E-05	5.88E-05	5.88E-05	8.88E-05	4.26E-05
Cu	7.34E-04	6.16E-04	2.18E-04	1.16E-03	6.16E-04	6.16E-04	6.16E-04	6.16E-04	6.16E-04	4.72E-04
Dy	3.15E-10	3.18E-10	1.78E-09	1.91E-09	1.98E-10	1.29E-09	2.95E-10	5.64E-10	3.97E-09	1.42E-09
Eu	3.09E-09	7.68E-09	1.19E-08	1.56E-08	1.95E-09	8.39E-09	3.26E-09	7.74E-09	4.38E-08	1.78E-08
F	4.99E-02	8.86E-02	3.24E-02	3.72E-02	2.32E-02	1.59E-01	3.98E-02	1.19E-01	3.34E-01	2.36E-01
Gd	1.87E-04	1.32E-07	1.41E-04	7.11E-04	8.17E-08	5.31E-07	1.22E-07	2.33E-07	1.64E-06	5.86E-07
Ge	4.45E-09	4.49E-09	2.52E-08	2.69E-08	2.79E-09	1.81E-08	4.16E-09	7.97E-09	5.60E-08	2.00E-08
In	6.74E-07	6.80E-07	3.81E-06	4.07E-06	4.22E-07	2.75E-06	6.30E-07	1.21E-06	8.48E-06	3.03E-06
I	5.87E-07	4.92E-07	6.46E-06	6.91E-06	2.92E-06	4.63E-06	1.07E-06	2.05E-06	4.17E-06	5.14E-06
Fe	2.29E-02	1.17E-02	1.12E-02	3.41E-02	1.46E-02	2.40E-02	1.56E-02	1.26E-02	5.28E-02	2.54E-02
La	4.54E-06	4.58E-06	2.57E-05	2.75E-05	2.85E-06	1.85E-05	4.25E-06	8.13E-06	5.72E-05	2.04E-05
Pb	1.38E-03	9.95E-04	3.51E-04	6.87E-04	2.83E-04	1.33E-03	4.18E-04	8.26E-04	1.08E-03	1.06E-03
Li	3.57E-04	2.49E-04	1.35E-04	2.54E-04	2.49E-04	2.49E-04	2.49E-04	2.49E-04	2.49E-04	2.49E-04
Mg	1.27E-02	5.56E-03	3.07E-03	8.04E-03	5.56E-03	5.56E-03	5.56E-03	5.56E-03	5.56E-03	5.56E-03
Mn	1.48E-02	1.30E-02	4.19E-03	8.19E-03	9.83E-03	1.92E-02	9.83E-03	9.83E-03	1.22E-02	1.16E-02
Hg	2.12E-03	4.80E-04	8.45E-04	1.71E-03	6.86E-04	3.97E-03	9.42E-04	2.69E-03	7.22E-03	1.50E-02
Mo	2.03E-04	1.82E-05	1.39E-04	5.58E-04	1.13E-05	5.34E-04	1.69E-05	3.24E-05	6.17E-04	8.13E-05
Nd	1.50E-05	1.52E-05	8.50E-05	9.09E-05	9.43E-06	6.13E-05	1.41E-05	2.69E-05	1.89E-04	6.76E-05
Np	1.66E-05	4.99E-06	4.81E-05	5.14E-05	5.33E-06	1.16E-05	7.95E-06	1.52E-05	4.64E-06	3.82E-05
Ni	1.55E-03	1.15E-03	8.52E-04	3.47E-03	4.14E-03	1.57E-03	4.14E-03	2.22E-03	5.11E-03	1.87E-03
Nb	1.63E-05	3.17E-08	1.78E-07	4.83E-05	1.97E-08	1.28E-07	2.93E-08	5.62E-08	3.63E-05	1.41E-07
NO_3	5.59E+00	3.38E+00	1.93E+00	4.59E+00	4.69E+00	5.47E+00	3.35E+00	3.06E+00	6.27E+00	6.57E+00
Pd	2.47E-05	1.79E-06	8.08E-06	1.07E-05	1.11E-06	7.25E-06	1.66E-06	3.18E-06	2.24E-05	7.99E-06
PO_4	1.44E-02	4.09E-04	4.09E-04	5.61E-04	1.05E-02	4.09E-04	4.94E-04	4.09E-04	2.89E-04	2.91E-04
Pu	5.53E-06	1.27E-06	1.09E-05	1.17E-05	4.39E-06	5.42E-06	1.80E-06	3.45E-06	1.20E-05	8.67E-06
Sm	2.88E-06	2.91E-06	1.63E-05	1.74E-05	1.81E-06	1.18E-05	2.70E-06	5.16E-06	3.63E-05	1.30E-05

Table A-1. (continued).

Name: As of July 1999	WM-180-1 278,600 gal	WM-181-1 275,900 gal	WM-182-1 6,400 gal	WM-183-1 30,900 gal	WM-184-1 262,600 gal	WM-185-1 20,600 gal	WM-186-1 281,500 gal	WM-187-1 49,600 gal	WM-188-1 13,500 gal	WM-189-1 100,400 gal
	mol/liter	mol/liter	mol/liter	mol/liter	mol/liter	mol/liter	mol/liter	mol/liter	mol/liter	mol/liter
Se	1.54E-04	3.90E-08	2.19E-07	3.55E-06	2.54E-07	5.54E-06	3.78E-07	7.24E-07	4.87E-07	1.74E-07
Si	3.18E-07	2.22E-03	1.21E-03	3.22E-03	2.22E-03	2.22E-03	2.22E-03	2.22E-03	2.22E-03	2.22E-03
Ag	5.57E-06	3.39E-05	2.15E-06	4.49E-06	2.02E-08	9.50E-05	3.01E-08	5.76E-08	4.78E-05	2.15E-06
Na	2.17E+00	8.60E-01	4.32E-01	5.46E-01	1.28E+00	1.32E+00	8.41E-01	1.18E-01	7.37E-01	9.02E-01
Sr	1.25E-04	9.81E-06	4.22E-05	8.36E-05	5.26E-06	3.79E-05	7.97E-06	1.90E-05	1.00E-04	4.28E-05
SO_4	7.35E-02	3.83E-02	1.61E-02	2.24E-02	2.74E-02	3.78E-02	2.91E-02	1.02E-02	3.47E-02	6.67E-03
Tc	2.82E-06	2.85E-06	1.29E-05	2.52E-05	1.77E-06	1.15E-05	2.64E-06	5.05E-06	6.00E-05	1.27E-05
Te	1.45E-06	1.47E-06	8.21E-06	8.78E-06	9.10E-07	5.92E-06	1.36E-06	2.60E-06	1.83E-05	6.53E-06
Tb	1.07E-09	1.08E-09	6.03E-09	6.45E-09	6.69E-10	4.35E-09	9.98E-10	1.91E-09	1.34E-08	4.79E-09
Tl	4.31E-05	7.03E-06	1.73E-06	4.18E-06	7.03E-06	7.03E-06	7.03E-06	7.03E-06	3.82E-06	1.84E-05
Th	9.39E-11	9.48E-11	5.32E-10	5.68E-10	5.89E-11	3.83E-10	8.79E-11	1.68E-10	1.18E-09	4.22E-10
Sn	4.32E-05	1.68E-07	1.03E-05	1.09E-05	1.04E-07	6.77E-07	1.55E-07	2.97E-07	2.09E-06	7.46E-07
Ti	6.08E-05	3.47E-05	2.15E-05	4.79E-05	3.47E-05	3.47E-05	3.47E-05	3.47E-05	3.47E-05	3.47E-05
U	3.54E-04	3.19E-04	1.51E-04	3.51E-04	1.82E-04	6.10E-04	3.82E-04	2.68E-04	1.86E-03	6.72E-04
V	9.72E-04	7.92E-05	2.45E-04	3.27E-05	7.92E-05	7.92E-05	7.92E-05	7.92E-05	2.60E-05	1.33E-05
Y	3.46E-06	3.49E-06	1.96E-05	2.09E-05	2.17E-06	1.41E-05	3.23E-06	6.19E-06	4.35E-05	1.55E-05
Zn	1.10E-03	7.92E-04	4.11E-04	1.10E-03	7.92E-04	7.92E-04	7.92E-04	7.92E-04	9.10E-04	7.48E-04
Zr	6.66E-05	6.06E-03	1.46E-03	1.12E-03	1.21E-02	9.91E-03	1.20E-02	1.48E-02	2.60E-02	3.57E-02
	Ci/liter Jan, 2016	Ci/liter Jan, 2016	Ci/liter Jan, 2016	Ci/liter Jan, 2016	Ci/liter Jan, 2016	Ci/liter Jan, 2016	Ci/liter Jan, 2016	Ci/liter Jan, 2016	Ci/liter Jan, 2016	Ci/liter Jan, 2016
Tl-207	2.76E-11	2.79E-11	1.56E-10	1.67E-10	1.73E-11	1.12E-10	2.58E-11	4.94E-11	3.47E-10	1.24E-10
Tl-208	3.35E-10	3.38E-10	1.90E-09	2.03E-09	2.10E-10	1.37E-09	3.13E-10	6.00E-10	4.22E-09	1.51E-09
Pb-209	1.45E-13	1.46E-13	8.19E-13	8.76E-13	9.08E-14	5.90E-13	1.35E-13	2.59E-13	1.82E-12	6.51E-13
Pb-210	2.64E-12	2.67E-12	1.49E-11	1.60E-11	1.66E-12	1.08E-11	2.47E-12	4.73E-12	3.32E-11	1.19E-11
Pb-211	2.76E-11	2.79E-11	1.56E-10	1.67E-10	1.73E-11	1.12E-10	2.58E-11	4.94E-11	3.47E-10	1.24E-10
Pb-212	9.46E-10	9.55E-10	5.35E-09	5.72E-09	5.93E-10	3.86E-09	8.85E-10	1.69E-09	1.19E-08	4.25E-09
Pb-214	6.31E-12	6.37E-12	3.57E-11	3.81E-11	3.95E-12	2.57E-11	5.90E-12	1.13E-11	7.94E-11	2.83E-11
Bi-210	2.64E-12	2.67E-12	1.49E-11	1.60E-11	1.66E-12	1.08E-11	2.47E-12	4.73E-12	3.32E-11	1.19E-11
Bi-211	2.76E-11	2.79E-11	1.56E-10	1.67E-10	1.73E-11	1.12E-10	2.58E-11	4.94E-11	3.47E-10	1.24E-10
Bi-212	9.46E-10	9.55E-10	5.35E-09	5.72E-09	5.93E-10	3.86E-09	8.85E-10	1.69E-09	1.19E-08	4.25E-09
Bi-213	1.89E-13	1.91E-13	1.07E-12	1.14E-12	1.19E-13	7.71E-13	1.77E-13	3.39E-13	2.38E-12	8.50E-13
Bi-214	6.31E-12	6.37E-12	3.57E-11	3.81E-11	3.95E-12	2.57E-11	5.90E-12	1.13E-11	7.94E-11	2.83E-11
Po-210	2.64E-12	2.67E-12	1.49E-11	1.60E-11	1.66E-12	1.08E-11	2.47E-12	4.73E-12	3.32E-11	1.19E-11
Po-213	8.28E-14	8.36E-14	4.68E-13	5.01E-13	5.19E-14	3.37E-13	7.74E-14	1.48E-13	1.04E-12	3.72E-13
Po-214	3.39E-12	3.42E-12	1.92E-11	2.05E-11	2.13E-12	1.38E-11	3.17E-12	6.07E-12	4.27E-11	1.52E-11
Po-215	1.58E-11	1.59E-11	8.92E-11	9.54E-11	9.89E-12	6.43E-11	1.47E-11	2.82E-11	1.98E-10	7.09E-11
Po-216	9.46E-10	9.55E-10	5.35E-09	5.72E-09	5.93E-10	3.86E-09	8.85E-10	1.69E-09	1.19E-08	4.25E-09
Po-218	6.31E-12	6.37E-12	3.57E-11	3.81E-11	3.95E-12	2.57E-11	5.90E-12	1.13E-11	7.94E-11	2.83E-11
At-217	8.28E-14	8.36E-14	4.68E-13	5.01E-13	5.19E-14	3.37E-13	7.74E-14	1.48E-13	1.04E-12	3.72E-13
Rn-219	2.76E-11	2.79E-11	1.56E-10	1.67E-10	1.73E-11	1.12E-10	2.58E-11	4.94E-11	3.47E-10	1.24E-10
Rn-220	9.46E-10	9.55E-10	5.35E-09	5.72E-09	5.93E-10	3.86E-09	8.85E-10	1.69E-09	1.19E-08	4.25E-09
Rn-222	6.31E-12	6.37E-12	3.57E-11	3.81E-11	3.95E-12	2.57E-11	5.90E-12	1.13E-11	7.94E-11	2.83E-11
Fr-221	1.89E-13	1.91E-13	1.07E-12	1.14E-12	1.19E-13	7.71E-13	1.77E-13	3.39E-13	2.38E-12	8.50E-13
Fr-223	3.82E-13	3.86E-13	2.16E-12	2.31E-12	2.40E-13	1.56E-12	3.58E-13	6.84E-13	4.81E-12	1.72E-12
Ra-223	2.76E-11	2.79E-11	1.56E-10	1.67E-10	1.73E-11	1.12E-10	2.58E-11	4.94E-11	3.47E-10	1.24E-10
Ra-224	9.46E-10	9.55E-10	5.35E-09	5.72E-09	5.93E-10	3.86E-09	8.85E-10	1.69E-09	1.19E-08	4.25E-09
Ra-225	1.89E-13	1.91E-13	1.07E-12	1.14E-12	1.19E-13	7.71E-13	1.77E-13	3.39E-13	2.38E-12	8.50E-13

Table A-1. (continued).

Name: As of July 1999	WM-180-1 278,600 gal	WM-181-1 275,900 gal	WM-182-1 6,400 gal	WM-183-1 30,900 gal	WM-184-1 262,600 gal	WM-185-1 20,600 gal	WM-186-1 281,500 gal	WM-187-1 49,600 gal	WM-188-1 13,500 gal	WM-189-1 100,400 gal
	Ci/liter Jan, 2016	Ci/liter Jan, 2016	Ci/liter Jan, 2016	Ci/liter Jan, 2016	Ci/liter Jan, 2016	Ci/liter Jan, 2016	Ci/liter Jan, 2016	Ci/liter Jan, 2016	Ci/liter Jan, 2016	Ci/liter Jan, 2016
Ra-226	6.31E-12	6.37E-12	3.57E-11	3.81E-11	3.95E-12	2.57E-11	5.90E-12	1.13E-11	7.94E-11	2.83E-11
Ac-225	1.89E-13	1.91E-13	1.07E-12	1.14E-12	1.19E-13	7.71E-13	1.77E-13	3.39E-13	2.38E-12	8.50E-13
Ac-227	2.76E-11	2.79E-11	1.56E-10	1.67E-10	1.73E-11	1.12E-10	2.58E-11	4.94E-11	3.47E-10	1.24E-10
Th-227	2.72E-11	2.75E-11	1.54E-10	1.64E-10	1.71E-11	1.11E-10	2.54E-11	4.87E-11	3.42E-10	1.22E-10
Th-228	9.46E-10	9.55E-10	5.35E-09	5.72E-09	5.93E-10	3.86E-09	8.85E-10	1.69E-09	1.19E-08	4.25E-09
Th-229	1.89E-13	1.91E-13	1.07E-12	1.14E-12	1.19E-13	7.71E-13	1.77E-13	3.39E-13	2.38E-12	8.50E-13
Th-230	4.72E-10	4.76E-10	2.67E-09	2.85E-09	2.96E-10	1.92E-09	4.41E-10	8.44E-10	5.94E-09	2.12E-09
Th-231	1.02E-08	1.03E-08	5.80E-08	6.20E-08	6.43E-09	4.18E-08	9.59E-09	1.83E-08	1.29E-07	4.61E-08
Th-234	1.02E-08	1.03E-08	5.80E-08	6.20E-08	6.43E-09	4.18E-08	9.59E-09	1.83E-08	1.29E-07	4.61E-08
Pa-231	4.73E-11	4.77E-11	2.68E-10	2.86E-10	2.97E-11	1.93E-10	4.42E-11	8.47E-11	5.95E-10	2.13E-10
Pa-233	1.42E-06	1.43E-06	8.03E-06	8.58E-06	8.90E-07	5.79E-06	1.33E-06	2.54E-06	1.79E-05	6.38E-06
Pa-234m	1.02E-08	1.03E-08	5.80E-08	6.20E-08	6.43E-09	4.18E-08	9.59E-09	1.83E-08	1.29E-07	4.61E-08
Pa-234	1.30E-11	1.31E-11	7.36E-11	7.87E-11	8.16E-12	5.30E-11	1.22E-11	2.33E-11	1.64E-10	5.85E-11
U-232	2.10E-09	1.93E-09	5.13E-09	7.11E-09	5.66E-10	3.70E-09	1.31E-08	1.62E-09	3.84E-08	4.07E-09
U-233	2.74E-10	2.52E-10	6.69E-10	9.27E-10	7.39E-11	4.82E-10	1.71E-09	2.12E-10	5.00E-09	5.31E-10
U-234	9.14E-07	8.40E-07	7.50E-07	9.72E-07	1.07E-06	1.61E-06	3.27E-11	7.06E-07	3.66E-06	1.77E-06
U-235	2.38E-08	2.18E-08	7.32E-09	1.76E-08	2.80E-08	4.18E-08	2.38E-09	1.83E-08	9.78E-08	4.61E-08
U-236	3.75E-08	3.44E-08	7.70E-09	9.98E-09	5.49E-08	6.59E-08	2.30E-10	2.89E-08	8.49E-08	7.26E-08
U-237	3.93E-09	3.61E-09	9.59E-09	1.33E-08	1.06E-09	6.91E-09	2.45E-08	3.03E-09	7.17E-08	7.62E-09
U-238	2.38E-08	2.18E-08	1.10E-08	2.53E-08	9.72E-09	4.18E-08	3.02E-08	1.83E-08	1.32E-07	4.61E-08
Np-237	4.99E-07	8.33E-07	8.03E-06	8.58E-06	8.90E-07	1.95E-06	1.33E-06	2.54E-06	7.75E-07	6.38E-06
Np-238	3.51E-11	3.54E-11	1.98E-10	2.12E-10	2.20E-11	1.43E-10	3.28E-11	6.28E-11	4.42E-10	1.58E-10
Np-239	1.02E-08	1.03E-08	5.80E-08	6.20E-08	6.43E-09	4.18E-08	9.59E-09	1.83E-08	1.29E-07	4.61E-08
Pu-236	5.52E-11	5.57E-11	3.12E-10	3.34E-10	3.46E-11	2.25E-10	5.16E-11	9.88E-11	6.95E-10	2.48E-10
Pu-238	5.95E-04	5.19E-04	9.37E-04	1.00E-03	2.94E-04	7.00E-04	1.55E-04	2.96E-04	1.17E-03	7.44E-04
Pu-239	9.91E-05	1.53E-05	1.49E-04	1.60E-04	6.30E-05	7.12E-05	2.47E-05	4.73E-05	1.45E-04	1.19E-04
Pu-240	5.12E-06	3.70E-06	2.90E-05	3.10E-05	3.21E-06	1.96E-05	4.79E-06	9.17E-06	6.45E-05	2.30E-05
Pu-241	6.70E-05	1.98E-04	3.79E-04	4.05E-04	4.20E-05	5.94E-04	6.27E-05	1.20E-04	8.44E-04	3.01E-04
Pu-242	3.86E-09	8.74E-09	2.19E-08	2.34E-08	2.42E-09	2.23E-08	3.61E-09	6.91E-09	6.03E-07	1.74E-08
Am-241	8.99E-05	3.98E-05	1.47E-04	1.57E-04	8.35E-05	7.49E-05	2.43E-05	4.66E-05	7.81E-05	1.17E-04
Am-242m	7.09E-09	7.16E-09	4.01E-08	4.29E-08	4.45E-09	2.89E-08	6.64E-09	1.27E-08	8.93E-08	3.19E-08
Am-242	7.09E-09	7.16E-09	4.01E-08	4.29E-08	4.45E-09	2.89E-08	6.64E-09	1.27E-08	8.93E-08	3.19E-08
Am-243	1.02E-08	1.03E-08	5.80E-08	6.20E-08	6.43E-09	4.18E-08	9.59E-09	1.83E-08	1.29E-07	4.61E-08
Cm-242	5.91E-09	5.97E-09	3.35E-08	3.58E-08	3.71E-09	2.41E-08	5.53E-09	1.06E-08	7.44E-08	2.66E-08
Cm-243	1.02E-08	1.03E-08	5.80E-08	6.20E-08	6.43E-09	4.18E-08	9.59E-09	1.83E-08	1.29E-07	4.61E-08
Cm-244	2.71E-06	5.17E-07	2.90E-06	3.10E-06	3.21E-07	2.09E-06	4.79E-07	9.17E-07	6.45E-06	2.30E-06
Cm-245	1.46E-10	1.47E-10	8.25E-10	8.82E-10	9.15E-11	5.95E-10	1.36E-10	2.61E-10	1.84E-09	6.56E-10
Cm-246	9.46E-12	9.55E-12	5.35E-11	5.72E-11	5.93E-12	3.86E-11	8.85E-12	1.69E-11	1.19E-10	4.25E-11
H-3	1.02E-05	1.12E-05	1.47E-05	1.57E-05	1.63E-06	7.05E-06	2.43E-06	9.24E-06	3.27E-05	8.56E-06
Be-10	1.46E-12	1.47E-12	8.25E-12	8.82E-12	9.15E-13	5.95E-12	1.36E-12	2.61E-12	1.84E-11	6.56E-12
C-14	5.91E-11	5.97E-11	3.35E-10	3.58E-10	3.71E-11	2.41E-10	5.53E-11	1.06E-10	8.18E-05	2.66E-10
Se-79	2.13E-07	2.15E-07	1.20E-06	1.29E-06	1.33E-07	8.68E-07	1.99E-07	3.81E-07	2.68E-06	9.57E-07
Rb-87	1.42E-11	1.43E-11	8.03E-11	8.58E-11	8.90E-12	5.79E-11	1.33E-11	2.54E-11	1.79E-10	6.38E-11
Sr-90	9.75E-03	1.71E-02	1.05E-01	1.12E-01	9.16E-03	6.60E-02	1.39E-02	3.32E-02	1.75E-01	7.46E-02
Y-90	9.75E-03	1.71E-02	1.05E-01	1.12E-01	9.16E-03	6.60E-02	1.39E-02	3.32E-02	1.75E-01	7.46E-02
Zr-93	1.06E-06	1.07E-06	6.02E-06	6.44E-06	6.67E-07	4.34E-06	9.96E-07	1.90E-06	1.34E-05	4.78E-06
Nb-93m	9.07E-07	9.15E-07	5.13E-06	5.48E-06	5.69E-07	3.70E-06	8.48E-07	1.62E-06	1.14E-05	4.07E-06

Table A-1. (continued).

Name: As of July 1999	WM-180-1 278,600 gal	WM-181-1 275,900 gal	WM-182-1 6,400 gal	WM-183-1 30,900 gal	WM-184-1 262,600 gal	WM-185-1 20,600 gal	WM-186-1 281,500 gal	WM-187-1 49,600 gal	WM-188-1 13,500 gal	WM-189-1 100,400 gal
	Ci/liter Jan, 2016	Ci/liter Jan, 2016	Ci/liter Jan, 2016	Ci/liter Jan, 2016	Ci/liter Jan, 2016	Ci/liter Jan, 2016	Ci/liter Jan, 2016	Ci/liter Jan, 2016	Ci/liter Jan, 2016	Ci/liter Jan, 2016
Nb-94	5.52E-07	5.57E-07	3.12E-06	3.34E-06	3.46E-07	2.25E-06	5.16E-07	9.88E-07	6.95E-06	2.48E-06
Tc-98	1.26E-12	1.27E-12	7.14E-12	7.63E-12	7.91E-13	5.14E-12	1.18E-12	2.26E-12	1.59E-11	5.67E-12
Tc-99	1.05E-05	4.77E-06	2.16E-05	4.23E-05	2.97E-06	1.93E-05	4.42E-06	8.47E-06	1.01E-04	2.13E-05
Ru-106	5.91E-11	2.16E-11	3.35E-10	3.58E-10	3.71E-11	6.92E-12	5.53E-11	1.06E-10	7.44E-10	2.66E-10
Rh-102	1.89E-11	1.91E-11	1.07E-10	1.14E-10	1.19E-11	7.71E-11	1.77E-11	3.39E-11	2.38E-10	8.50E-11
Rh-106	5.91E-11	2.16E-11	3.35E-10	3.58E-10	3.71E-11	6.92E-12	5.53E-11	1.06E-10	7.44E-10	2.66E-10
Pd-107	7.88E-09	7.96E-09	4.46E-08	4.77E-08	4.94E-09	3.21E-08	7.37E-09	1.41E-08	9.92E-08	3.54E-08
Cd-113m	8.67E-07	8.75E-07	4.91E-06	5.24E-06	5.44E-07	3.54E-06	8.11E-07	1.55E-06	1.09E-05	3.90E-06
In-115	4.73E-17	4.77E-17	2.68E-16	2.86E-16	2.97E-17	1.93E-16	4.42E-17	8.47E-17	5.95E-16	2.13E-16
Sn-121m	2.72E-08	2.75E-08	1.54E-07	1.64E-07	1.71E-08	1.11E-07	2.54E-08	4.87E-08	3.42E-07	1.22E-07
Sn-126	2.01E-07	2.03E-07	1.14E-06	1.22E-06	1.26E-07	8.20E-07	1.88E-07	3.60E-07	2.53E-06	9.04E-07
Sb-125	2.44E-07	1.09E-06	8.09E-07	1.48E-06	1.53E-07	9.96E-07	2.29E-07	4.37E-07	3.08E-06	1.10E-06
Sb-126m	2.01E-07	2.03E-07	1.14E-06	1.22E-06	1.26E-07	8.20E-07	1.88E-07	3.60E-07	2.53E-06	9.04E-07
Sb-126	2.80E-08	2.82E-08	1.58E-07	1.69E-07	1.75E-08	1.14E-07	2.62E-08	5.01E-08	3.52E-07	1.26E-07
Te-125m	5.91E-08	5.97E-08	3.35E-07	3.58E-07	3.71E-08	2.41E-07	5.53E-08	1.06E-07	7.44E-07	2.66E-07
I-129	1.34E-08	1.12E-08	1.47E-07	1.57E-07	6.65E-08	1.05E-07	2.43E-08	4.66E-08	9.49E-08	1.17E-07
Cs-134	5.06E-08	6.23E-07	1.12E-06	6.65E-07	3.50E-08	2.62E-07	2.48E-07	2.33E-07	2.84E-06	7.34E-07
Cs-135	4.34E-07	4.38E-07	2.45E-06	2.62E-06	2.72E-07	1.77E-06	4.06E-07	7.76E-07	5.46E-06	1.95E-06
Cs-137	2.17E-02	1.83E-02	1.03E-01	1.10E-01	1.14E-02	7.39E-02	1.70E-02	3.25E-02	2.28E-01	8.15E-02
Ba-137m	1.71E-02	1.72E-02	9.66E-02	1.03E-01	1.07E-02	6.96E-02	1.60E-02	3.05E-02	2.15E-01	7.67E-02
Ce-142	1.46E-11	1.47E-11	8.25E-11	8.82E-11	9.15E-12	5.95E-11	1.36E-11	2.61E-11	1.84E-10	6.56E-11
Ce-144	2.88E-12	2.16E-13	1.63E-11	1.74E-11	1.80E-12	1.90E-13	2.69E-12	5.15E-12	3.62E-11	1.29E-11
Pr-144	2.88E-12	2.16E-13	1.63E-11	1.74E-11	1.80E-12	1.90E-13	2.69E-12	5.15E-12	3.62E-11	1.29E-11
Pm-146	4.73E-09	4.77E-09	2.68E-08	2.86E-08	2.97E-09	1.93E-08	4.42E-09	8.47E-09	5.95E-08	2.13E-08
Pm-147	2.68E-06	2.71E-06	1.52E-05	1.62E-05	1.68E-06	1.09E-05	2.51E-06	4.80E-06	3.37E-05	1.20E-05
Sm-146	1.34E-13	1.35E-13	7.58E-13	8.11E-13	8.40E-14	5.46E-13	1.25E-13	2.40E-13	1.69E-12	6.02E-13
Sm-147	3.59E-12	3.62E-12	2.03E-11	2.17E-11	2.25E-12	1.46E-11	3.36E-12	6.42E-12	4.52E-11	1.61E-11
Sm-151	1.50E-04	1.51E-04	8.47E-04	9.06E-04	9.39E-05	6.11E-04	1.40E-04	2.68E-04	1.89E-03	6.73E-04
Eu-150	5.52E-12	5.57E-12	3.12E-11	3.34E-11	3.46E-12	2.25E-11	5.16E-12	9.88E-12	6.95E-11	2.48E-11
Eu-152	6.31E-07	6.37E-07	3.57E-06	3.81E-06	3.95E-07	2.57E-06	5.90E-07	1.13E-06	7.94E-06	2.83E-06
Eu-154	1.93E-05	7.18E-05	1.13E-04	1.46E-04	8.77E-06	7.60E-05	2.92E-05	4.94E-05	4.00E-04	1.06E-04
Eu-155	1.30E-05	8.75E-06	1.07E-05	1.55E-05	8.16E-06	9.94E-06	4.36E-06	2.33E-05	5.31E-05	5.85E-05
Ho-166m	2.25E-11	2.27E-11	1.27E-10	1.36E-10	1.41E-11	9.16E-11	2.10E-11	4.02E-11	2.83E-10	1.01E-10
Co-60	8.31E-07	1.14E-05	2.15E-06	6.82E-06	2.88E-06	3.76E-06	3.86E-06	5.71E-06	3.03E-05	6.89E-06
Ni-63	2.21E-05	5.15E-05	7.81E-05	8.34E-05	8.65E-06	5.62E-05	1.29E-05	2.47E-05	1.74E-04	6.20E-05

FY2000 WM-180 analysis as adjusted by J. Christian

calculated from radionuclide concentrations

less than

estimated based on Wenzel

estimated based on tot Cs to Cs-137 ratio in WM-183

estimated based on average of other tanks

KJR-02-94/JAN-03-94

Schi-04-99

correction based on e-mail from Schindler

from charge balance

est based on tot Sr to rad Sr in WM-182 & WM-183

adjusted to be consistent with chemical analysis

Table A2. Subsequent Tank Farm Liquid Concentrations.

	Stream							
	WM-181-2 105,000 gal	WM-181-3 125, 640 gal	WM-181-4 110,061 gal	WM-181-5 20,172 gal	WM-185-2 43,100 gal	WM-187-2 89,605 gal	WM-187-3 209,290 gal	WM-187-4 154,531 gal
	g/liter	g/liter	g/liter	g/liter	g/liter	g/liter	g/liter	g/liter
TOC	2.01E-02	9.54E-02	1.83E-02	6.03E-03	1.93E-01	2.26E-01	2.51E-01	8.84E-02
UDSl	1.19E-01	6.03E-01	1.28E-01	5.31E-02	2.98E+00	2.37E+00	1.79E+00	4.09E-01
	mol/liter	mol/liter	mol/liter	mol/liter	mol/liter	mol/liter	mol/liter	mol/liter
H+	1.96E-01	7.07E-01	1.40E-01	4.66E-02	1.86E+00	1.78E+00	3.12E+00	1.41E+00
Al	3.03E-02	3.21E-02	2.58E-02	9.38E-03	5.23E-01	4.01E-01	2.51E-01	5.51E-02
Am	1.03E-08	4.95E-09	4.60E-09	1.68E-09	1.15E-07	7.74E-08	3.31E-08	8.45E-09
Sb	1.91E-07	3.75E-06	3.43E-07	9.37E-08	1.78E-06	7.90E-07	6.09E-06	2.30E-06
As	2.18E-06	3.10E-07	2.83E-08	1.56E-08	4.00E-06	1.70E-06	4.12E-06	6.13E-07
Ba	4.02E-06	4.29E-06	3.27E-06	1.25E-06	6.32E-05	6.23E-05	3.09E-05	7.06E-06
Be	3.01E-07	4.40E-07	4.02E-08	1.61E-08	2.74E-06	1.16E-06	1.58E-06	7.65E-07
B	1.19E-03	8.05E-04	7.00E-04	2.70E-04	1.51E-02	1.43E-02	8.28E-03	1.75E-03
Br	5.10E-08	2.95E-08	7.02E-09	3.75E-09	6.96E-07	4.48E-07	7.76E-06	3.68E-06
Cd	2.72E-04	4.74E-05	2.16E-04	7.73E-05	8.10E-04	2.95E-03	1.29E-03	1.56E-04
Ca	3.35E-03	1.96E-03	9.02E-04	4.61E-04	4.42E-02	4.41E-02	1.98E-02	2.86E-03
Ce	2.50E-06	1.54E-06	3.95E-07	2.07E-07	3.64E-05	2.44E-05	1.04E-05	1.89E-06
Cs	2.92E-06	1.69E-06	4.02E-07	2.15E-07	3.99E-05	2.56E-05	1.10E-05	2.65E-06
Cl	8.71E-04	8.29E-04	1.32E-03	4.72E-04	1.74E-02	9.32E-03	9.81E-03	2.06E-03
Cr	4.98E-04	2.53E-04	2.03E-04	8.17E-05	5.84E-03	4.70E-03	2.03E-03	2.67E-04
Co	7.00E-06	4.58E-05	6.84E-06	2.16E-06	6.64E-05	6.08E-05	1.05E-04	4.62E-05
Cu	8.40E-05	3.47E-05	3.09E-05	1.22E-05	7.93E-04	6.78E-04	2.90E-04	3.52E-05
Dy	1.05E-10	6.09E-11	1.45E-11	7.73E-12	1.44E-09	9.23E-10	3.95E-10	9.56E-11
Eu	1.10E-09	4.67E-10	1.31E-10	6.67E-11	1.07E-08	8.84E-09	3.79E-09	7.48E-10
F	5.97E-03	8.08E-03	1.78E-03	7.84E-04	9.25E-02	1.05E-01	6.13E-02	1.35E-02
Gd	3.36E-05	1.34E-05	1.23E-06	9.47E-07	3.05E-04	1.30E-04	5.56E-05	9.93E-06
Ge	1.49E-09	8.60E-10	2.04E-10	1.09E-10	2.03E-08	1.30E-08	2.26E-08	9.51E-09
In	2.25E-07	1.30E-07	3.09E-08	1.65E-08	3.07E-06	1.97E-06	8.44E-07	2.04E-07
I	3.50E-07	2.19E-07	1.52E-07	5.84E-08	5.19E-06	3.34E-06	2.31E-06	7.68E-07
Fe	2.17E-03	1.32E-03	7.77E-04	3.18E-04	2.62E-02	1.81E-02	9.99E-03	2.36E-03
La	1.52E-06	8.77E-07	2.08E-07	1.11E-07	2.07E-05	1.33E-05	5.69E-06	1.38E-06
Pb	7.98E-05	6.06E-05	1.83E-05	8.12E-06	9.32E-04	8.53E-04	6.52E-03	1.96E-03
Li	2.39E-05	9.99E-06	1.21E-05	4.65E-06	2.29E-04	2.35E-04	1.01E-04	1.41E-05
Mg	6.44E-04	2.67E-04	2.75E-04	1.07E-04	6.12E-03	5.68E-03	2.45E-03	3.43E-04
Mn	1.00E-03	1.17E-03	5.50E-04	2.10E-04	1.27E-02	1.08E-02	5.71E-03	1.07E-03
Hg	1.04E-04	1.29E-04	4.27E-05	1.99E-05	2.64E-03	2.61E-03	7.28E-03	2.05E-03
Mo	2.72E-05	7.82E-05	7.66E-06	3.08E-06	4.96E-04	2.29E-04	3.56E-04	1.80E-04

Table A2. (continued).

	Stream							
	WM-181-2 105,000 gal	WM-181-3 125, 640 gal	WM-181-4 110,061 gal	WM-181-5 20,172 gal	WM-185-2 43,100 gal	WM-187-2 89,605 gal	WM-187-3 209,290 gal	WM-187-4 154,531 gal
	mol/liter	mol/liter	mol/liter	mol/liter	mol/liter	mol/liter	mol/liter	mol/liter
Nd	5.02E-06	2.90E-06	6.90E-07	3.69E-07	6.84E-05	4.40E-05	1.88E-05	4.56E-06
Np	2.66E-06	1.20E-06	3.50E-07	1.75E-07	2.76E-05	2.02E-05	8.64E-06	2.38E-06
Ni	2.19E-04	9.74E-05	1.95E-04	7.25E-05	2.24E-03	2.18E-03	9.34E-04	1.18E-04
Nb	2.28E-06	9.12E-07	8.43E-08	6.48E-08	2.08E-05	8.87E-06	3.80E-06	3.74E-07
NO_3	3.78E-01	7.37E-01	2.79E-01	9.86E-02	4.60E+00	3.65E+00	3.76E+00	1.42E+00
Pd	5.89E-07	3.42E-07	8.15E-08	4.35E-08	8.06E-06	5.19E-06	2.22E-06	4.75E-07
PO_4	4.60E-05	4.18E-05	4.77E-04	1.48E-04	4.37E-04	4.12E-04	5.62E-04	8.71E-05
Pu	6.11E-07	3.25E-07	2.27E-07	8.76E-08	7.61E-06	5.15E-06	2.20E-06	5.64E-07
K	9.02E-03	6.38E-03	4.40E-03	1.84E-03	1.17E-01	5.72E-02	3.37E-02	1.02E-02
Pr	1.40E-06	8.10E-07	1.93E-07	1.03E-07	1.91E-05	1.23E-05	5.26E-06	1.27E-06
Pm	5.12E-10	2.96E-10	7.04E-11	3.76E-11	6.98E-09	4.49E-09	1.92E-09	4.65E-10
Rh	6.14E-07	3.55E-07	8.44E-08	4.51E-08	8.37E-06	5.38E-06	2.30E-06	5.57E-07
Rb	1.36E-06	7.68E-07	1.72E-07	9.37E-08	1.81E-05	1.17E-05	5.03E-06	1.23E-06
Ru	5.57E-06	2.74E-06	4.93E-07	2.87E-07	6.37E-05	3.56E-05	1.52E-05	3.24E-06
Sm	9.62E-07	5.57E-07	1.32E-07	7.07E-08	1.31E-05	8.44E-06	3.61E-06	8.74E-07
Se	1.69E-07	1.97E-07	2.94E-08	1.76E-08	4.18E-06	2.18E-06	1.05E-06	1.41E-07
Si	2.58E-04	1.07E-04	1.10E-04	4.27E-05	2.45E-03	2.27E-03	1.08E-03	1.84E-04
Ag	1.82E-06	3.00E-06	2.75E-07	1.70E-07	4.76E-05	2.03E-05	1.05E-05	1.54E-06
Na	6.67E-02	4.81E-02	6.23E-02	2.24E-02	8.68E-01	4.34E-01	2.79E-01	9.88E-02
Sr	4.42E-06	2.31E-06	4.48E-07	2.55E-07	5.41E-05	3.35E-05	1.47E-05	2.93E-06
SO_4	2.88E-03	2.48E-03	1.46E-03	5.54E-04	2.78E-02	1.75E-02	1.35E-02	2.54E-03
Tc	1.33E-06	6.98E-07	1.43E-07	8.00E-08	1.63E-05	9.74E-06	4.17E-06	8.17E-07
Te	4.84E-07	2.80E-07	6.67E-08	3.56E-08	6.61E-06	4.25E-06	1.82E-06	4.40E-07
Tb	3.56E-10	2.06E-10	4.90E-11	2.62E-11	4.86E-09	3.12E-09	1.34E-09	3.23E-10
Tl	5.32E-07	2.53E-07	3.40E-07	1.28E-07	5.17E-06	6.09E-06	2.78E-06	4.01E-07
Th	3.13E-11	1.81E-11	4.31E-12	2.30E-12	4.28E-10	2.75E-10	1.18E-10	2.85E-11
Sn	5.24E-07	2.19E-07	2.47E-08	1.73E-08	5.02E-06	2.30E-06	9.84E-07	4.25E-07
Ti	3.91E-06	1.63E-06	1.71E-06	6.65E-07	3.72E-05	3.50E-05	1.51E-05	2.19E-06
U	3.17E-05	2.53E-05	1.05E-05	4.80E-06	4.43E-04	3.37E-04	1.57E-04	2.45E-05
V	5.32E-06	3.29E-06	3.87E-06	1.44E-06	5.21E-05	6.60E-05	3.06E-05	1.15E-05
Y	1.15E-06	6.68E-07	1.59E-07	8.48E-08	1.57E-05	1.01E-05	4.33E-06	1.05E-06
Zn	8.97E-05	1.64E-04	5.07E-05	1.82E-05	8.53E-04	8.01E-04	6.38E-04	7.11E-04
Zr	3.42E-04	3.28E-04	5.75E-04	2.10E-04	5.24E-03	1.04E-02	1.03E-02	1.89E-03
HCO_3	0.00E+00	1.87E-04	1.71E-05	4.47E-06	0.00E+00	0.00E+00	2.94E-02	1.41E-02
Tl-207	9.21E-12	6.37E-12	1.36E-12	7.02E-13	1.26E-10	8.08E-11	8.08E-11	1.73E-11
Tl-208	1.12E-10	7.74E-11	1.65E-11	8.52E-12	1.53E-09	9.81E-10	9.81E-10	2.10E-10
Pb-209	4.83E-14	3.34E-14	7.15E-15	3.68E-15	6.59E-13	4.24E-13	4.24E-13	9.06E-14

Table A2. (continued).

	Stream							
	WM-181-2 105,000 gal	WM-181-3 125, 640 gal	WM-181-4 110,061 gal	WM-181-5 20,172 gal	WM-185-2 43,100 gal	WM-187-2 89,605 gal	WM-187-3 209,290 gal	WM-187-4 154,531 gal
	Ci/liter Jan, 2016	Ci/liter Jan, 2016	Ci/liter Jan, 2016	Ci/liter Jan, 2016	Ci/liter Jan, 2016	Ci/liter Jan, 2016	Ci/liter Jan, 2016	Ci/liter Jan, 2016
Pb-210	8.81E-13	6.10E-13	1.30E-13	6.72E-14	1.20E-11	7.73E-12	7.73E-12	1.65E-12
Pb-211	9.21E-12	6.37E-12	1.36E-12	7.02E-13	1.26E-10	8.08E-11	8.08E-11	1.73E-11
Pb-212	3.16E-10	2.19E-10	4.67E-11	2.41E-11	4.31E-09	2.77E-09	2.77E-09	5.92E-10
Pb-214	2.10E-12	1.46E-12	3.11E-13	1.60E-13	2.87E-11	1.85E-11	1.85E-11	3.95E-12
Bi-210	8.81E-13	6.10E-13	1.30E-13	6.72E-14	1.20E-11	7.73E-12	7.73E-12	1.65E-12
Bi-211	9.21E-12	6.37E-12	1.36E-12	7.02E-13	1.26E-10	8.08E-11	8.08E-11	1.73E-11
Bi-212	3.16E-10	2.19E-10	4.67E-11	2.41E-11	4.31E-09	2.77E-09	2.77E-09	5.92E-10
Bi-213	6.31E-14	4.37E-14	9.34E-15	4.81E-15	8.62E-13	5.54E-13	5.54E-13	1.18E-13
Bi-214	2.10E-12	1.46E-12	3.11E-13	1.60E-13	2.87E-11	1.85E-11	1.85E-11	3.95E-12
Po-210	8.81E-13	6.10E-13	1.30E-13	6.72E-14	1.20E-11	7.73E-12	7.73E-12	1.65E-12
Po-213	2.76E-14	1.91E-14	4.09E-15	2.10E-15	3.77E-13	2.42E-13	2.42E-13	5.18E-14
Po-214	1.13E-12	7.83E-13	1.67E-13	8.62E-14	1.54E-11	9.92E-12	9.92E-12	2.12E-12
Po-215	5.26E-12	3.64E-12	7.78E-13	4.01E-13	7.18E-11	4.62E-11	4.62E-11	9.87E-12
Po-216	3.16E-10	2.19E-10	4.67E-11	2.41E-11	4.31E-09	2.77E-09	2.77E-09	5.92E-10
Po-218	2.10E-12	1.46E-12	3.11E-13	1.60E-13	2.87E-11	1.85E-11	1.85E-11	3.95E-12
At-217	2.76E-14	1.91E-14	4.09E-15	2.10E-15	3.77E-13	2.42E-13	2.42E-13	5.18E-14
Rn-219	9.21E-12	6.37E-12	1.36E-12	7.02E-13	1.26E-10	8.08E-11	8.08E-11	1.73E-11
Rn-220	3.16E-10	2.19E-10	4.67E-11	2.41E-11	4.31E-09	2.77E-09	2.77E-09	5.92E-10
Rn-222	2.10E-12	1.46E-12	3.11E-13	1.60E-13	2.87E-11	1.85E-11	1.85E-11	3.95E-12
Fr-221	6.31E-14	4.37E-14	9.34E-15	4.81E-15	8.62E-13	5.54E-13	5.54E-13	1.18E-13
Fr-223	1.28E-13	8.83E-14	1.89E-14	9.72E-15	1.74E-12	1.12E-12	1.12E-12	2.39E-13
Ra-223	9.21E-12	6.37E-12	1.36E-12	7.02E-13	1.26E-10	8.08E-11	8.08E-11	1.73E-11
Ra-224	3.16E-10	2.19E-10	4.67E-11	2.41E-11	4.31E-09	2.77E-09	2.77E-09	5.92E-10
Ra-225	6.31E-14	4.37E-14	9.34E-15	4.81E-15	8.62E-13	5.54E-13	5.54E-13	1.18E-13
Ra-226	2.10E-12	1.46E-12	3.11E-13	1.60E-13	2.87E-11	1.85E-11	1.85E-11	3.95E-12
Ac-225	6.31E-14	4.37E-14	9.34E-15	4.81E-15	8.62E-13	5.54E-13	5.54E-13	1.18E-13
Ac-227	9.21E-12	6.37E-12	1.36E-12	7.02E-13	1.26E-10	8.08E-11	8.08E-11	1.73E-11
Th-227	9.08E-12	6.28E-12	1.34E-12	6.92E-13	1.24E-10	7.96E-11	7.96E-11	1.70E-11
Th-228	3.16E-10	2.19E-10	4.67E-11	2.41E-11	4.31E-09	2.77E-09	2.77E-09	5.92E-10
Th-229	6.31E-14	4.37E-14	9.34E-15	4.81E-15	8.62E-13	5.54E-13	5.54E-13	1.18E-13
Th-230	1.57E-10	1.09E-10	2.33E-11	1.20E-11	2.15E-09	1.38E-09	1.38E-09	2.95E-10
Th-231	3.42E-09	2.37E-09	5.06E-10	2.61E-10	4.67E-08	3.00E-08	3.00E-08	6.41E-09
Th-234	3.42E-09	2.37E-09	5.06E-10	2.61E-10	4.67E-08	3.00E-08	3.00E-08	6.41E-09
Pa-231	1.58E-11	1.09E-11	2.34E-12	1.20E-12	2.15E-10	1.38E-10	1.38E-10	2.96E-11
Pa-233	4.73E-07	3.28E-07	7.01E-08	3.61E-08	6.46E-06	4.15E-06	4.15E-06	8.88E-07
Pa-234m	3.42E-09	2.37E-09	5.06E-10	2.61E-10	4.67E-08	3.00E-08	3.00E-08	6.41E-09
Pa-234	4.34E-12	3.00E-12	6.42E-13	3.31E-13	5.92E-11	3.81E-11	3.81E-11	8.14E-12

Table A2. (continued).

	Stream							
	WM-181-2 105,000 gal	WM-181-3 125, 640 gal	WM-181-4 110,061 gal	WM-181-5 20,172 gal	WM-185-2 43,100 gal	WM-187-2 89,605 gal	WM-187-3 209,290 gal	WM-187-4 154,531 gal
	Ci/liter Jan, 2016	Ci/liter Jan, 2016	Ci/liter Jan, 2016	Ci/liter Jan, 2016	Ci/liter Jan, 2016	Ci/liter Jan, 2016	Ci/liter Jan, 2016	Ci/liter Jan, 2016
U-232	4.28E-10	2.48E-10	4.82E-11	5.05E-11	4.83E-09	2.95E-09	2.95E-09	6.06E-10
U-233	5.58E-11	3.24E-11	6.29E-12	6.59E-12	6.29E-10	3.85E-10	3.85E-10	7.90E-11
U-234	8.59E-08	6.03E-08	5.37E-08	1.87E-08	1.19E-06	8.96E-07	8.96E-07	1.49E-07
U-235	1.87E-09	1.39E-09	1.39E-09	4.81E-10	2.76E-08	2.19E-08	2.19E-08	3.17E-09
U-236	2.11E-09	1.80E-09	2.64E-09	8.75E-10	3.59E-08	3.13E-08	3.13E-08	4.41E-09
U-237	7.99E-10	4.64E-10	9.01E-11	9.45E-11	9.02E-09	5.52E-09	5.52E-09	1.13E-09
U-238	2.23E-09	1.57E-09	5.81E-10	2.97E-10	3.09E-08	2.33E-08	2.33E-08	3.51E-09
Np-237	4.45E-07	2.39E-07	6.20E-08	3.02E-08	4.62E-06	3.37E-06	3.37E-06	7.86E-07
Np-238	1.17E-11	8.10E-12	1.73E-12	8.92E-13	1.60E-10	1.03E-10	1.03E-10	2.20E-11
Np-239	3.42E-09	2.37E-09	5.06E-10	2.61E-10	4.67E-08	3.00E-08	3.00E-08	6.41E-09
Pu-236	1.84E-11	1.27E-11	2.72E-12	1.40E-12	2.51E-10	1.62E-10	1.62E-10	3.45E-11
Pu-238	7.20E-05	3.96E-05	1.69E-05	6.90E-06	7.66E-04	4.90E-04	4.90E-04	1.04E-04
Pu-239	8.27E-06	5.25E-06	3.32E-06	1.26E-06	1.03E-04	6.99E-05	6.99E-05	1.56E-05
Pu-240	1.64E-06	1.15E-06	2.50E-07	1.28E-07	2.27E-05	1.47E-05	1.47E-05	3.17E-06
Pu-241	2.86E-05	2.30E-05	4.00E-06	2.20E-06	4.59E-04	2.62E-04	2.62E-04	5.05E-05
Pu-242	1.52E-09	1.05E-09	2.05E-10	1.08E-10	2.07E-08	1.26E-08	1.26E-08	2.59E-09
Am-241	9.33E-06	5.33E-06	4.25E-06	1.54E-06	1.04E-04	6.98E-05	6.98E-05	1.54E-05
Am-242m	2.37E-09	1.64E-09	3.50E-10	1.80E-10	3.23E-08	2.08E-08	2.08E-08	4.44E-09
Am-242	2.37E-09	1.64E-09	3.50E-10	1.80E-10	3.23E-08	2.08E-08	2.08E-08	4.44E-09
Am-243	3.42E-09	2.37E-09	5.06E-10	2.61E-10	4.67E-08	3.00E-08	3.00E-08	6.41E-09
Cm-242	1.97E-09	1.37E-09	2.92E-10	1.50E-10	2.69E-08	1.73E-08	1.73E-08	3.70E-09
Cm-243	3.42E-09	2.37E-09	5.06E-10	2.61E-10	4.67E-08	3.00E-08	3.00E-08	6.41E-09
Cm-244	1.71E-07	1.18E-07	2.53E-08	1.30E-08	2.33E-06	1.50E-06	1.50E-06	3.21E-07
Cm-245	4.87E-11	3.37E-11	7.20E-12	3.71E-12	6.64E-10	4.27E-10	4.27E-10	9.13E-11
Cm-246	3.16E-12	2.19E-12	4.67E-13	2.41E-13	4.31E-11	2.77E-11	2.77E-11	5.92E-12
H-3	1.28E-06	5.40E-07	1.23E-07	6.12E-08	1.01E-05	9.42E-06	9.42E-06	1.86E-06
Be-10	4.87E-13	3.37E-13	7.20E-14	3.71E-14	6.64E-12	4.27E-12	4.27E-12	9.13E-13
C-14	1.97E-11	1.37E-11	2.92E-12	1.50E-12	2.69E-10	1.73E-10	1.73E-10	3.70E-11
Se-79	7.10E-08	4.92E-08	1.05E-08	5.41E-09	9.69E-07	6.23E-07	6.23E-07	1.33E-07
Rb-87	4.73E-12	3.28E-12	7.01E-13	3.61E-13	6.46E-11	4.15E-11	4.15E-11	8.88E-12
Sr-90	6.10E-03	4.06E-03	7.84E-04	4.15E-04	7.98E-02	5.23E-02	5.23E-02	1.13E-02
Y-90	6.10E-03	4.06E-03	7.84E-04	4.15E-04	7.98E-02	5.23E-02	5.23E-02	1.13E-02
Zr-93	3.55E-07	2.46E-07	5.25E-08	2.71E-08	4.85E-06	3.12E-06	3.12E-06	6.66E-07
Nb-93m	3.03E-07	2.09E-07	4.48E-08	2.31E-08	4.13E-06	2.65E-06	2.65E-06	5.67E-07
Nb-94	1.84E-07	1.27E-07	2.72E-08	1.40E-08	2.51E-06	1.62E-06	1.62E-06	3.45E-07
Tc-98	4.21E-13	2.91E-13	6.23E-14	3.21E-14	5.74E-12	3.69E-12	3.69E-12	7.89E-13
Tc-99	2.22E-06	1.40E-06	2.62E-07	1.40E-07	2.74E-05	1.63E-05	1.63E-05	3.06E-06

Table A2. (continued).

	Stream							
	WM-181-2 105,000 gal	WM-181-3 125, 640 gal	WM-181-4 110,061 gal	WM-181-5 20,172 gal	WM-185-2 43,100 gal	WM-187-2 89,605 gal	WM-187-3 209,290 gal	WM-187-4 154,531 gal
	Ci/liter Jan, 2016	Ci/liter Jan, 2016	Ci/liter Jan, 2016	Ci/liter Jan, 2016	Ci/liter Jan, 2016	Ci/liter Jan, 2016	Ci/liter Jan, 2016	Ci/liter Jan, 2016
Ru-106	1.79E-11	8.26E-12	2.43E-12	1.14E-12	1.57E-10	1.25E-10	1.25E-10	3.08E-11
Rh-102	6.31E-12	4.37E-12	9.34E-13	4.81E-13	8.62E-11	5.54E-11	5.54E-11	1.18E-11
Rh-106	1.79E-11	8.26E-12	2.43E-12	1.14E-12	1.57E-10	1.25E-10	1.25E-10	3.08E-11
Pd-107	2.63E-09	1.82E-09	3.89E-10	2.00E-10	3.59E-08	2.31E-08	2.31E-08	4.93E-09
Cd-113m	2.89E-07	2.00E-07	4.28E-08	2.21E-08	3.95E-06	2.54E-06	2.54E-06	5.43E-07
In-115	1.58E-17	1.09E-17	2.34E-18	1.20E-18	2.15E-16	1.38E-16	1.38E-16	2.96E-17
Sn-121m	9.08E-09	6.28E-09	1.34E-09	6.92E-10	1.24E-07	7.96E-08	7.96E-08	1.70E-08
Sn-126	6.71E-08	4.64E-08	9.92E-09	5.11E-09	9.15E-07	5.88E-07	5.88E-07	1.26E-07
Sb-125	1.22E-07	5.84E-08	1.22E-08	6.26E-09	1.11E-06	7.15E-07	7.15E-07	1.28E-07
Sb-126m	6.71E-08	4.64E-08	9.92E-09	5.11E-09	9.15E-07	5.88E-07	5.88E-07	1.26E-07
Sb-126	9.34E-09	6.46E-09	1.38E-09	7.12E-10	1.27E-07	8.19E-08	8.19E-08	1.75E-08
Te-125m	1.97E-08	1.37E-08	2.92E-09	1.50E-09	2.69E-07	1.73E-07	1.73E-07	3.70E-08
I-129	7.96E-09	5.96E-09	3.54E-09	1.35E-09	1.18E-07	7.60E-08	7.60E-08	1.63E-08
Cs-134	6.11E-08	2.23E-08	3.62E-09	2.37E-09	4.11E-07	3.04E-07	3.04E-07	8.81E-08
Cs-135	1.45E-07	1.00E-07	2.14E-08	1.10E-08	1.97E-06	1.27E-06	1.27E-06	2.71E-07
Cs-137	6.05E-03	4.19E-03	8.95E-04	4.61E-04	8.26E-02	5.31E-02	5.31E-02	1.13E-02
Ba-137m	5.69E-03	3.94E-03	8.43E-04	4.34E-04	7.77E-02	5.00E-02	5.00E-02	1.07E-02
Ce-142	4.87E-12	3.37E-12	7.20E-13	3.71E-13	6.64E-11	4.27E-11	4.27E-11	9.13E-12
Ce-144	8.32E-13	3.97E-13	1.18E-13	5.54E-14	7.56E-12	6.07E-12	6.07E-12	1.49E-12
Pr-144	8.32E-13	3.97E-13	1.18E-13	5.54E-14	7.56E-12	6.07E-12	6.07E-12	1.49E-12
Pm-146	1.58E-09	1.09E-09	2.34E-10	1.20E-10	2.15E-08	1.38E-08	1.38E-08	2.96E-09
Pm-147	8.94E-07	6.19E-07	1.32E-07	6.82E-08	1.22E-05	7.85E-06	7.85E-06	1.68E-06
Sm-146	4.47E-14	3.10E-14	6.62E-15	3.41E-15	6.10E-13	3.92E-13	3.92E-13	8.39E-14
Sm-147	1.20E-12	8.29E-13	1.77E-13	9.12E-14	1.63E-11	1.05E-11	1.05E-11	2.24E-12
Sm-151	5.00E-05	3.46E-05	7.39E-06	3.81E-06	6.82E-04	4.38E-04	4.38E-04	9.37E-05
Eu-150	1.84E-12	1.27E-12	2.72E-13	1.40E-13	2.51E-11	1.62E-11	1.62E-11	3.45E-12
Eu-152	2.10E-07	1.46E-07	3.11E-08	1.60E-08	2.87E-06	1.85E-06	1.85E-06	3.95E-07
Eu-154	1.03E-05	5.19E-06	8.69E-07	5.08E-07	9.94E-05	6.96E-05	6.96E-05	1.39E-05
Eu-155	1.15E-06	5.95E-07	4.22E-07	1.59E-07	1.14E-05	1.78E-05	1.78E-05	2.78E-06
Ho-166m	7.50E-12	5.19E-12	1.11E-12	5.71E-13	1.02E-10	6.58E-11	6.58E-11	1.41E-11
Co-60	8.63E-07	2.65E-07	1.54E-07	6.38E-08	4.73E-06	5.18E-06	5.18E-06	7.68E-07
Ni-63	6.39E-06	3.27E-06	6.89E-07	3.53E-07	6.28E-05	4.04E-05	4.04E-05	8.63E-06

Table A3. Subsequent Tank Farm liquid concentrations.

	Stream						
	WM-187-5 170,719 gal	WM-187-6 62,264 gal	WM-188-2 283,667 gal	WM-189-2 22,600 gal	WM-189-3 280,012 gal	NT 2-1 125,118 gal	NT 2-2 118,761 gal
	g/liter	g/liter	g/liter	g/liter	g/liter	g/liter	g/liter
TOC	9.40E-02	3.78E-01	4.62E-01	2.08E-01	4.03E-01	1.28E-01	8.43E-02
UDS	4.70E-01	2.07E+00	4.01E+00	9.89E-01	4.16E+00	6.90E-01	4.83E-01
	mol/liter	mol/liter	mol/liter	mol/liter	mol/liter	mol/liter	mol/liter
H+	1.19E+00	2.75E+00	3.59E+00	2.40E+00	2.44E+00	6.91E-01	5.95E-01
Al	3.93E-02	1.81E-01	5.72E-01	8.64E-01	6.64E-01	4.13E-02	1.06E-02
Am	3.71E-09	2.24E-08	8.61E-08	1.23E-07	1.10E-07	3.01E-09	1.49E-10
Sb	2.98E-06	1.23E-05	7.31E-06	2.85E-05	2.50E-06	7.85E-06	3.74E-06
As	2.10E-07	9.09E-07	3.78E-05	1.26E-04	3.38E-05	2.09E-05	5.83E-07
Ba	5.45E-06	2.44E-05	8.64E-05	8.44E-05	1.06E-04	4.64E-06	1.75E-06
Be	5.89E-07	2.09E-06	1.78E-06	9.83E-06	9.15E-07	7.65E-07	3.18E-07
B	1.15E-03	5.07E-03	2.33E-02	2.37E-02	2.84E-02	7.18E-04	1.66E-04
Br	2.06E-06	5.69E-06	7.38E-06	6.27E-07	3.62E-07	6.06E-09	3.16E-10
Cd	1.65E-04	8.59E-04	6.32E-03	4.33E-03	9.00E-03	3.78E-05	8.55E-06
Ca	1.14E-03	6.44E-03	6.01E-02	8.00E-02	7.32E-02	2.08E-03	1.45E-04
Ce	3.96E-07	3.15E-06	2.17E-05	4.12E-05	1.80E-05	1.97E-06	6.05E-08
Cs	4.86E-07	3.55E-06	2.21E-05	3.59E-05	1.73E-05	3.23E-07	1.75E-08
Cl	1.58E-03	3.85E-03	2.30E-02	2.48E-02	3.07E-02	1.37E-03	1.34E-04
Cr	1.56E-04	1.00E-03	5.87E-03	4.47E-03	6.97E-03	1.41E-04	7.72E-06
Co	4.99E-05	1.92E-04	1.69E-04	4.01E-05	1.12E-04	6.03E-05	4.19E-05
Cu	2.22E-05	1.45E-04	8.77E-04	4.97E-04	1.17E-03	2.91E-05	1.28E-06
Dy	1.75E-11	1.28E-10	7.95E-10	1.29E-09	6.23E-10	1.25E-11	6.52E-13
Eu	1.48E-10	1.05E-09	9.53E-09	1.62E-08	9.37E-09	1.22E-10	6.01E-12
F	8.13E-03	3.21E-02	1.17E-01	2.15E-01	1.10E-01	7.85E-03	4.22E-03
Gd	1.34E-06	1.80E-05	4.58E-05	2.01E-05	1.38E-05	7.39E-06	2.34E-07
Ge	4.85E-09	1.44E-08	2.69E-08	1.83E-08	8.93E-09	1.76E-10	9.20E-12
In	3.74E-08	2.73E-07	1.70E-06	2.76E-06	1.33E-06	2.67E-08	1.39E-09
I	3.66E-07	1.46E-06	3.69E-06	4.63E-06	3.16E-06	2.33E-08	3.05E-09
Fe	1.38E-03	6.32E-03	2.50E-02	2.50E-02	2.76E-02	1.16E-03	2.14E-04
La	2.52E-07	1.84E-06	1.14E-05	1.86E-05	8.98E-06	1.80E-07	9.39E-09
Pb	9.85E-04	2.79E-03	6.09E-03	1.09E-03	1.16E-03	8.02E-05	1.94E-05
Li	8.93E-06	5.40E-05	3.42E-04	2.59E-04	4.72E-04	1.42E-05	5.67E-07
Mg	2.07E-04	1.27E-03	7.79E-03	6.27E-03	1.06E-02	5.02E-04	1.77E-05
Mn	9.35E-04	4.57E-03	1.63E-02	1.19E-02	2.07E-02	1.47E-03	6.50E-04
Hg	1.01E-03	2.90E-03	6.97E-03	1.36E-02	2.37E-03	1.10E-04	2.06E-05
Mo	1.33E-04	4.51E-04	3.95E-04	9.36E-05	4.81E-05	5.88E-05	3.15E-05

Table A3. (continued).

	Stream						
	WM-187-5 170,719 gal	WM-187-6 62,264 gal	WM-188-2 283,667 gal	WM-189-2 22,600 gal	WM-189-3 280,012 gal	NT 2-1 125,118 gal	NT 2-2 118,761 gal
	mol/liter	mol/liter	mol/liter	mol/liter	mol/liter	mol/liter	mol/liter
Nd	8.35E-07	6.10E-06	3.79E-05	6.17E-05	2.97E-05	5.96E-07	3.11E-08
Np	4.50E-07	2.91E-06	1.37E-05	3.57E-05	1.47E-05	6.58E-07	2.46E-08
Ni	1.35E-04	7.87E-04	4.14E-03	1.83E-03	5.81E-03	6.14E-05	4.64E-06
Nb	5.49E-08	1.13E-06	4.74E-06	1.84E-06	1.01E-06	6.48E-07	1.98E-08
NO_3	1.17E+00	2.80E+00	6.49E+00	6.43E+00	6.83E+00	7.94E-01	3.84E-01
Pd	9.09E-08	6.98E-07	4.44E-06	9.70E-06	3.71E-06	9.79E-07	2.76E-08
PO_4	3.37E-04	1.77E-03	4.16E-03	1.77E-03	6.92E-03	6.00E-04	4.08E-05
Pu	1.97E-07	1.22E-06	4.90E-06	8.29E-06	5.31E-06	2.19E-07	9.42E-09
K	7.37E-03	3.35E-02	1.54E-01	1.23E-01	2.18E-01	1.00E-02	1.57E-03
Pr	2.33E-07	1.70E-06	1.06E-05	1.72E-05	8.29E-06	1.66E-07	8.67E-09
Pm	8.52E-11	6.22E-10	3.86E-09	6.29E-09	3.03E-09	6.08E-11	3.17E-12
Rh	1.02E-07	7.46E-07	4.63E-06	7.54E-06	3.63E-06	7.29E-08	3.80E-09
Rb	2.18E-07	1.59E-06	9.59E-06	1.58E-05	7.47E-06	1.44E-07	7.71E-09
Ru	5.65E-07	4.88E-06	3.18E-05	4.81E-05	1.90E-05	5.20E-06	1.49E-07
Sm	1.60E-07	1.17E-06	7.27E-06	1.18E-05	5.70E-06	1.14E-07	5.96E-09
Se	8.14E-08	4.53E-07	1.08E-06	1.63E-05	1.77E-06	6.13E-06	1.86E-07
Si	1.09E-04	5.81E-04	3.20E-03	1.97E-03	4.19E-03	1.26E-08	1.78E-06
Ag	1.01E-06	6.02E-06	2.24E-05	2.50E-06	2.12E-05	1.71E-06	1.06E-06
Na	8.80E-02	3.90E-01	1.29E+00	1.03E+00	1.88E+00	1.00E-01	1.32E-02
Sr	6.01E-07	4.51E-06	2.46E-05	5.13E-05	1.94E-05	4.97E-06	1.41E-07
SO_4	2.20E-03	1.08E-02	4.48E-02	1.37E-02	5.84E-02	4.67E-03	1.34E-03
Tc	1.54E-07	1.30E-06	8.73E-06	1.16E-05	5.71E-06	1.12E-07	6.28E-09
Te	8.06E-08	5.89E-07	3.66E-06	5.96E-06	2.87E-06	5.75E-08	3.00E-09
Tb	5.92E-11	4.33E-10	2.69E-09	4.38E-09	2.11E-09	4.23E-11	2.20E-12
Tl	3.19E-07	1.68E-06	9.46E-06	2.09E-05	1.44E-05	1.72E-06	5.94E-08
Th	5.22E-12	3.81E-11	2.37E-10	3.85E-10	1.86E-10	3.72E-12	1.94E-13
Sn	5.65E-08	3.96E-07	1.17E-06	5.21E-06	8.61E-07	1.71E-06	4.58E-08
Ti	1.29E-06	7.91E-06	4.85E-05	3.72E-05	6.62E-05	2.41E-06	9.12E-08
U	1.39E-05	7.92E-05	5.14E-04	6.35E-04	5.86E-04	2.33E-05	7.08E-06
V	4.59E-06	2.21E-05	1.09E-04	1.14E-04	1.52E-04	3.99E-05	2.05E-06
Y	1.92E-07	1.40E-06	8.71E-06	1.42E-05	6.84E-06	1.37E-07	7.15E-09
Zn	5.27E-04	1.68E-03	1.67E-03	7.81E-04	1.51E-03	2.03E-04	1.11E-04
Zr	1.10E-03	4.30E-03	1.95E-02	3.18E-02	2.06E-02	1.24E-04	9.00E-05
HCO_3	8.05E-03	2.23E-02	2.72E-02	0.00E+00	2.35E-04	2.65E-04	1.87E-04
Tl-207	3.46E-12	1.77E-11	1.06E-10	1.13E-10	5.47E-11	1.37E-12	7.52E-14
Tl-208	4.21E-11	2.14E-10	1.29E-09	1.37E-09	6.65E-10	1.66E-11	9.13E-13
Pb-209	1.82E-14	9.26E-14	5.57E-13	5.94E-13	2.87E-13	7.18E-15	3.95E-16

Table A3. (continued).

	Stream						
	WM-187-5 170,719 gal	WM-187-6 62,264 gal	WM-188-2 283,667 gal	WM-189-2 22,600 gal	WM-189-3 280,012 gal	NT 2-1 125,118 gal	NT 2-2 118,761 gal
	Ci/liter Jan, 2016	Ci/liter Jan, 2016	Ci/liter Jan, 2016	Ci/liter Jan, 2016	Ci/liter Jan, 2016	Ci/liter Jan, 2016	Ci/liter Jan, 2016
Pb-210	3.32E-13	1.69E-12	1.02E-11	1.08E-11	5.24E-12	1.31E-13	7.20E-15
Pb-211	3.46E-12	1.77E-11	1.06E-10	1.13E-10	5.47E-11	1.37E-12	7.52E-14
Pb-212	1.19E-10	6.05E-10	3.64E-09	3.88E-09	1.88E-09	4.69E-11	2.58E-12
Pb-214	7.92E-13	4.04E-12	2.43E-11	2.59E-11	1.25E-11	3.13E-13	1.72E-14
Bi-210	3.32E-13	1.69E-12	1.02E-11	1.08E-11	5.24E-12	1.31E-13	7.20E-15
Bi-211	3.46E-12	1.77E-11	1.06E-10	1.13E-10	5.47E-11	1.37E-12	7.52E-14
Bi-212	1.19E-10	6.05E-10	3.64E-09	3.88E-09	1.88E-09	4.69E-11	2.58E-12
Bi-213	2.38E-14	1.21E-13	7.28E-13	7.76E-13	3.75E-13	9.38E-15	5.16E-16
Bi-214	7.92E-13	4.04E-12	2.43E-11	2.59E-11	1.25E-11	3.13E-13	1.72E-14
Po-210	3.32E-13	1.69E-12	1.02E-11	1.08E-11	5.24E-12	1.31E-13	7.20E-15
Po-213	1.04E-14	5.30E-14	3.18E-13	3.40E-13	1.64E-13	4.10E-15	2.26E-16
Po-214	4.26E-13	2.17E-12	1.30E-11	1.39E-11	6.72E-12	1.68E-13	9.24E-15
Po-215	1.98E-12	1.01E-11	6.06E-11	6.47E-11	3.13E-11	7.82E-13	4.30E-14
Po-216	1.19E-10	6.05E-10	3.64E-09	3.88E-09	1.88E-09	4.69E-11	2.58E-12
Po-218	7.92E-13	4.04E-12	2.43E-11	2.59E-11	1.25E-11	3.13E-13	1.72E-14
At-217	1.04E-14	5.30E-14	3.18E-13	3.40E-13	1.64E-13	4.10E-15	2.26E-16
Rn-219	3.46E-12	1.77E-11	1.06E-10	1.13E-10	5.47E-11	1.37E-12	7.52E-14
Rn-220	1.19E-10	6.05E-10	3.64E-09	3.88E-09	1.88E-09	4.69E-11	2.58E-12
Rn-222	7.92E-13	4.04E-12	2.43E-11	2.59E-11	1.25E-11	3.13E-13	1.72E-14
Fr-221	2.38E-14	1.21E-13	7.28E-13	7.76E-13	3.75E-13	9.38E-15	5.16E-16
Fr-223	4.80E-14	2.45E-13	1.47E-12	1.57E-12	7.59E-13	1.90E-14	1.04E-15
Ra-223	3.46E-12	1.77E-11	1.06E-10	1.13E-10	5.47E-11	1.37E-12	7.52E-14
Ra-224	1.19E-10	6.05E-10	3.64E-09	3.88E-09	1.88E-09	4.69E-11	2.58E-12
Ra-225	2.38E-14	1.21E-13	7.28E-13	7.76E-13	3.75E-13	9.38E-15	5.16E-16
Ra-226	7.92E-13	4.04E-12	2.43E-11	2.59E-11	1.25E-11	3.13E-13	1.72E-14
Ac-225	2.38E-14	1.21E-13	7.28E-13	7.76E-13	3.75E-13	9.38E-15	5.16E-16
Ac-227	3.46E-12	1.77E-11	1.06E-10	1.13E-10	5.47E-11	1.37E-12	7.52E-14
Th-227	3.41E-12	1.74E-11	1.05E-10	1.12E-10	5.40E-11	1.35E-12	7.41E-14
Th-228	1.19E-10	6.05E-10	3.64E-09	3.88E-09	1.88E-09	4.69E-11	2.58E-12
Th-229	2.38E-14	1.21E-13	7.28E-13	7.76E-13	3.75E-13	9.38E-15	5.16E-16
Th-230	5.92E-11	3.02E-10	1.81E-09	1.94E-09	9.36E-10	2.34E-11	1.29E-12
Th-231	1.29E-09	6.56E-09	3.94E-08	4.20E-08	2.03E-08	5.08E-10	2.79E-11
Th-234	1.29E-09	6.56E-09	3.94E-08	4.20E-08	2.03E-08	5.08E-10	2.79E-11
Pa-231	5.94E-12	3.03E-11	1.82E-10	1.94E-10	9.38E-11	2.35E-12	1.29E-13
Pa-233	1.78E-07	9.08E-07	5.46E-06	5.82E-06	2.82E-06	7.04E-08	3.87E-09

Table A3. (continued).

	Stream						
	WM-187-5 170,719 gal	WM-187-6 62,264 gal	WM-188-2 283,667 gal	WM-189-2 22,600 gal	WM-189-3 280,012 gal	NT 2-1 125,118 gal	NT 2-2 118,761 gal
	Ci/liter Jan, 2016	Ci/liter Jan, 2016	Ci/liter Jan, 2016	Ci/liter Jan, 2016	Ci/liter Jan, 2016	Ci/liter Jan, 2016	Ci/liter Jan, 2016
Pa-234m	1.29E-09	6.56E-09	3.94E-08	4.20E-08	2.03E-08	5.08E-10	2.79E-11
Pa-234	1.63E-12	8.32E-12	5.00E-11	5.34E-11	2.58E-11	6.45E-13	3.55E-14
U-232	1.20E-10	6.39E-10	9.68E-09	3.85E-09	9.72E-09	1.04E-10	5.59E-12
U-233	1.57E-11	8.34E-11	1.26E-09	5.02E-10	1.27E-09	1.36E-11	7.29E-13
U-234	6.60E-08	3.27E-07	1.51E-06	1.67E-06	1.31E-06	4.53E-08	2.27E-09
U-235	1.61E-09	8.04E-09	3.90E-08	4.35E-08	3.54E-08	1.18E-09	5.89E-11
U-236	2.86E-09	1.40E-08	5.78E-08	6.85E-08	5.98E-08	1.86E-09	9.84E-11
U-237	2.25E-10	1.20E-09	1.81E-08	7.19E-09	1.82E-08	1.95E-10	1.05E-11
U-238	9.40E-10	5.00E-09	4.57E-08	4.35E-08	4.11E-08	1.18E-09	5.00E-11
Np-237	1.62E-07	7.70E-07	3.82E-06	5.72E-06	2.44E-06	2.47E-08	2.20E-09
Np-238	4.40E-12	2.24E-11	1.35E-10	1.44E-10	6.96E-11	1.74E-12	9.56E-14
Np-239	1.29E-09	6.56E-09	3.94E-08	4.20E-08	2.03E-08	5.08E-10	2.79E-11
Pu-236	6.93E-12	3.53E-11	2.12E-10	2.26E-10	1.09E-10	2.74E-12	1.50E-13
Pu-238	2.84E-05	1.43E-04	7.79E-04	7.24E-04	6.63E-04	2.95E-05	1.23E-06
Pu-239	5.00E-06	2.41E-05	9.79E-05	1.16E-04	7.36E-05	4.91E-06	2.09E-07
Pu-240	6.38E-07	3.23E-06	1.90E-05	2.10E-05	9.26E-06	2.54E-07	1.39E-08
Pu-241	9.73E-06	5.46E-05	3.53E-04	2.75E-04	2.13E-04	3.32E-06	2.07E-07
Pu-242	5.12E-10	2.72E-09	4.42E-08	1.58E-08	1.06E-08	1.92E-10	1.10E-11
Am-241	5.80E-06	2.80E-05	1.10E-04	1.13E-04	1.01E-04	4.46E-06	2.09E-07
Am-242m	8.91E-10	4.54E-09	2.73E-08	2.91E-08	1.41E-08	3.52E-10	1.93E-11
Am-242	8.91E-10	4.54E-09	2.73E-08	2.91E-08	1.41E-08	3.52E-10	1.93E-11
Am-243	1.29E-09	6.56E-09	3.94E-08	4.20E-08	2.03E-08	5.08E-10	2.79E-11
Cm-242	7.42E-10	3.78E-09	2.27E-08	2.43E-08	1.17E-08	2.93E-10	1.61E-11
Cm-243	1.29E-09	6.56E-09	3.94E-08	4.20E-08	2.03E-08	5.08E-10	2.79E-11
Cm-244	6.43E-08	3.28E-07	1.97E-06	2.33E-06	1.04E-06	1.35E-07	4.71E-09
Cm-245	1.83E-11	9.33E-11	5.61E-10	5.98E-10	2.89E-10	7.23E-12	3.98E-13
Cm-246	1.19E-12	6.05E-12	3.64E-11	3.88E-11	1.88E-11	4.69E-13	2.58E-14
H-3	3.63E-07	1.70E-06	1.43E-05	8.69E-06	1.03E-05	5.07E-07	1.83E-08
Be-10	1.83E-13	9.33E-13	5.61E-12	5.98E-12	2.89E-12	7.23E-14	3.98E-15
C-14	7.42E-12	3.78E-11	3.94E-06	2.43E-10	1.17E-10	2.93E-12	1.61E-13
Se-79	2.67E-08	1.36E-07	8.19E-07	8.73E-07	4.22E-07	1.06E-08	5.80E-10
Rb-87	1.78E-12	9.08E-12	5.46E-11	5.82E-11	2.82E-11	7.04E-13	3.87E-14
Sr-90	2.19E-03	1.11E-02	6.44E-02	6.73E-02	3.15E-02	4.83E-04	3.46E-05
Y-90	2.19E-03	1.11E-02	6.44E-02	6.73E-02	3.15E-02	4.83E-04	3.46E-05
Zr-93	1.34E-07	6.81E-07	4.09E-06	4.37E-06	2.11E-06	5.28E-08	2.90E-09
Nb-93m	1.14E-07	5.80E-07	3.49E-06	3.72E-06	1.80E-06	4.50E-08	2.47E-09

Table A3. (continued).

	Stream						
	WM-187-5 170,719 gal	WM-187-6 62,264 gal	WM-188-2 283,667 gal	WM-189-2 22,600 gal	WM-189-3 280,012 gal	NT 2-1 125,118 gal	NT 2-2 118,761 gal
	Ci/liter Jan, 2016	Ci/liter Jan, 2016	Ci/liter Jan, 2016	Ci/liter Jan, 2016	Ci/liter Jan, 2016	Ci/liter Jan, 2016	Ci/liter Jan, 2016
Nb-94	6.93E-08	3.53E-07	2.12E-06	2.26E-06	1.09E-06	2.74E-08	1.50E-09
Tc-98	1.58E-13	8.07E-13	4.85E-12	5.17E-12	2.50E-12	6.25E-14	3.44E-15
Tc-99	6.12E-07	3.41E-06	2.20E-05	2.00E-05	9.66E-06	5.19E-07	2.24E-08
Ru-106	6.46E-12	2.94E-11	1.77E-10	2.43E-10	9.38E-11	2.93E-12	1.44E-13
Rh-102	2.38E-12	1.21E-11	7.28E-11	7.76E-11	3.75E-11	9.38E-13	5.16E-14
Rh-106	6.46E-12	2.94E-11	1.77E-10	2.43E-10	9.38E-11	2.93E-12	1.44E-13
Pd-107	9.90E-10	5.04E-09	3.03E-08	3.23E-08	1.56E-08	3.91E-10	2.15E-11
Cd-113m	1.09E-07	5.55E-07	3.33E-06	3.56E-06	1.72E-06	4.30E-08	2.36E-09
In-115	5.94E-18	3.03E-17	1.82E-16	1.94E-16	9.38E-17	2.35E-18	1.29E-19
Sn-121m	3.41E-09	1.74E-08	1.05E-07	1.12E-07	5.40E-08	1.35E-09	7.41E-11
Sn-126	2.52E-08	1.29E-07	7.73E-07	8.25E-07	3.99E-07	9.97E-09	5.48E-10
Sb-125	2.67E-08	1.47E-07	1.22E-06	1.00E-06	1.01E-06	1.21E-08	6.68E-10
Sb-126m	2.52E-08	1.29E-07	7.73E-07	8.25E-07	3.99E-07	9.97E-09	5.48E-10
Sb-126	3.51E-09	1.79E-08	1.08E-07	1.15E-07	5.55E-08	1.39E-09	7.63E-11
Te-125m	7.42E-09	3.78E-08	2.27E-07	2.43E-07	1.17E-07	2.93E-09	1.61E-10
I-129	5.25E-09	2.59E-08	9.99E-08	1.05E-07	7.21E-08	6.63E-10	8.51E-11
Cs-134	1.56E-08	6.95E-08	7.04E-07	6.58E-07	6.17E-07	2.51E-09	1.90E-10
Cs-135	5.44E-08	2.77E-07	1.67E-06	1.78E-06	8.60E-07	2.15E-08	1.18E-09
Cs-137	2.28E-03	1.16E-02	6.97E-02	7.48E-02	3.60E-02	1.07E-03	5.48E-05
Ba-137m	2.14E-03	1.09E-02	6.56E-02	7.00E-02	3.39E-02	8.46E-04	4.65E-05
Ce-142	1.83E-12	9.33E-12	5.61E-11	5.98E-11	2.89E-11	7.23E-13	3.98E-14
Ce-144	3.14E-13	1.42E-12	8.32E-12	1.18E-11	4.05E-12	1.43E-13	6.99E-15
Pr-144	3.14E-13	1.42E-12	8.32E-12	1.18E-11	4.05E-12	1.43E-13	6.99E-15
Pm-146	5.94E-10	3.03E-09	1.82E-08	1.94E-08	9.38E-09	2.35E-10	1.29E-11
Pm-147	3.37E-07	1.72E-06	1.03E-05	1.10E-05	5.32E-06	1.33E-07	7.31E-09
Sm-146	1.68E-14	8.58E-14	5.15E-13	5.50E-13	2.66E-13	6.65E-15	3.65E-16
Sm-147	4.50E-13	2.30E-12	1.38E-11	1.47E-11	7.12E-12	1.78E-13	9.78E-15
Sm-151	1.88E-05	9.58E-05	5.76E-04	6.14E-04	2.97E-04	7.43E-06	4.08E-07
Eu-150	6.93E-13	3.53E-12	2.12E-11	2.26E-11	1.09E-11	2.74E-13	1.50E-14
Eu-152	7.92E-08	4.04E-07	2.43E-06	2.59E-06	1.25E-06	3.13E-08	1.72E-09
Eu-154	2.59E-06	1.33E-05	1.13E-04	9.64E-05	7.70E-05	9.58E-07	5.35E-08
Eu-155	7.61E-07	3.35E-06	2.34E-05	5.34E-05	1.74E-05	6.45E-07	2.72E-08
Ho-166m	2.82E-12	1.44E-11	8.64E-11	9.22E-11	4.46E-11	1.11E-12	6.12E-14
Co-60	2.36E-07	1.15E-06	1.16E-05	6.22E-06	1.16E-05	4.12E-08	4.31E-09
Ni-63	1.73E-06	8.92E-06	6.59E-05	5.75E-05	5.06E-05	1.09E-06	5.02E-08

Table A4. Tank flush heel liquid concentrations.

	WM-180-FH 5,000 gal	WM-181-FH 5,000 gal	WM-182-FH 5,000 gal	WM-183-FH 5,000 gal	WM-184-FH 4,890 gal	WM-185-FH 5,000 gal	WM-186-FH 5,000 gal	WM-187-FH 5,000 gal	WM-188-FH 5,000 gal	WM-189-FH 5,000 gal
	g/liter	g/liter	g/liter	g/liter	g/liter	g/liter	g/liter	g/liter	g/liter	g/liter
TOC	1.75E-03	4.99E-05	1.37E-03	1.75E-03	1.75E-03	1.59E-03	1.75E-03	7.77E-04	3.82E-03	1.72E-03
UDS	2.04E-03	4.39E-04	7.36E-03	1.93E-02	1.33E-02	2.47E-02	4.17E-02	3.88E-03	3.31E-02	8.18E-03
SG										
	mol/liter	mol/liter	mol/liter	mol/liter	mol/liter	mol/liter	mol/liter	mol/liter	mol/liter	mol/liter
H+	8.77E-03	3.85E-04	4.37E-03	2.05E-02	1.38E-02	1.54E-02	1.13E-02	9.83E-03	2.97E-02	1.98E-02
Al	5.77E-03	7.75E-05	2.40E-03	3.55E-03	4.19E-03	4.33E-03	2.18E-03	3.24E-04	4.73E-03	7.14E-03
Am	6.28E-10	1.39E-11	1.35E-09	1.44E-09	7.60E-10	9.49E-10	2.23E-10	3.07E-11	7.12E-10	1.02E-09
Sb	5.55E-07	7.74E-10	2.33E-08	3.31E-08	1.68E-10	1.47E-08	2.50E-10	2.46E-08	6.04E-08	2.36E-07
As	4.34E-06	1.29E-10	2.44E-08	6.40E-08	6.27E-12	3.30E-08	9.35E-12	1.74E-09	3.13E-07	1.04E-06
Ba	4.85E-07	1.03E-08	2.08E-07	3.95E-07	5.29E-07	5.22E-07	5.29E-07	4.50E-08	7.14E-07	6.98E-07
Be	6.76E-08	1.33E-10	2.77E-08	5.27E-08	4.31E-14	2.26E-08	6.42E-14	4.87E-09	1.47E-08	8.12E-08
B	1.07E-04	2.23E-06	3.44E-05	7.47E-05	1.15E-04	1.24E-04	1.15E-04	9.51E-06	1.93E-04	1.96E-04
Br	1.26E-09	3.10E-11	7.15E-09	7.64E-09	7.93E-10	5.76E-09	1.18E-09	1.70E-08	6.10E-08	5.18E-09
Cd	6.56E-06	6.39E-07	4.44E-06	5.79E-06	3.88E-05	6.70E-06	3.88E-05	1.36E-06	5.22E-05	3.58E-05
Ca	4.11E-04	3.81E-06	1.05E-04	2.15E-04	1.33E-04	3.65E-04	4.12E-04	9.41E-06	4.97E-04	6.62E-04
Ce	4.11E-07	1.71E-09	2.25E-07	3.62E-07	4.67E-08	3.01E-07	6.96E-08	3.27E-09	1.79E-07	3.41E-07
Cs	6.73E-08	1.77E-09	4.09E-07	4.38E-07	4.54E-08	3.30E-07	6.77E-08	4.02E-09	1.82E-07	2.96E-07
Cl	2.61E-04	3.90E-06	6.86E-05	6.79E-05	2.28E-04	1.44E-04	1.49E-04	1.30E-05	1.90E-04	2.05E-04
Cr	2.92E-05	6.75E-07	1.57E-05	6.45E-05	3.31E-05	4.83E-05	3.42E-05	1.29E-06	4.86E-05	3.70E-05
Co	1.68E-07	1.79E-08	1.21E-07	7.35E-07	4.86E-07	5.49E-07	4.86E-07	4.13E-07	1.39E-06	3.31E-07
Cu	6.06E-06	1.01E-07	1.80E-06	9.57E-06	5.09E-06	6.55E-06	5.09E-06	1.84E-07	7.25E-06	4.11E-06
Dy	2.61E-12	6.39E-14	1.47E-11	1.58E-11	1.63E-12	1.19E-11	2.44E-12	1.45E-13	6.57E-12	1.07E-11
Eu	2.55E-11	5.52E-13	9.79E-11	1.29E-10	1.61E-11	8.86E-11	2.70E-11	1.23E-12	7.88E-11	1.34E-10
F	4.12E-04	6.48E-06	2.68E-04	3.07E-04	1.91E-04	7.65E-04	3.29E-04	6.72E-05	9.70E-04	1.78E-03
Gd	1.54E-06	7.83E-09	1.17E-06	5.87E-06	6.76E-10	2.52E-06	1.01E-09	1.11E-08	3.78E-07	1.66E-07
Ge	3.68E-11	9.02E-13	2.08E-10	2.22E-10	2.31E-11	1.68E-10	3.44E-11	4.01E-11	2.22E-10	1.51E-10
In	5.57E-09	1.37E-10	3.15E-08	3.37E-08	3.49E-09	2.54E-08	5.21E-09	3.09E-10	1.40E-08	2.28E-08
I	4.85E-09	4.82E-10	5.34E-08	5.71E-08	2.41E-08	4.29E-08	8.83E-09	3.02E-09	3.05E-08	3.83E-08
Fe	1.89E-04	2.63E-06	9.25E-05	2.82E-04	1.20E-04	2.16E-04	1.29E-04	1.14E-05	2.06E-04	2.07E-04
La	3.75E-08	9.20E-10	2.12E-07	2.27E-07	2.35E-08	1.71E-07	3.51E-08	2.08E-09	9.45E-08	1.54E-07
Pb	1.14E-05	6.71E-08	2.90E-06	5.67E-06	2.34E-06	7.70E-06	3.45E-06	8.14E-06	5.03E-05	9.02E-06
Li	2.95E-06	3.85E-08	1.12E-06	2.10E-06	2.06E-06	1.89E-06	2.06E-06	7.38E-08	2.83E-06	2.14E-06
Mg	1.05E-04	8.84E-07	2.54E-05	6.64E-05	4.59E-05	5.06E-05	4.59E-05	1.71E-06	6.44E-05	5.18E-05
Mn	1.23E-04	1.73E-06	3.46E-05	6.77E-05	8.12E-05	1.05E-04	8.12E-05	7.73E-06	1.35E-04	9.84E-05
Hg	1.75E-05	1.64E-07	6.99E-06	1.42E-05	5.67E-06	2.18E-05	7.79E-06	8.33E-06	5.76E-05	1.12E-04

Table A4. (continued).

	WM-180-FH 5,000 gal	WM-181-FH 5,000 gal	WM-182-FH 5,000 gal	WM-183-FH 5,000 gal	WM-184-FH 4,890 gal	WM-185-FH 5,000 gal	WM-186-FH 5,000 gal	WM-187-FH 5,000 gal	WM-188-FH 5,000 gal	WM-189-FH 5,000 gal
	mol/liter	mol/liter	mol/liter	mol/liter	mol/liter	mol/liter	mol/liter	mol/liter	mol/liter	mol/liter
Mo	1.68E-06	2.54E-08	1.15E-06	4.61E-06	9.37E-08	4.10E-06	1.40E-07	1.10E-06	3.27E-06	7.73E-07
Nd	1.24E-07	3.05E-09	7.03E-07	7.51E-07	7.79E-08	5.66E-07	1.16E-07	6.90E-09	3.13E-07	5.10E-07
Np	1.37E-07	1.45E-09	3.97E-07	4.25E-07	4.40E-08	2.28E-07	6.57E-08	3.72E-09	1.13E-07	2.95E-07
Ni	1.28E-05	6.00E-07	7.04E-06	2.87E-05	3.42E-05	1.85E-05	3.42E-05	1.11E-06	3.42E-05	1.51E-05
Nb	1.35E-07	5.35E-10	1.47E-09	3.99E-07	1.63E-10	1.72E-07	2.43E-10	4.54E-10	3.92E-08	1.52E-08
NO_3	4.62E-02	8.15E-04	1.59E-02	3.80E-02	3.87E-02	3.80E-02	2.77E-02	9.71E-03	5.36E-02	5.32E-02
Pd	2.04E-07	3.59E-10	6.68E-08	8.81E-08	9.21E-09	6.66E-08	1.37E-08	7.52E-10	3.67E-08	8.02E-08
PO_4	1.19E-04	1.22E-06	3.38E-06	4.64E-06	8.68E-05	3.61E-06	4.08E-06	2.79E-06	3.44E-05	1.47E-05
Pu	4.57E-08	7.24E-10	9.02E-08	9.64E-08	3.63E-08	6.29E-08	1.49E-08	1.63E-09	4.05E-08	6.85E-08
K	1.71E-03	1.52E-05	4.22E-04	5.66E-04	7.00E-04	9.63E-04	1.15E-03	6.09E-05	1.27E-03	1.02E-03
Pr	3.47E-08	8.50E-10	1.96E-07	2.10E-07	2.17E-08	1.58E-07	3.24E-08	1.93E-09	8.74E-08	1.42E-07
Pm	1.27E-11	3.11E-13	7.17E-11	7.67E-11	7.95E-12	5.77E-11	1.19E-11	7.04E-13	3.19E-11	5.20E-11
Rh	1.52E-08	3.73E-10	8.60E-08	9.19E-08	9.53E-09	6.92E-08	1.42E-08	8.44E-10	3.83E-08	6.23E-08
Rb	3.00E-08	7.75E-10	1.91E-07	2.04E-07	1.88E-08	1.49E-07	2.82E-08	1.80E-09	7.92E-08	1.31E-07
Ru	1.08E-06	2.37E-09	4.55E-07	9.02E-07	4.45E-08	5.26E-07	6.63E-08	4.67E-09	2.63E-07	3.97E-07
Sm	2.38E-08	5.84E-10	1.35E-07	1.44E-07	1.49E-08	1.09E-07	2.23E-08	1.32E-09	6.00E-08	9.78E-08
Se	1.27E-06	1.45E-10	1.81E-09	2.93E-08	2.10E-09	3.46E-08	3.13E-09	6.73E-10	8.95E-09	1.35E-07
Si	2.63E-09	3.53E-07	9.96E-06	2.67E-05	1.83E-05	2.02E-05	1.83E-05	9.02E-07	2.64E-05	1.63E-05
Ag	4.60E-08	1.40E-09	1.78E-08	3.71E-08	1.67E-10	3.93E-07	2.49E-10	8.37E-09	1.85E-07	2.06E-08
Na	1.79E-02	1.85E-04	3.57E-03	4.51E-03	1.06E-02	7.17E-03	6.95E-03	7.28E-04	1.06E-02	8.51E-03
Sr	1.04E-06	2.11E-09	3.49E-07	6.91E-07	4.35E-08	4.47E-07	6.59E-08	4.97E-09	2.04E-07	4.24E-07
SO_4	6.08E-04	4.57E-06	1.33E-04	1.85E-04	2.26E-04	2.30E-04	2.40E-04	1.82E-05	3.70E-04	1.13E-04
Tc	2.33E-08	6.61E-10	1.06E-07	2.08E-07	1.46E-08	1.35E-07	2.18E-08	1.27E-09	7.21E-08	9.56E-08
Te	1.20E-08	2.94E-10	6.79E-08	7.26E-08	7.52E-09	5.46E-08	1.12E-08	6.66E-10	3.02E-08	4.92E-08
Tb	8.81E-12	2.16E-13	4.99E-11	5.33E-11	5.53E-12	4.01E-11	8.24E-12	4.90E-13	2.22E-11	3.62E-11
Tl	3.56E-07	1.06E-09	1.43E-08	3.46E-08	5.81E-08	4.28E-08	5.81E-08	2.63E-09	7.82E-08	1.73E-07
Th	7.76E-13	1.90E-14	4.39E-12	4.70E-12	4.87E-13	3.54E-12	7.26E-13	4.31E-14	1.96E-12	3.19E-12
Sn	3.57E-07	1.43E-10	8.48E-08	9.03E-08	8.60E-10	4.15E-08	1.28E-09	4.67E-10	9.64E-09	4.30E-08
Ti	5.03E-07	5.50E-09	1.78E-07	3.96E-07	2.87E-07	3.08E-07	2.87E-07	1.07E-08	4.01E-07	3.08E-07
U	2.93E-06	3.97E-08	1.25E-06	2.90E-06	1.50E-06	3.66E-06	3.16E-06	1.15E-07	4.25E-06	5.25E-06
V	8.03E-06	1.19E-08	2.02E-06	2.71E-07	6.54E-07	4.30E-07	6.54E-07	3.79E-08	8.98E-07	9.42E-07
Y	2.86E-08	7.01E-10	1.62E-07	1.73E-07	1.79E-08	1.30E-07	2.67E-08	1.59E-09	7.20E-08	1.17E-07
Zn	9.13E-06	1.51E-07	3.39E-06	9.10E-06	6.55E-06	7.05E-06	6.55E-06	4.35E-06	1.38E-05	6.46E-06
Zr	5.50E-07	1.74E-06	1.21E-05	9.25E-06	1.00E-04	4.33E-05	9.92E-05	9.13E-06	1.61E-04	2.62E-04
HCO_3	0.00E+00	3.69E-08	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.66E-05	2.25E-04	0.00E+00
Tl-207	2.28E-13	5.80E-15	1.29E-12	1.38E-12	1.43E-13	1.04E-12	2.13E-13	2.86E-14	8.77E-13	9.36E-13
Tl-208	2.77E-12	7.04E-14	1.57E-11	1.67E-11	1.74E-12	1.26E-11	2.59E-12	3.48E-13	1.06E-11	1.14E-11

Table A4. (continued).

	WM-180-FH 5,000 gal	WM-181-FH 5,000 gal	WM-182-FH 5,000 gal	WM-183-FH 5,000 gal	WM-184-FH 4,890 gal	WM-185-FH 5,000 gal	WM-186-FH 5,000 gal	WM-187-FH 5,000 gal	WM-188-FH 5,000 gal	WM-189-FH 5,000 gal
	Ci/liter Jan, 2016	Ci/liter Jan, 2016	Ci/liter Jan, 2016	Ci/liter Jan, 2016	Ci/liter Jan, 2016	Ci/liter Jan, 2016	Ci/liter Jan, 2016	Ci/liter Jan, 2016	Ci/liter Jan, 2016	Ci/liter Jan, 2016
Pb-209	1.20E-15	3.04E-17	6.77E-15	7.24E-15	7.50E-16	5.45E-15	1.12E-15	1.50E-16	4.60E-15	4.91E-15
Pb-210	2.18E-14	5.55E-16	1.23E-13	1.32E-13	1.37E-14	9.94E-14	2.04E-14	2.74E-15	8.39E-14	8.95E-14
Pb-211	2.28E-13	5.80E-15	1.29E-12	1.38E-12	1.43E-13	1.04E-12	2.13E-13	2.86E-14	8.77E-13	9.36E-13
Pb-212	7.82E-12	1.99E-13	4.42E-11	4.73E-11	4.90E-12	3.56E-11	7.31E-12	9.82E-13	3.01E-11	3.21E-11
Pb-214	5.21E-14	1.33E-15	2.95E-13	3.15E-13	3.27E-14	2.37E-13	4.88E-14	6.54E-15	2.00E-13	2.14E-13
Bi-210	2.18E-14	5.55E-16	1.23E-13	1.32E-13	1.37E-14	9.94E-14	2.04E-14	2.74E-15	8.39E-14	8.95E-14
Bi-211	2.28E-13	5.80E-15	1.29E-12	1.38E-12	1.43E-13	1.04E-12	2.13E-13	2.86E-14	8.77E-13	9.36E-13
Bi-212	7.82E-12	1.99E-13	4.42E-11	4.73E-11	4.90E-12	3.56E-11	7.31E-12	9.82E-13	3.01E-11	3.21E-11
Bi-213	1.56E-15	3.98E-17	8.85E-15	9.46E-15	9.81E-16	7.12E-15	1.46E-15	1.96E-16	6.01E-15	6.41E-15
Bi-214	5.21E-14	1.33E-15	2.95E-13	3.15E-13	3.27E-14	2.37E-13	4.88E-14	6.54E-15	2.00E-13	2.14E-13
Po-210	2.18E-14	5.55E-16	1.23E-13	1.32E-13	1.37E-14	9.94E-14	2.04E-14	2.74E-15	8.39E-14	8.95E-14
Po-213	6.84E-16	1.74E-17	3.87E-15	4.14E-15	4.29E-16	3.12E-15	6.40E-16	8.59E-17	2.63E-15	2.81E-15
Po-214	2.80E-14	7.12E-16	1.59E-13	1.69E-13	1.76E-14	1.28E-13	2.62E-14	3.52E-15	1.08E-13	1.15E-13
Po-215	1.30E-13	3.31E-15	7.37E-13	7.88E-13	8.17E-14	5.93E-13	1.22E-13	1.64E-14	5.01E-13	5.35E-13
Po-216	7.82E-12	1.99E-13	4.42E-11	4.73E-11	4.90E-12	3.56E-11	7.31E-12	9.82E-13	3.01E-11	3.21E-11
Po-218	5.21E-14	1.33E-15	2.95E-13	3.15E-13	3.27E-14	2.37E-13	4.88E-14	6.54E-15	2.00E-13	2.14E-13
At-217	6.84E-16	1.74E-17	3.87E-15	4.14E-15	4.29E-16	3.12E-15	6.40E-16	8.59E-17	2.63E-15	2.81E-15
Rn-219	2.28E-13	5.80E-15	1.29E-12	1.38E-12	1.43E-13	1.04E-12	2.13E-13	2.86E-14	8.77E-13	9.36E-13
Rn-220	7.82E-12	1.99E-13	4.42E-11	4.73E-11	4.90E-12	3.56E-11	7.31E-12	9.82E-13	3.01E-11	3.21E-11
Rn-222	5.21E-14	1.33E-15	2.95E-13	3.15E-13	3.27E-14	2.37E-13	4.88E-14	6.54E-15	2.00E-13	2.14E-13
Fr-221	1.56E-15	3.98E-17	8.85E-15	9.46E-15	9.81E-16	7.12E-15	1.46E-15	1.96E-16	6.01E-15	6.41E-15
Fr-223	3.16E-15	8.04E-17	1.79E-14	1.91E-14	1.98E-15	1.44E-14	2.96E-15	3.97E-16	1.22E-14	1.30E-14
Ra-223	2.28E-13	5.80E-15	1.29E-12	1.38E-12	1.43E-13	1.04E-12	2.13E-13	2.86E-14	8.77E-13	9.36E-13
Ra-224	7.82E-12	1.99E-13	4.42E-11	4.73E-11	4.90E-12	3.56E-11	7.31E-12	9.82E-13	3.01E-11	3.21E-11
Ra-225	1.56E-15	3.98E-17	8.85E-15	9.46E-15	9.81E-16	7.12E-15	1.46E-15	1.96E-16	6.01E-15	6.41E-15
Ra-226	5.21E-14	1.33E-15	2.95E-13	3.15E-13	3.27E-14	2.37E-13	4.88E-14	6.54E-15	2.00E-13	2.14E-13
Ac-225	1.56E-15	3.98E-17	8.85E-15	9.46E-15	9.81E-16	7.12E-15	1.46E-15	1.96E-16	6.01E-15	6.41E-15
Ac-227	2.28E-13	5.80E-15	1.29E-12	1.38E-12	1.43E-13	1.04E-12	2.13E-13	2.86E-14	8.77E-13	9.36E-13
Th-227	2.25E-13	5.72E-15	1.27E-12	1.36E-12	1.41E-13	1.02E-12	2.10E-13	2.82E-14	8.64E-13	9.22E-13
Th-228	7.82E-12	1.99E-13	4.42E-11	4.73E-11	4.90E-12	3.56E-11	7.31E-12	9.82E-13	3.01E-11	3.21E-11
Th-229	1.56E-15	3.98E-17	8.85E-15	9.46E-15	9.81E-16	7.12E-15	1.46E-15	1.96E-16	6.01E-15	6.41E-15
Th-230	3.90E-12	9.91E-14	2.21E-11	2.36E-11	2.44E-12	1.78E-11	3.65E-12	4.89E-13	1.50E-11	1.60E-11
Th-231	8.47E-11	2.15E-12	4.79E-10	5.12E-10	5.31E-11	3.86E-10	7.92E-11	1.06E-11	3.26E-10	3.47E-10
Th-234	8.47E-11	2.15E-12	4.79E-10	5.12E-10	5.31E-11	3.86E-10	7.92E-11	1.06E-11	3.26E-10	3.47E-10
Pa-231	3.91E-13	9.94E-15	2.21E-12	2.36E-12	2.45E-13	1.78E-12	3.66E-13	4.91E-14	1.50E-12	1.60E-12
Pa-233	1.17E-08	2.98E-10	6.64E-08	7.09E-08	7.35E-09	5.34E-08	1.10E-08	1.47E-09	4.51E-08	4.81E-08

Table A4. (continued).

	WM-180-FH 5,000 gal	WM-181-FH 5,000 gal	WM-182-FH 5,000 gal	WM-183-FH 5,000 gal	WM-184-FH 4,890 gal	WM-185-FH 5,000 gal	WM-186-FH 5,000 gal	WM-187-FH 5,000 gal	WM-188-FH 5,000 gal	WM-189-FH 5,000 gal
	Ci/liter Jan, 2016	Ci/liter Jan, 2016	Ci/liter Jan, 2016	Ci/liter Jan, 2016	Ci/liter Jan, 2016	Ci/liter Jan, 2016	Ci/liter Jan, 2016	Ci/liter Jan, 2016	Ci/liter Jan, 2016	Ci/liter Jan, 2016
Pa-234m	8.47E-11	2.15E-12	4.79E-10	5.12E-10	5.31E-11	3.86E-10	7.92E-11	1.06E-11	3.26E-10	3.47E-10
Pa-234	1.07E-13	2.73E-15	6.08E-13	6.50E-13	6.74E-14	4.90E-13	1.01E-13	1.35E-14	4.13E-13	4.41E-13
U-232	1.74E-11	4.18E-13	4.24E-11	5.87E-11	4.68E-12	3.99E-11	1.08E-10	9.94E-13	8.00E-11	3.18E-11
U-233	2.27E-12	5.45E-14	5.53E-12	7.66E-12	6.10E-13	5.20E-12	1.41E-11	1.30E-13	1.04E-11	4.14E-12
U-234	7.56E-09	1.54E-10	6.20E-09	8.03E-09	8.85E-09	9.83E-09	2.70E-13	5.45E-10	1.25E-08	1.38E-08
U-235	1.96E-10	3.98E-12	6.05E-11	1.46E-10	2.31E-10	2.28E-10	1.96E-11	1.33E-11	3.22E-10	3.59E-10
U-236	3.10E-10	7.23E-12	6.36E-11	8.25E-11	4.54E-10	2.97E-10	1.90E-12	2.36E-11	4.78E-10	5.66E-10
U-237	3.25E-11	7.81E-13	7.93E-11	1.10E-10	8.75E-12	7.46E-11	2.03E-10	1.86E-12	1.50E-10	5.94E-11
U-238	1.96E-10	2.45E-12	9.06E-11	2.09E-10	8.03E-11	2.55E-10	2.50E-10	7.77E-12	3.77E-10	3.59E-10
Np-237	4.12E-09	2.50E-10	6.64E-08	7.09E-08	7.35E-09	3.82E-08	1.10E-08	1.34E-09	3.16E-08	4.73E-08
Np-238	2.90E-13	7.37E-15	1.64E-12	1.75E-12	1.82E-13	1.32E-12	2.71E-13	3.64E-14	1.11E-12	1.19E-12
Np-239	8.47E-11	2.15E-12	4.79E-10	5.12E-10	5.31E-11	3.86E-10	7.92E-11	1.06E-11	3.26E-10	3.47E-10
Pu-236	4.56E-13	1.16E-14	2.58E-12	2.76E-12	2.86E-13	2.08E-12	4.27E-13	5.73E-14	1.75E-12	1.87E-12
Pu-238	4.92E-06	5.70E-08	7.74E-06	8.27E-06	2.43E-06	6.33E-06	1.28E-06	2.35E-07	6.44E-06	5.99E-06
Pu-239	8.19E-07	1.04E-08	1.23E-06	1.32E-06	5.20E-07	8.49E-07	2.04E-07	4.13E-08	8.09E-07	9.59E-07
Pu-240	4.23E-08	1.06E-09	2.40E-07	2.56E-07	2.66E-08	1.88E-07	3.96E-08	5.27E-09	1.57E-07	1.74E-07
Pu-241	5.54E-07	1.82E-08	3.13E-06	3.35E-06	3.47E-07	3.79E-06	5.18E-07	8.04E-08	2.92E-06	2.27E-06
Pu-242	3.19E-11	8.96E-13	1.81E-10	1.93E-10	2.00E-11	1.71E-10	2.99E-11	4.23E-12	3.66E-10	1.31E-10
Am-241	7.43E-07	1.27E-08	1.22E-06	1.30E-06	6.90E-07	8.55E-07	2.01E-07	4.79E-08	9.06E-07	9.38E-07
Am-242m	5.86E-11	1.49E-12	3.32E-10	3.55E-10	3.68E-11	2.67E-10	5.49E-11	7.36E-12	2.26E-10	2.41E-10
Am-242	5.86E-11	1.49E-12	3.32E-10	3.55E-10	3.68E-11	2.67E-10	5.49E-11	7.36E-12	2.26E-10	2.41E-10
Am-243	8.47E-11	2.15E-12	4.79E-10	5.12E-10	5.31E-11	3.86E-10	7.92E-11	1.06E-11	3.26E-10	3.47E-10
Cm-242	4.89E-11	1.24E-12	2.76E-10	2.96E-10	3.06E-11	2.23E-10	4.57E-11	6.13E-12	1.88E-10	2.00E-10
Cm-243	8.47E-11	2.15E-12	4.79E-10	5.12E-10	5.31E-11	3.86E-10	7.92E-11	1.06E-11	3.26E-10	3.47E-10
Cm-244	2.24E-08	1.08E-10	2.40E-08	2.56E-08	2.66E-09	1.93E-08	3.96E-09	5.32E-10	1.63E-08	1.93E-08
Cm-245	1.21E-12	3.06E-14	6.82E-12	7.29E-12	7.56E-13	5.49E-12	1.13E-12	1.51E-13	4.64E-12	4.94E-12
Cm-246	7.82E-14	1.99E-15	4.42E-13	4.73E-13	4.90E-14	3.56E-13	7.31E-14	9.82E-15	3.01E-13	3.21E-13
H-3	8.44E-08	5.06E-10	1.22E-07	1.30E-07	1.35E-08	8.38E-08	2.01E-08	3.00E-09	1.18E-07	7.18E-08
Be-10	1.21E-14	3.06E-16	6.82E-14	7.29E-14	7.56E-15	5.49E-14	1.13E-14	1.51E-15	4.64E-14	4.94E-14
C-14	4.89E-13	1.24E-14	2.76E-12	2.96E-12	3.06E-13	2.23E-12	4.57E-13	6.13E-14	3.26E-08	2.00E-12
Se-79	1.76E-09	4.47E-11	9.95E-09	1.06E-08	1.10E-09	8.01E-09	1.65E-09	2.21E-10	6.77E-09	7.22E-09
Rb-87	1.17E-13	2.98E-15	6.64E-13	7.09E-13	7.35E-14	5.34E-13	1.10E-13	1.47E-14	4.51E-13	4.81E-13
Sr-90	8.06E-05	3.43E-06	8.66E-04	9.26E-04	7.57E-05	6.59E-04	1.15E-04	1.81E-05	5.32E-04	5.57E-04
Y-90	8.06E-05	3.43E-06	8.66E-04	9.26E-04	7.57E-05	6.59E-04	1.15E-04	1.81E-05	5.32E-04	5.57E-04
Zr-93	8.80E-09	2.24E-10	4.98E-08	5.32E-08	5.52E-09	4.01E-08	8.23E-09	1.10E-09	3.38E-08	3.61E-08
Nb-93m	7.49E-09	1.91E-10	4.24E-08	4.53E-08	4.70E-09	3.41E-08	7.01E-09	9.41E-10	2.88E-08	3.07E-08

Table A4. (continued).

	WM-180-FH 5,000 gal	WM-181-FH 5,000 gal	WM-182-FH 5,000 gal	WM-183-FH 5,000 gal	WM-184-FH 4,890 gal	WM-185-FH 5,000 gal	WM-186-FH 5,000 gal	WM-187-FH 5,000 gal	WM-188-FH 5,000 gal	WM-189-FH 5,000 gal
	Ci/liter Jan, 2016	Ci/liter Jan, 2016	Ci/liter Jan, 2016	Ci/liter Jan, 2016	Ci/liter Jan, 2016	Ci/liter Jan, 2016	Ci/liter Jan, 2016	Ci/liter Jan, 2016	Ci/liter Jan, 2016	Ci/liter Jan, 2016
Nb-94	4.56E-09	1.16E-10	2.58E-08	2.76E-08	2.86E-09	2.08E-08	4.27E-09	5.73E-10	1.75E-08	1.87E-08
Tc-98	1.04E-14	2.65E-16	5.90E-14	6.30E-14	6.54E-15	4.75E-14	9.75E-15	1.31E-15	4.01E-14	4.28E-14
Tc-99	8.65E-08	1.15E-09	1.78E-07	3.50E-07	2.45E-08	2.27E-07	3.66E-08	5.06E-09	1.82E-07	1.65E-07
Ru-106	4.89E-13	9.45E-15	2.76E-12	2.96E-12	3.06E-13	1.30E-12	4.57E-13	5.34E-14	1.47E-12	2.00E-12
Rh-102	1.56E-13	3.98E-15	8.85E-13	9.46E-13	9.81E-14	7.12E-13	1.46E-13	1.96E-14	6.01E-13	6.41E-13
Rh-106	4.89E-13	9.45E-15	2.76E-12	2.96E-12	3.06E-13	1.30E-12	4.57E-13	5.34E-14	1.47E-12	2.00E-12
Pd-107	6.52E-11	1.66E-12	3.69E-10	3.94E-10	4.09E-11	2.97E-10	6.09E-11	8.18E-12	2.51E-10	2.67E-10
Cd-113m	7.17E-09	1.82E-10	4.05E-08	4.33E-08	4.49E-09	3.26E-08	6.70E-09	9.00E-10	2.76E-08	2.94E-08
In-115	3.91E-19	9.94E-21	2.21E-18	2.36E-18	2.45E-19	1.78E-18	3.66E-19	4.91E-20	1.50E-18	1.60E-18
Sn-121m	2.25E-10	5.72E-12	1.27E-09	1.36E-09	1.41E-10	1.02E-09	2.10E-10	2.82E-11	8.64E-10	9.22E-10
Sn-126	1.66E-09	4.22E-11	9.40E-09	1.00E-08	1.04E-09	7.57E-09	1.55E-09	2.09E-10	6.39E-09	6.82E-09
Sb-125	2.02E-09	5.17E-11	6.69E-09	1.22E-08	1.27E-09	9.20E-09	1.89E-09	2.20E-10	1.01E-08	8.29E-09
Sb-126m	1.66E-09	4.22E-11	9.40E-09	1.00E-08	1.04E-09	7.57E-09	1.55E-09	2.09E-10	6.39E-09	6.82E-09
Sb-126	2.31E-10	5.88E-12	1.31E-09	1.40E-09	1.45E-10	1.05E-09	2.16E-10	2.90E-11	8.89E-10	9.49E-10
Te-125m	4.89E-10	1.24E-11	2.76E-09	2.96E-09	3.06E-10	2.23E-09	4.57E-10	6.13E-11	1.88E-09	2.00E-09
I-129	1.10E-10	1.12E-11	1.22E-09	1.30E-09	5.49E-10	9.77E-10	2.01E-10	4.34E-11	8.25E-10	8.71E-10
Cs-134	4.18E-10	1.96E-11	9.30E-09	5.49E-09	2.90E-10	3.40E-09	2.05E-09	1.29E-10	5.82E-09	5.44E-09
Cs-135	3.58E-09	9.11E-11	2.03E-08	2.17E-08	2.25E-09	1.63E-08	3.35E-09	4.50E-10	1.38E-08	1.47E-08
Cs-137	1.79E-04	3.81E-06	8.48E-04	9.06E-04	9.40E-05	6.82E-04	1.40E-04	1.88E-05	5.76E-04	6.18E-04
Ba-137m	1.41E-04	3.59E-06	7.98E-04	8.53E-04	8.84E-05	6.42E-04	1.32E-04	1.77E-05	5.42E-04	5.79E-04
Ce-142	1.21E-13	3.06E-15	6.82E-13	7.29E-13	7.56E-14	5.49E-13	1.13E-13	1.51E-14	4.64E-13	4.94E-13
Ce-144	2.38E-14	4.58E-16	1.35E-13	1.44E-13	1.49E-14	6.25E-14	2.22E-14	2.59E-15	6.88E-14	9.76E-14
Pr-144	2.38E-14	4.58E-16	1.35E-13	1.44E-13	1.49E-14	6.25E-14	2.22E-14	2.59E-15	6.88E-14	9.76E-14
Pm-146	3.91E-11	9.94E-13	2.21E-10	2.36E-10	2.45E-11	1.78E-10	3.66E-11	4.91E-12	1.50E-10	1.60E-10
Pm-147	2.22E-08	5.63E-10	1.25E-07	1.34E-07	1.39E-08	1.01E-07	2.07E-08	2.78E-09	8.52E-08	9.09E-08
Sm-146	1.11E-15	2.82E-17	6.27E-15	6.70E-15	6.95E-16	5.04E-15	1.04E-15	1.39E-16	4.26E-15	4.54E-15
Sm-147	2.96E-14	7.54E-16	1.68E-13	1.79E-13	1.86E-14	1.35E-13	2.77E-14	3.72E-15	1.14E-13	1.22E-13
Sm-151	1.24E-06	3.15E-08	7.00E-06	7.49E-06	7.76E-07	5.64E-06	1.16E-06	1.55E-07	4.76E-06	5.08E-06
Eu-150	4.56E-14	1.16E-15	2.58E-13	2.76E-13	2.86E-14	2.08E-13	4.27E-14	5.73E-15	1.75E-13	1.87E-13
Eu-152	5.21E-09	1.33E-10	2.95E-08	3.15E-08	3.27E-09	2.37E-08	4.88E-09	6.54E-10	2.00E-08	2.14E-08
Eu-154	1.60E-07	4.20E-09	9.30E-07	1.21E-06	7.25E-08	8.21E-07	2.41E-07	2.14E-08	9.30E-07	7.96E-07
Eu-155	1.07E-07	1.32E-09	8.82E-08	1.28E-07	6.74E-08	9.46E-08	3.60E-08	6.29E-09	1.93E-07	4.41E-07
Ho-166m	1.86E-13	4.72E-15	1.05E-12	1.12E-12	1.16E-13	8.46E-13	1.74E-13	2.33E-14	7.14E-13	7.62E-13
Co-60	6.87E-09	5.27E-10	1.78E-08	5.63E-08	2.38E-08	3.91E-08	3.19E-08	1.95E-09	9.61E-08	5.14E-08
Ni-63	1.82E-07	2.92E-09	6.45E-07	6.90E-07	7.15E-08	5.19E-07	1.07E-07	1.43E-08	5.45E-07	4.75E-07

Table A5. Tank flush discharge liquid concentrations.

	WM-180-F 100,000 gal	WM-181-F 100,000 gal	WM-182-F 100,000 gal	WM-183-F 100,000 gal	WM-184-F 100,000 gal	WM-185-F 100,000 gal	WM-186-F 100,000 gal	WM-187-F 100,000 gal	WM-188-F 100,000 gal	WM-189-F 100,000 gal
	g/liter	g/liter	g/liter	g/liter	g/liter	g/liter	g/liter	g/liter	g/liter	g/liter
TOC	1.05E-02	2.99E-04	8.20E-03	1.05E-02	1.05E-02	9.55E-03	1.05E-02	1.89E-02	2.29E-02	2.01E-02
UDS	1.22E-02	2.63E-03	4.41E-02	1.16E-01	7.98E-02	1.48E-01	2.50E-01	1.03E-01	1.99E-01	2.08E-01
	mol/liter	mol/liter	mol/liter	mol/liter	mol/liter	mol/liter	mol/liter	mol/liter	mol/liter	mol/liter
H+	5.26E-02	2.31E-03	2.62E-02	1.23E-01	8.30E-02	9.23E-02	6.76E-02	1.37E-01	1.78E-01	1.21E-01
Al	3.46E-02	4.65E-04	1.44E-02	2.13E-02	2.51E-02	2.60E-02	1.31E-02	9.02E-03	2.84E-02	3.28E-02
Am	3.77E-09	8.32E-11	8.08E-09	8.64E-09	4.56E-09	5.69E-09	1.34E-09	1.12E-09	4.27E-09	5.47E-09
Sb	3.33E-06	4.64E-09	1.40E-07	1.99E-07	1.01E-09	8.84E-08	1.50E-09	6.13E-07	3.62E-07	1.13E-07
As	2.61E-05	7.74E-10	1.46E-07	3.84E-07	3.76E-11	1.98E-07	5.61E-11	4.54E-08	1.88E-06	1.64E-06
Ba	2.91E-06	6.18E-08	1.25E-06	2.37E-06	3.17E-06	3.13E-06	3.17E-06	1.22E-06	4.29E-06	5.27E-06
Be	4.05E-07	8.00E-10	1.66E-07	3.16E-07	2.58E-13	1.36E-07	3.85E-13	1.04E-07	8.81E-08	4.17E-08
B	6.42E-04	1.34E-05	2.06E-04	4.48E-04	6.89E-04	7.46E-04	6.89E-04	2.53E-04	1.16E-03	1.41E-03
Br	7.58E-09	1.86E-10	4.29E-08	4.59E-08	4.76E-09	3.45E-08	7.09E-09	2.84E-07	3.66E-07	1.78E-08
Cd	3.94E-05	3.83E-06	2.66E-05	3.48E-05	2.33E-04	4.02E-05	2.33E-04	4.29E-05	3.13E-04	4.48E-04
Ca	2.46E-03	2.29E-05	6.31E-04	1.29E-03	7.95E-04	2.19E-03	2.47E-03	3.21E-04	2.98E-03	3.63E-03
Ce	2.47E-06	1.02E-08	1.35E-06	2.17E-06	2.80E-07	1.81E-06	4.18E-07	1.57E-07	1.07E-06	8.81E-07
Cs	4.04E-07	1.06E-08	2.46E-06	2.63E-06	2.72E-07	1.98E-06	4.06E-07	1.77E-07	1.09E-06	8.50E-07
Cl	1.57E-03	2.34E-05	4.12E-04	4.07E-04	1.37E-03	8.62E-04	8.93E-04	1.92E-04	1.14E-03	1.52E-03
Cr	1.75E-04	4.05E-06	9.42E-05	3.87E-04	1.98E-04	2.90E-04	2.05E-04	5.00E-05	2.91E-04	3.47E-04
Co	1.01E-06	1.07E-07	7.28E-07	4.41E-06	2.91E-06	3.29E-06	2.91E-06	9.56E-06	8.36E-06	5.56E-06
Cu	3.64E-05	6.06E-07	1.08E-05	5.74E-05	3.06E-05	3.93E-05	3.06E-05	7.22E-06	4.35E-05	5.81E-05
Dy	1.56E-11	3.83E-13	8.85E-11	9.46E-11	9.81E-12	7.12E-11	1.46E-11	6.39E-12	3.94E-11	3.06E-11
Eu	1.53E-10	3.31E-12	5.88E-10	7.73E-10	9.67E-11	5.31E-10	1.62E-10	5.26E-11	4.73E-10	4.62E-10
F	2.47E-03	3.89E-05	1.61E-03	1.84E-03	1.15E-03	4.59E-03	1.97E-03	1.60E-03	5.82E-03	5.39E-03
Gd	9.25E-06	4.70E-08	7.00E-06	3.52E-05	4.05E-09	1.51E-05	6.05E-09	8.98E-07	2.27E-06	6.82E-07
Ge	2.21E-10	5.41E-12	1.25E-09	1.33E-09	1.38E-10	1.01E-09	2.06E-10	7.20E-10	1.33E-09	4.39E-10
In	3.34E-08	8.19E-10	1.89E-07	2.02E-07	2.09E-08	1.52E-07	3.12E-08	1.37E-08	8.42E-08	6.54E-08
I	2.91E-08	2.89E-09	3.21E-07	3.43E-07	1.45E-07	2.57E-07	5.30E-08	7.27E-08	1.83E-07	1.56E-07
Fe	1.13E-03	1.58E-05	5.55E-04	1.69E-03	7.22E-04	1.30E-03	7.75E-04	3.16E-04	1.24E-03	1.37E-03
La	2.25E-07	5.52E-09	1.27E-06	1.36E-06	1.41E-07	1.03E-06	2.11E-07	9.20E-08	5.67E-07	4.41E-07
Pb	6.82E-05	4.03E-07	1.74E-05	3.40E-05	1.40E-05	4.62E-05	2.07E-05	1.39E-04	3.02E-04	5.78E-05
Li	1.77E-05	2.31E-07	6.70E-06	1.26E-05	1.23E-05	1.13E-05	1.23E-05	2.70E-06	1.70E-05	2.35E-05
Mg	6.28E-04	5.31E-06	1.52E-04	3.99E-04	2.76E-04	3.03E-04	2.76E-04	6.36E-05	3.86E-04	5.29E-04
Mn	7.36E-04	1.04E-05	2.08E-04	4.06E-04	4.87E-04	6.30E-04	4.87E-04	2.28E-04	8.08E-04	1.03E-03
Hg	1.05E-04	9.87E-07	4.19E-05	8.50E-05	3.40E-05	1.31E-04	4.67E-05	1.44E-04	3.46E-04	1.13E-04
Mo	1.01E-05	1.53E-07	6.91E-06	2.77E-05	5.62E-07	2.46E-05	8.39E-07	2.25E-05	1.96E-05	2.36E-06
Nd	7.45E-07	1.83E-08	4.22E-06	4.51E-06	4.67E-07	3.39E-06	6.97E-07	3.05E-07	1.88E-06	1.46E-06
Np	8.23E-07	8.68E-09	2.38E-06	2.55E-06	2.64E-07	1.37E-06	3.94E-07	1.46E-07	6.80E-07	7.18E-07
Ni	7.68E-05	3.60E-06	4.23E-05	1.72E-04	2.05E-04	1.11E-04	2.05E-04	3.93E-05	2.05E-04	2.90E-04
Nb	8.11E-07	3.21E-09	8.80E-09	2.40E-06	9.76E-10	1.03E-06	1.46E-09	5.62E-08	2.35E-07	4.98E-08
NO3	2.77E-01	4.89E-03	9.57E-02	2.28E-01	2.32E-01	2.28E-01	1.66E-01	1.39E-01	3.22E-01	3.39E-01
Pd	1.23E-06	2.16E-09	4.01E-07	5.29E-07	5.53E-08	4.00E-07	8.25E-08	3.49E-08	2.20E-07	1.81E-07
PO4	7.15E-04	7.33E-06	2.03E-05	2.78E-05	5.21E-04	2.17E-05	2.45E-05	8.82E-05	2.06E-04	3.45E-04
Pu	2.74E-07	4.34E-09	5.41E-07	5.78E-07	2.18E-07	3.77E-07	8.94E-08	6.09E-08	2.43E-07	2.62E-07
K	1.02E-02	9.15E-05	2.53E-03	3.40E-03	4.20E-03	5.78E-03	6.90E-03	1.67E-03	7.62E-03	1.09E-02
Pr	2.08E-07	5.10E-09	1.18E-06	1.26E-06	1.30E-07	9.48E-07	1.95E-07	8.51E-08	5.24E-07	4.08E-07
Pm	7.60E-11	1.86E-12	4.30E-10	4.60E-10	4.77E-11	3.46E-10	7.11E-11	3.11E-11	1.92E-10	1.49E-10

Table A5. (continued).

	WM-180-F 100,000 gal	WM-181-F 100,000 gal	WM-182-F 100,000 gal	WM-183-F 100,000 gal	WM-184-F 100,000 gal	WM-185-F 100,000 gal	WM-186-F 100,000 gal	WM-187-F 100,000 gal	WM-188-F 100,000 gal	WM-189-F 100,000 gal
	mol/liter	mol/liter	mol/liter	mol/liter	mol/liter	mol/liter	mol/liter	mol/liter	mol/liter	mol/liter
Rh	9.12E-08	2.24E-09	5.16E-07	5.51E-07	5.72E-08	4.15E-07	8.53E-08	3.73E-08	2.30E-07	1.79E-07
Rb	1.80E-07	4.65E-09	1.15E-06	1.23E-06	1.13E-07	8.96E-07	1.69E-07	7.93E-08	4.75E-07	3.67E-07
Ru	6.51E-06	1.42E-08	2.73E-06	5.41E-06	2.67E-07	3.16E-06	3.98E-07	2.44E-07	1.58E-06	9.28E-07
Sm	1.43E-07	3.51E-09	8.09E-07	8.65E-07	8.97E-08	6.51E-07	1.34E-07	5.85E-08	3.60E-07	2.80E-07
Se	7.62E-06	8.70E-10	1.09E-08	1.76E-07	1.26E-08	2.07E-07	1.88E-08	2.26E-08	5.37E-08	8.20E-08
Si	1.58E-08	2.12E-06	5.98E-05	1.60E-04	1.10E-04	1.21E-04	1.10E-04	2.90E-05	1.59E-04	2.09E-04
Ag	2.76E-07	8.41E-09	1.07E-07	2.23E-07	1.00E-09	2.36E-06	1.49E-09	3.00E-07	1.11E-06	1.06E-06
Na	1.07E-01	1.11E-03	2.14E-02	2.71E-02	6.37E-02	4.30E-02	4.17E-02	1.95E-02	6.38E-02	9.35E-02
Sr	6.22E-06	1.26E-08	2.09E-06	4.15E-06	2.61E-07	2.68E-06	3.95E-07	2.25E-07	1.22E-06	9.49E-07
SO_4	3.65E-03	2.74E-05	8.00E-04	1.11E-03	1.36E-03	1.38E-03	1.44E-03	5.39E-04	2.22E-03	2.92E-03
Tc	1.40E-07	3.97E-09	6.37E-07	1.25E-06	8.77E-08	8.10E-07	1.31E-07	6.49E-08	4.33E-07	2.81E-07
Te	7.20E-08	1.77E-09	4.07E-07	4.35E-07	4.51E-08	3.28E-07	6.73E-08	2.94E-08	1.81E-07	1.41E-07
Tb	5.29E-11	1.30E-12	2.99E-10	3.20E-10	3.32E-11	2.41E-10	4.95E-11	2.16E-11	1.33E-10	1.04E-10
Tl	2.13E-06	6.35E-09	8.58E-08	2.07E-07	3.49E-07	2.57E-07	3.49E-07	8.38E-08	4.69E-07	7.11E-07
Th	4.66E-12	1.14E-13	2.64E-11	2.82E-11	2.92E-12	2.12E-11	4.36E-12	1.90E-12	1.17E-11	9.13E-12
Sn	2.14E-06	8.57E-10	5.09E-07	5.42E-07	5.16E-09	2.49E-07	7.70E-09	1.98E-08	5.78E-08	4.09E-08
Ti	3.02E-06	3.30E-08	1.07E-06	2.37E-06	1.72E-06	1.85E-06	1.72E-06	3.95E-07	2.41E-06	3.29E-06
U	1.76E-05	2.38E-07	7.51E-06	1.74E-05	9.01E-06	2.20E-05	1.90E-05	3.95E-06	2.55E-05	2.91E-05
V	4.82E-05	7.14E-08	1.21E-05	1.62E-06	3.93E-06	2.58E-06	3.93E-06	1.10E-06	5.39E-06	7.56E-06
Y	1.71E-07	4.21E-09	9.70E-07	1.04E-06	1.08E-07	7.81E-07	1.60E-07	7.01E-08	4.32E-07	3.36E-07
Zn	5.48E-05	9.04E-07	2.04E-05	5.46E-05	3.93E-05	4.23E-05	3.93E-05	8.40E-05	8.27E-05	7.54E-05
Zr	3.30E-06	1.04E-05	7.25E-05	5.55E-05	6.00E-04	2.60E-04	5.95E-04	2.14E-04	9.66E-04	1.02E-03
HCO_3	0.00E+00	2.22E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.11E-03	1.35E-03	1.17E-05
	Ci/liter Jan, 2016	Ci/liter Jan, 2016	Ci/liter Jan, 2016	Ci/liter Jan, 2016	Ci/liter Jan, 2016	Ci/liter Jan, 2016	Ci/liter Jan, 2016	Ci/liter Jan, 2016	Ci/liter Jan, 2016	Ci/liter Jan, 2016
Tl-207	1.37E-12	3.48E-14	7.74E-12	8.27E-12	8.58E-13	6.23E-12	1.28E-12	8.81E-13	5.26E-12	2.69E-12
Tl-208	1.66E-11	4.22E-13	9.40E-11	1.00E-10	1.04E-11	7.57E-11	1.55E-11	1.07E-11	6.39E-11	3.27E-11
Pb-209	7.18E-15	1.83E-16	4.06E-14	4.34E-14	4.50E-15	3.27E-14	6.72E-15	4.62E-15	2.76E-14	1.41E-14
Pb-210	1.31E-13	3.33E-15	7.41E-13	7.92E-13	8.21E-14	5.96E-13	1.22E-13	8.44E-14	5.04E-13	2.57E-13
Pb-211	1.37E-12	3.48E-14	7.74E-12	8.27E-12	8.58E-13	6.23E-12	1.28E-12	8.81E-13	5.26E-12	2.69E-12
Pb-212	4.69E-11	1.19E-12	2.65E-10	2.84E-10	2.94E-11	2.14E-10	4.39E-11	3.02E-11	1.80E-10	9.22E-11
Pb-214	3.13E-13	7.95E-15	1.77E-12	1.89E-12	1.96E-13	1.42E-12	2.93E-13	2.01E-13	1.20E-12	6.15E-13
Bi-210	1.31E-13	3.33E-15	7.41E-13	7.92E-13	8.21E-14	5.96E-13	1.22E-13	8.44E-14	5.04E-13	2.57E-13
Bi-211	1.37E-12	3.48E-14	7.74E-12	8.27E-12	8.58E-13	6.23E-12	1.28E-12	8.81E-13	5.26E-12	2.69E-12
Bi-212	4.69E-11	1.19E-12	2.65E-10	2.84E-10	2.94E-11	2.14E-10	4.39E-11	3.02E-11	1.80E-10	9.22E-11
Bi-213	9.38E-15	2.39E-16	5.31E-14	5.67E-14	5.88E-15	4.27E-14	8.78E-15	6.04E-15	3.61E-14	1.84E-14
Bi-214	3.13E-13	7.95E-15	1.77E-12	1.89E-12	1.96E-13	1.42E-12	2.93E-13	2.01E-13	1.20E-12	6.15E-13
Po-210	1.31E-13	3.33E-15	7.41E-13	7.92E-13	8.21E-14	5.96E-13	1.22E-13	8.44E-14	5.04E-13	2.57E-13
Po-213	4.10E-15	1.04E-16	2.32E-14	2.48E-14	2.57E-15	1.87E-14	3.84E-15	2.64E-15	1.58E-14	8.07E-15
Po-214	1.68E-13	4.27E-15	9.51E-13	1.02E-12	1.05E-13	7.65E-13	1.57E-13	1.08E-13	6.46E-13	3.31E-13
Po-215	7.82E-13	1.99E-14	4.42E-12	4.73E-12	4.90E-13	3.56E-12	7.31E-13	5.04E-13	3.01E-12	1.54E-12
Po-216	4.69E-11	1.19E-12	2.65E-10	2.84E-10	2.94E-11	2.14E-10	4.39E-11	3.02E-11	1.80E-10	9.22E-11
Po-218	3.13E-13	7.95E-15	1.77E-12	1.89E-12	1.96E-13	1.42E-12	2.93E-13	2.01E-13	1.20E-12	6.15E-13
At-217	4.10E-15	1.04E-16	2.32E-14	2.48E-14	2.57E-15	1.87E-14	3.84E-15	2.64E-15	1.58E-14	8.07E-15
Rn-219	1.37E-12	3.48E-14	7.74E-12	8.27E-12	8.58E-13	6.23E-12	1.28E-12	8.81E-13	5.26E-12	2.69E-12
Rn-220	4.69E-11	1.19E-12	2.65E-10	2.84E-10	2.94E-11	2.14E-10	4.39E-11	3.02E-11	1.80E-10	9.22E-11
Rn-222	3.13E-13	7.95E-15	1.77E-12	1.89E-12	1.96E-13	1.42E-12	2.93E-13	2.01E-13	1.20E-12	6.15E-13

Table A5. (continued).

	WM-180-F 100,000 gal	WM-181-F 100,000 gal	WM-182-F 100,000 gal	WM-183-F 100,000 gal	WM-184-F 100,000 gal	WM-185-F 100,000 gal	WM-186-F 100,000 gal	WM-187-F 100,000 gal	WM-188-F 100,000 gal	WM-189-F 100,000 gal
	Ci/liter Jan, 2016	Ci/liter Jan, 2016	Ci/liter Jan, 2016	Ci/liter Jan, 2016	Ci/liter Jan, 2016	Ci/liter Jan, 2016	Ci/liter Jan, 2016	Ci/liter Jan, 2016	Ci/liter Jan, 2016	Ci/liter Jan, 2016
Fr-221	9.38E-15	2.39E-16	5.31E-14	5.67E-14	5.88E-15	4.27E-14	8.78E-15	6.04E-15	3.61E-14	1.84E-14
Fr-223	1.90E-14	4.82E-16	1.07E-13	1.15E-13	1.19E-14	8.63E-14	1.77E-14	1.22E-14	7.29E-14	3.73E-14
Ra-223	1.37E-12	3.48E-14	7.74E-12	8.27E-12	8.58E-13	6.23E-12	1.28E-12	8.81E-13	5.26E-12	2.69E-12
Ra-224	4.69E-11	1.19E-12	2.65E-10	2.84E-10	2.94E-11	2.14E-10	4.39E-11	3.02E-11	1.80E-10	9.22E-11
Ra-225	9.38E-15	2.39E-16	5.31E-14	5.67E-14	5.88E-15	4.27E-14	8.78E-15	6.04E-15	3.61E-14	1.84E-14
Ra-226	3.13E-13	7.95E-15	1.77E-12	1.89E-12	1.96E-13	1.42E-12	2.93E-13	2.01E-13	1.20E-12	6.15E-13
Ac-225	9.38E-15	2.39E-16	5.31E-14	5.67E-14	5.88E-15	4.27E-14	8.78E-15	6.04E-15	3.61E-14	1.84E-14
Ac-227	1.37E-12	3.48E-14	7.74E-12	8.27E-12	8.58E-13	6.23E-12	1.28E-12	8.81E-13	5.26E-12	2.69E-12
Th-227	1.35E-12	3.43E-14	7.63E-12	8.16E-12	8.46E-13	6.14E-12	1.26E-12	8.69E-13	5.19E-12	2.65E-12
Th-228	4.69E-11	1.19E-12	2.65E-10	2.84E-10	2.94E-11	2.14E-10	4.39E-11	3.02E-11	1.80E-10	9.22E-11
Th-229	9.38E-15	2.39E-16	5.31E-14	5.67E-14	5.88E-15	4.27E-14	8.78E-15	6.04E-15	3.61E-14	1.84E-14
Th-230	2.34E-11	5.95E-13	1.32E-10	1.41E-10	1.47E-11	1.07E-10	2.19E-11	1.51E-11	9.00E-11	4.60E-11
Th-231	5.08E-10	1.29E-11	2.88E-09	3.07E-09	3.19E-10	2.31E-09	4.75E-10	3.27E-10	1.95E-09	9.99E-10
Th-234	5.08E-10	1.29E-11	2.88E-09	3.07E-09	3.19E-10	2.31E-09	4.75E-10	3.27E-10	1.95E-09	9.99E-10
Pa-231	2.35E-12	5.96E-14	1.33E-11	1.42E-11	1.47E-12	1.07E-11	2.19E-12	1.51E-12	9.02E-12	4.61E-12
Pa-233	7.04E-08	1.79E-09	3.98E-07	4.26E-07	4.41E-08	3.20E-07	6.58E-08	4.53E-08	2.71E-07	1.38E-07
Pa-234m	5.08E-10	1.29E-11	2.88E-09	3.07E-09	3.19E-10	2.31E-09	4.75E-10	3.27E-10	1.95E-09	9.99E-10
Pa-234	6.45E-13	1.64E-14	3.65E-12	3.90E-12	4.04E-13	2.94E-12	6.03E-13	4.16E-13	2.48E-12	1.27E-12
U-232	1.04E-10	2.51E-12	2.54E-10	3.52E-10	2.81E-11	2.39E-10	6.51E-10	3.19E-11	4.80E-10	4.84E-10
U-233	1.36E-11	3.27E-13	3.32E-11	4.60E-11	3.66E-12	3.12E-11	8.49E-11	4.16E-12	6.26E-11	6.32E-11
U-234	4.53E-08	9.25E-10	3.72E-08	4.82E-08	5.31E-08	5.90E-08	1.62E-12	1.63E-08	7.50E-08	6.47E-08
U-235	1.18E-09	2.39E-11	3.63E-10	8.74E-10	1.39E-09	1.37E-09	1.18E-10	4.01E-10	1.93E-09	1.75E-09
U-236	1.86E-09	4.34E-11	3.82E-10	4.95E-10	2.72E-09	1.78E-09	1.14E-11	6.97E-10	2.87E-09	2.96E-09
U-237	1.95E-10	4.68E-12	4.76E-10	6.59E-10	5.25E-11	4.47E-10	1.22E-09	5.97E-11	8.97E-10	9.06E-10
U-238	1.18E-09	1.47E-11	5.44E-10	1.25E-09	4.82E-10	1.53E-09	1.50E-09	2.50E-10	2.26E-09	2.04E-09
Np-237	2.47E-08	1.50E-09	3.98E-07	4.26E-07	4.41E-08	2.29E-07	6.58E-08	3.84E-08	1.90E-07	1.19E-07
Np-238	1.74E-12	4.42E-14	9.84E-12	1.05E-11	1.09E-12	7.92E-12	1.63E-12	1.12E-12	6.69E-12	3.42E-12
Np-239	5.08E-10	1.29E-11	2.88E-09	3.07E-09	3.19E-10	2.31E-09	4.75E-10	3.27E-10	1.95E-09	9.99E-10
Pu-236	2.74E-12	6.96E-14	1.55E-11	1.65E-11	1.72E-12	1.25E-11	2.56E-12	1.76E-12	1.05E-11	5.38E-12
Pu-238	2.95E-05	3.42E-07	4.64E-05	4.96E-05	1.46E-05	3.80E-05	7.68E-06	7.13E-06	3.86E-05	3.28E-05
Pu-239	4.91E-06	6.23E-08	7.41E-06	7.92E-06	3.12E-06	5.10E-06	1.22E-06	1.21E-06	4.86E-06	3.63E-06
Pu-240	2.54E-07	6.36E-09	1.44E-06	1.54E-06	1.59E-07	1.13E-06	2.38E-07	1.61E-07	9.42E-07	4.54E-07
Pu-241	3.32E-06	1.09E-07	1.88E-05	2.01E-05	2.08E-06	2.28E-05	3.11E-06	2.73E-06	1.75E-05	1.05E-05
Pu-242	1.92E-10	5.38E-12	1.08E-09	1.16E-09	1.20E-10	1.03E-09	1.79E-10	1.36E-10	2.19E-09	5.26E-10
Am-241	4.46E-06	7.65E-08	7.30E-06	7.80E-06	4.14E-06	5.13E-06	1.21E-06	1.40E-06	5.43E-06	4.98E-06
Am-242m	3.52E-10	8.95E-12	1.99E-09	2.13E-09	2.21E-10	1.60E-09	3.29E-10	2.27E-10	1.35E-09	6.92E-10
Am-242	3.52E-10	8.95E-12	1.99E-09	2.13E-09	2.21E-10	1.60E-09	3.29E-10	2.27E-10	1.35E-09	6.92E-10
Am-243	5.08E-10	1.29E-11	2.88E-09	3.07E-09	3.19E-10	2.31E-09	4.75E-10	3.27E-10	1.95E-09	9.99E-10
Cm-242	2.93E-10	7.46E-12	1.66E-09	1.77E-09	1.84E-10	1.34E-09	2.74E-10	1.89E-10	1.13E-09	5.76E-10
Cm-243	5.08E-10	1.29E-11	2.88E-09	3.07E-09	3.19E-10	2.31E-09	4.75E-10	3.27E-10	1.95E-09	9.99E-10
Cm-244	1.35E-07	6.46E-10	1.44E-07	1.54E-07	1.59E-08	1.16E-07	2.38E-08	1.64E-08	9.77E-08	5.08E-08
Cm-245	7.23E-12	1.84E-13	4.09E-11	4.37E-11	4.53E-12	3.29E-11	6.76E-12	4.66E-12	2.78E-11	1.42E-11
Cm-246	4.69E-13	1.19E-14	2.65E-12	2.84E-12	2.94E-13	2.14E-12	4.39E-13	3.02E-13	1.80E-12	9.22E-13
H-3	5.07E-07	3.03E-09	7.30E-07	7.80E-07	8.09E-08	5.03E-07	1.21E-07	8.48E-08	7.08E-07	5.11E-07
Be-10	7.23E-14	1.84E-15	4.09E-13	4.37E-13	4.53E-14	3.29E-13	6.76E-14	4.66E-14	2.78E-13	1.42E-13
C-14	2.93E-12	7.46E-14	1.66E-11	1.77E-11	1.84E-12	1.34E-11	2.74E-12	1.89E-12	1.95E-07	5.76E-12
Se-79	1.06E-08	2.68E-10	5.97E-08	6.38E-08	6.62E-09	4.81E-08	9.87E-09	6.80E-09	4.06E-08	2.08E-08

Table A5. (continued).

	WM-180-F 100,000 gal	WM-181-F 100,000 gal	WM-182-F 100,000 gal	WM-183-F 100,000 gal	WM-184-F 100,000 gal	WM-185-F 100,000 gal	WM-186-F 100,000 gal	WM-187-F 100,000 gal	WM-188-F 100,000 gal	WM-189-F 100,000 gal
	Ci/liter Jan, 2016	Ci/liter Jan, 2016	Ci/liter Jan, 2016	Ci/liter Jan, 2016	Ci/liter Jan, 2016	Ci/liter Jan, 2016	Ci/liter Jan, 2016	Ci/liter Jan, 2016	Ci/liter Jan, 2016	Ci/liter Jan, 2016
Rb-87	7.04E-13	1.79E-14	3.98E-12	4.26E-12	4.41E-13	3.20E-12	6.58E-13	4.53E-13	2.71E-12	1.38E-12
Sr-90	4.83E-04	2.06E-05	5.20E-03	5.56E-03	4.54E-04	3.96E-03	6.88E-04	5.52E-04	3.19E-03	1.55E-03
Y-90	4.83E-04	2.06E-05	5.20E-03	5.56E-03	4.54E-04	3.96E-03	6.88E-04	5.52E-04	3.19E-03	1.55E-03
Zr-93	5.28E-08	1.34E-09	2.99E-07	3.19E-07	3.31E-08	2.40E-07	4.94E-08	3.40E-08	2.03E-07	1.04E-07
Nb-93m	4.50E-08	1.14E-09	2.54E-07	2.72E-07	2.82E-08	2.05E-07	4.21E-08	2.90E-08	1.73E-07	8.84E-08
Nb-94	2.74E-08	6.96E-10	1.55E-07	1.65E-07	1.72E-08	1.25E-07	2.56E-08	1.76E-08	1.05E-07	5.38E-08
Tc-98	6.25E-14	1.59E-15	3.54E-13	3.78E-13	3.92E-14	2.85E-13	5.85E-14	4.03E-14	2.41E-13	1.23E-13
Tc-99	5.19E-07	6.93E-09	1.07E-06	2.10E-06	1.47E-07	1.36E-06	2.19E-07	1.70E-07	1.09E-06	4.75E-07
Ru-106	2.93E-12	5.67E-14	1.66E-11	1.77E-11	1.84E-12	7.78E-12	2.74E-12	1.47E-12	8.79E-12	4.59E-12
Rh-102	9.38E-13	2.39E-14	5.31E-12	5.67E-12	5.88E-13	4.27E-12	8.78E-13	6.04E-13	3.61E-12	1.84E-12
Rh-106	2.93E-12	5.67E-14	1.66E-11	1.77E-11	1.84E-12	7.78E-12	2.74E-12	1.47E-12	8.79E-12	4.59E-12
Pd-107	3.91E-10	9.94E-12	2.21E-09	2.36E-09	2.45E-10	1.78E-09	3.66E-10	2.52E-10	1.50E-09	7.69E-10
Cd-113m	4.30E-08	1.09E-09	2.43E-07	2.60E-07	2.70E-08	1.96E-07	4.02E-08	2.77E-08	1.65E-07	8.45E-08
In-115	2.35E-18	5.96E-20	1.33E-17	1.42E-17	1.47E-18	1.07E-17	2.19E-18	1.51E-18	9.02E-18	4.61E-18
Sn-121m	1.35E-09	3.43E-11	7.63E-09	8.16E-09	8.46E-10	6.14E-09	1.26E-09	8.69E-10	5.19E-09	2.65E-09
Sn-126	9.97E-09	2.53E-10	5.64E-08	6.03E-08	6.25E-09	4.54E-08	9.32E-09	6.42E-09	3.83E-08	1.96E-08
Sb-125	1.21E-08	3.10E-10	4.01E-08	7.33E-08	7.60E-09	5.52E-08	1.13E-08	7.36E-09	6.04E-08	4.99E-08
Sb-126m	9.97E-09	2.53E-10	5.64E-08	6.03E-08	6.25E-09	4.54E-08	9.32E-09	6.42E-09	3.83E-08	1.96E-08
Sb-126	1.39E-09	3.53E-11	7.85E-09	8.39E-09	8.70E-10	6.32E-09	1.30E-09	8.94E-10	5.34E-09	2.73E-09
Te-125m	2.93E-09	7.46E-11	1.66E-08	1.77E-08	1.84E-09	1.34E-08	2.74E-09	1.89E-09	1.13E-08	5.76E-09
I-129	6.63E-10	6.70E-11	7.30E-09	7.80E-09	3.30E-09	5.86E-09	1.21E-09	1.29E-09	4.95E-09	3.56E-09
Cs-134	2.51E-09	1.17E-10	5.58E-08	3.30E-08	1.74E-09	2.04E-08	1.23E-08	3.47E-09	3.49E-08	3.06E-08
Cs-135	2.15E-08	5.47E-10	1.22E-07	1.30E-07	1.35E-08	9.79E-08	2.01E-08	1.39E-08	8.27E-08	4.23E-08
Cs-137	1.07E-03	2.29E-05	5.09E-03	5.44E-03	5.64E-04	4.09E-03	8.41E-04	5.79E-04	3.46E-03	1.77E-03
Ba-137m	8.46E-04	2.15E-05	4.79E-03	5.12E-03	5.31E-04	3.85E-03	7.92E-04	5.45E-04	3.25E-03	1.66E-03
Ce-142	7.23E-13	1.84E-14	4.09E-12	4.37E-12	4.53E-13	3.29E-12	6.76E-13	4.66E-13	2.78E-12	1.42E-12
Ce-144	1.43E-13	2.75E-15	8.07E-13	8.63E-13	8.95E-14	3.75E-13	1.33E-13	7.11E-14	4.13E-13	1.98E-13
Pr-144	1.43E-13	2.75E-15	8.07E-13	8.63E-13	8.95E-14	3.75E-13	1.33E-13	7.11E-14	4.13E-13	1.98E-13
Pm-146	2.35E-10	5.96E-12	1.33E-09	1.42E-09	1.47E-10	1.07E-09	2.19E-10	1.51E-10	9.02E-10	4.61E-10
Pm-147	1.33E-07	3.38E-09	7.52E-07	8.04E-07	8.33E-08	6.05E-07	1.24E-07	8.56E-08	5.11E-07	2.61E-07
Sm-146	6.65E-15	1.69E-16	3.76E-14	4.02E-14	4.17E-15	3.03E-14	6.22E-15	4.28E-15	2.56E-14	1.31E-14
Sm-147	1.78E-13	4.52E-15	1.01E-12	1.08E-12	1.12E-13	8.10E-13	1.66E-13	1.15E-13	6.84E-13	3.50E-13
Sm-151	7.43E-06	1.89E-07	4.20E-05	4.49E-05	4.66E-06	3.38E-05	6.95E-06	4.78E-06	2.86E-05	1.46E-05
Eu-150	2.74E-13	6.96E-15	1.55E-12	1.65E-12	1.72E-13	1.25E-12	2.56E-13	1.76E-13	1.05E-12	5.38E-13
Eu-152	3.13E-08	7.95E-10	1.77E-07	1.89E-07	1.96E-08	1.42E-07	2.93E-08	2.01E-08	1.20E-07	6.15E-08
Eu-154	9.58E-07	2.52E-08	5.58E-06	7.26E-06	4.35E-07	4.93E-06	1.45E-06	6.66E-07	5.58E-06	3.81E-06
Eu-155	6.45E-07	7.89E-09	5.29E-07	7.70E-07	4.04E-07	5.67E-07	2.16E-07	1.67E-07	1.16E-06	8.49E-07
Ho-166m	1.11E-12	2.83E-14	6.30E-12	6.74E-12	6.99E-13	5.07E-12	1.04E-12	7.18E-13	4.28E-12	2.19E-12
Co-60	4.12E-08	3.16E-09	1.07E-07	3.38E-07	1.43E-07	2.35E-07	1.92E-07	5.75E-08	5.76E-07	5.79E-07
Ni-63	1.09E-06	1.75E-08	3.87E-06	4.14E-06	4.29E-07	3.12E-06	6.40E-07	4.45E-07	3.27E-06	2.51E-06

Table A6. Evaporator concentrates.

	AS-1 191,571 gal	AS-2 207,350 gal	AS-3 95,850 gal	AS-4 25,310 gal	AS-5 26,487 gal	AS-6 4,997 gal	AS-7 5,779 gal	AS-8 5,239 gal	AS-9 8,591 gal	AS-10 8,188 gal
	g/liter	g/liter	g/liter	g/liter	g/liter	g/liter	g/liter	g/liter	g/liter	g/liter
TOC	4.45E-01	3.98E-01	5.09E-01	4.72E-01	5.08E-01	4.02E-01	1.91E+00	3.65E-01	1.82E+00	1.19E+00
UDS	7.19E+00	2.11E+00	3.62E+00	2.19E+00	2.54E+00	2.37E+00	1.21E+01	2.55E+00	9.80E+00	6.79E+00
	1.31E+00	1.35E+00								
	mol/liter	mol/liter	mol/liter	mol/liter	mol/liter	mol/liter	mol/liter	mol/liter	mol/liter	mol/liter
H+	2.58E+00	2.31E+00	5.07E+00	4.98E+00	4.54E+00	1.72E+00	3.47E+00	1.48E+00	3.44E+00	4.58E+00
Al	5.17E-01	7.65E-01	5.08E-01	2.94E-01	2.12E-01	6.07E-01	6.42E-01	5.16E-01	5.86E-01	1.49E-01
Am	6.85E-08	1.42E-07	6.71E-08	4.51E-08	2.01E-08	2.07E-07	9.89E-08	9.19E-08	4.28E-08	2.10E-09
Sb	6.53E-08	4.60E-08	1.23E-05	1.23E-05	1.61E-05	3.81E-06	7.49E-05	6.87E-06	1.11E-04	5.26E-05
As	2.67E-05	2.43E-05	8.35E-06	3.27E-06	1.14E-06	4.37E-05	6.19E-06	5.67E-07	2.97E-04	8.21E-06
Ba	1.15E-04	1.03E-04	6.27E-05	3.77E-05	2.95E-05	8.03E-05	8.59E-05	6.55E-05	6.59E-05	2.46E-05
Be	1.68E-11	1.18E-11	3.21E-06	4.08E-06	3.18E-06	6.03E-06	8.80E-06	8.04E-07	1.09E-05	4.48E-06
B	3.07E-02	2.75E-02	1.68E-02	9.37E-03	6.22E-03	2.38E-02	1.61E-02	1.40E-02	1.02E-02	2.33E-03
Br	3.08E-07	2.17E-07	1.57E-05	1.97E-05	1.11E-05	1.02E-06	5.91E-07	1.40E-07	8.61E-08	4.45E-09
Cd	1.01E-02	9.03E-03	2.62E-03	8.33E-04	8.91E-04	5.44E-03	9.48E-04	4.32E-03	5.37E-04	1.20E-04
Ca	1.01E-01	4.83E-02	4.02E-02	1.53E-02	6.16E-03	6.70E-02	3.93E-02	1.80E-02	2.95E-02	2.04E-03
Ce	1.81E-05	1.28E-05	2.12E-05	1.01E-05	2.14E-06	5.00E-05	3.07E-05	7.90E-06	2.80E-05	8.52E-07
Cs	1.77E-05	1.24E-05	2.22E-05	1.42E-05	2.63E-06	5.84E-05	3.38E-05	8.04E-06	4.58E-06	2.46E-07
Cl	2.91E-02	3.40E-02	1.74E-02	3.57E-03	3.14E-03	1.17E-02	2.14E-03	2.04E-02	4.60E-03	2.96E-04
Cr	7.69E-03	6.70E-03	4.12E-03	1.43E-03	8.42E-04	9.96E-03	5.07E-03	4.07E-03	2.01E-03	1.09E-04
Co	1.23E-04	1.10E-04	2.12E-04	2.46E-04	2.70E-04	1.40E-04	9.17E-04	1.37E-04	8.57E-04	5.90E-04
Cu	1.29E-03	1.16E-03	5.89E-04	1.88E-04	1.20E-04	1.68E-03	6.94E-04	6.19E-04	4.13E-04	1.79E-05
Dy	6.36E-10	4.48E-10	8.01E-10	5.10E-10	9.47E-11	2.10E-09	1.22E-09	2.90E-10	1.77E-10	9.17E-12
Eu	9.95E-09	7.31E-09	7.67E-09	3.99E-09	8.02E-10	2.20E-08	9.35E-09	2.61E-09	1.74E-09	8.45E-11
F	1.17E-01	8.49E-02	1.23E-01	7.08E-02	4.31E-02	1.17E-01	1.55E-01	3.49E-02	1.08E-01	5.63E-02
Gd	2.63E-07	1.85E-07	1.13E-04	5.30E-05	7.23E-06	6.71E-04	2.68E-04	2.46E-05	1.05E-04	3.29E-06
Ge	8.97E-09	6.33E-09	4.57E-08	5.07E-08	2.62E-08	2.97E-08	1.72E-08	4.09E-09	2.51E-09	1.29E-10
In	1.36E-06	9.58E-07	1.71E-06	1.09E-06	2.02E-07	4.50E-06	2.60E-06	6.19E-07	3.79E-07	1.96E-08
I	1.84E-06	3.94E-06	4.68E-06	4.10E-06	1.98E-06	7.00E-06	4.38E-06	3.03E-06	3.30E-07	4.29E-08
Fe	3.01E-02	2.55E-02	2.03E-02	1.26E-02	7.49E-03	4.33E-02	2.65E-02	1.55E-02	1.65E-02	3.01E-03
La	9.15E-06	6.45E-06	1.15E-05	7.35E-06	1.36E-06	3.03E-05	1.75E-05	4.17E-06	2.56E-06	1.32E-07
Pb	1.28E-03	9.85E-04	1.32E-02	1.05E-02	5.33E-03	1.60E-03	1.21E-03	3.66E-04	1.14E-03	2.73E-04
Li	5.23E-04	4.68E-04	2.04E-04	7.53E-05	4.83E-05	4.77E-04	2.00E-04	2.43E-04	2.01E-04	7.98E-06
Mg	1.17E-02	1.04E-02	4.96E-03	1.83E-03	1.12E-03	1.29E-02	5.35E-03	5.50E-03	7.13E-03	2.49E-04
Mn	2.28E-02	2.05E-02	1.16E-02	5.71E-03	5.06E-03	2.01E-02	2.33E-02	1.10E-02	2.09E-02	9.14E-03
Hg	1.62E-03	1.10E-03	1.45E-02	1.07E-02	5.36E-03	1.84E-03	2.30E-03	7.61E-04	1.42E-03	2.82E-04

Table A6. (continued).

	AS-1 191,571 gal	AS-2 207,350 gal	AS-3 95,850 gal	AS-4 25,310 gal	AS-5 26,487 gal	AS-6 4,997 gal	AS-7 5,779 gal	AS-8 5,239 gal	AS-9 8,591 gal	AS-10 8,188 gal
	mol/liter	mol/liter	mol/liter	mol/liter	mol/liter	mol/liter	mol/liter	mol/liter	mol/liter	mol/liter
Mo	3.64E-05	2.57E-05	7.22E-04	9.58E-04	7.20E-04	5.44E-04	1.56E-03	1.53E-04	8.36E-04	4.44E-04
Nd	3.03E-05	2.14E-05	3.82E-05	2.43E-05	4.51E-06	1.00E-04	5.81E-05	1.38E-05	8.46E-06	4.37E-07
Np	1.46E-05	9.79E-06	1.75E-05	1.27E-05	2.43E-06	5.33E-05	2.40E-05	6.99E-06	9.34E-06	3.46E-07
Ni	6.60E-03	5.88E-03	1.89E-03	6.30E-04	7.28E-04	4.37E-03	1.95E-03	3.91E-03	8.71E-04	6.53E-05
Nb	6.33E-08	4.46E-08	7.70E-06	2.00E-06	2.97E-07	4.57E-05	1.82E-05	1.69E-06	9.20E-06	2.78E-07
NO_3	6.59E+00	7.17E+00	6.37E+00	5.04E+00	4.03E+00	5.37E+00	4.10E+00	4.26E+00	4.91E+00	1.62E+00
Pd	3.58E-06	2.53E-06	4.50E-06	2.54E-06	4.92E-07	1.18E-05	6.84E-06	1.63E-06	1.39E-05	3.88E-07
PO_4	9.78E-04	1.33E-02	1.14E-03	4.65E-04	1.82E-03	9.19E-04	8.35E-04	9.54E-03	8.52E-03	5.74E-04
Pu	3.41E-06	6.26E-06	4.47E-06	3.01E-06	1.07E-06	1.22E-05	6.50E-06	4.55E-06	3.11E-06	1.33E-07
K	2.80E-01	1.82E-01	6.83E-02	5.47E-02	3.99E-02	1.80E-01	1.28E-01	8.80E-02	1.43E-01	2.21E-02
Pr	8.46E-06	5.96E-06	1.07E-05	6.79E-06	1.26E-06	2.80E-05	1.62E-05	3.85E-06	2.36E-06	1.22E-07
Pm	3.09E-09	2.18E-09	3.90E-09	2.48E-09	4.60E-10	1.02E-08	5.92E-09	1.41E-09	8.63E-10	4.46E-11
Rh	3.71E-06	2.61E-06	4.67E-06	2.98E-06	5.52E-07	1.23E-05	7.10E-06	1.69E-06	1.03E-06	5.35E-08
Rb	7.53E-06	5.32E-06	1.02E-05	6.57E-06	1.18E-06	2.71E-05	1.54E-05	3.45E-06	2.05E-06	1.08E-07
Ru	1.73E-05	1.22E-05	3.09E-05	1.73E-05	3.06E-06	1.11E-04	5.47E-05	9.85E-06	7.39E-05	2.09E-06
Sm	5.81E-06	4.10E-06	7.33E-06	4.67E-06	8.66E-07	1.92E-05	1.11E-05	2.65E-06	1.62E-06	8.39E-08
Se	5.57E-07	3.40E-07	2.14E-06	7.51E-07	4.40E-07	3.39E-06	3.93E-06	5.88E-07	8.70E-05	2.62E-06
Si	4.65E-03	4.16E-03	2.18E-03	9.80E-04	5.90E-04	5.16E-03	2.14E-03	2.19E-03	1.79E-07	2.51E-05
Ag	2.37E-05	2.16E-05	2.12E-05	8.24E-06	5.48E-06	3.65E-05	6.01E-05	5.51E-06	2.43E-05	1.50E-05
Na	1.78E+00	2.14E+00	5.65E-01	5.28E-01	4.76E-01	1.33E+00	9.62E-01	1.25E+00	1.42E+00	1.86E-01
Sr	1.80E-05	1.28E-05	2.99E-05	1.57E-05	3.25E-06	8.83E-05	4.63E-05	8.97E-06	7.06E-05	1.99E-06
SO_4	6.75E-02	5.84E-02	2.75E-02	1.35E-02	1.19E-02	5.76E-02	4.96E-02	2.92E-02	6.64E-02	1.88E-02
Tc	5.68E-06	4.01E-06	8.45E-06	4.36E-06	8.30E-07	2.65E-05	1.40E-05	2.87E-06	1.59E-06	8.83E-08
Te	2.93E-06	2.06E-06	3.69E-06	2.35E-06	4.36E-07	9.69E-06	5.61E-06	1.33E-06	8.17E-07	4.22E-08
Tb	2.15E-09	1.52E-09	2.71E-09	1.73E-09	3.20E-10	7.12E-09	4.12E-09	9.79E-10	6.00E-10	3.10E-11
Tl	1.48E-05	1.32E-05	5.64E-06	2.14E-06	1.72E-06	1.06E-05	5.07E-06	6.80E-06	2.45E-05	8.36E-07
Th	1.89E-10	1.34E-10	2.39E-10	1.52E-10	2.82E-11	6.27E-10	3.63E-10	8.63E-11	5.29E-11	2.73E-12
Sn	3.35E-07	2.36E-07	1.99E-06	2.27E-06	3.05E-07	1.05E-05	4.38E-06	4.94E-07	2.43E-05	6.45E-07
Ti	7.29E-05	6.52E-05	3.06E-05	1.17E-05	7.00E-06	7.83E-05	3.25E-05	3.42E-05	3.42E-05	1.28E-06
U	7.58E-04	4.29E-04	3.18E-04	1.31E-04	7.54E-05	6.35E-04	5.05E-04	2.10E-04	3.30E-04	9.95E-05
V	1.66E-04	1.49E-04	6.20E-05	6.16E-05	2.48E-05	1.06E-04	6.58E-05	7.74E-05	5.67E-04	2.89E-05
Y	6.97E-06	4.92E-06	8.78E-06	5.60E-06	1.04E-06	2.31E-05	1.34E-05	3.18E-06	1.95E-06	1.01E-07
Zn	1.66E-03	1.49E-03	1.29E-03	3.79E-03	2.85E-03	1.79E-03	3.28E-03	1.01E-03	2.89E-03	1.57E-03
Zr	2.10E-02	1.89E-02	2.09E-02	1.01E-02	5.97E-03	6.83E-03	6.56E-03	1.15E-02	1.76E-03	1.27E-03
HCO_3	0.00E+00	0.00E+00	5.96E-02	7.53E-02	4.35E-02	0.00E+00	3.74E-03	3.41E-04	3.76E-03	2.63E-03

Table A6. (continued).

	AS-1 191,571 gal	AS-2 207,350 gal	AS-3 95,850 gal	AS-4 25,310 gal	AS-5 26,487 gal	AS-6 4,997 gal	AS-7 5,779 gal	AS-8 5,239 gal	AS-9 8,591 gal	AS-10 8,188 gal
	Ci/liter Jan, 2016	Ci/liter Jan, 2016	Ci/liter Jan, 2016	Ci/liter Jan, 2016	Ci/liter Jan, 2016	Ci/liter Jan, 2016	Ci/liter Jan, 2016	Ci/liter Jan, 2016	Ci/liter Jan, 2016	Ci/liter Jan, 2016
Tl-207	5.56E-11	3.92E-11	1.64E-10	9.22E-11	1.87E-11	1.84E-10	1.27E-10	2.72E-11	1.94E-11	1.06E-12
Tl-208	6.76E-10	4.76E-10	1.99E-09	1.12E-09	2.27E-10	2.24E-09	1.55E-09	3.31E-10	2.36E-10	1.28E-11
Pb-209	2.92E-13	2.06E-13	8.59E-13	4.84E-13	9.83E-14	9.66E-13	6.69E-13	1.43E-13	1.02E-13	5.55E-15
Pb-210	5.32E-12	3.75E-12	1.57E-11	8.82E-12	1.79E-12	1.76E-11	1.22E-11	2.61E-12	1.86E-12	1.01E-13
Pb-211	5.56E-11	3.92E-11	1.64E-10	9.22E-11	1.87E-11	1.84E-10	1.27E-10	2.72E-11	1.94E-11	1.06E-12
Pb-212	1.91E-09	1.34E-09	5.61E-09	3.16E-09	6.42E-10	6.31E-09	4.37E-09	9.34E-10	6.66E-10	3.63E-11
Pb-214	1.27E-11	8.96E-12	3.74E-11	2.11E-11	4.28E-12	4.21E-11	2.91E-11	6.23E-12	4.44E-12	2.42E-13
Bi-210	5.32E-12	3.75E-12	1.57E-11	8.82E-12	1.79E-12	1.76E-11	1.22E-11	2.61E-12	1.86E-12	1.01E-13
Bi-211	5.56E-11	3.92E-11	1.64E-10	9.22E-11	1.87E-11	1.84E-10	1.27E-10	2.72E-11	1.94E-11	1.06E-12
Bi-212	1.91E-09	1.34E-09	5.61E-09	3.16E-09	6.42E-10	6.31E-09	4.37E-09	9.34E-10	6.66E-10	3.63E-11
Bi-213	3.81E-13	2.69E-13	1.12E-12	6.32E-13	1.28E-13	1.26E-12	8.74E-13	1.87E-13	1.33E-13	7.26E-15
Bi-214	1.27E-11	8.96E-12	3.74E-11	2.11E-11	4.28E-12	4.21E-11	2.91E-11	6.23E-12	4.44E-12	2.42E-13
Po-210	5.32E-12	3.75E-12	1.57E-11	8.82E-12	1.79E-12	1.76E-11	1.22E-11	2.61E-12	1.86E-12	1.01E-13
Po-213	1.67E-13	1.18E-13	4.91E-13	2.77E-13	5.62E-14	5.52E-13	3.82E-13	8.17E-14	5.83E-14	3.17E-15
Po-214	6.83E-12	4.82E-12	2.01E-11	1.13E-11	2.30E-12	2.26E-11	1.57E-11	3.35E-12	2.39E-12	1.30E-13
Po-215	3.18E-11	2.24E-11	9.36E-11	5.27E-11	1.07E-11	1.05E-10	7.28E-11	1.56E-11	1.11E-11	6.05E-13
Po-216	1.91E-09	1.34E-09	5.61E-09	3.16E-09	6.42E-10	6.31E-09	4.37E-09	9.34E-10	6.66E-10	3.63E-11
Po-218	1.27E-11	8.96E-12	3.74E-11	2.11E-11	4.28E-12	4.21E-11	2.91E-11	6.23E-12	4.44E-12	2.42E-13
At-217	1.67E-13	1.18E-13	4.91E-13	2.77E-13	5.62E-14	5.52E-13	3.82E-13	8.17E-14	5.83E-14	3.17E-15
Rn-219	5.56E-11	3.92E-11	1.64E-10	9.22E-11	1.87E-11	1.84E-10	1.27E-10	2.72E-11	1.94E-11	1.06E-12
Rn-220	1.91E-09	1.34E-09	5.61E-09	3.16E-09	6.42E-10	6.31E-09	4.37E-09	9.34E-10	6.66E-10	3.63E-11
Rn-222	1.27E-11	8.96E-12	3.74E-11	2.11E-11	4.28E-12	4.21E-11	2.91E-11	6.23E-12	4.44E-12	2.42E-13
Fr-221	3.81E-13	2.69E-13	1.12E-12	6.32E-13	1.28E-13	1.26E-12	8.74E-13	1.87E-13	1.33E-13	7.26E-15
Fr-223	7.71E-13	5.43E-13	2.27E-12	1.28E-12	2.60E-13	2.55E-12	1.77E-12	3.78E-13	2.69E-13	1.47E-14
Ra-223	5.56E-11	3.92E-11	1.64E-10	9.22E-11	1.87E-11	1.84E-10	1.27E-10	2.72E-11	1.94E-11	1.06E-12
Ra-224	1.91E-09	1.34E-09	5.61E-09	3.16E-09	6.42E-10	6.31E-09	4.37E-09	9.34E-10	6.66E-10	3.63E-11
Ra-225	3.81E-13	2.69E-13	1.12E-12	6.32E-13	1.28E-13	1.26E-12	8.74E-13	1.87E-13	1.33E-13	7.26E-15
Ra-226	1.27E-11	8.96E-12	3.74E-11	2.11E-11	4.28E-12	4.21E-11	2.91E-11	6.23E-12	4.44E-12	2.42E-13
Ac-225	3.81E-13	2.69E-13	1.12E-12	6.32E-13	1.28E-13	1.26E-12	8.74E-13	1.87E-13	1.33E-13	7.26E-15
Ac-227	5.56E-11	3.92E-11	1.64E-10	9.22E-11	1.87E-11	1.84E-10	1.27E-10	2.72E-11	1.94E-11	1.06E-12
Th-227	5.48E-11	3.87E-11	1.61E-10	9.09E-11	1.85E-11	1.82E-10	1.26E-10	2.69E-11	1.92E-11	1.04E-12
Th-228	1.91E-09	1.34E-09	5.61E-09	3.16E-09	6.42E-10	6.31E-09	4.37E-09	9.34E-10	6.66E-10	3.63E-11
Th-229	3.81E-13	2.69E-13	1.12E-12	6.32E-13	1.28E-13	1.26E-12	8.74E-13	1.87E-13	1.33E-13	7.26E-15
Th-230	9.51E-10	6.71E-10	2.80E-09	1.58E-09	3.20E-10	3.15E-09	2.18E-09	4.66E-10	3.32E-10	1.81E-11
Th-231	2.07E-08	1.46E-08	6.08E-08	3.42E-08	6.96E-09	6.84E-08	4.73E-08	1.01E-08	7.22E-09	3.93E-10
Th-234	2.07E-08	1.46E-08	6.08E-08	3.42E-08	6.96E-09	6.84E-08	4.73E-08	1.01E-08	7.22E-09	3.93E-10
Pa-231	9.54E-11	6.72E-11	2.81E-10	1.58E-10	3.21E-11	3.16E-10	2.19E-10	4.67E-11	3.33E-11	1.81E-12

Table A6. (continued).

	AS-1 191,571 gal	AS-2 207,350 gal	AS-3 95,850 gal	AS-4 25,310 gal	AS-5 26,487 gal	AS-6 4,997 gal	AS-7 5,779 gal	AS-8 5,239 gal	AS-9 8,591 gal	AS-10 8,188 gal
	Ci/liter Jan, 2016	Ci/liter Jan, 2016	Ci/liter Jan, 2016	Ci/liter Jan, 2016	Ci/liter Jan, 2016	Ci/liter Jan, 2016	Ci/liter Jan, 2016	Ci/liter Jan, 2016	Ci/liter Jan, 2016	Ci/liter Jan, 2016
Pa-233	2.86E-06	2.02E-06	8.42E-06	4.74E-06	9.63E-07	9.47E-06	6.56E-06	1.40E-06	9.99E-07	5.44E-08
Pa-234m	2.07E-08	1.46E-08	6.08E-08	3.42E-08	6.96E-09	6.84E-08	4.73E-08	1.01E-08	7.22E-09	3.93E-10
Pa-234	2.62E-11	1.85E-11	7.72E-11	4.35E-11	8.83E-12	8.68E-11	6.01E-11	1.28E-11	9.16E-12	4.99E-13
U-232	1.97E-08	1.93E-09	5.98E-09	3.23E-09	6.50E-10	8.55E-09	4.97E-09	9.64E-10	1.48E-09	7.86E-11
U-233	2.57E-09	2.52E-10	7.80E-10	4.22E-10	8.48E-11	1.12E-09	6.48E-10	1.26E-10	1.93E-10	1.03E-11
U-234	5.88E-07	1.86E-06	1.82E-06	7.97E-07	3.57E-07	1.72E-06	1.21E-06	1.07E-06	6.44E-07	3.19E-08
U-235	1.86E-08	4.87E-08	4.44E-08	1.69E-08	8.69E-09	3.74E-08	2.79E-08	2.78E-08	1.67E-08	8.28E-10
U-236	2.44E-08	9.01E-08	6.34E-08	2.36E-08	1.55E-08	4.22E-08	3.59E-08	5.28E-08	2.64E-08	1.38E-09
U-237	3.69E-08	3.61E-09	1.12E-08	6.05E-09	1.22E-09	1.60E-08	9.29E-09	1.80E-09	2.77E-09	1.47E-10
U-238	5.76E-08	2.60E-08	4.72E-08	1.87E-08	5.08E-09	4.47E-08	3.13E-08	1.16E-08	1.67E-08	7.03E-10
Np-237	2.44E-06	1.64E-06	6.83E-06	4.19E-06	8.77E-07	8.90E-06	4.79E-06	1.24E-06	3.51E-07	3.10E-08
Np-238	7.07E-11	4.99E-11	2.08E-10	1.17E-10	2.38E-11	2.34E-10	1.62E-10	3.46E-11	2.47E-11	1.35E-12
Np-239	2.07E-08	1.46E-08	6.08E-08	3.42E-08	6.96E-09	6.84E-08	4.73E-08	1.01E-08	7.22E-09	3.93E-10
Pu-236	1.11E-10	7.84E-11	3.27E-10	1.84E-10	3.75E-11	3.68E-10	2.55E-10	5.45E-11	3.89E-11	2.12E-12
Pu-238	5.80E-04	6.96E-04	9.92E-04	5.57E-04	1.54E-04	1.44E-03	7.92E-04	3.38E-04	4.19E-04	1.72E-05
Pu-239	4.53E-05	8.80E-05	1.42E-04	8.30E-05	2.70E-05	1.65E-04	1.05E-04	6.63E-05	6.98E-05	2.95E-06
Pu-240	9.30E-06	6.35E-06	2.99E-05	1.69E-05	3.45E-06	3.28E-05	2.30E-05	5.00E-06	3.61E-06	1.95E-07
Pu-241	2.26E-04	1.78E-04	5.30E-04	2.69E-04	5.26E-05	5.71E-04	4.61E-04	8.00E-05	4.72E-05	2.91E-06
Pu-242	1.12E-08	8.57E-09	2.56E-08	1.38E-08	2.77E-09	3.04E-08	2.10E-08	4.10E-09	2.72E-09	1.55E-10
Am-241	6.19E-05	1.29E-04	1.41E-04	8.25E-05	3.13E-05	1.87E-04	1.07E-04	8.50E-05	6.33E-05	2.95E-06
Am-242m	1.43E-08	1.01E-08	4.21E-08	2.37E-08	4.82E-09	4.73E-08	3.28E-08	7.01E-09	5.00E-09	2.72E-10
Am-242	1.43E-08	1.01E-08	4.21E-08	2.37E-08	4.82E-09	4.73E-08	3.28E-08	7.01E-09	5.00E-09	2.72E-10
Am-243	2.07E-08	1.46E-08	6.08E-08	3.42E-08	6.96E-09	6.84E-08	4.73E-08	1.01E-08	7.22E-09	3.93E-10
Cm-242	1.19E-08	8.40E-09	3.51E-08	1.98E-08	4.01E-09	3.95E-08	2.73E-08	5.84E-09	4.16E-09	2.27E-10
Cm-243	2.07E-08	1.46E-08	6.08E-08	3.42E-08	6.96E-09	6.84E-08	4.73E-08	1.01E-08	7.22E-09	3.93E-10
Cm-244	1.03E-06	7.28E-07	3.04E-06	1.71E-06	3.48E-07	3.42E-06	2.37E-06	5.06E-07	1.91E-06	6.62E-08
Cm-245	2.94E-10	2.07E-10	8.65E-10	4.87E-10	9.90E-11	9.73E-10	6.74E-10	1.44E-10	1.03E-10	5.59E-12
Cm-246	1.91E-11	1.34E-11	5.61E-11	3.16E-11	6.42E-12	6.31E-11	4.37E-11	9.34E-12	6.66E-12	3.63E-13
H-3	1.12E-05	9.14E-06	1.91E-05	9.95E-06	1.96E-06	2.55E-05	1.08E-05	2.46E-06	7.19E-06	2.57E-07
Be-10	2.94E-12	2.07E-12	8.65E-12	4.87E-12	9.90E-13	9.73E-12	6.74E-12	1.44E-12	1.03E-12	5.59E-14
C-14	1.19E-10	8.40E-11	3.51E-10	1.98E-10	4.01E-11	3.95E-10	2.73E-10	5.84E-11	4.16E-11	2.27E-12
Se-79	4.29E-07	3.03E-07	1.26E-06	7.11E-07	1.44E-07	1.42E-06	9.83E-07	2.10E-07	1.50E-07	8.16E-09
Rb-87	2.86E-11	2.02E-11	8.42E-11	4.74E-11	9.63E-12	9.47E-11	6.56E-11	1.40E-11	9.99E-12	5.44E-13
Sr-90	3.14E-02	2.22E-02	1.06E-01	6.05E-02	1.18E-02	1.22E-01	8.12E-02	1.57E-02	6.86E-03	4.87E-04
Y-90	3.14E-02	2.22E-02	1.06E-01	6.05E-02	1.18E-02	1.22E-01	8.12E-02	1.57E-02	6.86E-03	4.87E-04
Zr-93	2.15E-06	1.51E-06	6.31E-06	3.56E-06	7.22E-07	7.10E-06	4.92E-06	1.05E-06	7.49E-07	4.08E-08
Nb-93m	1.83E-06	1.29E-06	5.38E-06	3.03E-06	6.15E-07	6.05E-06	4.19E-06	8.95E-07	6.38E-07	3.48E-08

Table A6. (continued).

	AS-1 191,571 gal	AS-2 207,350 gal	AS-3 95,850 gal	AS-4 25,310 gal	AS-5 26,487 gal	AS-6 4,997 gal	AS-7 5,779 gal	AS-8 5,239 gal	AS-9 8,591 gal	AS-10 8,188 gal
	Ci/liter Jan, 2016	Ci/liter Jan, 2016	Ci/liter Jan, 2016	Ci/liter Jan, 2016	Ci/liter Jan, 2016	Ci/liter Jan, 2016	Ci/liter Jan, 2016	Ci/liter Jan, 2016	Ci/liter Jan, 2016	Ci/liter Jan, 2016
Nb-94	1.11E-06	7.84E-07	3.27E-06	1.84E-06	3.75E-07	3.68E-06	2.55E-06	5.45E-07	3.89E-07	2.12E-08
Tc-98	2.54E-12	1.79E-12	7.48E-12	4.21E-12	8.56E-13	8.42E-12	5.83E-12	1.25E-12	8.88E-13	4.84E-14
Tc-99	9.54E-06	6.72E-06	3.31E-05	1.63E-05	3.31E-06	4.45E-05	2.80E-05	5.23E-06	7.37E-06	3.16E-07
Ru-106	9.25E-11	5.98E-11	2.54E-10	1.64E-10	3.49E-11	3.58E-10	1.65E-10	4.85E-11	4.16E-11	2.02E-12
Rh-102	3.81E-11	2.69E-11	1.12E-10	6.32E-11	1.28E-11	1.26E-10	8.74E-11	1.87E-11	1.33E-11	7.26E-13
Rh-106	9.25E-11	5.98E-11	2.54E-10	1.64E-10	3.49E-11	3.58E-10	1.65E-10	4.85E-11	4.16E-11	2.02E-12
Pd-107	1.59E-08	1.12E-08	4.68E-08	2.63E-08	5.35E-09	5.26E-08	3.64E-08	7.78E-09	5.55E-09	3.02E-10
Cd-113m	1.75E-06	1.23E-06	5.15E-06	2.90E-06	5.89E-07	5.79E-06	4.01E-06	8.56E-07	6.11E-07	3.33E-08
In-115	9.54E-17	6.72E-17	2.81E-16	1.58E-16	3.21E-17	3.16E-16	2.19E-16	4.67E-17	3.33E-17	1.81E-18
Sn-121m	5.48E-08	3.87E-08	1.61E-07	9.09E-08	1.85E-08	1.82E-07	1.26E-07	2.69E-08	1.92E-08	1.04E-09
Sn-126	4.05E-07	2.86E-07	1.19E-06	6.72E-07	1.36E-07	1.34E-06	9.29E-07	1.98E-07	1.42E-07	7.71E-09
Sb-125	1.08E-06	8.85E-07	1.45E-06	6.84E-07	1.44E-07	2.44E-06	1.17E-06	2.45E-07	1.72E-07	9.40E-09
Sb-126m	4.05E-07	2.86E-07	1.19E-06	6.72E-07	1.36E-07	1.34E-06	9.29E-07	1.98E-07	1.42E-07	7.71E-09
Sb-126	5.64E-08	3.98E-08	1.66E-07	9.35E-08	1.90E-08	1.87E-07	1.29E-07	2.76E-08	1.97E-08	1.07E-09
Te-125m	1.19E-07	8.40E-08	3.51E-07	1.98E-07	4.01E-08	3.95E-07	2.73E-07	5.84E-08	4.16E-08	2.27E-09
I-129	4.19E-08	8.98E-08	1.54E-07	8.68E-08	2.84E-08	1.59E-07	1.19E-07	7.08E-08	9.41E-09	1.20E-09
Cs-134	7.83E-07	4.40E-07	6.16E-07	4.70E-07	8.44E-08	1.22E-06	4.47E-07	7.24E-08	3.56E-08	2.67E-09
Cs-135	8.74E-07	6.16E-07	2.57E-06	1.45E-06	2.94E-07	2.89E-06	2.00E-06	4.28E-07	3.05E-07	1.66E-08
Cs-137	3.66E-02	2.58E-02	1.08E-01	6.06E-02	1.23E-02	1.21E-01	8.38E-02	1.79E-02	1.53E-02	7.70E-04
Ba-137m	3.44E-02	2.43E-02	1.01E-01	5.70E-02	1.16E-02	1.14E-01	7.88E-02	1.69E-02	1.20E-02	6.54E-04
Ce-142	2.94E-11	2.07E-11	8.65E-11	4.87E-11	9.90E-12	9.73E-11	6.74E-11	1.44E-11	1.03E-11	5.59E-13
Ce-144	3.92E-12	2.38E-12	1.23E-11	7.97E-12	1.70E-12	1.66E-11	7.94E-12	2.35E-12	2.03E-12	9.83E-14
Pr-144	3.92E-12	2.38E-12	1.23E-11	7.97E-12	1.70E-12	1.66E-11	7.94E-12	2.35E-12	2.03E-12	9.83E-14
Pm-146	9.54E-09	6.72E-09	2.81E-08	1.58E-08	3.21E-09	3.16E-08	2.19E-08	4.67E-09	3.33E-09	1.81E-10
Pm-147	5.40E-06	3.81E-06	1.59E-05	8.95E-06	1.82E-06	1.79E-05	1.24E-05	2.65E-06	1.89E-06	1.03E-07
Sm-146	2.70E-13	1.91E-13	7.95E-13	4.48E-13	9.10E-14	8.94E-13	6.19E-13	1.32E-13	9.44E-14	5.14E-15
Sm-147	7.23E-12	5.10E-12	2.13E-11	1.20E-11	2.43E-12	2.39E-11	1.66E-11	3.54E-12	2.53E-12	1.38E-13
Sm-151	3.02E-04	2.13E-04	8.89E-04	5.00E-04	1.02E-04	1.00E-03	6.92E-04	1.48E-04	1.05E-04	5.74E-06
Eu-150	1.11E-11	7.84E-12	3.27E-11	1.84E-11	3.75E-12	3.68E-11	2.55E-11	5.45E-12	3.89E-12	2.12E-13
Eu-152	1.27E-06	8.96E-07	3.74E-06	2.11E-06	4.28E-07	4.21E-06	2.91E-06	6.23E-07	4.44E-07	2.42E-08
Eu-154	9.11E-05	5.66E-05	1.41E-04	7.44E-05	1.40E-05	2.07E-04	1.04E-04	1.74E-05	1.36E-05	7.52E-07
Eu-155	1.22E-05	1.57E-05	3.60E-05	1.48E-05	4.11E-06	2.30E-05	1.19E-05	8.44E-06	9.16E-06	3.83E-07
Ho-166m	4.53E-11	3.19E-11	1.33E-10	7.51E-11	1.52E-11	1.50E-10	1.04E-10	2.22E-11	1.58E-11	8.62E-13
Co-60	1.34E-05	1.08E-05	1.05E-05	4.10E-06	1.28E-06	1.73E-05	5.30E-06	3.08E-06	5.85E-07	6.07E-08
Ni-63	5.41E-05	4.35E-05	8.19E-05	4.61E-05	9.36E-06	1.28E-04	6.55E-05	1.38E-05	1.55E-05	7.06E-07

Table A7. Newly generated liquid waste streams.

	NGLW-1 20,587 gal	NGLW-2 119,685 gal	NGLW-3 39,531 gal	NGLW-4 41,298 gal	NGLW-5 166 gal	NGLW-6 1335 gal
	g/liter	g/liter	g/liter	g/liter	g/liter	g/liter
TOC	0.53	0.27	0.23	0.32	1.06	0.65
UDS	2.93	1.35	0.81	1.55	5.86	3.24
	mol/liter	mol/liter	mol/liter	mol/liter	mol/liter	mol/liter
H+	3.82	4.12	4.27	4.05	6.11	6.48
Al	6.24E-02	1.38E-01	8.40E-02	7.48E-02	1.25E-01	1.92E-01
Sb	2.24E-05	1.01E-05	6.32E-06	1.12E-05	4.48E-05	2.39E-05
As	3.91E-07	5.93E-06	4.63E-07	5.70E-07	7.83E-07	4.91E-06
Ba	1.00E-05	7.48E-06	1.27E-05	1.15E-05	2.00E-05	1.98E-05
Be	1.95E-06	1.89E-06	1.97E-06	2.07E-06	3.90E-06	3.99E-06
B	9.95E-04	3.80E-03	3.20E-03	2.25E-03	1.99E-03	5.35E-03
Br	—	1.32E-05	1.13E-05	6.78E-06	—	1.68E-05
Cd	2.74E-05	5.34E-05	5.25E-05	4.22E-05	5.48E-05	8.94E-05
Ca	5.22E-04	1.71E-03	2.05E-03	1.40E-03	1.04E-03	2.84E-03
Cl	6.55E-04	1.02E-02	3.28E-03	2.22E-03	1.11E-03	8.31E-03
Cr	1.83E-05	3.28E-05	3.54E-05	2.85E-05	3.66E-05	5.80E-05
Co	2.62E-04	1.37E-04	1.39E-04	1.78E-04	5.24E-04	3.44E-04
Cu	—	2.97E-08	2.54E-08	1.52E-08	—	3.76E-08
F	2.56E-02	2.85E-02	2.56E-02	2.44E-02	5.09E-02	5.17E-02
Ge	—	2.97E-08	2.54E-08	1.52E-08	—	3.76E-08
I	—	1.54E-06	1.32E-06	7.87E-07	—	1.95E-06
Fe	1.25E-03	3.93E-03	4.01E-03	2.82E-03	2.50E-03	6.12E-03
Pb	1.26E-04	1.08E-02	5.13E-03	3.12E-03	2.46E-04	1.08E-02
Mg	—	2.95E-05	2.53E-05	1.51E-05	—	3.74E-05
Mn	3.82E-03	1.86E-03	1.49E-03	2.17E-03	7.63E-03	4.45E-03
Hg	1.26E-04	1.08E-02	5.13E-03	3.12E-03	2.46E-04	1.08E-02
Mo	3.51E-04	4.51E-04	5.49E-04	4.64E-04	7.02E-04	8.96E-04
NO_3	3.30E+00	3.83E+00	3.89E+00	3.62E+00	6.60E+00	7.33E+00
PO_4	1.38E-04	6.75E-04	7.58E-05	9.21E-05	2.77E-04	6.07E-04
K	8.67E-03	1.62E-02	2.08E-02	1.54E-02	1.73E-02	3.00E-02
Se	1.51E-07	2.13E-07	1.22E-07	2.36E-07	3.03E-07	4.38E-07
Si	—	1.85E-04	1.58E-04	9.46E-05	—	2.34E-04
Ag	6.42E-06	3.13E-06	1.80E-06	3.45E-06	1.28E-05	7.28E-06
Na	6.81E-02	1.62E-01	2.26E-01	1.62E-01	1.36E-01	3.05E-01
Sr	—	6.77E-07	5.81E-07	3.47E-07	—	8.59E-07
SO_4	7.74E-03	1.06E-02	2.75E-03	4.58E-03	1.55E-02	1.41E-02
Tl	1.69E-07	3.07E-07	2.96E-07	2.78E-07	3.38E-07	5.55E-07
Ti	—	1.64E-07	1.41E-07	8.41E-08	—	2.08E-07
U	3.96E-05	2.22E-05	1.72E-05	2.38E-05	7.93E-05	4.97E-05
V	6.24E-06	4.11E-06	2.77E-06	3.76E-06	1.25E-05	8.26E-06
Zn	7.74E-04	5.16E-04	2.48E-03	1.75E-03	1.55E-03	2.42E-03
Zr	6.55E-04	1.02E-02	3.28E-03	2.22E-03	1.11E-03	8.31E-03
HCO_3	1.14E-03	5.14E-02	4.40E-02	2.67E-02	2.28E-03	6.58E-02

Table A8. Newly generated liquid waste streams.

	NGLW-8 2000 gal	Dilute WM-100-1 70578 gal	Conc WM-100-1 35289 gal	NGLW-9 25118 gal	NGLW-10 15635 gal	NGLW-13-18 80,016 gal
	g/liter	g/liter	g/liter	g/liter	g/liter	g/liter
TOC	1.21	0.38	0.77	0.60	0.61	1.31
UDS	6.94	2.00	4.00	3.39	3.51	7.51
	mol/liter	mol/liter	mol/liter	mol/liter	mol/liter	mol/liter
H+	5.01	3.89	6.22	3.23	4.37	5.26
Al	1.38E-01	8.94E-02	1.79E-01	6.78E-02	6.93E-02	1.48E-01
Sb	5.29E-05	1.50E-05	2.99E-05	2.59E-05	2.68E-05	5.72E-05
As	5.24E-07	1.97E-06	3.94E-06	2.81E-07	2.52E-07	5.38E-07
Ba	2.36E-05	1.02E-05	2.04E-05	1.15E-05	1.19E-05	2.55E-05
Be	4.48E-06	2.03E-06	4.06E-06	2.20E-06	2.26E-06	4.83E-06
B	2.05E-03	2.30E-03	4.60E-03	1.02E-03	1.03E-03	2.20E-03
Br	—	6.49E-06	1.30E-05	—	—	—
Cd	6.50E-05	4.16E-05	8.32E-05	3.17E-05	3.29E-05	7.03E-05
Ca	1.08E-03	1.22E-03	2.44E-03	5.35E-04	5.39E-04	1.15E-03
Cl	1.01E-03	3.92E-03	6.67E-03	6.05E-04	5.92E-04	1.08E-03
Cr	1.10E-05	2.45E-05	4.91E-05	7.38E-06	4.45E-06	9.51E-06
Co	6.05E-04	1.99E-04	3.97E-04	2.97E-04	3.06E-04	6.54E-04
Cu	—	1.46E-08	2.91E-08	—	—	—
F	5.95E-02	2.66E-02	5.29E-02	2.93E-02	3.03E-02	6.43E-02
Ge	—	1.46E-08	2.91E-08	—	—	—
I	—	7.53E-07	1.51E-06	—	—	—
Fe	2.58E-03	2.66E-03	5.31E-03	1.28E-03	1.29E-03	2.76E-03
Pb	2.52E-04	4.31E-03	8.62E-03	1.28E-04	1.29E-04	2.69E-04
Mg	—	1.45E-05	2.90E-05	—	—	—
Mn	9.03E-03	2.70E-03	5.40E-03	4.41E-03	4.57E-03	9.77E-03
Hg	2.52E-04	4.31E-03	8.45E-03	1.28E-04	1.29E-04	2.69E-04
Mo	4.72E-04	4.08E-04	8.15E-04	2.53E-04	2.27E-04	4.85E-04
NO_3	5.54E+00	3.50E+00	5.44E+00	2.85E+00	2.73E+00	5.83E+00
PO_4	2.85E-04	2.67E-04	5.34E-04	1.42E-04	1.43E-04	3.05E-04
K	1.86E-02	1.37E-02	2.73E-02	9.21E-03	9.36E-03	2.00E-02
Se	3.59E-07	2.08E-07	4.17E-07	1.75E-07	1.82E-07	3.88E-07
Si	—	9.06E-05	1.81E-04	—	—	—
Ag	1.52E-05	4.46E-06	8.91E-06	7.42E-06	7.69E-06	1.64E-05
Na	1.45E-01	1.34E-01	2.69E-01	7.20E-02	7.31E-02	1.56E-01
Sr	—	3.32E-07	6.65E-07	—	—	—
SO_4	1.79E-02	7.39E-03	1.48E-02	8.76E-03	9.04E-03	1.93E-02
Tl	1.48E-07	2.38E-07	4.75E-07	8.79E-08	6.62E-08	1.41E-07
Ti	—	8.05E-08	1.61E-07	—	—	—
U	9.40E-05	2.94E-05	5.87E-05	4.59E-05	4.76E-05	1.02E-04
V	1.42E-05	4.75E-06	9.49E-06	6.97E-06	7.17E-06	1.53E-05
Zn	1.60E-03	1.12E-03	2.23E-03	7.95E-04	8.00E-04	1.71E-03
Zr	1.01E-03	3.92E-03	7.85E-03	6.05E-04	5.92E-04	1.08E-03
HCO_3	2.70E-03	2.57E-02	5.15E-02	1.32E-03	1.37E-03	2.92E-03