1 of 3

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21

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7. Abstract The document reports the preliminary results on work to develop a methodology for simulating the retrieval and processing of SST and DST waste. The method that has been developed provides a tool for evaluating proposed retrieval sequences. Given a retrieval sequence, a tank farm configuration, and time cycle for in-tank operations, the model provides insights into duration of processing, and variability in the composition of the glass being produced. The model uses the latest estimate of tank farm inventories on a tank-by-tank basis.		
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PRELIMINARY TIME-PHASED TWRS PROCESS MODEL RESULTS

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TABLE OF CONTENTS

1.0 INTRODUCTION	6
2.0 RESULTS OF MODELLING	7
2.1 MODELLING METHODOLOGY	7
2.2 MODELLING RESULTS	10
2.2.1 SIMAN/ARENA Results	10
2.2.2 Flowsheet Modelling - LLW Projections	12
2.2.3 Flowsheet Modelling - Low-Level Glass Projections	15
2.2.4 Flowsheet Modelling - High-Level Glass Projections	15
2.3 DISCUSSION OF RESULTS	30
3.0 MODEL BASES	32
3.1 NEAR TERM DST OPERATIONS	32
3.2 DST STATUS PRIOR TO COMMENCEMENT OF RETRIEVAL IN 2003	34
3.3 PROPOSED TANK FARM USAGE	36
3.4 EARLY LLW PRETREATMENT FEEDS FROM DSTs	38
3.5 SIMAN MODELLING VARIABLES	39
3.5.1 SST Retrieval and Transfer Parameters	39
3.5.2 In-Tank Process Parameters	40
3.6 LLW VITRIFICATION PARAMETERS	43
3.7 HLW VITRIFICATION PARAMETERS	43
REFERENCES	44
APPENDIX A	45
APPENDIX B	57
APPENDIX C	64
APPENDIX D	176
APPENDIX E	190

LIST OF FIGURES

Figure 2-1 In-Tank Sludge Washing Configuration	8
Figure 2-2 LLW Glass Input	13
Figure 2-3 LLW Glass Input	14
Figure 2-4 LLW Glass Output	16
Figure 2-5a LLW Glass Output	17
Figure 2-5b LLW Glass Output	18
Figure 2-6 HLW Glass Output	26
Figure 2-7 HLW Glass Output	27
Figure 2-8 HLW Glass Output	28

LIST OF TABLES

Table 2-1 Processing Steps and Timings for Sludge Wash Tanks	11
Table 2-2 Low-Level Glass Composition and Volume	19
Table 2-3 High-Level Glass Composition and Volume	29
Table 3-1 DSTs <u>Not</u> Committed to Storage of Concentrated Wastes and Sludges	34
Table 3-2 Status of AN Tanks Committed to Concentrated Waste Storage . .	35
Table 3-3 Status of AP Tanks Committed to Concentrated Waste Storage . .	35
Table 3-4 Allocation of In-Tank Processing Functions	37
Table 3-5 Submodel retrieve.mod	39
Table 3-6 Submodel x site.mod	39
Table 3-7 Submodel sd_1st.mod	40
Table 3-8 Submodel sd_2nd.mod	41
Table 3-9 Submodel sd_2_dec.mod	41
Table 3-10 Submodel sd_wash1.mod	42
Table 3-11 Submodel sd_wash2.mod	42

1.0 INTRODUCTION

The following report documents the first phase of efforts to model the retrieval and processing of Hanford tank waste within the constraints of an assumed tank farm configuration. This time-phased approach simulates a "first try" at a retrieval sequence, the batching of waste through retrieval facilities, the batching of retrieved waste through enhanced sludge washing, the batching of liquids through pretreatment and low-level waste (LLW) vitrification, and the batching of pretreated solids through high-level waste (HLW) vitrification. The report should be regarded as an interim status report on our efforts to refine the modelling methodology.¹

The future fill status of the tanks is an important startup consideration for modelling in-tank waste processing. The contents of some double-shell tanks (DSTs) will remain virtually unchanged between now and the beginning of retrieval and pretreatment. Salt-well liquor pumping, generation of facility wastes, and 242A evaporator operations make the condition of other tanks that are actively involved in tank farm operations less certain. Decisions pertaining to evaporator operations usually are made shortly before an evaporator campaign begins. After consolidation of the current inventory and salt well pumping are completed (about 2000), it should be possible to specify DST contents with a higher degree of certainty.

Usage of existing tanks is also affected by programmatic factors, such as the recent recommendation to not build any new tanks, the recent recommendation to do sludge washing out-of-tank, and the current thinking to privatize much of the disposal mission. For the purposes of this report, a series of assumptions was made about the future status of DSTs. As the disposal mission continues to evolve, so will the assumptions pertaining to tank usage.

The results reflect the outcome of an assumed retrieval sequence that has not been tailored with respect to accepted measures of performance (Certa 1995). The batch data, composition variability, and final waste volume projections in this report should be regarded as tentative. Nevertheless, the results provide interesting insights into time-phased processing of the tank waste. Inspection of the composition variability, for example, suggests modifications to the retrieval sequence that will further improve the uniformity of feed to the vitrification facilities. This model will be a valuable tool for evaluating suggested retrieval sequences and establishing a time-phased processing baseline. An official recommendation on tank retrieval sequence will be made in September, 1995.

¹The time-phased model is capable of tracking numerous measures of performance. For a complete list of performance measures that are currently modelled, see APPENDIX E. This report reflects just a few of the capabilities that are pertinent to the process flowsheet.

2.0 RESULTS OF MODELLING

2.1 MODELLING METHODOLOGY

Our current modelling capability requires a preconceived retrieval schedule as an input.² For the purposes of this report, scheduling follows a draft sequence document (WHC 1994). The sequence is listed in APPENDIX A. The draft sequence has no official standing, nor does it address the sequence of DSTs or intentional blending considerations. The sequence was revised as needed, especially during the initial years of pretreatment, to account for the retrieval of DSTs. The primary criterion for DST sequencing was the need to empty some DSTs before retrieving single-shell tank (SST) waste. The SST sequence was driven by retrieval of safety watch list tanks and Tri-Party Agreement (TPA) SST closure milestones to initiate retrieval of a certain number of tanks each year beginning at the end of 2003.

The SIMAN/ARENA model³ simulates the batch processing of waste through a specified tank farm facility configuration. The configuration modelled in this report is depicted in Figure 2-1. DSTs were initialized as decanted waste tanks so the liquids could be routed directly to LLW pretreatment. Thereafter, the DSTs assume the function that has been allocated to them in Table 3-4.

The model determines the actual initiation date and duration of retrieval for each tank. (Note: The retrieval schedule is used by SIMAN to fix the earliest start date). The start date is constrained by the availability of retrieval annexes, and the time cycles assumed for in-tank sludge washing. Event-driven simulation is inherently equipment limited, and does not necessarily meet all milestones. (By contrast, time or schedule-driven simulation would meet all milestones, but equipment requirements would increase as needed to meet the milestones). The model creates discrete batches of waste which indicate the contribution from each tank. The batches are subsequently modelled with the ASPEN PLUS⁴ TWRs Process Flowsheet model (Orme 1994).

² Current modelling capability does not generate the "ideal" retrieval schedule. Arriving at the ideal retrieval schedule is a complicated and iterative exercise taking into account TPA commitments, capability of the available processing equipment, glass composition constraints, budget constraints, etc., and is well beyond the scope of this introductory study.

³SIMAN is a discrete event simulation language used to drive animation within the ARENA software development window. SIMAN/ARENA are trademarks of Systems Modelling Corporation.

⁴ASPEN PLUS is a steady state chemical process simulation model and trademark of Aspen Technologies, Inc.

Figure 2-1 In-Tank Sludge Washing Configuration

While SIMAN simulates the sequence of activities for the entire disposal process, the ASPEN PLUS model is the accepted standard for glass volume projections. Consequently, the SIMAN/ARENA model is used in conjunction with the ASPEN PLUS process model. The steps to using this time-phased process model are:

- (1) Establish a retrieval schedule defining the earliest date that retrieval of each tank can begin.
- (2) Model the retrieval schedule using the SIMAN/ARENA event-driven process simulator, an assumed tank farm configuration for enhanced sludge washing, and an assumed time cycle for enhanced sludge washing. SIMAN creates two tables that show the timing of batches. One table is used for simulating liquids processing; the other is used for simulating solids processing. The SIMAN tables indicate the fractional contribution from specific tanks to a given batch.
- (3) Simulate pretreatment and vitrification with a modified ASPEN PLUS process model using the SIMAN/ARENA batches corresponding to liquid processing. Since these batches do not correctly reflect the accumulation in washed solids tanks, the HLW results are discarded.
- (4) Simulate pretreatment and vitrification with a modified ASPEN PLUS process model using the SIMAN/ARENA batches corresponding to solids processing. Since these batches do not correctly reflect the accumulation in decanted liquid tanks, the LLW results are discarded.

The ASPEN PLUS simulation for the TWRS Process Flowsheet (Orme 1994) is impractical to use for the large number of batches generated by the time-phased approach. A simplified ASPEN PLUS simulation is used for the purposes of this report. The following steps were taken to simplify the model:

- (1) The Sludge Washing and CsIX sections were left intact with two exceptions. The recycle stream from HLW was removed and solids carry over in the decanted liquids was turned off. (With solids carryover left intact, the model generates several unusual batches with minuscule contributions from many tanks. Deactivating solids carryover has virtually no impact on final waste volume). While the model ignores solids carryover, it still accounts for the 2nd stage settling of those solids in the sludge washing time cycle.
- (2) All recycle streams in the melter sections were eliminated. These streams gave the flowsheet added complexity but did not affect the amount of glass produced.
- (3) The offgas treatment steps were completely removed. This does not affect the glass volume.

(4) Both melters are considered to be combustion type melters. This does not affect the amount of glass produced, but it does simplify the HLW melter line.

(5) Most radionuclides are not tracked. Cold Cs and Sr are kept because they can affect the flowsheet (Cs in the CsIX section and Sr because of the mass involved).

(6) The TWRS Process Flowsheet high-level glass composition limits are imposed (i.e., HWVP composition limits but the frit limits are ignored). Ignoring the frit limits decreases the complexity of the algorithm that formulates the glass while not impacting the glass volume. The glass composition of each batch is optimized by an algorithm built into the ASPEN PLUS model.

2.2 MODELLING RESULTS

Three categories of modelling results are discussed below: SIMAN/ARENA modelling, ASPEN PLUS modelling of SIMAN batches to simulate liquids processing, and ASPEN PLUS modelling of SIMAN batches to simulate solids processing. As noted above, the model has been programmed to track numerous performance measures, but only those most pertinent to the flowsheet are reported here. For a complete list of performance measures, see APPENDIX E. These will be reported in a separate document later in the year.

2.2.1 SIMAN/ARENA Results

Figure 2-1 illustrates the tank farm facility configuration that is modelled by SIMAN. A complete set of variable modelling parameters is summarized in Section 3.0 MODEL BASES.

SST waste is retrieved into one of four retrieval annexes until the slurry reaches 10 wt% solids or the sluicing liquid increases to 5 M Na, whichever occurs first. In the West Area, the contents of three 75,000 gal retrieval annex tanks are transferred as a batch to the SY Farm to accumulate ~million gallon batches for cross site transfer. Million gallon batches are then transferred to a million gallon receiver tank in the East Area. In the East Area, the contents of three retrieval annex tanks are transferred as a batch to a receiver tank until an ~million gallon batch is accumulated.

Million gallon batches are transferred into the sludge wash tanks. The time cycles for the sludge wash tanks and 2nd stage settling tanks are defined Table 2-1.

The results of SIMAN/ARENA modelling are too voluminous to reproduce in this section. The SIMAN-generated batches for simulating LLW processing are provided in APPENDIX C. For clarification, an excerpt from the SIMAN output is reproduced and explained below:

Table 2-1 Processing Steps and Timings for Sludge Wash Tanks

Processing Steps	Timing
FILLING TANK WITH SLUDGE 1. Transfer waste to processing tank 2. Settle suspended solids 3. Decant supernatant liquid to 2 nd stage SD tank 4. Repeat steps 1-3 to obtain required level of sludge	100 kgal/day 30 days 100 kgal/day -
FILLING 2ND SD TANK WITH SUPERNATANT 1. Receive supernatant to 2 nd stage SD tank 2. Settle suspended solids 3. Decant supernatant liquid to accumulation tank 4. Repeat steps 1-3 to obtain required level of sludge	100 kgal/day 30 days 100 kgal/day -
LEACHING SLUDGE 5. Add 5M caustic 1:1 to waste 6. Leach solids by mixing with mixing pumps 7. Settle suspended solids 8. Decant supernatant liquid to accumulation tank	100 kgal/day 30 days 30 days 100 kgal/day
WASHING SLUDGE 9. Add wash water 2:1 to waste 10. Mix waste with mixing pumps 11. Settle suspended solids 12. Decant supernatant liquid to accumulation tank 13. Repeat steps 9-12 three times	100 kgal/day 7 days 30 days 100 kgal/day
TRANSFERRING SLUDGE 14. Add water for slurry transfer 15. Transfer waste to sludge accumulation tank	100 kgal/day 100 kgal/day

Batch No. = 23, Time = 1216. days, Batch Vol = 9.925E+02 kgal
 Mass Tot = 4.693E+09 g, Na Con = 5.539E+00 M

116	8.033E-02	107TX
127	4.252E-01	118TX
158	9.256E-02	102AP
161	9.256E-02	105AP
175	3.184E-02	101SY
177	3.664E-02	103SY

This is the 23rd batch accumulated in the decanted liquid tanks in Figure 2-1. The time indicates that this batch starts feeding the LLW pretreatment facility 1216 days after January 1, 2003. The first two lines indicate that this batch provides 992 kgal of 5.54 M Na feed to LLW pretreatment. The first column contains index numbers used to identify the tank. The second column is the fraction of the tank designated in the third column.

The total volume of decanted liquid from this model run agrees with expectations. The model allows a batch greater than 800,000 gallons to proceed to evaporation and ion exchange, resulting in numerous batches of

decanted liquid that are less than a full million gallons. Consequently, the total batch count of 268 is somewhat higher than ideal, but not unreasonable. The fractional contributions from each tank have been checked (i.e., the fractions add to 1) which indicates that all of the soluble tank inventory is accounted for.

Double-shell tank liquids are the first transfers to LLW pretreatment to make room for incoming SST waste. The first 21 batches fed to LLW pretreatment are DST waste (saltwell liquor recovered after February 1994, DSSF, DSS, CC and NCAW). Retrieved SST waste begins to show up in the 22nd decanted liquid batch.

The SIMAN-generated batches for simulating HLW processing are provided in APPENDIX D. An example of a solids batch output is shown below:

```

Batch No. = 2, Time = 2960. days, Batch Vol = 9.500E+02 kgal
Mass Tot = 4.397E+09 g, Mass Sol = 5.463E+08 g
  56  1.000E+00  106C
 116  6.847E-02  107TX
 121  6.642E-02  112TX
 127  5.465E-01  118TX
 169  1.733E-01  105AW
 172  1.000E+00  102AY
 175  5.946E-01  101SY
 176  1.641E-01  102SY

```

This is the 2nd batch accumulated in the washed solids tanks in Figure 2-1. The first two lines indicate that this batch starts feeding the HLW vitrification plant 2960 days after January 1, 2003 and that this batch provides 950 kgal of washed sludge containing 546 Mg of solids. The second column indicates the fraction of the insoluble solids from the tank designated in the third column.

The fractional contributions from each tank have been checked. All insoluble materials have been accounted for.

2.2.2 Flowsheet Modelling - LLW Projections

All of the batches generated by SIMAN/ARENA (APPENDIX C) for LLW modelling were processed through the modified ASPEN PLUS TWRS Process Flowsheet model. Figure 2-2 and Figure 2-3 plot the batch-to-batch variability of the major LLW components in all 268 batches of pretreated waste. The values shown are the equivalent oxide weight percent. As expected, Na accounts for a nominal 85 wt% of the pretreated feed and frequently exceeds 90 wt%. Al varies from 1 to 24 wt%. Potassium exhibits three spikes in the first 25 batches and then flattens out to essentially nothing for the duration. The potassium spikes are attributed to a high potassium DST that is processed early in the schedule.

Figure 2-2. LLW GLASS INPUT

Figure 2-3. LLW GLASS INPUT

2.2.3 Flowsheet Modelling - Low-Level Glass Projections

The TWRS Process Flowsheet model determines the minimum addition of Si, Ca, and Al to bring the pretreated waste within glass formulation bounds. (See Section 3.0 for a listing of the glass formulation bounds). Figure 2-4 plots the variability of the glass composition by batch. Figures 2-5a and 2-5b show the details of two minor components on an expanded scale. The SiO_2 spikes on Figure 2-4 coincide with aluminum-rich batches ($> 15 \text{ wt\% Al}_2\text{O}_3$) on Figure 2-2 and Figure 2-3. For the formulation bounds used in this simulation, aluminum-rich batches require an extra measure of Si to bring the aluminum fraction down to 5%. The Si addition is responsible for the negative sodium spikes as the sodium is diluted below 25 wt%. Ca and Al are fixed at a constant 10 and 5 wt%, respectively. (See Section 2.3 for more discussion of the formulation bounds and how the spikes can be eliminated).

As shown in Figure 2-5a and 2-5b, the fraction of phosphate and chromium varies from batch to batch, but for the most part remains within an acceptable composition envelope.⁵ This model run made no attempt to equalize minor components by selective retrieval or intentional blending; all blending was incidental to the tank farm operation.

Table 2-2 shows the fraction of a LLW vault filled by each batch, and the composition of the glass from each batch. The model predicts a total of 46 LLW vaults, which is consistent with the TWRS Process Flowsheet (Orme 1994).

2.2.4 Flowsheet Modelling - High-Level Glass Projections

All of the batches generated by SIMAN/ARENA for HLW modelling (see APPENDIX D) were likewise processed through the modified TWRS Process Flowsheet model. Figures 2-6, 2-7 and 2-8 show the variability of key components in glass. Table 2-3 shows the canister count from each of the 32 batches, and the composition of each batch. The simulation predicts 8451 HLW canisters.

⁵Components (Al, Cr, P) that are leached from the sludge during caustic washing are accounted for in the total results, but they are not properly distributed from batch to batch. Since the bulk of these components is already in solution before leaching, the effect of this quirk in the current modelling method has little effect on glass composition or volume projections.

Figure 2-4. LLW GLASS OUTPUT

Figure 2-5a. LLW GLASS OUTPUT

Figure 2-5b. LLW GLASS OUTPUT

Table 2-2 Low-Level Glass Composition and Volume

Total Volume 45.5 Vaults

Batch#	AL2O3	CAO	CR2O3	K2O	NA2O	P2O5	SI02	UO3	VAULTS
1	5.0%	10.0%	0.07%	0.09%	25.0%	0.63%	59.0%	0.08%	0.272
2	5.0%	10.0%	0.07%	0.18%	25.0%	0.48%	59.1%	0.00%	0.354
3	5.0%	10.0%	0.07%	0.84%	21.5%	0.03%	62.5%	0.01%	0.403
4	5.0%	10.0%	0.08%	0.56%	25.0%	0.14%	59.2%	0.00%	0.346
5	5.0%	10.0%	0.07%	0.42%	21.6%	0.08%	62.8%	0.00%	0.402
6	5.0%	10.0%	0.21%	0.50%	25.0%	0.24%	59.0%	0.00%	0.351
7	5.0%	10.0%	0.02%	3.92%	25.0%	0.12%	55.9%	0.02%	0.347
8	5.0%	10.0%	0.28%	0.09%	25.0%	0.21%	59.3%	0.00%	0.645
9	5.0%	10.0%	0.18%	0.11%	25.0%	0.17%	59.3%	0.18%	0.275
10	5.0%	10.0%	0.22%	0.59%	25.0%	0.23%	58.9%	0.00%	0.366
11	5.0%	10.0%	0.41%	0.37%	25.0%	0.15%	59.0%	0.00%	0.232
12	5.0%	10.0%	0.04%	0.21%	25.0%	0.03%	59.6%	0.00%	0.353
13	5.0%	10.0%	0.08%	0.03%	25.0%	0.57%	59.1%	0.09%	0.264
14	5.0%	10.0%	0.20%	0.28%	25.0%	1.46%	58.1%	0.00%	0.233
15	5.0%	10.0%	0.08%	0.03%	25.0%	0.57%	59.1%	0.09%	0.264
16	5.0%	10.0%	0.03%	4.01%	25.0%	0.04%	55.9%	0.01%	0.295
17	5.0%	10.0%	0.14%	1.31%	25.0%	0.28%	58.3%	0.01%	0.681
18	5.0%	10.0%	0.33%	0.31%	25.0%	0.48%	58.8%	0.01%	0.339
19	5.0%	10.0%	0.07%	0.84%	21.5%	0.03%	62.5%	0.01%	0.397
20	5.0%	10.0%	0.08%	0.56%	25.0%	0.14%	59.2%	0.00%	0.302
21	5.0%	10.0%	0.07%	0.42%	21.6%	0.08%	62.8%	0.00%	0.376
22	5.0%	10.0%	0.18%	0.18%	25.0%	0.37%	59.2%	0.00%	0.321
23	5.0%	10.0%	0.16%	0.11%	25.0%	0.22%	59.4%	0.03%	0.286
24	5.0%	10.0%	0.05%	2.51%	25.0%	0.15%	57.2%	0.06%	0.312
25	5.0%	10.0%	0.19%	0.12%	25.0%	0.30%	59.3%	0.08%	0.098
26	5.0%	10.0%	0.16%	0.14%	25.0%	0.33%	59.2%	0.03%	0.041
27	5.0%	10.0%	0.10%	0.01%	25.0%	0.21%	59.4%	0.17%	0.262
28	5.0%	10.0%	0.10%	0.25%	25.0%	0.20%	59.2%	0.18%	0.265
29	5.0%	10.0%	0.10%	0.00%	25.0%	0.11%	59.5%	0.22%	0.259
30	5.0%	10.0%	0.09%	0.00%	25.0%	0.09%	59.6%	0.20%	0.262
31	5.0%	10.0%	0.06%	0.00%	25.0%	1.51%	58.3%	0.10%	0.264
32	5.0%	10.0%	0.05%	0.07%	25.0%	1.71%	58.0%	0.06%	0.324
33	5.0%	10.0%	0.06%	0.04%	25.0%	1.81%	58.0%	0.11%	0.181
34	5.0%	10.0%	0.07%	0.02%	25.0%	0.48%	59.2%	0.15%	0.226
35	5.0%	10.0%	0.05%	0.03%	25.0%	2.11%	57.7%	0.08%	0.075
36	5.0%	10.0%	0.07%	0.02%	25.0%	1.07%	58.6%	0.09%	0.052
37	5.0%	10.0%	0.09%	0.05%	25.0%	0.47%	59.2%	0.13%	0.148
38	5.0%	10.0%	0.10%	0.04%	25.0%	0.27%	59.4%	0.14%	0.096
39	5.0%	10.0%	0.08%	0.01%	25.0%	0.27%	59.4%	0.17%	0.114
40	5.0%	10.0%	0.07%	0.02%	25.0%	0.22%	59.4%	0.15%	0.25

Table 2-2 Low-Level Glass Composition and Volume

Total Volume 45.5 Vaults

Batch#	AL2O3	CAO	CR2O3	K2O	NA2O	P2O5	SiO2	UO3	VAULTS
41	5.0%	10.0%	0.09%	0.02%	25.0%	0.24%	59.4%	0.16%	0.268
42	5.0%	10.0%	0.08%	0.01%	25.0%	0.23%	59.4%	0.19%	0.235
43	5.0%	10.0%	0.07%	0.02%	25.0%	0.23%	59.4%	0.15%	0.232
44	5.0%	10.0%	0.09%	0.00%	25.0%	0.30%	59.4%	0.20%	0.262
45	5.0%	10.0%	0.08%	0.01%	25.0%	0.33%	59.3%	0.18%	0.246
46	5.0%	10.0%	0.06%	0.03%	25.0%	0.32%	59.3%	0.14%	0.266
47	5.0%	10.0%	0.06%	0.03%	25.0%	0.29%	59.3%	0.13%	0.075
48	5.0%	10.0%	0.08%	0.01%	25.0%	0.28%	59.4%	0.19%	0.257
49	5.0%	10.0%	0.07%	0.03%	25.0%	0.32%	59.3%	0.14%	0.065
50	5.0%	10.0%	0.07%	0.02%	25.0%	0.27%	59.4%	0.16%	0.184
51	5.0%	10.0%	0.06%	0.02%	25.0%	0.28%	59.4%	0.12%	0.254
52	5.0%	10.0%	0.06%	0.01%	25.0%	0.90%	58.5%	0.14%	0.139
53	5.0%	10.0%	0.06%	0.01%	25.0%	0.80%	58.7%	0.15%	0.133
54	5.0%	10.0%	0.02%	0.00%	25.0%	2.70%	56.4%	0.08%	0.093
55	5.0%	10.0%	0.08%	0.01%	25.0%	0.26%	59.4%	0.17%	0.146
56	5.0%	10.0%	0.07%	0.03%	25.0%	0.23%	59.4%	0.09%	0.216
57	5.0%	10.0%	0.08%	0.01%	25.0%	0.25%	59.4%	0.17%	0.154
58	5.0%	10.0%	0.14%	0.01%	25.0%	0.20%	59.4%	0.13%	0.209
59	5.0%	10.0%	0.08%	0.01%	25.0%	1.01%	58.5%	0.12%	0.089
60	5.0%	10.0%	0.05%	0.03%	25.0%	0.33%	59.3%	0.11%	0.238
61	5.0%	10.0%	0.09%	0.01%	25.0%	0.75%	58.8%	0.13%	0.054
62	5.0%	10.0%	0.07%	0.02%	25.0%	0.55%	59.1%	0.14%	0.194
63	5.0%	10.0%	0.07%	0.01%	25.0%	0.66%	58.9%	0.15%	0.102
64	5.0%	10.0%	0.04%	0.00%	25.0%	1.26%	58.3%	0.13%	0.122
65	5.0%	10.0%	0.06%	0.00%	25.0%	0.36%	58.7%	0.15%	0.145
66	5.0%	10.0%	0.08%	0.02%	25.0%	0.57%	59.0%	0.11%	0.011
67	5.0%	10.0%	0.08%	0.02%	25.0%	0.57%	59.0%	0.11%	0.004
68	5.0%	10.0%	0.06%	0.00%	25.0%	0.70%	58.9%	0.18%	0.138
69	5.0%	10.0%	0.07%	0.01%	25.0%	0.77%	58.9%	0.14%	0.251
70	5.0%	10.0%	0.07%	0.01%	25.0%	0.77%	58.9%	0.13%	0.249
71	5.0%	10.0%	0.07%	0.01%	25.0%	0.75%	58.9%	0.17%	0.243
72	5.0%	10.0%	0.06%	0.00%	25.0%	1.80%	57.9%	0.11%	0.137
73	5.0%	10.0%	0.06%	0.01%	25.0%	1.47%	58.2%	0.13%	0.268
74	5.0%	10.0%	0.06%	0.02%	25.0%	0.92%	58.7%	0.10%	0.224
75	5.0%	10.0%	0.07%	0.01%	25.0%	1.53%	58.2%	0.13%	0.082
76	5.0%	10.0%	0.07%	0.02%	25.0%	0.75%	58.9%	0.11%	0.187
77	5.0%	10.0%	0.07%	0.01%	25.0%	1.00%	58.7%	0.17%	0.151
78	5.0%	10.0%	0.06%	0.01%	25.0%	0.99%	58.7%	0.13%	0.264
79	5.0%	10.0%	0.07%	0.01%	25.0%	0.85%	58.8%	0.15%	0.271
80	5.0%	10.0%	0.07%	0.01%	25.0%	0.63%	59.0%	0.16%	0.218

Table 2-2 Low-Level Glass Composition and Volume

Total Volume 45.5 Vaults

Batch#	AL2O3	CAO	CR2O3	K2O	NA2O	P2O5	SiO2	UO3	VAULTS
81	5.0%	10.0%	0.06%	0.02%	25.0%	0.71%	59.0%	0.11%	0.239
82	5.0%	10.0%	0.04%	0.01%	25.0%	1.64%	58.1%	0.11%	0.127
83	5.0%	10.0%	0.07%	0.02%	25.0%	0.27%	59.4%	0.14%	0.264
84	5.0%	10.0%	0.05%	0.01%	25.0%	1.28%	58.4%	0.13%	0.047
85	5.0%	10.0%	0.08%	0.02%	25.0%	0.24%	59.4%	0.12%	0.22
86	5.0%	10.0%	0.03%	0.00%	23.5%	2.05%	59.2%	0.08%	0.027
87	5.0%	10.0%	0.11%	0.01%	25.0%	0.18%	59.5%	0.12%	0.164
88	5.0%	10.0%	0.09%	0.01%	25.0%	0.39%	59.3%	0.12%	0.02
89	5.0%	10.0%	0.08%	0.01%	25.0%	0.88%	58.8%	0.11%	0.272
90	5.0%	10.0%	0.11%	0.01%	25.0%	0.45%	59.2%	0.11%	0.208
91	5.0%	10.0%	0.08%	0.01%	25.0%	0.64%	59.0%	0.12%	0.066
92	5.0%	10.0%	0.10%	0.01%	25.0%	0.66%	59.0%	0.11%	0.198
93	5.0%	10.0%	0.09%	0.10%	25.0%	0.44%	59.1%	0.14%	0.179
94	5.0%	10.0%	0.09%	0.01%	25.0%	1.21%	58.4%	0.09%	0.259
95	5.0%	10.0%	0.10%	0.02%	25.0%	0.47%	59.2%	0.12%	0.27
96	5.0%	10.0%	0.04%	0.01%	25.0%	1.53%	58.0%	0.13%	0.221
97	5.0%	10.0%	0.04%	0.01%	25.0%	1.46%	58.1%	0.13%	0.073
98	5.0%	10.0%	0.09%	0.02%	25.0%	1.04%	58.6%	0.10%	0.184
99	5.0%	10.0%	0.05%	0.01%	25.0%	1.42%	58.2%	0.13%	0.025
100	5.0%	10.0%	0.07%	0.02%	25.0%	0.89%	58.6%	0.14%	0.267
101	5.0%	10.0%	0.07%	0.02%	25.0%	0.70%	58.8%	0.16%	0.25
102	5.0%	10.0%	0.10%	0.01%	25.0%	0.30%	59.3%	0.13%	0.025
103	5.0%	10.0%	0.09%	0.02%	25.0%	1.23%	58.4%	0.09%	0.23
104	5.0%	10.0%	0.10%	0.01%	25.0%	0.30%	59.3%	0.13%	0.01
105	5.0%	10.0%	0.06%	0.01%	25.0%	1.15%	58.4%	0.14%	0.033
106	5.0%	10.0%	0.06%	0.02%	25.0%	0.52%	59.0%	0.21%	0.142
107	5.0%	10.0%	0.19%	0.02%	25.0%	0.17%	59.4%	0.09%	0.266
108	5.0%	10.0%	0.06%	0.02%	25.0%	0.32%	59.3%	0.25%	0.255
109	5.0%	10.0%	0.39%	0.01%	25.0%	0.10%	59.3%	0.17%	0.226
110	5.0%	10.0%	0.49%	0.00%	19.7%	0.05%	64.6%	0.10%	0.178
111	5.0%	10.0%	0.55%	0.00%	22.5%	0.08%	61.7%	0.12%	0.252
112	5.0%	10.0%	0.47%	0.00%	16.0%	0.03%	68.4%	0.06%	0.111
113	5.0%	10.0%	0.26%	0.02%	25.0%	0.32%	59.0%	0.17%	0.177
114	5.0%	10.0%	0.04%	0.01%	25.0%	1.24%	58.3%	0.12%	0.244
115	5.0%	10.0%	0.47%	0.00%	15.5%	0.03%	68.9%	0.06%	0.03
116	5.0%	10.0%	0.20%	0.02%	25.0%	0.63%	58.8%	0.13%	0.085
117	5.0%	10.0%	0.44%	0.02%	25.0%	0.16%	59.1%	0.13%	0.035
118	5.0%	10.0%	0.25%	0.01%	25.0%	0.25%	59.2%	0.17%	0.178
119	5.0%	10.0%	0.27%	0.02%	25.0%	0.59%	58.8%	0.12%	0.018
120	5.0%	10.0%	0.09%	0.01%	25.0%	1.21%	58.4%	0.13%	0.253

Table 2-2 Low-Level Glass Composition and Volume

Total Volume 45.5 Vaults

Batch#	AL2O3	CAO	CR2O3	K2O	NA2O	P2O5	SI02	UO3	VAULTS
121	5.0%	10.0%	0.16%	0.02%	25.0%	0.39%	59.1%	0.15%	0.169
122	5.0%	10.0%	0.04%	0.01%	20.2%	0.36%	64.2%	0.13%	0.168
123	5.0%	10.0%	0.15%	0.03%	25.0%	0.18%	59.4%	0.09%	0.197
124	5.0%	10.0%	0.32%	0.03%	25.0%	0.26%	59.0%	0.14%	0.051
125	5.0%	10.0%	0.21%	0.03%	25.0%	0.17%	59.3%	0.09%	0.145
126	5.0%	10.0%	0.29%	0.01%	23.5%	0.21%	60.8%	0.14%	0.039
127	5.0%	10.0%	0.04%	0.01%	25.0%	0.32%	59.3%	0.19%	0.183
128	5.0%	10.0%	0.10%	0.03%	25.0%	0.21%	59.4%	0.10%	0.085
129	5.0%	10.0%	0.21%	0.03%	25.0%	0.20%	59.3%	0.12%	0.095
130	5.0%	10.0%	0.10%	0.02%	25.0%	0.24%	59.4%	0.16%	0.213
131	5.0%	10.0%	0.11%	0.02%	25.0%	0.23%	59.4%	0.12%	0.076
132	5.0%	10.0%	0.05%	0.01%	21.5%	0.23%	62.9%	0.15%	0.212
133	5.0%	10.0%	0.10%	0.02%	25.0%	0.25%	59.3%	0.15%	0.082
134	5.0%	10.0%	0.07%	0.01%	20.2%	0.23%	64.3%	0.13%	0.025
135	5.0%	10.0%	0.21%	0.02%	25.0%	0.24%	59.3%	0.08%	0.255
136	5.0%	10.0%	0.19%	0.03%	25.0%	0.17%	59.3%	0.09%	0.053
137	5.0%	10.0%	0.08%	0.02%	25.0%	0.36%	59.0%	0.14%	0.109
138	5.0%	10.0%	0.19%	0.03%	25.0%	0.17%	59.3%	0.09%	0.019
139	5.0%	10.0%	0.08%	0.02%	25.0%	0.33%	59.1%	0.15%	0.058
140	5.0%	10.0%	0.11%	0.02%	25.0%	0.31%	59.1%	0.13%	0.027
141	5.0%	10.0%	0.04%	0.01%	20.5%	0.24%	63.9%	0.13%	0.009
142	5.0%	10.0%	0.04%	0.01%	25.0%	0.40%	59.0%	0.19%	0.10
143	5.0%	10.0%	0.08%	0.01%	25.0%	0.62%	59.0%	0.13%	0.235
144	5.0%	10.0%	0.11%	0.02%	25.0%	0.31%	59.1%	0.13%	0.008
145	5.0%	10.0%	0.04%	0.01%	25.0%	0.40%	59.0%	0.16%	0.22
146	5.0%	10.0%	0.04%	0.01%	25.0%	0.42%	58.9%	0.17%	0.066
147	5.0%	10.0%	0.04%	0.01%	25.0%	0.40%	59.0%	0.14%	0.187
148	5.0%	10.0%	0.26%	0.01%	25.0%	1.48%	58.1%	0.06%	0.281
149	5.0%	10.0%	0.04%	0.01%	25.0%	0.40%	59.0%	0.15%	0.059
150	5.0%	10.0%	0.14%	0.01%	25.0%	0.86%	58.6%	0.12%	0.085
151	5.0%	10.0%	0.31%	0.01%	25.0%	0.66%	58.7%	0.12%	0.077
152	5.0%	10.0%	0.22%	0.01%	25.0%	1.27%	58.3%	0.09%	0.058
153	5.0%	10.0%	0.12%	0.01%	25.0%	0.42%	59.0%	0.16%	0.204
154	5.0%	10.0%	0.05%	0.01%	25.0%	3.01%	56.6%	0.09%	0.223
155	5.0%	10.0%	0.22%	0.01%	25.0%	1.28%	58.3%	0.09%	0.023
156	5.0%	10.0%	0.13%	0.01%	25.0%	2.20%	57.4%	0.08%	0.075
157	5.0%	10.0%	0.03%	0.03%	25.0%	2.21%	57.5%	0.03%	0.261
158	5.0%	10.0%	0.17%	0.01%	17.2%	0.24%	67.3%	0.03%	0.311
159	5.0%	10.0%	0.16%	0.01%	25.0%	1.69%	57.9%	0.07%	0.023
160	5.0%	10.0%	0.17%	0.01%	18.8%	0.43%	65.5%	0.04%	0.107

Table 2-2 Low-Level Glass Composition and Volume

Total Volume 45.5 Vaults

Batch#	AL2O3	CAO	CR2O3	K2O	NA2O	P2O5	SI02	UO3	VAULTS
161	5.0%	10.0%	0.41%	0.01%	25.0%	1.20%	58.2%	0.08%	0.176
162	5.0%	10.0%	0.34%	0.02%	25.0%	0.81%	58.7%	0.07%	0.083
163	5.0%	10.0%	0.10%	0.02%	25.0%	1.91%	57.7%	0.10%	0.27
164	5.0%	10.0%	0.10%	0.02%	25.0%	1.36%	58.2%	0.20%	0.119
165	5.0%	10.0%	0.08%	0.02%	25.0%	1.90%	57.7%	0.10%	0.14
166	5.0%	10.0%	0.24%	0.02%	25.0%	0.50%	59.0%	0.16%	0.141
167	5.0%	10.0%	0.00%	0.03%	25.0%	0.58%	59.1%	0.09%	0.042
168	5.0%	10.0%	0.24%	0.02%	25.0%	0.44%	59.0%	0.16%	0.1
169	5.0%	10.0%	0.07%	0.02%	25.0%	0.88%	58.7%	0.21%	0.257
170	5.0%	10.0%	0.24%	0.02%	25.0%	0.46%	59.0%	0.16%	0.032
171	5.0%	10.0%	0.13%	0.03%	25.0%	0.38%	59.2%	0.08%	0.164
172	5.0%	10.0%	0.06%	0.01%	25.0%	2.35%	57.4%	0.10%	0.172
173	5.0%	10.0%	0.05%	0.03%	25.0%	1.81%	57.9%	0.15%	0.273
174	5.0%	10.0%	0.06%	0.01%	25.0%	2.32%	57.4%	0.11%	0.036
175	5.0%	10.0%	0.06%	0.03%	25.0%	0.20%	59.5%	0.04%	0.258
176	5.0%	10.0%	0.06%	0.02%	25.0%	1.14%	58.5%	0.16%	0.163
177	5.0%	10.0%	0.13%	0.03%	25.0%	0.39%	59.2%	0.06%	0.124
178	5.0%	10.0%	0.08%	0.03%	25.0%	0.64%	59.1%	0.04%	0.255
179	5.0%	10.0%	0.06%	0.02%	25.0%	1.91%	57.8%	0.06%	0.152
180	5.0%	10.0%	0.06%	0.02%	25.0%	0.37%	59.2%	0.26%	0.249
181	5.0%	10.0%	0.10%	0.02%	25.0%	0.93%	58.8%	0.06%	0.138
182	5.0%	10.0%	0.03%	0.02%	25.0%	1.93%	57.8%	0.12%	0.248
183	5.0%	10.0%	0.03%	0.01%	25.0%	2.57%	57.2%	0.09%	0.184
184	5.0%	10.0%	0.05%	0.02%	25.0%	0.80%	58.8%	0.14%	0.215
185	5.0%	10.0%	0.04%	0.02%	25.0%	0.88%	58.7%	0.14%	0.254
186	5.0%	10.0%	0.03%	0.02%	25.0%	0.57%	59.1%	0.14%	0.23
187	5.0%	10.0%	0.08%	0.02%	25.0%	1.18%	58.5%	0.08%	0.226
188	5.0%	10.0%	0.13%	0.02%	23.6%	0.60%	60.5%	0.05%	0.069
189	5.0%	10.0%	0.04%	0.02%	25.0%	1.40%	58.2%	0.14%	0.235
190	5.0%	10.0%	0.10%	0.02%	25.0%	0.71%	58.9%	0.09%	0.097
191	5.0%	10.0%	0.08%	0.02%	25.0%	0.64%	59.0%	0.14%	0.036
192	5.0%	10.0%	0.10%	0.02%	25.0%	0.88%	58.8%	0.10%	0.083
193	5.0%	10.0%	0.11%	0.02%	25.0%	0.84%	58.8%	0.09%	0.063
194	5.0%	10.0%	0.04%	0.02%	25.0%	1.53%	58.2%	0.11%	0.145
195	5.0%	10.0%	0.03%	0.02%	25.0%	1.59%	58.1%	0.11%	0.106
196	5.0%	10.0%	0.05%	0.03%	25.0%	0.60%	59.1%	0.17%	0.134
197	5.0%	10.0%	0.10%	0.02%	25.0%	0.75%	58.9%	0.10%	0.019
198	5.0%	10.0%	0.11%	0.03%	25.0%	0.35%	59.3%	0.11%	0.201
199	5.0%	10.0%	0.13%	0.02%	25.0%	0.65%	59.0%	0.07%	0.181
200	5.0%	10.0%	0.05%	0.03%	25.0%	0.40%	59.2%	0.21%	0.244

Table 2-2 Low-Level Glass Composition and Volume

Total Volume 45.5 Vaults

Batch#	AL2O3	CaO	CR2O3	K2O	Na2O	P2O5	SiO2	UO3	VAULTS
201	5.0%	10.0%	0.13%	0.02%	19.4%	0.13%	65.2%	0.03%	0.089
202	5.0%	10.0%	0.03%	0.03%	25.0%	0.79%	58.9%	0.15%	0.261
203	5.0%	10.0%	0.05%	0.03%	25.0%	0.41%	59.2%	0.17%	0.242
204	5.0%	10.0%	0.06%	0.02%	25.0%	0.58%	59.1%	0.19%	0.154
205	5.0%	10.0%	0.13%	0.02%	22.4%	0.23%	62.0%	0.05%	0.033
206	5.0%	10.0%	0.27%	0.02%	25.0%	0.33%	59.1%	0.10%	0.24
207	5.0%	10.0%	0.02%	0.02%	25.0%	2.54%	57.3%	0.04%	0.22
208	5.0%	10.0%	0.03%	0.02%	25.0%	0.94%	58.8%	0.08%	0.246
209	5.0%	10.0%	0.06%	0.02%	25.0%	1.31%	57.4%	0.06%	0.088
210	5.0%	10.0%	0.01%	0.01%	25.0%	1.40%	58.5%	0.03%	0.285
211	5.0%	10.0%	0.11%	0.02%	25.0%	1.28%	58.4%	0.05%	0.208
212	5.0%	10.0%	0.05%	0.02%	25.0%	1.82%	57.9%	0.04%	0.207
213	5.0%	10.0%	0.01%	0.01%	25.0%	1.04%	58.8%	0.07%	0.264
214	5.0%	10.0%	0.03%	0.02%	25.0%	2.00%	57.8%	0.03%	0.052
215	5.0%	10.0%	0.06%	0.02%	25.0%	0.54%	59.1%	0.17%	0.266
216	5.0%	10.0%	0.03%	0.03%	25.0%	1.22%	58.5%	0.05%	0.218
217	5.0%	10.0%	0.06%	0.02%	25.0%	0.41%	59.2%	0.26%	0.264
218	5.0%	10.0%	0.05%	0.03%	25.0%	0.48%	59.2%	0.09%	0.177
219	5.0%	10.0%	0.04%	0.03%	25.0%	1.49%	58.3%	0.05%	0.059
220	5.0%	10.0%	0.03%	0.03%	25.0%	0.94%	58.7%	0.15%	0.158
221	5.0%	10.0%	0.03%	0.02%	25.0%	1.87%	57.9%	0.06%	0.035
222	5.0%	10.0%	0.06%	0.03%	25.0%	0.53%	59.1%	0.08%	0.068
223	5.0%	10.0%	0.04%	0.03%	25.0%	0.97%	58.7%	0.12%	0.02
224	5.0%	10.0%	0.03%	0.03%	25.0%	1.04%	58.6%	0.15%	0.055
225	5.0%	10.0%	0.05%	0.02%	25.0%	1.70%	58.1%	0.05%	0.011
226	5.0%	10.0%	0.02%	0.02%	25.0%	2.32%	57.4%	0.09%	0.175
227	5.0%	10.0%	0.04%	0.03%	25.0%	1.12%	58.6%	0.05%	0.118
228	5.0%	10.0%	0.05%	0.02%	25.0%	2.01%	57.7%	0.08%	0.071
229	5.0%	10.0%	0.03%	0.02%	25.0%	1.88%	57.8%	0.12%	0.258
230	5.0%	10.0%	0.02%	0.02%	25.0%	2.32%	57.5%	0.10%	0.266
231	5.0%	10.0%	0.03%	0.03%	25.0%	2.24%	57.5%	0.04%	0.268
232	5.0%	10.0%	0.02%	0.02%	25.0%	2.23%	57.5%	0.08%	0.105
233	5.0%	10.0%	0.04%	0.01%	25.0%	3.13%	56.7%	0.05%	0.242
234	5.0%	10.0%	0.08%	0.02%	25.0%	1.96%	57.8%	0.05%	0.214
235	5.0%	10.0%	0.13%	0.02%	25.0%	1.56%	58.1%	0.05%	0.063
236	5.0%	10.0%	0.06%	0.02%	25.0%	2.11%	57.6%	0.06%	0.195
237	5.0%	10.0%	0.08%	0.02%	25.0%	1.56%	58.1%	0.13%	0.242
238	5.0%	10.0%	0.16%	0.01%	16.0%	0.33%	68.4%	0.03%	0.247
239	5.0%	10.0%	0.06%	0.02%	25.0%	1.39%	58.3%	0.16%	0.053
240	5.0%	10.0%	0.16%	0.01%	16.4%	0.41%	67.9%	0.03%	0.091

Table 2-2 Low-Level Glass Composition and Volume

Total Volume 45.5 Vaults

Batch#	AL2O3	CAO	CR2O3	K2O	NA2O	P2O5	SiO2	UO3	VAULTS
241	5.0%	10.0%	0.06%	0.02%	25.0%	1.44%	58.3%	0.14%	0.025
242	5.0%	10.0%	0.16%	0.02%	20.8%	1.11%	62.8%	0.04%	0.01
243	5.0%	10.0%	0.06%	0.02%	25.0%	1.44%	58.2%	0.14%	0.009
244	5.0%	10.0%	0.11%	0.02%	25.0%	1.88%	57.8%	0.05%	0.005
245	5.0%	10.0%	0.15%	0.02%	22.6%	1.20%	60.9%	0.05%	0.021
246	5.0%	10.0%	0.06%	0.02%	25.0%	0.36%	59.2%	0.25%	0.255
247	5.0%	10.0%	0.14%	0.01%	18.0%	0.29%	66.5%	0.05%	0.2
248	5.0%	10.0%	0.06%	0.01%	25.0%	2.71%	57.1%	0.06%	0.228
249	5.0%	10.0%	0.15%	0.01%	19.9%	0.13%	64.6%	0.07%	0.166
250	5.0%	10.0%	0.16%	0.02%	19.3%	0.13%	65.2%	0.05%	0.229
251	5.0%	10.0%	0.07%	0.03%	25.0%	0.62%	59.1%	0.05%	0.215
252	5.0%	10.0%	0.16%	0.01%	16.9%	0.19%	67.6%	0.04%	0.05
253	5.0%	10.0%	0.15%	0.01%	15.7%	0.15%	68.9%	0.04%	0.023
254	5.0%	10.0%	0.17%	0.01%	22.0%	1.12%	61.5%	0.06%	0.192
255	5.0%	10.0%	0.09%	0.02%	25.0%	1.77%	57.9%	0.10%	0.064
256	5.0%	10.0%	0.14%	0.01%	16.4%	0.07%	68.3%	0.04%	0.004
257	5.0%	10.0%	0.16%	0.01%	15.1%	0.23%	69.4%	0.03%	0.004
258	5.0%	10.0%	0.16%	0.02%	19.7%	0.14%	64.8%	0.06%	0.003
259	5.0%	10.0%	0.06%	0.03%	25.0%	0.28%	59.4%	0.04%	0.206
260	5.0%	10.0%	0.01%	0.01%	25.0%	3.72%	56.0%	0.11%	0.207
261	5.0%	10.0%	0.05%	0.04%	25.0%	0.19%	59.5%	0.04%	0.254
262	5.0%	10.0%	0.04%	0.03%	25.0%	1.34%	58.3%	0.06%	0.086
263	5.0%	10.0%	0.07%	0.03%	25.0%	0.17%	59.5%	0.06%	0.257
264	5.0%	10.0%	0.05%	0.03%	25.0%	0.87%	58.8%	0.06%	0.044
265	5.0%	10.0%	0.05%	0.03%	25.0%	0.87%	58.8%	0.06%	0.017
266	5.0%	10.0%	0.05%	0.03%	25.0%	0.90%	58.8%	0.06%	0.006
267	5.0%	10.0%	0.05%	0.04%	25.0%	0.18%	59.5%	0.06%	0.137
268	5.0%	10.0%	0.05%	0.03%	25.0%	0.18%	59.5%	0.06%	0.11

Figure 2-6. HLW GLASS OUTPUT

Figure 2-7. HLW GLASS OUTPUT

Figure 2-8. HLW GLASS OUTPUT

Table 2-3 High-Level Glass Composition and Volume

Total Volume 8451 Canisters 10649 Cubic Meters

Batch#	Al2O3	Cr2O3	Fe2O3	Na2O	P2O5	UO3	ZrO2	B2O3	Li2O	SiO2	Al+Zr	Al+Fe+Zr	Canisters
1	1.3%	0.5%	4.0%	10.7%	0.3%	0.8%	5.2%	14.9%	2.0%	56.0%	6.5%	10.5%	784.8
2	9.3%	0.0%	4.5%	12.5%	2.0%	5.7%	0.4%	7.0%	2.0%	49.4%	9.7%	14.3%	346.4
3	6.2%	0.0%	8.4%	12.5%	0.4%	9.4%	2.4%	7.0%	2.0%	47.9%	8.6%	17.0%	316.9
4	2.7%	0.0%	4.0%	10.0%	0.8%	3.4%	10.0%	7.2%	2.0%	56.0%	12.7%	16.7%	394.8
5	6.7%	0.0%	4.0%	12.5%	1.1%	6.7%	6.8%	7.0%	2.0%	48.2%	13.5%	17.5%	241.7
6	9.1%	0.1%	4.0%	12.5%	0.9%	10.1%	0.1%	7.0%	2.0%	50.9%	9.2%	13.2%	211.9
7	7.4%	0.0%	4.0%	12.5%	1.9%	9.8%	1.4%	7.0%	2.0%	49.9%	8.7%	12.7%	228.2
8	10.1%	0.1%	4.0%	12.5%	2.6%	6.3%	2.3%	7.0%	2.0%	49.6%	12.3%	16.3%	186.9
9	11.0%	0.2%	4.0%	9.0%	0.2%	1.3%	0.1%	14.3%	2.0%	56.0%	11.1%	15.1%	175.2
10	9.6%	0.2%	4.0%	12.5%	1.3%	3.9%	2.3%	7.0%	2.0%	53.1%	11.9%	15.9%	223.8
11	6.6%	0.5%	5.5%	7.0%	0.0%	1.0%	0.0%	17.0%	6.0%	56.0%	6.6%	12.1%	473.0
12	8.9%	0.5%	4.2%	9.6%	0.8%	3.2%	0.1%	9.9%	2.0%	56.0%	9.0%	13.2%	265.0
13	11.0%	0.3%	4.4%	11.8%	0.4%	4.9%	0.6%	7.0%	2.0%	53.7%	11.6%	16.0%	202.9
14	11.0%	0.1%	4.1%	7.8%	0.2%	5.3%	2.8%	8.0%	2.0%	56.0%	13.8%	17.9%	179.4
15	11.0%	0.2%	4.0%	9.0%	0.1%	3.8%	1.9%	8.8%	2.0%	56.0%	12.9%	16.9%	170.1
16	10.6%	0.2%	4.8%	9.2%	0.4%	5.0%	3.4%	7.0%	2.0%	53.7%	14.0%	18.8%	193.7
17	7.6%	0.0%	4.0%	7.0%	0.2%	3.9%	6.4%	10.3%	2.0%	56.0%	14.0%	18.0%	256.9
18	9.6%	0.4%	9.7%	11.4%	1.9%	3.2%	1.7%	7.0%	2.0%	46.0%	11.3%	21.0%	186.1
19	11.0%	0.5%	4.0%	7.0%	0.6%	0.8%	0.1%	16.1%	2.0%	56.0%	11.1%	15.1%	190.6
20	7.8%	0.5%	4.0%	10.1%	2.1%	6.6%	0.3%	7.9%	2.0%	56.0%	8.1%	12.1%	250.4
21	4.4%	0.1%	4.0%	9.3%	3.0%	3.6%	0.2%	14.2%	2.0%	56.0%	4.6%	8.6%	354.6
22	11.0%	0.3%	4.4%	12.5%	2.3%	2.6%	1.4%	7.0%	2.0%	52.6%	12.4%	16.8%	175.0
23	6.9%	0.1%	4.4%	12.5%	2.2%	8.1%	0.3%	7.0%	2.0%	49.6%	7.1%	11.5%	270.0
24	11.0%	0.3%	4.0%	8.3%	0.8%	2.0%	0.1%	12.8%	2.0%	56.0%	11.1%	15.1%	191.6
25	4.8%	0.0%	11.8%	12.5%	2.2%	6.5%	0.3%	7.0%	2.0%	49.4%	5.1%	16.9%	276.0
26	5.9%	0.2%	7.6%	12.5%	2.5%	6.7%	0.1%	7.0%	2.0%	51.8%	6.0%	13.6%	266.4
27	4.6%	0.0%	10.4%	12.5%	2.0%	8.3%	0.2%	7.0%	2.0%	49.2%	4.8%	15.2%	283.9
28	8.8%	0.1%	4.0%	10.7%	3.0%	10.4%	0.4%	7.0%	2.0%	49.9%	9.2%	13.2%	210.4
29	8.1%	0.1%	4.0%	10.0%	3.0%	1.2%	0.4%	11.2%	2.0%	56.0%	8.6%	12.6%	256.4
30	7.8%	0.1%	4.0%	7.0%	2.2%	1.1%	6.2%	11.7%	2.0%	56.0%	14.0%	18.0%	254.2
31	9.0%	0.3%	4.0%	7.0%	0.2%	2.7%	5.0%	12.6%	2.0%	56.0%	14.0%	18.0%	237.8
32	9.2%	0.1%	4.0%	12.5%	1.5%	7.8%	1.6%	7.0%	2.0%	52.0%	10.7%	14.7%	196.4

2.3 DISCUSSION OF RESULTS

In reviewing batch data from APPENDIX C and D, it is clear that the processing scenario defined in Figure 2-1 is quite effective at blending liquid waste. After the soluble DST waste has been processed (the first 22 LLW batches), the typical batch of LLW or HLW contains contributions from several tanks. This blending is incidental to the operation, not intentional. This fanning out of waste to several batches would be virtually impossible to keep straight by hand. It shows clearly that a model is justified for tracking the progress of waste through the tank farms.

The Si and Na spikes in Figure 2-4 are actually a quirk of the glass formulation algorithm used in this run of the TWRS Process Flowsheet model. The algorithm does not allow the addition of Na (only Si, Ca and Al can be added), and in some batches a larger amount of Si is required to dilute the Al to 5 wt%. As a consequence, Na is also diluted beyond 25 wt% maximum. If the algorithm was modified to allow sodium additions to hold the sodium concentration at a fixed 25 wt%, then the Si spikes and Na spikes would disappear with no increase in glass volume.

The LLW algorithm placed no limits on phosphorus or chromium, but inspection of Figure 2-5a shows only three batches of LLW glass exceeded 3 wt% P_2O_5 . Only one batch exceeded 0.5 wt% Cr_2O_3 in Figure 2-5b. The variability in LLW composition is clearly dampened by the incidental blending that occurs during retrieval and in-tank processing. With the exception of early DST feeds, a LLW batch typically contains contributions from eight or more tanks. The remaining variability is easily handled by the addition of glass formers and modifiers in the proper proportions.

It is also clear from these results that, by itself, incidental blending during the in-tank sludge process is not effective in approaching uniformity in the solids; there is still considerable variability from batch to batch of HLW glass. Greater uniformity (and fewer HLW glass formulations) would appear to require an intentional blending step or a tailored retrieval sequence.

The total HLW canister count of 8451 is 22% higher than the 6,926 canisters projected in the TWRS Process Flowsheet (Orme 1994).⁶ The TWRS Process Flowsheet was based on perfectly blended feed, so the increase was expected. The canister count for a tank-by-tank (totally non-blended) case is 13,345, or 93% higher than the 6,926 canister projection. These results indicate that blending incidental to in-tank sludge processing is quite effective at reducing HLW volume.

While incidental blending is fairly effective at reducing canister count, it does not result in a uniform glass. Several qualified glass

⁶Rev.0 of the TWRS Process Flowsheet sets the canister production at 6800. The canister count of 6,926 is based on the latest tank inventory numbers using the TWRS Process Flowsheet ASPEN PLUS model.

formulations seem to be indicated. Addition of intentional blending to the model would reduce the canister count even further, and possibly minimize the number of glass formulations. The addition of intentional blending scenarios to this model, scheduled for later in this year, should improve HLW glass uniformity and volume.

The time data in APPENDIX C indicates that the first batch of LLW liquids begins feeding the pretreatment plant 753 days after January 1, 2003 or during January, 2005. The final batch of LLW liquids begins feeding the pretreatment plant 7034 days after January 1, 2003. This would place the final batch at the beginning of the 2nd quarter of 2022.

The time data in APPENDIX D indicates that the first batch of HLW solids begins feeding the vitrification plant 2901 days after January 1, 2003 or in the December, 2010. The final batch of HLW solids begins feeding the HLW vitrification plant at 7039 days, or the 2nd quarter of 2022.

3.0 MODEL BASES

Based on the Tri-Party Agreement, retrieval of SSTs begins in December, 2003 and Pretreatment begins in December, 2004. A retrieval schedule that meets TPA commitments is shown in APPENDIX A. This schedule indicates desired order and timing for the start of retrieval, but SIMAN determines the actual start date subject to tank availability. The schedule in APPENDIX A did not address the emptying of DSTs during the initial years; the order for retrieving DSTs is a separate input to the model.

The availability of SST retrieval equipment is inherent in the assumed retrieval schedule, i.e., retrieval equipment is in place and operational when needed. (The SIMAN/ARENA model is programmed to track how many retrieval systems are in use at the same time, although this measure is not addressed in this report).

Shelton (Shelton 1994) establishes DST inventories as of February, 1994. The inventories are tabulated in APPENDIX B. Tank farm operations between February, 1994 and the beginning of retrieval will affect the inventory and its location. These operations include the consolidation of dilute wastes through evaporation and receipt of salt well liquor from Single Shell Tank stabilization.

The periodic Operational Waste Volume Projection (Koreski and Strode 1994) provides a four year projection of individual tank usage, and a long term projection of total tank requirements. Without construction of new tanks, nearly all existing double shell tanks will be full or committed to operational support by the startup of retrieval. A realistic view of in-tank processing requires that at least some DSTs be emptied before significant SST retrieval can occur.

3.1 NEAR TERM DST OPERATIONS

It is assumed that tank farm operations subsequent to February, 1994 will do little or nothing to change Shelton's inventory of the following tanks: AN-102, AN-103, AN-104, AN-105, AN-107, AP-102, AP-105, AW-101, SY-101, SY-103. Shelton's inventories were used as is.

Many of the DSTs contain dilute waste. A variety of miscellaneous dilute facility wastes will continue to accumulate in the DSTs for several years to come. These wastes are evaporated to conserve tank space as needed. The series of evaporator campaigns planned for the 242-A Evaporator are described below. The contribution of future facility wastes to the chemical inventory of the tanks was ignored while determining the future inventory of DSTs. That contribution is small compared to the salt well liquor that will be added to the DSTs.

The 242A Evaporator operates under tighter constraints than in the past. The concentration achieved in the evaporator bottoms will vary from campaign

to campaign. The concentration will not be known until campaign run plans are prepared and approved.

Evaporator Campaign 1. AP-103, AW-102 and AW-106 wastes totalling $10.9\text{E}+6$ L (2.87 Mgal) were reduced to $1.8\text{E}+6$ L (0.477 Mgal) of dilute double shell slurry feed (DDSSF) during the first evaporator campaign. AP-103 continues to function as a dilute waste receiver, although plans for its use are changing daily. AW-102 and AW-106 are continuing to support evaporator operations as the evaporator feed tank and slurry receiver tank, respectively. Freshly produced DDSSF was accumulated in AN-106 (Guthrie 1994).

Evaporator Campaign 2. AP-101, AP-107 and AP-108 were emptied during the second evaporator campaign (Post Run Report not yet available). AP-101 will receive dilute waste from AY-101 in the near term and eventually become a dilute complexed waste receiver, although plans for its use are changing daily. AP-107 continues to function as a dilute waste receiver and eventually becomes a salt well liquor tank. AP-108 continues to function as a dilute waste receiver. Freshly produced DDSSF was accumulated in AN-106.

Evaporator Campaign 3. The third campaign is scheduled to begin in June 1995. The feeds are tentatively identified as dilute wastes from AP-106 and AP-107 (Per E. Q. Lu).

Evaporator Campaigns 4 and 5. Campaigns 4 and 5 will target waste originating in AW-105, SY-102, AY-102, and AP-101.

Beyond the fifth campaign, 242A Evaporator will be operated periodically to work off accumulated facility waste and salt well liquors. The 242A Evaporator is shut down in 2005. Facility wastes will be evaporated at the new LLW pretreatment facility after that date. There is work underway to extend the life of 242A Evaporator. If it is not extended, AW-102 and AW-106 would presumably be available for use as sludge washing tanks.

Salt well pumping will continue through 2000. The volume of the salt well liquor remaining to be transferred after February 1994 from SSTs to DSTs is $13.6\text{E}+6$ L (3.6 Mgal) of a nominal 5 M Na solution. As much as $23.5\text{E}+6$ L (6.2 Mgal) of salt well liquor could be pumped per a study that is in progress (Brown and Mattichak 1995). The reason that the above sodium concentration is fairly low is because much of the remaining liquor is from sludge tanks where the liquids are not saturated with salt. For the purposes of this model, complexed salt-well liquor is not segregated; the salt well liquor is placed in AN-101, AP-101, AP-103, AP-106, and AP-107. No evaporation of the SWL was assumed.

In summary, evaporator operations will consolidate the soluble components from several tanks (AP-103, AW-102, AW-106, AP-101, AP-107, AP-108, and AP-106) into AN-106, and from other tanks (AW-105, SY-102, AW-103, AW-104) into AP-106. Saltwell liquor will be added to several tanks. At this point in time, establishing the volume of early feed from a number of tanks requires engineering judgement.

In addition to evaporator operations and salt well pumping, an in-tank pretreatment process test is scheduled for the near future. This demonstration entails a number of inter-tank transfers of liquids and solids. Various scenarios are being considered, but the "official" test plan tentatively identifies the following actions:

The liquids in AY-101 will be decanted (via AP-101) to AY-102 to use for sluicing the solids out of C-106.

The liquids in AZ-101 will be decanted to AY-101.

The liquids in AY-102 will be decanted to AZ-101 to use in the mixer pump test (Project W-151); then liquids and solids will be transferred to AZ-102.

The liquids in AZ-102 will be decanted to AY-101 prior to receiving the liquids and solids from AZ-101.

It would be desirable to transfer the combined C-106/AY-102 solids from AY-102 to AZ-102, but this transfer is subject to space availability early in 1999. (Current waste volume projections show that all DSTs will either contain concentrated waste or be designated as operational tanks by 1999). For the purposes of this retrieval sequence flowsheet, the solids are left in AY-102.

3.2 DST STATUS PRIOR TO COMMENCEMENT OF RETRIEVAL IN 2003

All of the above considered, the future inventory of the DSTs will be considerably different from the February, 1994 inventory. The inventory of chemicals and radionuclides in DSTs is projected from the above near term tank farm activities to reflect the DST contents in 2003.

Prior to commencement of tank retrieval operations, there will be three West Area DSTs. One will be available for receiving retrieved waste. In the East Area, the four aging waste tanks will be storing NCAW liquids, partially washed NCAW solids, and partially washed C-106 solids. Of the remaining 21 DSTs, about 15 are full of concentrated waste, two are storing zirconium sludge, one is a dilute waste receiver, two are supporting evaporator operations, and two are spares.

Table 3-1
DSTs Not Committed to Storage of Concentrated Wastes and Sludges

AP-104/AW-104	Spare
AP-108	Dilute Waste Receiver
AW-102/AW-106	Evaporator Tanks
SY-102	West Area Receiver

Concentrated liquids begin to be worked off through pretreatment and LLW vitrification in 2005. It is obvious that there will be very little flexibility in tank farm operations until pretreatment has emptied some of the tanks. It is also clear that progress in retrieving SSTs will be short-lived if pretreatment and vitrification do not start up on schedule.

AN Tank Farm

Tank AN-101 serves as the East Area non-complexed saltwell liquor receiver. This function will end after saltwell pumping is completed around the year 2000, and AN-101 will continue to store salt well liquor. The balance of the tanks in the AN Tank Farm will continue storing concentrated waste for the foreseeable future.

Table 3-2
Status of AN Tanks Committed to Concentrated Waste Storage

AN-101	Future saltwell liquor
AN-102	Full of CC
AN-103	Full of DSS
AN-104	Full of DSSF
AN-105	Full of DSSF
AN-106	Full of DSSF by 1996
AN-107	Full of CC

AP Tank Farm

Tank AP-101 is a dilute complexed waste receiver for the East Area; AP-103 and AP-108 serve as dilute waste receivers. AP-101, AP-103, AP-106 and AP-107 will be used for future saltwell liquor.

Table 3-3
Status of AP Tanks Committed to Concentrated Waste Storage

AP-101	Future complexed saltwell liquor
AP-102	Full of Concentrated Phosphate
AP-103	Future saltwell liquor
AP-104	Non-aging waste spare
AP-105	Full of DSSF by mid-1997
AP-106	Full of DSSF and saltwell liquor by mid-1997
AP-107	Full of saltwell liquor by mid-1997

AW Farm

Only one tank in the AW Tank Farm is currently committed to concentrated liquid waste storage. AW-101 is full of DSSF. Tank AW-102 serves as the 242A Evaporator Feed Tank. That function should end by 1/2005 when the new evaporator of the LLW pretreatment facility begins operation. AW-103 serves as a miscellaneous waste receiver, although the volume is restricted by the 363 kgal of NCRW sludge in the tank. AW-104 is a PUREX waste receiver, as is AW-105. Both of these tanks are likewise limited as waste receivers by their sludge heels, 179 and 297 kgal respectively. AW-106 is designated as a slurry receiver to support the 242A evaporator.

The sludges in AW-101, AW-102, AW-104 and AW-106 not characterized, but are believed to be primarily soluble salts. AW-103 and AW-105 are zirconium sludges known to contain a high concentration of sodium fluoride.

AY Tank Farm

The AY Tank Farm is committed to holding the consolidated in-tank demonstration liquids from AZ-101/102 in AY-101, and the solids from the C-106 retrieval demonstration in AY-102.

AZ Tank Farm

AZ-101 should be empty after the sludge washing demonstration is complete. AZ-102 will be holding washed NCAW solids.

SY Tank Farm

SY-102 should be available for receiving retrieved West Area waste after the salt well liquor pumping is complete in FY-1999. SY-101 and SY-103 are committed to storage of CC, DSS and complexed salt well liquor.

3.3 PROPOSED TANK FARM USAGE

Solids will be retrieved (or transferred from West Area) into the AN and AW Farms for settling, caustic leaching, washing and blending. For this model, two tanks are designated as waste receivers, six as primary sludge wash tanks, four as 2nd stage settling tanks, seven as decanted liquid tanks, and four as washed sludge tanks. In summary, the system modelled in this study uses 23 of the 25 East Area tanks.

There is currently no analysis to assign tank functions to specific tanks. The following table suggests an allocation of future functions for the 25 East Area DSTs. Most of tanks require some form of pretreatment action to prepare them for in-tank processing; the table also identifies the required pretreatment action to free up each tank for the designated service.

Table 3-4
Allocation of In-Tank Processing Functions

Tank	Future Function	Required Action
AN-101	2nd stage	Pretreat SWL
AN-102	1st stage	Pretreat Complexed Concentrate
AN-103	2nd stage	Pretreat DSS
AN-104	1st stage	Pretreat DSSF
AN-105	1st stage	Pretreat DSSF
AN-106	1st stage	Pretreat DSSF
AN-107	Unassigned	Pretreat Complexed Concentrate
AW-101	1st stage	Pretreat DSSF
AW-102	1st stage	Evaporation at LLW pretreatment
AW-103	SST receiver	Work off NCRW
AW-104	SST receiver	No action
AW-105	2nd stage	Work off NCRW
AW-106	2nd stage	Evaporation at LLW pretreatment
AY-101	Washed solids storage	Pretreat solids/NCAW liquids
AY-102	Washed solids storage	Pretreat C-106 solids
AZ-101	Washed solids storage	In-tank demonstration
AZ-102	Washed solids storage	Work off NCAW solids
AP-101	Store decanted liquids	Pretreat SWL
AP-102	Store decanted liquids	Pretreat concentrated phosphate
AP-103	Store decanted liquids	Pretreat SWL
AP-104	Spare	No action
AP-105	Store decanted liquids	Pretreat DSSF
AP-106	Store decanted liquids	Pretreat SWL
AP-107	Store decanted liquids	Pretreat SWL
AP-108	Store decanted liquids	No action

Since the AN Farm is currently committed to concentrated waste storage, the liquids in several tanks will have to be processed through LLW pretreatment before the AN Farm can be converted to sludge washing. AN-101 functions as a salt well liquor receiver, which function is discontinued after 2000. It is assumed that AN-101 will be full of SWL after the year 2000. AN-103, AN-104, AN-105 and AN-106 contain concentrated liquid waste and 281 kgal of sludge which is believed to be primarily precipitated salt. The AN Farm also contains approximately half of the concentrated complexed waste (AN-102 and AN-107). As this waste is worked off through pretreatment, the tanks are converted to 1st and 2nd stage tanks. AN-107 was not assigned a function; because of the internal components it isn't suitable for in-tank washing.

The availability of AW-102 and AW-106 for in-tank processing will depend on future decisions pertaining to the operation of 242A Evaporator, although it is assumed for planning purposes that the evaporator will be shut down. AW-101, AW-102, AW-104 and AW-106 contain 1.8×10^6 L (475 kgal) (Hanlon 1994) of heels which is expected to be precipitated salts. It is assumed that these salts are soluble and will be consolidated into other tanks through waste volume reduction actions. Any solids will be washed in place during preparations for in-tank processing. The insoluble material will remain and become part of the initial batch processed through these tanks. AW-103 and AW-105 contain 660 kgal of a zirconium oxide sludge (NCRW) that will be blended off gradually into the solids that are processed through the AW Farm. Two AW tanks are SST receivers; the other four 1st and 2nd stage tanks.

The AP Farm serves a dual role as dilute facility waste receiver and storage for decanted liquids awaiting LLW pretreatment. Seven tanks are earmarked as holding tanks for decanted liquids. AP-104 remains as a spare.

AZ-101 solids will be removed by the in-tank mobilization demonstration. The AZ tanks and AY tanks eventually become storage for washed solids after their current contents are washed.

Tanks that are set aside for storing treated solids are equipped with at least two mixer pumps for solids immobilization and a slurry transfer pump. In addition, tanks that are set up for in-tank sludge washing require a decanting pump and the instrumentation to control the settling and decanting operation.

3.4 EARLY LLW PRETREATMENT FEEDS FROM DSTs

The earliest pretreatment feeds are drawn from the AN farm, the AW farm, the SY farm and the aging waste farms. Early feeds were derived by diluting highly concentrated DST waste down to 7 M Na, or, in the case of SWL, leaving the waste at a nominal 5 M Na. A rough idea of the order that the model is following can be observed in APPENDIX C. The first five batches come exclusively from AN farm. After the fifth batch, SY, AW and aging waste begin to show up in the batches. The AP farm must also be cleared out to receive decanted liquids from the 2nd stage tanks, but the primary schedule driver is for the AN farm to be available for receiving SST salt solutions retrieved

from the 200 West Area. The first salt solutions are expected to contain few solids, but nevertheless will be retrieved into the AN Farm, checked for solids content, and decanted to the AP Farm. Essentially all of the DST inventory has been moved to LLW pretreatment by the 22nd batch.

3.5 SIMAN MODELLING VARIABLES

Section 3.5.1 and 3.5.2 tabulate the major variables used to simulate retrieval and in-tank pretreatment in the SIMAN/ARENA system model. The variables and assumptions of the system model are discussed in considerable detail in *Baseline Simulation Model for Hanford Tank Waste Remediation System* (Wittman 1995). Variable values for the current study that depart from Wittman will be mentioned.

3.5.1 SST Retrieval and Transfer Parameters

Tables 3-5 and 3-6 list the major variables used by the "retrieve.mod" and "x_site.mod" submodels, respectively, to simulate the waste retrieval and transfer functions.

Table 3-5 Submodel retrieve.mod.

Variable	Description	Default Values (Ref)
fISOL	Maximum solids fraction in retrieved waste.	.10 wt. frac. ¹
I-Aq/I	% insoluble solids dissolved during caustic washes.	31% ¹
MolNaAR	Molarity of sodium solids in retrieved wastes.	5 M Na. ¹
rrate	Tank retrieval rate.	7.2 (m ³ /day) ¹
WRFind	Number of waste receiver facilities.	4 ²
RWStorage	Number of waste receiver DSTs in East Area.	AW-103 and AW-104 ³
Storewest	Number of waste receiver DSTs	SY-101, 102, 103 ³
retrschd.txt	SST Retrieval Schedule	WHC-SD-WM-ER-193
rSDfill	Settle/Decant Tank fill rate.	100.000 (kgal/day) (378.5 m ³ /day)

¹ WHC-SD-WM-TI-613 THRS PROCESS FLOWSHEET

² Assumption for this simulation

³ Engineering discussions

Table 3-6. Submodel x_site.mod.

Variable	Descriptions	Default Value (Ref)
r200gpm	Rate of Cross-Site Transfer Pump	200 gpm (288 kgal/day or 1100 m ³ /day)

¹ Historic transfer data

3.5.2 In-Tank Process Parameters

Submodel sd_1st.mod simulates the first stage of the in-tank solid-liquid separation. Table 3-7 lists the variables defined for submodel "sd_1st.mod."

Table 3-7. Submodel sd_1st.mod.

Variable	Description	Default Values (Ref)
fentsol0	Entrained insoluble solids in the clarified liquid region.	Turned off for this run.
f _{set}	Insoluble solids in the settled particulate region.	.2 wt. frac. ¹
fworking	Maximum working volume fraction of a tank.	.95 ²
rSDfill	Rate that a settle decant tank fills.	100. kgal/day ³ (3.785 m ³ /day)
Scutoff	Solids Cut-off fraction to bypass Sludge washing.	Turned off for this run.
Sd1st	Tank assigned for 1st stage S/D decant.	AN-102, 104, 105, 106, and AW-101, 102 respectively. ⁴
spheight	Waste height (level) specification before for sludge removal. (Process begins)	9.9 ft. ¹
Stime	Time for settling solids.	30 days ¹

1 WHC-SD-WM-TI-613 TWRS PROCESS FLOW SHEET

2 Engineering judgement for maximum operating capacity

3 Historic transfer rate data

4 Engineering Discussions

Submodel sd_2nd.mod simulates the second stage of the in-tank solid-liquid separation. The decanted liquid from the first stage settle/decant process may still contain significant amounts of solids. Therefore, a second solids settling operation is performed on the decanted liquid. The fraction of entrained soluble solids is set to zero for this simulation for the sake of simplicity. Table 3-8 lists the variables defined for submodel "sd_2nd.mod."

Table 3-8 Submodel sd 2nd.mod.

Variables	Descriptions	Default Values (Ref)
fentsol	Entrained insoluble solids in clarified region.	Turned off for this run
f _{set}	Settled solids in settled particulate region.	.2 wt. frac. ¹
fworking	Fraction of working capacity for a tank.	.95 ²
rSDfill	Rate settle decant tanks are filled	100. kgal/day (378.5 m ³ /day) ³
SD2ndR	Tanks assigned for 2nd stage S/D decant.	AW-105, 106, AN-101, AN-103 ⁴
SPheight	Height specification for sludge removal.	9.9 ft. ¹
STime	Time for settling.	30 days. ¹

1 WHC-SD-WM-TI-613 TWRS PROCESS FLOW SHEET

2 Engineering judgement for maximum operating capacity

3 Historic transfer rate data

4 Engineering Discussions

Submodel "sd 2 dec.mod" simulates the transfer of decanted liquid from the second stage settle/decant DSTs to existing DSTs designated for storing partially pretreated LLW for feed to the out-of-tank pretreatment system. Table 3-9 lists the variables defined for submodel "sd_2_dec.mod."

Table 3-9 Submodel sd 2 dec.mod.

Variable	Description	Default Values (Ref)
fentsol	Entrained insoluble solids	Turned off for this run
f _{set}	Insoluble solids in the solid particulate layer	.2 wt. frac. ¹
fworking	Fraction of Working capacity for tank.	.95 ²
rSDfill	Change in transfer rate	100. kgal/day (378.5 m ³ /day) ³
SPheight	Settled Sludge layers in tank.	9.9 ft. ¹

1 WHC-SD-WM-TI-613 TWRS PROCESS FLOW SHEET

2 Engineering judgement for maximum operating capacity

3 Historic transfer rate data

4 Engineering Discussions

WHC-SD-WM-TI-693 Rev. 0

Submodel "sd_wash1.mod" simulates the metathesis wash of the accumulated solids settled in the first and second stage settle/decant DSTs. Table 3-10 lists the variables defined for submodel "sd_wash1.mod."

Table 3-10 Submodel sd_wash1.mod.

Variable	Description	Default Values (Ref)
downtime_tank	Change out time for Mixer pump.	180. days ¹
fentsolO	Entrained insoluble solids for in the clarified region. Value is determined dependent upon the settle decant stage.	Turned off for this run
f _{set}	Solids settled particulate region.	.2 wt. frac. ²
fworking	Fraction of working capacity for tank.	.95 ³
molNaAr	Composition of Caustic wash.	5 M caustic wash. ²
rSDfill	Transfer rate.	100 kgal/day (378.5 m ³ /day) ⁴
Stime	Settling time for solids to settle out after wash.	30 days. ²
uptime tank	Operational life of mixer pump.	5000 hr (Estimate) ¹
Wtime	Time for washing in days.	30.0 day Wash time (Caustic). ² 7.0 day Wash time (Water) ²

¹ W/B-SD-W236B-RPT-018 Initial Pretreatment Module Trade Studies

² WHC-SD-WM-TI-613 TWRS Process Flowsheet

³ Engineering judgement for maximum operating capacity

⁴ Historic transfer rate data

Submodel "sd_wash2.mod" simulates the water washes performed on the solids after completion of the metathesis wash. The washes are performed to remove interstitial sodium from the solids. Table 3-11 lists the variables defined for submodel "sd_wash2.mod."

Table 3-11 Submodel sd_wash2.mod.

Variable	Description	Default Values (Ref)
Decant	Settle decant tanks used for transfer waste to pretreatment.	AN-102,-104,-105,-106, AW-101, AW-102
Nwash	Number of water washes to perform.	3 ¹
rSDfill	Settle/Decant tank fill rate.	100. kgal/day (378.5 m ³ /day) ²
Stime	Time for solids to settle.	30.days ¹
Wtime	Time for solids to be washed.	7.0 days ¹

¹ WHC-SD-WM-TI-613 TWRS PROCESS FLOWSHEET

² Historic Transfer Rate data

3.6 LLW VITRIFICATION PARAMETERS

Low-level glass is formulated subject to the following constraints used in the TWRS Process Flowsheet (Orme 1994):

$$\text{Al}_2\text{O}_3 = 5 \text{ wt\%}$$

$$\text{CaO} = 10 \text{ wt\%}$$

$$\text{SiO}_2 \geq 50 \text{ wt\%}$$

$$\text{Na}_2\text{O} \leq 25 \text{ wt\%}$$

$$\text{Na}_2\text{O} + \text{K}_2\text{O} \leq 30 \text{ wt\%}$$

The minimum amount Al, Ca and Si are added to meet the above specifications.

3.7 HLW VITRIFICATION PARAMETERS

High-level waste is formulated subject to the following constraints from the TWRS Process Flowsheet (Orme 1994):

$$\text{Al}_2\text{O}_3 = 1 \text{ to } 11 \text{ wt\%}$$

$$\text{Cr}_2\text{O}_3 \leq 0.5 \text{ wt\%}$$

$$\text{Fe}_2\text{O}_3 = 4 \text{ to } 12 \text{ wt\%}$$

$$\text{Na}_2\text{O} = 7 \text{ to } 12.5 \text{ wt\%}$$

$$\text{ZrO}_2 \leq 10 \text{ wt\%}$$

$$\text{B}_2\text{O}_3 = 7 \text{ to } 17 \text{ wt\%}$$

$$\text{Li}_2\text{O} = 2 \text{ to } 6 \text{ wt\%}$$

$$\text{SiO}_2 = 46 \text{ to } 56 \text{ wt\%}$$

$$\text{P}_2\text{O}_5 \leq 3 \text{ wt\%}$$

$$\text{Cr}_2\text{O}_3 \leq 0.5 \text{ wt\%}$$

$$\text{Al}_2\text{O}_3 + \text{ZrO}_2 + \text{Fe}_2\text{O}_3 \leq 21 \text{ wt\%}$$

$$\text{Al}_2\text{O}_3 + \text{ZrO}_2 \leq 14 \text{ wt\%}$$

The minimum amount of B, Li and Si are added to meet the above specifications.

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Brown and Mattichak 1995, MWTF Path Forward Engineering Analysis Technical Task 3.3, Single-Shell Tank Liquid Contents, WHC-SD-W236A-ES-012, Rev. 0, draft.

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WHC-SD-WM-TI-693 Rev. 0

APPENDIX A

Tank Retrieval Sequence

Borrowed from WHC-SD-WM-ER-193 draft
DST/SST Retrieval Sequence

Table A-1 TANK DATA TABLE

NO.	TANK	TYPE	WASTE TYPE	WHEN RETRIEVED	WHAT HAPPENS	WHY
1	106-C	SST	NCPLX	10/1997 - 10/2003	SLUICE, LRA, SLUDGE WASH, PRETREAT, LWVP & HWVP	HIGH HEAT TANK
2	101-SY	DST	CC	8/1998 - 4/1999	PRETREAT, LWVP & HWVP	HYDROGEN WATCH LIST
3	103-SY	DST	CC	11/1999 - 7/2005	PRETREAT, LWVP & HWVP	HYDROGEN WATCH LIST
4	101-AW	DST	DSSF	6/2001 - 4/2011	SLUDGE WASH, PRETREAT, LWVP & HWVP	
5	118-TX	SST	NCPLX	12/2003 - 9/2004	SLUICE, PRETREAT, LWVP & HWVP	FERROCYANIDE, ORGANICS
6	104-AN	DST	DSSF	4/2004 - 5/2004	SLUDGE WASH, PRETREAT, LWVP & HWVP	HYDROGEN WATCH LIST
7	107-TX	SST	NCPLX	9/2004 - 2/2005	LRA, PRETREAT, LWVP & HWVP	ASSUMED LEAKER
8	103-AN	DST	DSS	1/2005 - 2/2005	PRETREAT, LWVP & HWVP	HYDROGEN WATCH LIST
9	105-AN	DST	DSSF	2/2005 - 3/2005	PRETREAT, LWVP & HWVP	HYDROGEN WATCH LIST
10	112-TX	SST	NCPLX	2/2005 - 10/2005	SLUICE, PRETREAT, LWVP & HWVP	
11	106-TX	SST	NCPLX	9/2005 - 1/2006	SLUICE, PRETREAT, LWVP & HWVP	
12	108-TX	SST	NCPLX	11/2005 - 1/2006	SLUICE, PRETREAT, LWVP & HWVP	
13	106-AN	DST	CP	12/2005 - 2/2006	SLUDGE WASH, PRETREAT, LWVP & HWVP	
14	109-TX	SST	NCPLX	2/2006 - 7/2006	SLUICE, PRETREAT, LWVP & HWVP	
15	105-TX	SST	NCPLX	7/2006 - 2/2007	LRA, PRETREAT, LWVP & HWVP	ASSUMED LEAKER, ORGANICS
16	104-TX	SST	NCPLX	10/2006 - 12/2006	SLUICE, PRETREAT, LWVP & HWVP	
17	102-TX	SST	NCPLX	12/2006 - 2/2007	SLUICE, PRETREAT, LWVP & HWVP	
18	111-TX	SST	NCPLX	2/2007 - 6/2007	SLUICE, PRETREAT, LWVP & HWVP	
19	101-AZ	DST	NCAW	6/2007 - 7/2007	SLUDGE WASH, PRETREAT, LWVP & HWVP	PROCESS TESTS TO DEMONSTRATE RETRIEVAL SYSTEM FOR NCAW

WHC-SD-WM-TI-693 Rev. 0

NO.	TANK	TYPE	WASTE TYPE	WHEN RETRIEVED	WHAT HAPPENS	WHY
20	102-AZ	DST	NCAW	8/2007 - 2/2010	SLUDGE WASH, PRETREAT, LWVP & HWVP	
21	110-TX	SST	NCPLX	7/2007 - 11/2007	LRA, PRETREAT, LWVP & HWVP	ASSUMED LEAKER
22	103-TX	SST	NCPLX	10/2007 - 12/2007	SLUICE, SLUDGE WASH, PRETREAT, LWVP & HWVP	
23	101-TX	SST	NCPLX	12/2007 - 2/2008	SLUICE, SLUDGE WASH, PRETREAT, LWVP & HWVP	
24	106-U	SST	NCPLX	3/2008 - 7/2008	SLUICE, SLUDGE WASH, PRETREAT, LWVP & HWVP	HYDROGEN WATCH LIST
25	114-TX	SST	NCPLX	6/2008 - 10/2008	LRA, PRETREAT, LWVP & HWVP	ASSUMED LEAKER
26	103-U	SST	NCPLX	7/2008 - 11/2008	SLUICE, SLUDGE WASH, PRETREAT, LWVP & HWVP	HYDROGEN WATCH LIST
27	112-C	SST	NCPLX	11/2008 - 1/2009	SLUICE, SLUDGE WASH, PRETREAT, LWVP & HWVP	FERROCYANIDE
28	107-U	SST	DSSF	11/2008 - 4/2009	SLUICE, SLUDGE WASH, PRETREAT, LWVP & HWVP	ORGANICS
29	102-AY	DST	DN	12/2008 - 12/2111	SLUDGE WASH, PRETREAT, LWVP & HWVP	
30	108-C	SST	NCPLX	1/2009 - 3/2009	SLUICE, SLUDGE WASH, PRETREAT, LWVP & HWVP	FERROCYANIDE
31	106-U	SST	NCPLX	3/2009 - 5/2009	SLUICE, SLUDGE WASH, PRETREAT, LWVP & HWVP	ORGANICS
32	117-TX	SST	NCPLX	4/2009 - 10/2009	LRA, PRETREAT, LWVP & HWVP	ASSUMED LEAKER
33	111-C	SST	NCPLX	5/2009 - 7/2009	LRA, SLUDGE WASH, PRETREAT, LWVP & HWVP	ASSUMED LEAKER, FERROCYANIDE
34	108-U	SST	NCPLX	7/2009 - 12/2009	SLUICE, SLUDGE WASH, PRETREAT, LWVP & HWVP	HYDROGEN WATCH LIST
35	108-C	SST	NCPLX	7/2009 - 9/2009	SLUICE, SLUDGE WASH, PRETREAT, LWVP & HWVP	FERROCYANIDE

WCH-SD-WM-TI-693 Rev. 0

NO.	TANK	TYPE	WASTE TYPE	WHEN RETRIEVED	WHAT HAPPENS	WHY
36	110-C	SST	DC	11/2009 - 1/2010	LRA, SLUDGE WASH, PRETREAT, LWVP & HWVP	ASSUMED LEAKER
37	113-TX	SST	NCPLX	12/2009 - 6/2010	LRA, PRETREAT, LWVP & HWVP	ASSUMED LEAKER
38	101-C	SST	NCPLX	1/2010 - 3/2010	LRA, SLUDGE WASH, PRETREAT, LWVP & HWVP	ASSUMED LEAKER
39	109-U	SST	NCPLX	1/2010 - 6/2010	SLUICE, SLUDGE WASH, PRETREAT, LWVP & HWVP	HYDROGEN WATCH LIST
40	102-C	SST	DC	1/2010 - 5/2010	SLUICE, SLUDGE WASH, PRETREAT, LWVP & HWVP	
41	115-TX	SST	NCPLX	2/2010 - 9/2010	LRA, PRETREAT, LWVP & HWVP	ASSUMED LEAKER
42	105-C	SST	NCPLX	4/2010 - 6/2010	SLUICE, SLUDGE WASH, PRETREAT, LWVP & HWVP	HIGH HEAT TANK
43	116-TX	SST	NCPLX	6/2010 - 11/2010	LRA, PRETREAT, LWVP & HWVP	ASSUMED LEAKER
44	201-C	SST	NCPLX	7/2010 - 9/2010	LRA, SLUDGE WASH, PRETREAT, LWVP & HWVP	ASSUMED LEAKER
45	101-AP	DST	DN	7/2010 - 2/2012	PRETREAT, LWVP & HWVP	
46	101-U	SST	NCPLX	9/2010 - 11/2010	LRA, SLUDGE WASH, PRETREAT, LWVP & HWVP	ASSUMED LEAKER
47	102-U	SST	NCPLX	10/2010 - 3/2011	SLUICE, SLUDGE WASH, PRETREAT, LWVP & HWVP	
48	110-U	SST	NCPLX	11/2010 - 1/2011	LRA, SLUDGE WASH, PRETREAT, LWVP & HWVP	ASSUMED LEAKER
49	112-U	SST	NCPLX	2/2011 - 4/2011	LRA, SLUDGE WASH, PRETREAT, LWVP & HWVP	ASSUMED LEAKER
50	111-U	SST	DSSF	3/2011 - 8/2011	SLUICE, SLUDGE WASH, PRETREAT, LWVP & HWVP	
51	104-U	SST	NCPLX	4/2011 - 6/2011	LRA, SLUDGE WASH, PRETREAT, LWVP & HWVP	ASSUMED LEAKER
52	202-C	SST	EMPTY	6/2011 - 7/2011	LRA, SLUDGE WASH, PRETREAT, LWVP & HWVP	ASSUMED LEAKER

WHC-SD-WM-TI-693 Rev. 0

NO.	TANK	TYPE	WASTE TYPE	WHEN RETRIEVED	WHAT HAPPENS	WHY
53	103-C	SST	NCPLX	5/2011 - 8/2011	SLUICE, SLUDGE WASH, PRETREAT, LWVP & HWVP	ORGANICS
54	204-C	SST	NCPLX	7/2011 - 9/2011	LRA, SLUDGE WASH, PRETREAT, LWVP & HWVP	ASSUMED LEAKER
55	201-U	SST	NCPLX	8/2011 - 10/2011	SLUICE, SLUDGE WASH, PRETREAT, LWVP & HWVP	
56	203-C	SST	NCPLX	9/2011 - 11/2011	LRA, SLUDGE WASH, PRETREAT, LWVP & HWVP	ASSUMED LEAKER
57	106-SX	SST	NCPLX	9/2011 - 3/2012	LRA, SLUDGE WASH, PRETREAT, LWVP & HWVP	ASSUMED LEAKER, HYDROGEN WATCH LIST, ORGANICS
58	203-U	SST	NCPLX	10/2011 - 12/2011	SLUICE, SLUDGE WASH, PRETREAT, LWVP & HWVP	
59	107-C	SST	DC	11/2011 - 1/2012	SLUICE, SLUDGE WASH, PRETREAT, LWVP & HWVP	
60	104-SX	SST	DSSF	11/2011 - 6/2012	LRA, SLUDGE WASH, PRETREAT, LWVP & HWVP	ASSUMED LEAKER, HYDROGEN WATCH LIST
61	202-U	SST	NCPLX	12/2011 - 2/2012	SLUICE, SLUDGE WASH, PRETREAT, LWVP & HWVP	
62	204-U	SST	NCPLX	2/2012 - 4/2012	SLUICE, SLUDGE WASH, PRETREAT, LWVP & HWVP	
63	105-SX	SST	DSSF	4/2012 - 6/2013	SLUICE, SLUDGE WASH, PRETREAT, LWVP & HWVP	HYDROGEN WATCH LIST
64	109-SX	SST	NCPLX	6/2012 - 8/2012	LRA, SLUDGE WASH, PRETREAT, LWVP & HWVP	ASSUMED LEAKER, HIGH HEAT TANK, HYDROGEN WATCH LIST
65	105-BY	SST	NCPLX	6/2012 - 12/2012	LRA, SLUDGE WASH, PRETREAT, LWVP & HWVP	ASSUMED LEAKER, FERROCYANIDE
66	107-SX	SST	NCPLX	8/2012 - 10/2012	LRA, SLUDGE WASH, PRETREAT, LWVP & HWVP	ASSUMED LEAKER, HIGH HEAT TANK
67	111-SX	SST	NCPLX	10/2012 - 1/2013	LRA, SLUDGE WASH, PRETREAT, LWVP & HWVP	ASSUMED LEAKER, HIGH HEAT TANK
68	102-SX	SST	DSSF	12/2012 - 11/2013	SLUICE, SLUDGE WASH, PRETREAT, LWVP & HWVP	HYDROGEN WATCH LIST

WHC-SD-WM-TI-693 Rev. 0

NO.	TANK	TYPE	WASTE TYPE	WHEN RETRIEVED	WHAT HAPPENS	WHY
69	103-BY	SST	NCPLX	12/2012 - 6/2013	LRA, SLUDGE WASH, PRETREAT, LWVP & HWVP	ASSUMED LEAKER, FERROCYANIDE
70	108-SX	SST	NCPLX	12/2012 - 3/2013	LRA, SLUDGE WASH, PRETREAT, LWVP & HWVP	ASSUMED LEAKER, HIGH HEAT TANK
71	103-SX	SST	NCPLX	2/2013 - 1/2014	SLUICE, SLUDGE WASH, PRETREAT, LWVP & HWVP	HYDROGEN WATCH LIST
72	101-SX	SST	DC	5/2013 - 2/2014	SLUICE, SLUDGE WASH, PRETREAT, LWVP & HWVP	HYDROGEN WATCH LIST
73	114-SX	SST	NCPLX	5/2013 - 7/2013	LRA, SLUDGE WASH, PRETREAT, LWVP & HWVP	ASSUMED LEAKER, HIGH HEAT TANK
74	108-BY	SST	NCPLX	6/2013 - 10/2013	LRA, SLUDGE WASH, PRETREAT, LWVP & HWVP	ASSUMED LEAKER, FERROCYANIDE
75	102-S	SST	DSSF	7/2013 - 5/2014	SLUICE, SLUDGE WASH, PRETREAT, LWVP & HWVP	HYDROGEN WATCH LIST, ORGANICS
76	110-SX	SST	NCPLX	9/2013 - 11/2013	LRA, SLUDGE WASH, PRETREAT, LWVP & HWVP	ASSUMED LEAKER, HIGH HEAT TANK
77	106-BY	SST	NCPLX	10/2013 - 4/2014	LRA, SLUDGE WASH, PRETREAT, LWVP & HWVP	ASSUMED LEAKER, FERROCYANIDE
78	112-SX	SST	NCPLX	1/2014 - 3/2014	LRA, SLUDGE WASH, PRETREAT, LWVP & HWVP	ASSUMED LEAKER, HIGH HEAT TANK
79	104-BY	SST	NCPLX	2/2014 - 8/2014	SLUICE, SLUDGE WASH, PRETREAT, LWVP & HWVP	FERROCYANIDE
80	107-BY	SST	NCPLX	4/2014 - 8/2014	LRA, SLUDGE WASH, PRETREAT, LWVP & HWVP	ASSUMED LEAKER, FERROCYANIDE
81	113-SX	SST	NCPLX	5/2014 - 7/2014	LRA, SLUDGE WASH, PRETREAT, LWVP & HWVP	ASSUMED LEAKER
82	104-C	SST	CC	5/2014 - 8/2014	SLUICE, SLUDGE WASH, PRETREAT, LWVP & HWVP	
83	103-T	SST	NCPLX	6/2014 - 8/2014	LRA, SLUDGE WASH, PRETREAT, LWVP & HWVP	ASSUMED LEAKER
84	111-T	SST	NCPLX	8/2014 - 2/2015	LRA, SLUDGE WASH, PRETREAT, LWVP & HWVP	ASSUMED LEAKER

WHC-SD-WM-TI-693 Rev. 0

NO.	TANK	TYPE	WASTE TYPE	WHEN RETRIEVED	WHAT HAPPENS	WHY
85	115-SX	SST	NCPLX	9/2014 - 11/2014	LRA, SLUDGE WASH, PRETREAT, LWVP & HWVP	ASSUMED LEAKER
86	109-T	SST	NCPLX	10/2014 - 12/2014	LRA, SLUDGE WASH, PRETREAT, LWVP & HWVP	ASSUMED LEAKER
87	105-B	SST	NCPLX	11/2014 - 2/2015	LRA, SLUDGE WASH, PRETREAT, LWVP & HWVP	ASSUMED LEAKER
38	203-B	SST	NCPLX	3/2015 - 4/2015	LRA, SLUDGE WASH, PRETREAT, LWVP & HWVP	ASSUMED LEAKER
89	107-B	SST	NCPLX	4/2015 - 6/2015	LRA, SLUDGE WASH, PRETREAT, LWVP & HWVP	ASSUMED LEAKER
90	106-T	SST	NCPLX	5/2015 - 7/2015	LRA, SLUDGE WASH, PRETREAT, LWVP & HWVP	ASSUMED LEAKER
91	102-BX	SST	NCPLX	6/2015 - 8/2015	LRA, SLUDGE WASH, PRETREAT, LWVP & HWVP	ASSUMED LEAKER, FERROCYANIDE
92	111-BY	SST	NCPLX	6/2015 - 2/2016	SLUICE, SLUDGE WASH, PRETREAT, LWVP & HWVP	FERROCYANIDE
93	112-S	SST	NCPLX	6/2015 - 7/2016	SLUICE, SLUDGE WASH, PRETREAT, LWVP & HWVP	HYDROGEN WATCH LIST
94	111-B	SST	NCPLX	8/2015 - 10/2015	LRA, SLUDGE WASH, PRETREAT, LWVP & HWVP	ASSUMED LEAKER
95	108-T	SST	NCPLX	8/2015 - 10/2015	LRA, SLUDGE WASH, PRETREAT, LWVP & HWVP	ASSUMED LEAKER
96	110-BX	SST	NCPLX	9/2015 - 11/2015	LRA, SLUDGE WASH, PRETREAT, LWVP & HWVP	ASSUMED LEAKER, FERROCYANIDE
97	107-T	SST	NCPLX	11/2015 - 1/2016	LRA, SLUDGE WASH, PRETREAT, LWVP & HWVP	ASSUMED LEAKER, FERROCYANIDE
98	111-BX	SST	NCPLX	12/2015 - 3/2016	LRA, SLUDGE WASH, PRETREAT, LWVP & HWVP	ASSUMED LEAKER, FERROCYANIDE
99	204-B	SST	NCPLX	12/2015 - 2/2016	LRA, SLUDGE WASH, PRETREAT, LWVP & HWVP	ASSUMED LEAKER
100	101-S	SST	NCPLX	1/2016 - 10/2016	SLUICE, SLUDGE WASH, PRETREAT, LWVP & HWVP	

WHC-SD-WM-TI-693 Rev. 0

NO.	TANK	TYPE	WASTE TYPE	WHEN RETRIEVED	WHAT HAPPENS	WHY
101	101-TY	SST	NCPLX	2/2016 - 4/2016	LRA, SLUDGE WASH, PRETREAT, LWVP & HWVP	ASSUMED LEAKER, FERROCYANIDE
102	112-BY	SST	NCPLX	2/2016 - 5/2016	SLUICE, SLUDGE WASH, PRETREAT, LWVP & HWVP	FERROCYANIDE
103	101-BX	SST	NCPLX	3/2016 - 4/2016	LRA, SLUDGE WASH, PRETREAT, LWVP & HWVP	ASSUMED LEAKER
104	110-B	SST	NCPLX	4/2016 - 6/2016	LRA, SLUDGE WASH, PRETREAT, LWVP & HWVP	ASSUMED LEAKER
105	108-BX	SST	NCPLX	5/2016 - 6/2016	LRA, SLUDGE WASH, PRETREAT, LWVP & HWVP	ASSUMED LEAKER
106	110-BY	SST	NCPLX	6/2016 - 10/2016	SLUICE, SLUDGE WASH, PRETREAT, LWVP & HWVP	FERROCYANIDE
107	111-S	SST	NCPLX	6/2016 - 12/2016	SLUICE, SLUDGE WASH, PRETREAT, LWVP & HWVP	HYDROGEN WATCH LIST
108	106-BX	SST	NCPLX	7/2016 - 8/2016	SLUICE, SLUDGE WASH, PRETREAT, LWVP & HWVP	FERROCYANIDE
109	112-B	SST	NCPLX	8/2016 - 10/2016	LRA, SLUDGE WASH, PRETREAT, LWVP & HWVP	ASSUMED LEAKER
110	105-S	SST	NCPLX	9/2016 - 2/2017	SLUICE, SLUDGE WASH, PRETREAT, LWVP & HWVP	
111	104-A	SST	NCPLX	9/2016 - 10/2016	LRA, SLUDGE WASH, PRETREAT, LWVP & HWVP	ASSUMED LEAKER, HIGH HEAT TANK
112	112-BX	SST	NCPLX	9/2016 - 11/2016	SLUICE, SLUDGE WASH, PRETREAT, LWVP & HWVP	
113	101-BY	SST	NCPLX	10/2016 - 3/2017	SLUICE, SLUDGE WASH, PRETREAT, LWVP & HWVP	FERROCYANIDE
114	105-A	SST	NCPLX	11/2016 - 12/2016	LRA, SLUDGE WASH, PRETREAT, LWVP & HWVP	ASSUMED LEAKER, HIGH HEAT TANK
115	110-S	SST	NCPLX	11/2016 - 4/2017	SLUICE, SLUDGE WASH, PRETREAT, LWVP & HWVP	
116	104-BX	SST	NCPLX	12/2016 - 2/2017	SLUICE, SLUDGE WASH, PRETREAT, LWVP & HWVP	

WHC-SD-WM-TI-693 Rev. 0

NO.	TANK	TYPE	WASTE TYPE	WHEN RETRIEVED	WHAT HAPPENS	WHY
117	201-B	SST	NCPLX	12/2016 - 2/2017	LRA, SLUDGE WASH, PRETREAT, LWVP & HWVP	ASSUMED LEAKER
118	103-TY	SST	NCPLX	12/2016 - 2/2017	LRA, SLUDGE WASH, PRETREAT, LWVP & HWVP	ASSUMED LEAKER, FERROCYANIDE
119	103-A	SST	DSSF	1/2017 - 4/2017	LRA, SLUDGE WASH, PRETREAT, LWVP & HWVP	ASSUMED LEAKER
120	109-BY	SST	NCPLX	3/2017 - 10/2017	SLUICE, SLUDGE WASH, PRETREAT, LWVP & HWVP	
121	103-S	SST	DSSF	3/2017 - 7/2017	SLUICE, SLUDGE WASH, PRETREAT, LWVP & HWVP	
121	109-BX	SST	NCPLX	3/2017 - 5/2017	SLUICE, SLUDGE WASH, PRETREAT, LWVP & HWVP	
122	104-TY	SST	NCPLX	4/2017 - 6/2017	LRA, SLUDGE WASH, PRETREAT, LWVP & HWVP	ASSUMED LEAKER, FERROCYANIDE
123	103-B	SST	NCPLX	4/2017 - 6/2017	LRA, SLUDGE WASH, PRETREAT, LWVP & HWVP	ASSUMED LEAKER, ORGANICS
124	101-A	SST	DSSF	4/2017 - 2/2018	SLUICE, SLUDGE WASH, PRETREAT, LWVP & HWVP	HYDROGEN WATCH LIST
125	106-B	SST	NCPLX	6/2017 - 8/2017	SLUICE, SLUDGE WASH, PRETREAT, LWVP & HWVP	
126	106-TY	SST	NCPLX	7/2017 - 8/2017	LRA, SLUDGE WASH, PRETREAT, LWVP & HWVP	ASSUMED LEAKER
127	103-BX	SST	NCPLX	6/2017 - 7/2017	SLUICE, SLUDGE WASH, PRETREAT, LWVP & HWVP	
128	105-TY	SST	NCPLX	7/2017 - 8/2017	LRA, SLUDGE WASH, PRETREAT, LWVP & HWVP	ASSUMED LEAKER
129	104-B	SST	NCPLX	8/2017 - 12/2017	SLUICE, SLUDGE WASH, PRETREAT, LWVP & HWVP	
130	105-BX	SST	NCPLX	8/2017 - 9/2017	SLUICE, SLUDGE WASH, PRETREAT, LWVP & HWVP	
131	109-B	SST	NCPLX	9/2017 - 11/2017	SLUICE, SLUDGE WASH, PRETREAT, LWVP & HWVP	

WHC-SD-WM-TI-693 Rev. 0

NO.	TANK	TYPE	WASTE TYPE	WHEN RETRIEVED	WHAT HAPPENS	WHY
132	110-T	SST	NCPLX	9/2017 - 12/2017	SLUICE, SLUDGE WASH, PRETREAT, LWVP & HWVP	HYDROGEN WATCH LIST
133	107-BX	SST	NCPLX	9/2017 - 12/2017	SLUICE, SLUDGE WASH, PRETREAT, LWVP & HWVP	
134	102-BY	SST	NCPLX	10/2017 - 1/2018	PRETREAT, LWVP & HWVP	
135	106-A	SST	CP	11/2017 - 1/2018	SLUICE, SLUDGE WASH, PRETREAT, LWVP & HWVP	
136	109-S	SST	NCPLX	12/2017 - 5/2018	SLUICE, SLUDGE WASH, PRETREAT, LWVP & HWVP	
137	108-B	SST	NCPLX	12/2017 - 2/2018	SLUICE, SLUDGE WASH, PRETREAT, LWVP & HWVP	
138	102-B	SST	NCPLX	12/2017 - 8/2018	SLUICE, SLUDGE WASH, PRETREAT, LWVP & HWVP	
139	203-T	SST	NCPLX	12/2017 - 1/2018	SLUICE, SLUDGE WASH, PRETREAT, LWVP & HWVP	
140	102-A	SST	DSSF	2/2018 - 4/2018	SLUICE, SLUDGE WASH, PRETREAT, LWVP & HWVP	
141	105-T	SST	NCPLX	2/2018 - 3/2018	SLUICE, SLUDGE WASH, PRETREAT, LWVP & HWVP	
142	104-S	SST	NCPLX	3/2018 - 6/2018	LRA, SLUDGE WASH, PRETREAT, LWVP & HWVP	ASSUMED LEAKER
143	202-B	SST	NCPLX	3/2018 - 4/2018	SLUICE, SLUDGE WASH, PRETREAT, LWVP & HWVP	
144	101-T	SST	NCPLX	3/2018 - 5/2018	SLUICE, SLUDGE WASH, PRETREAT, LWVP & HWVP	FERROCYANIDE
145	101-B	SST	NCPLX	4/2018 - 6/2018	LRA, SLUDGE WASH, PRETREAT, LWVP & HWVP	ASSUMED LEAKER
146	102-AX	SST	CC	4/2018 - 6/2018	LRA, SLUDGE WASH, PRETREAT, LWVP & HWVP	ASSUMED LEAKER
147	107-S	SST	NCPLX	5/2018 - 9/2018	SLUICE, SLUDGE WASH, PRETREAT, LWVP & HWVP	

WHC-SD-WM-TI-693 Rev. 0

NO.	TANK	TYPE	WASTE TYPE	WHEN RETRIEVED	WHAT HAPPENS	WHY
148	202-T	SST	NCPLX	6/2018 - 7/2018	SLUICE, SLUDGE WASH, PRETREAT, LWVP & HWVP	
149	108-S	SST	NCPLX	6/2018 - 11/2018	SLUICE, SLUDGE WASH, PRETREAT, LWVP & HWVP	
150	103-AX	SST	CC	6/2018 - 10/2018	SLUICE, SLUDGE WASH, PRETREAT, LWVP & HWVP	HYDROGEN WATCH LIST
151	201-T	SST	NCPLX	7/2018 - 8/2018	SLUICE, SLUDGE WASH, PRETREAT, LWVP & HWVP	
152	104-AX	SST	NCPLX	7/2018 - 8/2018	LRA, SLUDGE WASH, PRETREAT, LWVP & HWVP	ASSUMED LEAKER
153	112-T	SST	NCPLX	8/2018 - 9/2018	SLUICE, SLUDGE WASH, PRETREAT, LWVP & HWVP	
154	102-T	SST	NCPLX	10/2018 - 11/2018	SLUICE, SLUDGE WASH, PRETREAT, LWVP & HWVP	
155	106-S	SST	NCPLX	11/2018 - 6/2019	SLUICE, SLUDGE WASH, PRETREAT, LWVP & HWVP	
156	101-AX	SST	DSSF	11/2018 - 6/2019	SLUICE, SLUDGE WASH, PRETREAT, LWVP & HWVP	HYDROGEN WATCH LIST
157	104-T	SST	NCPLX	11/2018 - 4/2019	SLUICE, SLUDGE WASH, PRETREAT, LWVP & HWVP	
158	204-T	SST	NCPLX	12/2018 - 1/2019	SLUICE, SLUDGE WASH, PRETREAT, LWVP & HWVP	
159	102-TY	SST	NCPLX	12/2018 - 1/2019	SLUICE, SLUDGE WASH, PRETREAT, LWVP & HWVP	
161	101-AN	DST	DN	N/A	PRETREAT, LWVP & HWVP	
162	102-SY	DST	DN/PT	N/A	SLUDGE WASH, PRETREAT, LWVP & HWVP	TRANSFER TANK
163	102-AN	DST	CC	N/A	SLUDGE WASH, PRETREAT, LWVP & HWVP	
164	107-AN	DST	CC	N/A	SLUDGE WASH, PRETREAT, LWVP & HWVP	

WHC-SD-WM-TI-693 Rev. 0

NO.	TANK	TYPE	WASTE TYPE	WHEN RETRIEVED	WHAT HAPPENS	WHY
165	104-AW	DST	DN	N/A	SLUDGE WASH, PRETREAT, LWVP & HWVP	HYDROGEN WATCH LIST
166	103-AW	DST	DN/PD	N/A	SLUDGE WASH, PRETREAT, LWVP & HWVP	
167	105-AW	DST	DN/PD	N/A	SLUDGE WASH, PRETREAT, LWVP & HWVP	
168	106-AW	DST	DN	N/A	SLUDGE WASH, PRETREAT, LWVP & HWVP	
169	101-AY	DST	DC	N/A	SLUDGE WASH, PRETREAT, LWVP & HWVP	
170	103-AP	DST	DN	N/A	PRETREAT, LWVP & HWVP	
171	105-AP	DST	DSSF	N/A	PRETREAT, LWVP & HWVP	
172	106-AP	DST	DN	N/A	PRETREAT, LWVP & HWVP	
173	107-AP	DST	DN	N/A	PRETREAT, LWVP & HWVP	
174	108-AP	DST	DN	N/A	PRETREAT, LWVP & HWVP	
175	102-AW	DST	DN	N/A	SLUDGE WASH, PRETREAT, LWVP & HWVP	EVAPORATOR FEED TANK
176	102-AP	DST	DN	N/A	PRETREAT, LWVP & HWVP	GROUT FEED TANK
177	104-AP	DST	DN	N/A	PRETREAT, LWVP & HWVP	GROUT FEED TANK

NOMENCLATURE:

CC: COMPLEXANT CONCENTRATES

DSS: DOUBLE SHELL SLURRY

CP: CONCENTRATE PHOSPHATE

DC: DILUTE COMPLEXED WASTE

PD/PN: PLUTONIUM-URANIUM EXTRACTION (FUREX) NEUTRALIZED CLADDING REMOVAL WASTE (NCRW), TRANSURANIC WASTE (TRU)

NCAW: NEUTRALIZED CURRENT ACID WASTE

DSSF: DOUBLE SHELL SLURRY FEED

NCPLX: NON-COMPLEXED WASTE

DN: DILUTE NON-COMPLEXED WASTE

PT: PLUTONIUM FINISHING PLANT (PFP) TRU SOLIDS

WHC-SD-WM-TI-693 Rev. 0

APPENDIX B

DST Inventories as of February, 1994

Courtesy of L. W. Shelton

WHC-SD-WM-TI-693 Rev. 0
Estimated Mass of Chemical and Radioactive Components
in Double-Shell Tank Wastes
Decayed to 12/31/99

Units are in Metric Tons		Total		101AN		102AN		103AN		104AN	
Component		Soluble	Insoluble	Soluble	Insoluble	Soluble	Insoluble	Soluble	Insoluble	Soluble	Insoluble
Ag		3.28E-01	1.38E+00	4.57E-03				5.75E-02			
Al (III)			6.78E+01				1.46E-01				
As ³⁺		7.70E-01	4.98E-01	1.54E-03				5.75E-01			
B ³⁺		5.19E-01	9.94E-01								
Ba ²⁺		7.91E-01	3.09E+00	1.32E-03		5.88E-01	6.53E-02	5.75E-02			
Be ²⁺		8.19E-02	7.61E-03	1.65E-03				5.75E-02			
Bi ³⁺		2.26E+00		1.93E-05				1.72E+00			
Ca ²⁺		1.03E+01	1.15E+01	1.61E-02		2.08E+00	2.31E-01	3.10E-01			
Cd ²⁺		1.67E-01	6.01E+00	4.24E-03			2.43E-01	5.75E-02			
Ce ³⁺		2.26E-02	3.04E+00				1.61E-01				
Cr (III)			3.41E+01				4.75E-03				
Cu ²⁺		1.77E-01	7.46E-01	1.29E-06			1.37E-01	4.31E-02			
Fe ³⁺		8.09E+00	1.42E+02	4.00E-02		6.94E-01	3.65E-02	2.53E-01		4.61E-02	
Hg		5.84E-02		1.34E-05				5.75E-02			
K		5.46E+02	2.02E+01	1.50E+00		7.17E+00	7.24E-02	5.46E+01		2.95E+01	
La		2.19E-01	2.10E+01				5.99E-01				
Li		5.77E-03	2.46E-02								
Mg ²⁺		9.65E-01	1.10E+01	9.57E-03		7.09E-02	7.88E-03	1.03E-01			
Mn ²⁺		7.69E+00	1.80E+01	2.52E-03		3.78E+00	1.99E-01	1.03E-01			
Mo ⁶⁺		4.87E+00	8.01E-01	3.21E-05		3.00E+00	1.68E-01	3.16E-01			
Na		1.09E+04	2.30E+02	6.72E+01		8.42E+02	8.61E+00	1.21E+03		1.14E+03	
Ni ²⁺		4.07E+00	6.57E+00	1.10E-02		1.44E+00	7.58E-02	8.62E-02			
Pb ²⁺		1.96E+00	3.28E+00	5.36E-03			8.25E-01	2.59E-01			
Rb		6.14E-02	2.56E-03								
Re		4.01E-03	2.46E-01								
Rh		1.20E-02	1.68E+00								
Ru		2.60E-02	1.23E+00								
Sb		6.21E-01	2.96E+00					5.75E-01			
Se		1.21E+00	3.95E+00	1.22E-04				7.47E-01			
SiO ₂		1.55E+01	2.14E+02	4.18E-05			1.62E+00	2.65E+00			
UO ₂ ²⁺		3.54E+00	2.68E+01	5.12E-03				5.01E-01			
V ³⁺		6.20E-02	1.88E-01					5.75E-02			
W ⁶⁺		7.47E-01						7.47E-01			
Zn ²⁺		3.59E+00	9.45E-01	3.68E-02		1.83E-02	2.03E-03	1.72E-01			
Zr ⁴⁺		4.48E-01	2.77E+02	3.21E-05			1.40E-01	8.62E-02			
Al(OH) ₃		4.47E+03		1.97E+01		2.04E+02		7.29E+02		5.45E+02	
CO ₂		1.87E+03	5.83E+01	1.40E+01		1.90E+02	1.92E+00	3.22E+01		1.17E+02	
Cl ⁻		2.73E+02	1.49E+00	1.57E+00		2.55E+01	2.58E-01	3.45E+01		3.10E+01	
CrO ₄ ²⁻		9.05E+01		5.93E-01		4.03E+00		6.79E+00		6.22E+00	
F ⁻		3.46E+02	1.91E+01	3.78E+00		1.54E+01	1.56E-01	2.64E+00			
SO ₄ ²⁻		3.86E+02	6.68E+00	4.08E+00		3.79E+01	3.83E-01	5.75E+00		2.70E+01	
NO ₃ ⁻		7.65E+03	3.91E+01	5.29E+01		7.74E+02	7.82E+00	5.75E+02		7.93E+02	
NO ₂ ⁻		3.07E+03	8.42E+00	2.13E+01		2.09E+02	2.11E+00	4.96E+02		3.65E+02	
PO ₄ ³⁻		2.12E+02	2.16E+01	5.26E+00		3.09E+01	3.12E-01	3.33E+00		1.15E+01	
OH ⁻		1.90E+03	1.23E+02	1.00E+01		2.14E+01	1.61E+00	3.51E+02		2.87E+02	
TOC		9.90E+02	6.84E+01	2.12E+00		1.54E+02	1.56E+00	2.64E+01		2.28E+02	
Total w/o H ₂ O		3.28E+04	1.51E+03	2.04E+02		2.53E+03	2.96E+01	3.53E+03		3.58E+03	
H ₂ O		8.25E+04		2.52E+03		2.80E+03		1.88E+03		2.39E+03	
Total		1.15E+05	1.51E+03	2.72E+03		5.33E+03	2.96E+01	5.41E+03		5.97E+03	
Volume, Liters				2.72E+06		3.83E+06		3.61E+06		3.98E+06	

Radionuclides (Ci)	Total		101AN		102AN		103AN		104AN	
	Soluble	Insoluble	Soluble	Insoluble	Soluble	Insoluble	Soluble	Insoluble	Soluble	Insoluble
14C	3.45E+02	1.99E+03	2.88E-01			8.72E+01	7.09E+00			
90Sr	1.47E+06	1.09E+07	8.52E+02		4.38E+05	2.30E+04	3.97E+04		3.39E+04	
90Y	1.47E+06	1.09E+07	8.52E+02		4.38E+05	2.30E+04	3.97E+04		3.39E+04	
99Tc	1.39E+04	4.04E+02	8.77E+01		1.74E+03		6.03E+02		7.21E+02	
137Cs	2.47E+07	6.46E+05	1.97E+05		1.14E+06	1.15E+04	2.31E+06		2.62E+06	
137Ba	2.34E+07	6.14E+05	1.87E+05		1.08E+06	1.09E+04	2.19E+06		2.49E+06	
154Eu	2.13E+04	3.80E+04	1.57E+01		4.46E+03	4.51E+01				
238Pu	2.96E+02	1.27E+03								
239Pu	1.31E+03	7.86E+03	6.66E-01		7.54E+02	3.97E+01	8.74E+00		4.16E+01	
240Pu	3.17E+02	2.10E+03	1.02E-01		1.92E+02	1.01E+01	1.03E+00		6.39E+00	
241Pu	7.76E+02	3.79E+04	3.02E-01		3.57E+02	3.60E+00	3.08E+00		1.89E+01	
241Am	5.31E+03	7.22E+04	7.22E-01		2.51E+03	1.32E+02	8.08E+00		6.06E+00	
Total Curies	5.11E+07	2.32E+07	3.86E+05		3.11E+06	6.88E+04	4.68E+06		5.18E+06	

WHC-SD-WM-TI-693 Rev. 0
Estimated Mass of Chemical and Radioactive Components
in Double-Shell Tank Wastes
Decayed to 12/31/99

Units are in Metric Tons		105AN		106AN		107AN		101AP		102AP	
Component		Soluble	Insoluble	Soluble	Insoluble	Soluble	Insoluble	Soluble	Insoluble	Soluble	Insoluble
Ag ⁺				2.89E-04						5.22E-04	
Al (III)							1.07E+00				
As ⁺⁵				5.72E-06				5.22E-05		3.70E-04	
B ⁺³											
Ba ⁺²				8.82E-04		2.09E-02	2.32E-03	9.07E-04		1.19E-03	
Be ⁺²										6.10E-04	
Bi ⁺³				1.15E-02							
Ca ⁺²				7.17E-03		2.06E+00	2.29E-01	8.06E-02			
Cd ⁺²				3.94E-03			1.91E-02	5.74E-04		6.14E-03	
Ce ⁺³							6.44E-02				
Cr (III)							3.35E-03				
Cu ⁺²				2.98E-04							
Fe ⁺³	4.79E-02			5.50E-04		1.99E+00	1.04E-01	1.13E-03		1.59E-02	
Hg ⁺				3.97E-06				2.01E-05		2.09E-05	
K ⁺	2.63E+01			8.58E-02		7.97E+00	8.05E-02			5.39E+00	
La ⁺³							1.91E-02				
Li ⁺											
Mg ⁺²				2.20E-04		2.90E-01	3.22E-02	2.64E-03			
Mn ⁺⁴				4.41E-03		1.44E+00	7.57E-02	6.02E-05			
Mo ⁺⁶				5.29E-03						2.45E-02	
Na ⁺	1.18E+03			7.18E+00		8.12E+02	8.20E+00	1.79E+01		4.26E+02	
Ni ⁺²						1.60E+00	8.42E-02			1.11E-01	
Pb ⁺⁴				3.66E-02			1.95E-01	1.79E-03		1.37E-02	
Rb											
Re											
Rh											
Ru											
Sb											
Se				1.07E-05				2.32E-05		1.53E-06	
SiO ₂							5.17E-03				
UO ₂ ⁺²				1.51E-06				4.69E-02		1.67E-02	
V ⁺⁵											
W ⁺⁶											
Zn ⁺²				7.48E-04		5.04E-02	5.61E-03	1.98E-03			
Zr ⁺⁴				2.21E-03			5.58E-02				
Al(OH) ₃	7.09E+02			2.60E+00		7.35E+01		9.42E-03		1.71E+02	
CO ₂	9.33E+01			1.56E+00		2.08E+02	2.11E+00	3.81E+00		1.12E+02	
Cl ⁻	3.65E+01			1.96E-01		1.28E+01	1.29E-01	8.83E-02		1.21E+01	
CrO ₄ ⁻²	6.48E+00			9.98E-02		2.76E+00		3.52E-04		5.76E+00	
F ⁻				4.89E-03		2.72E+00	2.75E-02	2.75E-01		7.01E-01	
SO ₄ ⁻²	2.81E+01			1.71E-01		4.32E+01	4.36E-01	3.46E-01		1.88E+01	
NO ₃	8.29E+02			5.37E+00		8.60E+02	8.69E+00	6.34E+00		3.26E+02	
NO ₂	5.14E+02			2.35E+00		1.52E+02	1.53E+00	4.45E+00		1.59E+02	
PO ₄ ⁻³	8.14E+00			1.46E+00		1.64E+00	1.66E-02	4.01E-02		4.84E+01	
OH ⁻	2.65E+02			6.41E-01		5.67E-05	4.27E-06	7.30E+00		3.82E+01	
TOC	2.00E+02			2.59E-01		1.78E+02	1.80E+00	9.51E-02		1.37E+01	
Total w/o H ₂ O	3.90E+03			2.21E+01		2.36E+03	2.51E+01	4.08E+01		1.34E+03	
H ₂ O	2.23E+03			8.13E+01		3.05E+03		3.97E+03		2.84E+03	
Total	6.13E+03			1.03E+02		5.42E+03	2.51E+01	4.01E+03		4.18E+03	
Volume, Liters	4.28E+06			7.95E+04		4.01E+06		4.01E+06		4.18E+06	

Radionuclides (Ci)	105AN		106AN		107AN		101AP		102AP	
	Soluble	Insoluble	Soluble	Insoluble*	Soluble	Insoluble	Soluble	Insoluble	Soluble	Insoluble
14C			2.66E-02			1.88E+03	1.87E-02		1.75E+00	
90Sr	1.19E+04		1.38E+02		3.49E+05	1.83E+04	1.95E+00		5.19E+03	
90Y	1.19E+04		1.38E+02		3.49E+05	1.83E+04	1.95E+00		5.19E+03	
99Tc	7.49E+02		5.50E+00		1.76E+03		1.23E-01		3.58E+02	
137Cs	1.87E+06		1.27E+04		8.69E+05	8.78E+03	1.13E+02		8.28E+03	
137Ba	1.77E+06		1.21E+04		8.26E+05	8.34E+03	1.07E+02		7.86E+03	
154Eu					5.31E+03	5.37E+01	2.35E+00			
238Pu										
239Pu	4.45E+01		1.46E-03		3.07E+02	1.62E+01	8.55E-01		3.13E-01	
240Pu	6.83E+00		2.24E-04		7.80E+01	4.11E+00	1.31E-01		4.81E-02	
241Pu	2.02E+01		6.83E-04		1.45E+02	1.47E+00	3.88E-01		1.42E-01	
241Am	6.48E+00		4.74E-02		1.46E+03	7.68E+01	5.41E-01		1.74E+00	
Total Curies	3.67E+06		2.51E+04		2.40E+06	5.58E+04	2.29E+02		2.69E+04	

WHC-SD-WM-TI-693 Rev. 0
 Estimated Mass of Chemical and Radioactive Components
 in Double-Shell Tank Wastes
 Decayed to 12/31/99

Units are in Metric Tons										
Component	103AP		104AP		105AP		106AP		107AP	
	Soluble	Insoluble	Soluble	Insoluble	Soluble	Insoluble	Soluble	Insoluble	Soluble	Insoluble
Ag	1.71E-04		6.62E-06		4.31E-04		2.72E-02		2.07E-04	
Al (III)										
As ⁴⁺	2.07E-04				2.82E-03		1.07E-03		5.46E-05	
B ³⁺					6.64E-02					
Ba ²⁺	2.78E-04		3.30E-05		1.98E-03		6.87E-04		1.04E-04	
Be ²⁺							1.64E-02			
Bi ³⁺			1.98E-04							
Ca ²⁺			5.95E-05		2.07E-01				8.44E-02	
Cd ²⁺	4.76E-04		1.32E-05		5.49E-03		2.53E-02		8.40E-05	
Ce ³⁺										
Cr (III)										
Cu ²⁺			1.32E-05							
Fe ³⁺	5.27E-03		1.52E-04		2.05E-02		2.94E-02		2.31E-04	
Hg ²⁺	2.14E-05				7.76E-05		1.07E-05		1.28E-05	
K ⁺	6.51E+00		6.62E-04		9.62E+01		3.49E+00			
La ³⁺										
Li ⁺										
Mg ²⁺	5.09E-03		1.06E-04		2.82E-02				6.51E-03	
Mn ²⁺	1.85E-04		7.97E-06						3.25E-04	
Mo ⁶⁺			3.30E-04							
Na ⁺	2.27E+01		7.70E-01		5.18E+02		2.36E+01		9.58E+00	
Ni ²⁺			1.32E-05		3.38E-02		1.74E-03			
Pb ²⁺	1.71E-03		2.64E-04		1.67E-02		6.62E-03		1.38E-03	
Rb										
Re										
Rh										
Ru										
Sb										
Se	8.56E-05				4.38E-04		1.07E-03		5.46E-05	
SiO ₂			4.30E-04		1.22E+00					
UO ₂ ²⁺	1.79E-02		1.70E-05		1.49E-01		1.80E-02		1.12E-04	
V ⁵⁺										
W ⁶⁺										
Zn ²⁺	1.89E-03				1.82E-01				4.16E-03	
Zr ⁴⁺			3.30E-04							
Al(OH) ₃	3.71E+00		2.33E-04		1.28E+02		3.17E+00		1.57E-02	
CO ₃ ²⁻	1.10E+01				6.98E+01		1.10E+01		6.22E+00	
Cl ⁻	2.12E-01		2.49E-03		7.32E+00		2.40E-01		9.24E-02	
CrO ₄ ²⁻	4.19E-02		2.51E-04		1.29E+00		4.51E-02		2.89E-04	
F ⁻	5.52E-01		1.13E-03		4.72E+00		7.39E-01		5.97E-01	
SO ₄ ²⁻	1.50E+00		1.08E-01		7.51E+00		5.98E-01		8.53E-01	
NO ₃ ⁻	1.73E+01		1.31E-04		5.12E+02		1.81E+01		4.29E+00	
NO ₂ ⁻	5.57E+00				1.50E+02		4.95E+00		4.66E+00	
PO ₄ ³⁻	5.95E-01		1.10E+00		1.37E+00		9.01E-01		4.20E-02	
OH ⁻	7.23E+00				1.68E+02		6.11E+00		1.12E+00	
TOC	4.79E-01		1.29E-02		8.54E+00		2.07E+00		2.18E-01	
Total w/o H ₂ O	7.74E+01		2.00E+00		1.67E+03		7.51E+01		2.78E+01	
H ₂ O	4.20E+03		6.62E+01		1.43E+03		4.20E+03		4.17E+03	
Total	4.28E+03		6.82E+01		3.10E+03		4.28E+03		4.20E+03	
Volume, Liters	4.28E+06		6.82E+04		3.10E+06		4.28E+06		4.20E+06	

Radionuclides (Ci)	103AP		104AP		105AP		106AP		107AP	
	Soluble	Insoluble	Soluble	Insoluble	Soluble	Insoluble	Soluble	Insoluble	Soluble	Insoluble
14C	1.91E-02		8.19E-05		6.75E-01		3.31E-02		1.34E-02	
90Sr	9.67E+00		1.78E-03		5.58E+02		2.54E+00		4.29E-01	
90Y	9.67E+00		1.78E-03		5.58E+02		2.54E+00		4.29E-01	
99Tc	4.63E+00		3.46E-03		2.17E+02		5.73E+01		8.64E-02	
137Cs	2.43E+04		3.20E-02		6.12E+05		1.69E+04		4.49E-01	
137Ba	2.31E+04		3.04E-02		5.81E+05		1.61E+04		4.27E-01	
154Eu	7.25E+01								4.89E-01	
238Pu										
239Pu	2.99E-02		2.29E-04		4.91E-01		5.81E-01		2.25E+00	
240Pu	4.59E-03		3.52E-05		7.64E-02		8.92E-02		3.46E-01	
241Pu	1.35E-02		1.04E-04		2.23E-01		2.84E-01		1.02E+00	
241Am	4.84E-02		5.53E-05		1.26E+00		4.04E-04		2.66E+00	
Total Curies	4.74E+04		7.00E-02		1.19E+06		3.30E+04		8.60E+00	

WHC-SD-WM-TI-693 Rev. 0
Estimated Mass of Chemical and Radioactive Components
In Double-Shell Tank Wastes
Decayed to 12/31/99

Units are in Metric Tons	108AP		101AW		102AW		103AW		104AW	
	Soluble	Insoluble	Soluble	Insoluble	Soluble	Insoluble	Soluble	Insoluble	Soluble	Insoluble
Ag ⁺	7.20E-03		1.43E-01		3.31E-03				7.16E-03	
Al (III)								9.83E+00		
As ⁵⁺	2.42E-03		4.29E-05		5.58E-03				2.41E-03	
B ³⁺										
Ba ²⁺	2.08E-03		4.02E-02		4.82E-03			6.80E-01	2.07E-03	
Be ²⁺	2.60E-03								2.58E-03	
Bi ³⁺	3.04E-05		5.21E-01						3.02E-05	
Ca ²⁺	2.53E-02		1.42E-01				3.00E-02	1.47E+00	2.51E-02	
Cd ²⁺	6.69E-03		5.21E-03		1.48E-03				6.64E-03	
Ce ³⁺										
Cr (III)								5.92E-01		
Cu ²⁺	2.02E-06		1.04E-01						2.01E-06	
Fe ²⁺	6.30E-02		1.89E-01		1.17E-01			1.40E+00	6.25E-02	
Hg ⁺	2.11E-05		6.76E-04		1.85E-05				2.10E-05	
K ⁺	2.36E+00		1.80E+02				2.65E+01	7.48E+00	2.34E+00	
La ³⁺								9.00E-01		
Li ⁺										
Mg ²⁺	1.51E-02		2.25E-01		4.98E-02			8.30E-01	1.50E-02	
Mn ²⁺	3.96E-03		1.12E-01		3.60E-03			9.50E-01	3.93E-03	
Mo ⁶⁺	5.06E-05		2.47E-01					4.50E-01	5.03E-05	
Na ⁺	1.06E+02		9.90E+02		6.22E+01		2.02E+02	7.84E+01	1.05E+02	
Ni ²⁺	1.73E-02							3.60E-01	1.72E-02	
Pb ²⁺	8.44E-03		1.30E+00		2.96E-02				8.38E-03	
Rb										
Re										
Rh										
Ru										
Sb										
Se	1.92E-04		1.42E-04						1.91E-04	
SiO ₂	1.43E-01		1.43E+00				1.63E+00	6.51E+00	6.54E-05	
UO ₂ ²⁺	8.07E-03		1.09E+00					1.70E+01	8.01E-03	
V ⁵⁺										
W ⁶⁺										
Zn ²⁺	5.80E-02		1.36E+00		3.39E-02			2.80E-01	5.76E-02	
Zr ⁴⁺	5.06E-05		2.17E-01					1.59E+02	5.03E-05	
Al(OH) ₃	3.11E+01		4.23E+02		6.38E+00		4.00E+00		3.08E+01	
CO ₂	2.20E+01				1.37E+02				2.19E+01	
Cl ⁻	2.48E+00		2.23E+01		1.72E+00		5.82E-01	1.80E-02	2.46E+00	
CrO ₄ ²⁻	9.34E-01		1.54E+00		8.81E-02		1.97E-01		9.27E-01	
F ⁻	5.95E+00		3.28E-01		1.49E+01		1.21E+02	9.10E+00	5.91E+00	
SO ₄ ²⁻	1.42E+00		4.43E+00		8.65E+00				6.38E+00	
NO ₃ ⁻	8.31E+01		9.21E+02		5.31E+01		7.68E+00	4.32E+00	8.26E+01	
NO ₂ ⁻	3.35E+01		4.39E+02		9.53E+00		1.38E+00	3.24E-01	3.32E+01	
PO ₄ ³⁻	9.59E-01		9.08E+00		6.48E-01			5.73E-02	8.23E+00	
OH ⁻	1.58E+01		3.71E+02		1.07E+01		3.93E+00	1.79E+01	1.57E+01	
TOC	3.34E+00		1.06E+01		1.82E+00		1.63E+00		3.31E+00	
Total w/o H ₂ O	3.14E+02		3.38E+03		3.07E+02		3.70E+02	3.18E+02	3.19E+02	
H ₂ O	3.95E+03		3.29E+03		3.99E+03		2.19E+03		3.91E+03	
Total	4.26E+03		6.67E+03		4.30E+03		2.56E+03	3.18E+02	4.23E+03	
Volume, Liters	4.26E+06		4.30E+06		3.70E+06		2.13E+06		4.23E+06	

Radionuclides (Ci)	108AP		101AW		102AW		103AW		104AW	
	Soluble	Insoluble	Soluble	Insoluble	Soluble	Insoluble	Soluble	Insoluble	Soluble	Insoluble
14C	4.06E-01		1.50E+00						5.05E-01	
90Sr	1.20E+03		3.50E+03		1.22E+02			3.15E+04	1.49E+03	
90Y	1.20E+03		3.50E+03		1.22E+02			3.15E+04	1.49E+03	
99Tc	1.24E+02		6.14E+02						1.54E+02	
137Cs	2.77E+05		1.74E+06		4.15E+04		4.12E+04	4.12E+04	3.45E+05	
137Ba	2.83E+05		1.65E+06		3.94E+04		3.91E+04	3.91E+04	3.28E+05	
154Eu	2.21E+02				3.06E+01				2.75E+01	
238Pu							8.91E+01	3.46E+01		
239Pu	9.39E-01		5.44E+01		1.28E+00			7.97E+02	1.17E+00	
240Pu	1.44E-01		8.35E+00		1.97E-01			2.25E+02	1.79E-01	
241Pu	4.26E-01		2.47E+01		5.81E-01			6.71E+03	5.30E-01	
241Am	1.02E+00		1.37E+02		8.95E-01			1.75E+02	1.27E+00	
Total Curies	5.43E+05		3.40E+06		8.12E+04		8.04E+04	1.51E+05	6.76E+05	

WHC-SD-WM-TI-693 Rev. 0
Estimated Mass of Chemical and Radioactive Components
in Double-Shell Tank Wastes
Decayed to 12/31/99

Units are in Metric Tons Component	105AW		106AW		101AY		102AY		101AZ	
	Soluble	Insoluble	Soluble	Insoluble	Soluble	Insoluble	Soluble	Insoluble	Soluble	Insoluble
Ag ⁺			2.02E-02				2.82E-02	1.04E+00	8.00E-03	8.09E-02
Al (III)		6.83E-01				1.74E+01		5.48E+00		6.74E+00
As ³⁺			1.10E-02						1.01E-01	1.80E-01
B ³⁺						3.14E-01	2.39E-02	3.95E-01	3.10E-02	8.39E-02
Ba ²⁺		8.00E-04	7.28E-03		1.83E-02	1.68E+00	2.08E-03	2.88E-01	6.74E-03	2.18E-01
Be ²⁺		1.39E-04							2.66E-04	3.53E-03
Bi ³⁺										
Ce ³⁺	6.60E-03	3.23E-01			6.60E-01	4.12E+00	1.25E-02	2.04E+00	1.50E-02	4.88E-01
Cd ²⁺			1.25E-02		3.07E-02	5.03E-02	3.89E-04	6.03E-02		1.11E+00
Ce ⁴⁺						2.20E+00			1.46E-02	2.29E-01
Cr (III)		1.92E-01				8.70E+00		5.06E-01		3.10E-02
Cu ²⁺					2.00E-02	8.17E-02			4.30E-03	8.18E-02
Fe ³⁺		5.20E-01	3.14E-01		3.16E-02	6.06E+01	1.22E-03	1.22E+01		2.77E+01
Hg ⁺			4.38E-05							
K ⁺	3.74E+01	1.06E+01			1.02E+00		1.81E-01	1.47E-01	1.49E+01	1.13E+00
La ³⁺		4.50E-01			1.95E-01	1.60E+01	1.73E-04	5.75E-01	1.15E-02	1.13E+00
Li ⁺							1.69E-04	1.70E-06	1.28E-03	1.47E-02
Mg ²⁺		1.70E-01	4.45E-02		4.23E-02	8.11E+00	1.78E-03	9.89E-01	2.57E-03	1.26E-01
Mn ²⁺			2.81E-02		7.85E-01	1.18E+01		1.28E+00		5.96E-01
Mo ⁶⁺		7.50E-02					1.41E-03	1.96E-02	3.12E-01	1.99E-02
Na ⁺	1.49E+02	5.78E+01	1.67E+02		1.73E+02	2.83E+01	9.47E+00	2.79E+00	3.73E+02	1.15E+01
Ni ²⁺		7.00E-02			1.98E-01	1.04E+00	3.96E-04	4.39E-01		1.48E+00
Pb ²⁺					2.30E-01	1.51E+00			8.46E-03	1.12E-01
Rb ⁺									3.90E-02	1.62E-03
Re ⁷⁺		2.14E-01							1.43E-03	1.15E-02
Rh ³⁺		1.47E+00							7.70E-03	4.73E-02
Ru ³⁺		8.35E-01							1.67E-02	1.69E-01
Sb ³⁺		1.35E+00							1.65E-02	5.32E-01
Se ⁶⁺		2.59E+00							3.32E-01	5.20E-01
SiO ₂	7.04E-01	2.82E+00			2.85E-01	1.86E+02	1.85E+00	3.95E+00	1.89E+00	2.50E+00
UO ₂ ²⁺		8.96E+00			6.80E-02		1.60E+00	7.87E-01	7.12E-03	4.55E-03
V ⁵⁺		1.66E-01							1.06E-03	1.89E-03
W ⁶⁺										
Zn ²⁺			4.36E-01		3.44E-02	2.29E-01	2.42E-03	5.46E-02	2.56E-02	9.64E-02
Zr ⁴⁺		9.90E+01			1.41E-01	2.54E+00	1.89E-04	1.91E-06		1.06E+01
Al(OH) ₃	8.17E+00		2.48E+01		1.91E+01		1.33E-02		1.26E+02	
CO ₂	1.20E+01	3.00E+00	4.36E+02		5.17E+01				1.07E+02	2.19E+01
Cl ⁻	5.82E-01	1.80E-02	2.24E+00		1.41E+00		2.74E+00	1.57E-01	5.09E-01	2.12E-02
CrO ₄ ²⁻	3.56E-01		2.15E-01		2.21E-01		6.81E-02		4.35E+00	
F ⁻	1.19E+02	8.96E+00	2.74E+01		1.70E+00		6.58E-01	1.86E-01	5.56E+00	1.72E-01
SO ₄ ²⁻	9.86E-01	1.25E+00	1.44E+01		1.91E+01		3.87E-01	2.00E-02	6.16E+01	6.22E-01
NO ₃ ⁻	7.04E+00	3.96E+00	1.53E+02		1.55E+02		7.52E-01	2.68E-02	3.60E+02	3.64E+00
NO ₂ ⁻	2.43E+00	5.70E-01	4.02E+01		3.56E+01		3.45E+00	3.49E-02	1.22E+02	1.23E+00
PO ₄ ³⁻		4.00E-01	3.06E+00		2.96E+00	1.32E+01	3.85E-01	3.89E-03	5.18E+00	4.50E-01
OH ⁻	9.14E+00	4.17E+01	4.20E+01		2.32E+01				4.07E+01	2.29E+01
TOC	4.60E+00	4.60E+00	4.41E+00		1.75E+01	4.24E+01	1.19E+00	5.64E+00	2.36E-01	5.44E+00
Total w/o H ₂ O	3.51E+02	2.86E+02	9.16E+02		5.03E+02	4.17E+02	2.28E+01	3.95E+01	1.22E+03	1.26E+02
H ₂ O	3.32E+03		4.13E+03		2.73E+03		3.15E+03		3.25E+03	
Total	3.67E+03	2.86E+02	5.05E+03		3.24E+03	4.17E+02	3.18E+03	3.95E+01	4.48E+03	1.26E+02
Volume, Liters	3.67E+06		4.21E+06		2.94E+06		2.65E+06		3.44E+06	

Radionuclides (Ci)	105AW		106AW		101AY		102AY		101AZ	
	Soluble	Insoluble	Soluble	Insoluble	Soluble	Insoluble	Soluble	Insoluble	Soluble	Insoluble
14C			3.13E-01				1.81E-01		1.94E+02	1.02E+01
90Sr		1.96E+04	1.07E+02		3.58E+05	3.96E+05	3.70E+03	1.98E+06	5.48E+04	5.42E+06
90Y		1.96E+04	1.07E+02		3.58E+05	3.96E+05	3.70E+03	1.98E+06	5.48E+04	5.42E+06
99Tc			7.05E+01		4.30E+02		2.47E+01	4.54E+00	1.10E+03	2.58E+02
137Cs	1.10E+05	1.10E+05	1.84E+05		1.44E+05	1.32E+05	5.40E+03	1.92E+04	6.14E+06	1.90E+05
137Ba	1.05E+05	1.05E+05	1.75E+05		1.37E+05	1.26E+05	5.13E+03	1.82E+04	5.83E+06	1.80E+05
154Eu			4.08E+01				4.53E+01	4.20E+03	1.05E+04	1.78E+04
238Pu	4.89E+01	1.82E+01						1.92E+02	8.16E+01	2.52E+00
239Pu		4.19E+02	4.15E-01		2.40E+01	2.79E+03	4.61E-01	6.56E+02	2.17E+01	5.20E+02
240Pu		1.19E+02	6.37E-02		6.10E+00	6.97E+02	1.17E-01		6.13E+00	1.47E+02
241Pu		3.53E+03	1.88E-01		1.09E+01	4.91E+02	2.09E-01		1.82E+02	4.37E+03
241Am		1.74E+02	8.93E-02		9.83E+01	1.21E+04	3.60E-01	3.25E+03	5.76E+02	2.82E+04
Total Curies	2.15E+05	2.59E+05	3.60E+05		9.97E+05	1.07E+06	1.80E+04	4.00E+06	1.21E+07	1.13E+07

WHC-SD-WM-TI-693 Rev. 0
Estimated Mass of Chemical and Radioactive Components
in Double-Shell Tank Wastes
Decayed to 12/31/99

Units are in Metric Tons	102AZ		101SY		102SY		103SY	
	Soluble	Insoluble	Soluble	Insoluble	Soluble	Insoluble	Soluble	Insoluble
Ag ⁺	1.94E-02	1.96E-01				5.80E-02		
Al (III)		1.21E+01		3.75E+00		1.07E+01		2.05E-02
As ³⁺	6.69E-02	1.17E-01				2.01E-01		
B ³⁺	4.57E-02	1.24E-01				5.81E-02	3.52E-01	1.85E-02
Ba ²⁺	4.83E-03	1.56E-01					2.93E-02	3.26E-03
Be ²⁺	2.96E-04	3.94E-03						
Bi ³⁺								
Ca ²⁺	2.65E-02	8.58E-01	3.68E+00	3.06E-01	2.42E-01	1.37E+00	5.65E-01	6.28E-02
Cd ²⁺		4.28E+00				2.42E-01		
Ce ³⁺	8.00E-03	1.28E-01				2.64E-01		
Cr (III)		6.56E-02		2.11E+01		2.91E+00		1.89E-03
Cu ²⁺	5.50E-03	1.05E-01				3.42E-01		
Fe ³⁺		3.11E+01	1.43E-01	2.06E+00		6.00E+00	4.03E+00	2.12E-01
Hg ⁺								
K ⁺	4.88E+00	3.67E-01	1.90E+01	1.92E-01	7.53E+00	7.61E-02	1.07E+01	1.08E-01
La ³⁺	1.29E-02	1.28E+00						9.89E-02
Li ⁺	6.90E-04	7.93E-03			3.64E-03	1.98E-03		
Mg ²⁺	5.50E-03	2.69E-01				4.57E-01	4.67E-02	5.18E-03
Mn ²⁺		8.26E-01				2.21E+00	1.42E+00	7.47E-02
Mo ⁶⁺	1.80E-01	1.15E-02	3.95E-01	2.08E-02		2.58E-02	3.90E-01	2.05E-02
Na ⁺	1.87E+02	5.80E+00	1.19E+03	1.20E+01	7.77E+01	7.69E+00	8.70E+02	8.78E+00
Ni ²⁺		1.92E+00	1.70E-01	9.30E-01		1.58E-01	3.84E-01	2.02E-02
Pb ²⁺	2.33E-02	3.09E-01				3.34E-01		
Rb	2.24E-02	9.35E-04						
Re	2.59E-03	2.09E-02						
Rh	4.25E-03	2.61E-02				1.38E-01		
Ru	9.22E-03	9.32E-02				1.36E-01		
Sb	3.03E-02	9.78E-01				9.82E-02		
Se	1.28E-01	2.00E-01				6.37E-01		
SiO ₂	3.58E+00	4.75E+00			7.15E-02	2.31E+00		3.70E+00
UO ₂ ²⁺								
V ⁵⁺	3.49E-03	6.20E-03				1.37E-02		
W ⁶⁺								
Zn ²⁺	6.63E-03	3.25E-02	3.20E-01	3.55E-02		1.23E-01	7.82E-01	8.68E-02
Zr ⁴⁺		5.20E+00				9.81E-02		8.65E-02
Al(OH) ₃	1.28E+01		6.56E+02		1.25E+01		5.24E+02	
CO ₂	1.26E+02	2.59E+01			1.42E+01	2.91E+00	6.97E+01	7.04E-01
Cl ⁻	2.52E-01	1.05E-02	4.82E+01	4.87E-01	3.02E+00	1.59E-01	2.28E+01	2.31E-01
CrO ₄ ²⁻	8.96E+00		4.00E+00		8.67E+00		4.75E+01	
F ⁻	3.14E+00	9.71E-02	6.95E-01	7.02E-03	3.10E+00	3.07E-01	4.83E+00	4.88E-02
SO ₄ ²⁻	4.98E+01	5.03E-01	2.54E+01	2.57E-01	1.39E+00	3.09E+00	1.15E+01	1.16E-01
NO ₃ ⁻	2.17E+01	2.19E-01	2.65E+02	2.68E+00	1.10E+02	1.11E+00	6.54E+02	6.61E+00
NO ₂ ⁻	1.47E+01	1.48E-01	2.28E+02	2.30E+00	1.54E+01	1.56E-01		
PO ₄ ³⁻	5.48E-01	4.77E-02	4.07E+01	4.11E-01	9.89E+00	6.59E+00	1.57E+01	1.58E-01
OH ⁻			1.31E+02	9.83E+00	2.37E-01	2.34E+01	7.23E+01	5.44E+00
TOC	2.44E-01	5.63E+00	9.44E+01	9.54E-01			3.31E+01	3.34E-01
Total w/o H ₂ O	4.35E+02	1.07E+02	2.70E+03	5.73E+01	2.64E+02	7.58E+01	2.34E+03	2.69E+01
H ₂ O	3.48E+03		3.96E+03		3.15E+03		2.11E+03	
Total	3.91E+03	1.07E+02	6.66E+03	5.73E+01	3.42E+03	7.58E+01	4.45E+03	2.69E+01
Volume, Liters	3.56E+06		4.16E+06		2.65E+06		2.78E+06	

Radionuclides (Ci)	102AZ		101SY		102SY		103SY	
	Soluble	Insoluble	Soluble	Insoluble	Soluble	Insoluble	Soluble	Insoluble
14C	1.39E+02	7.31E+00				8.06E-01		
90Sr	2.98E+04	2.95E+08	4.62E+04	3.50E+04		2.32E+04	8.80E+04	4.61E+02
90Y	2.98E+04	2.95E+08	4.62E+04	3.50E+04		2.32E+04	8.80E+04	4.61E+02
99Tc	6.00E+02	1.41E+02	2.57E+03				1.88E+03	
137Cs	3.37E+06	1.04E+06	1.43E+06	1.45E+04	5.24E+04	2.76E+03	1.12E+06	1.13E+04
137Ba	3.20E+06	9.89E+04	1.36E+06	1.37E+04	4.98E+04	2.82E+03	1.06E+06	1.07E+04
154Eu	6.49E+02	1.56E+04			3.25E+00	3.22E+02		
238Pu	7.87E+01	2.43E+00				1.02E+03		
239Pu	2.09E+01	5.01E+02	8.81E+00	3.76E+01		2.08E+03	1.14E+01	6.02E-01
240Pu	5.91E+00	1.42E+02	2.24E+00	9.54E+00		7.49E+02	2.90E+00	1.53E-01
241Pu	8.42E-01	4.39E+03	4.00E+00	1.71E+01		1.84E+04	5.41E+00	5.46E-02
241Am	3.36E+02	1.65E+04	8.03E+01	3.42E+02		1.13E+04	8.21E+01	4.32E+00
Total Curies	6.63E+06	6.14E+06	2.89E+06	9.87E+04	1.02E+05	8.56E+04	2.36E+06	2.29E+04

WHC-SD-WM-TI-693 Rev. 0

APPENDIX C

Batches Generated by SIMAN for Simulating LLW Processing

Courtesy of R. S. Wittman

WHC-SD-WM-TI-693 Rev. 0

Batch No. = 1, Time = 753. days, Batch Vol = 1.000E+03 kgal
 Mass Tot = 4.734E+09 g, Na Con = 5.051E+00 M

1	2.043E-02	101A
7	2.000E-02	101AX
32	3.414E-02	106BX
40	3.708E-03	102BY
41	4.656E-03	103BY
43	1.690E-02	105BY
44	1.500E-02	106BY
47	7.588E-03	109BY
52	1.983E-03	102C
53	2.949E-02	103C
57	9.571E-03	107C
60	3.363E-03	110C
67	1.509E-02	101S
68	1.828E-02	102S
69	1.716E-02	103S
72	5.346E-03	106S
73	6.294E-03	107S
74	2.759E-03	108S
75	5.346E-03	109S
76	9.484E-04	110S
77	1.707E-02	111S
78	5.863E-03	112S
79	1.543E-02	101SX
80	1.431E-02	102SX
81	1.897E-02	103SX
82	3.966E-03	104SX
83	1.604E-02	105SX
84	2.613E-02	106SX
97	1.457E-02	104T
100	1.526E-02	107T
103	1.302E-02	110T
104	2.078E-02	111T
135	1.612E-02	102U
136	1.759E-02	103U
138	2.207E-02	105U
139	1.440E-02	106U
140	2.535E-02	107U
141	9.053E-03	108U
142	2.138E-02	109U
144	1.535E-02	111U
150	8.622E-01	101AN

Batch No. = 2, Time = 776. days, Batch Vol = 1.000E+03 kgal
 Mass Tot = 4.709E+09 g, Na Con = 6.963E+00 M
 151 7.200E-01 102AN

WHC-SD-WM-TI-693 Rev. 0

Batch No. = 3, Time = 799. days, Batch Vol = 1.000E+03 kgal
 Mass Tot = 4.726E+09 g, Na Con = 6.996E+00 M
 152 5.033E-01 103AN

Batch No. = 4, Time = 823. days, Batch Vol = 1.000E+03 kgal
 Mass Tot = 4.737E+09 g, Na Con = 7.001E+00 M
 153 5.346E-01 104AN

Batch No. = 5, Time = 846. days, Batch Vol = 1.000E+03 kgal
 Mass Tot = 4.720E+09 g, Na Con = 6.999E+00 M
 154 5.164E-01 105AN

Batch No. = 6, Time = 869. days, Batch Vol = 1.000E+03 kgal
 Mass Tot = 4.735E+09 g, Na Con = 7.006E+00 M
 155 9.074E-01 106AN
 157 9.074E-01 101AP
 159 9.074E-01 103AP
 162 9.074E-01 106AP
 163 9.074E-01 107AP
 164 9.074E-01 108AP
 166 9.074E-01 102AW
 170 9.074E-01 106AW
 177 2.671E-01 103SY

Batch No. = 7, Time = 892. days, Batch Vol = 1.000E+03 kgal
 Mass Tot = 4.727E+09 g, Na Con = 6.999E+00 M
 165 6.155E-01 101AW

Batch No. = 8, Time = 914. days, Batch Vol = 9.500E+02 kgal
 Mass Tot = 3.726E+09 g, Na Con = 5.809E+00 M
 171 1.000E+00 101AY
 177 3.534E-01 103SY

Batch No. = 9, Time = 936. days, Batch Vol = 9.500E+02 kgal
 Mass Tot = 4.197E+09 g, Na Con = 3.226E+00 M
 56 1.000E+00 106C
 172 1.000E+00 102AY
 175 6.135E-02 101SY
 177 1.093E-01 103SY

Batch No. = 10, Time = 958. days, Batch Vol = 9.500E+02 kgal
 Mass Tot = 4.334E+09 g, Na Con = 6.753E+00 M
 173 1.000E+00 101AZ
 175 1.041E-01 101SY
 177 6.746E-02 103SY

Batch No. = 11, Time = 980. days, Batch Vol = 9.500E+02 kgal
 Mass Tot = 4.138E+09 g, Na Con = 5.660E+00 M
 174 1.000E+00 102AZ
 175 8.018E-02 101SY

177 5.197E-02 103SY

Batch No. = 12, Time = 1003. days, Batch Vol = 1.000E+03 kgal

Mass Tot = 4.714E+09 g, Na Con = 6.979E+00 M

156 7.483E-01 107AN

Batch No. = 13, Time = 1026. days, Batch Vol = 1.000E+03 kgal

Mass Tot = 4.734E+09 g, Na Con = 4.843E+00 M

1	2.259E-02	101A
7	2.216E-02	101AX
32	3.777E-02	106BX
40	4.052E-03	102BY
41	5.173E-03	103BY
43	1.871E-02	105BY
44	1.655E-02	106BY
47	8.450E-03	109BY
52	2.242E-03	102C
53	3.251E-02	103C
57	1.061E-02	107C
60	3.708E-03	110C
67	1.664E-02	101S
68	2.018E-02	102S
69	1.888E-02	103S
72	5.949E-03	106S
73	6.898E-03	107S
74	3.018E-03	108S
75	5.949E-03	109S
76	1.035E-03	110S
77	1.888E-02	111S
78	6.467E-03	112S
79	1.707E-02	101SX
80	1.578E-02	102SX
81	2.095E-02	103SX
82	4.397E-03	104SX
83	1.776E-02	105SX
84	2.888E-02	106SX
97	1.604E-02	104T
100	1.690E-02	107T
103	1.440E-02	110T
104	2.302E-02	111T
135	1.785E-02	102U
136	1.940E-02	103U
138	2.440E-02	105U
139	1.595E-02	106U
140	2.802E-02	107U
141	1.000E-02	108U
142	2.371E-02	109U
144	1.690E-02	111U

WHC-SD-WM-TI-693 Rev. 0

Batch No. = 14, Time = 1049. days, Batch Vol = 1.000E+03 kgal

Mass Tot = 4.442E+09 g, Na Con = 4.972E+00 M

158	9.074E-01	102AP
175	1.317E-02	101SY
177	8.539E-03	103SY

Batch No. = 15, Time = 1073. days, Batch Vol = 1.000E+03 kgal

Mass Tot = 4.734E+09 g, Na Con = 4.843E+00 M

1	2.259E-02	101A
7	2.216E-02	101AX
32	3.777E-02	106BX
40	4.052E-03	102BY
41	5.173E-03	103BY
43	1.871E-02	105BY
44	1.655E-02	106BY
47	8.450E-03	109BY
52	2.242E-03	102C
53	3.251E-02	103C
57	1.061E-02	107C
60	3.708E-03	110C
67	1.664E-02	101S
68	2.018E-02	102S
69	1.888E-02	103S
72	5.949E-03	106S
73	6.898E-03	107S
74	3.018E-03	108S
75	5.949E-03	109S
76	1.035E-03	110S
77	1.888E-02	111S
78	6.467E-03	112S
79	1.707E-02	101SX
80	1.578E-02	102SX
81	2.095E-02	103SX
82	4.397E-03	104SX
83	1.776E-02	105SX
84	2.888E-02	106SX
97	1.604E-02	104T
100	1.690E-02	107T
103	1.440E-02	110T
104	2.302E-02	111T
135	1.785E-02	102U
136	1.940E-02	103U
138	2.440E-02	105U
139	1.595E-02	106U
140	2.802E-02	107U
141	1.000E-02	108U
142	2.371E-02	109U
144	1.690E-02	111U

WHC-SD-WM-TI-693 Rev. 0

Batch No. = 16, Time = 1092. days, Batch Vol = 8.507E+02 kgal
 Mass Tot = 4.040E+09 g, Na Con = 6.995E+00 M
 161 1.000E+00 105AP

Batch No. = 17, Time = 1115. days, Batch Vol = 1.000E+03 kgal
 Mass Tot = 4.729E+09 g, Na Con = 6.708E+00 M

1	3.146E-03	101A
7	3.048E-03	101AX
32	5.309E-03	106BX
40	5.899E-04	102BY
41	6.882E-04	103BY
43	2.654E-03	105BY
44	2.359E-03	106BY
47	1.180E-03	109BY
52	2.949E-04	102C
53	4.522E-03	103C
57	1.475E-03	107C
60	4.915E-04	110C
67	2.359E-03	101S
68	2.851E-03	102S
69	2.654E-03	103S
72	7.865E-04	106S
73	9.831E-04	107S
74	3.932E-04	108S
75	7.865E-04	109S
76	9.831E-05	110S
77	2.654E-03	111S
78	8.848E-04	112S
79	2.359E-03	101SX
80	2.163E-03	102SX
81	2.949E-03	103SX
82	5.899E-04	104SX
83	2.458E-03	105SX
84	4.031E-03	106SX
97	2.261E-03	104T
100	2.359E-03	107T
103	2.064E-03	110T
104	3.244E-03	111T
135	2.458E-03	102U
136	2.753E-03	103U
138	3.441E-03	105U
139	2.261E-03	106U
140	3.932E-03	107U
141	1.376E-03	108U
142	3.343E-03	109U
144	2.359E-03	111U
167	9.831E-01	103AW
168	9.831E-01	104AW
169	9.831E-01	105AW
176	9.831E-01	102SY

WHC-SD-WM-TI-693 Rev. 0

Batch No. = 18, Time = 1139. days, Batch Vol = 1.000E+03 kgal
 Mass Tot = 4.752E+09 g, Na Con = 6.724E+00 M

1	2.963E-03	101A
7	2.901E-03	101AX
32	4.951E-03	106BX
40	5.376E-04	102BY
41	6.752E-04	103BY
43	2.451E-03	105BY
44	2.176E-03	106BY
47	1.100E-03	109BY
52	2.876E-04	102C
53	4.276E-03	103C
57	1.388E-03	107C
60	4.876E-04	110C
67	2.188E-03	101S
68	2.651E-03	102S
69	2.488E-03	103S
72	7.752E-04	106S
73	9.127E-04	107S
74	4.001E-04	108S
75	7.752E-04	109S
76	1.375E-04	110S
77	2.476E-03	111S
78	8.502E-04	112S
79	2.238E-03	101SX
80	2.075E-03	102SX
81	2.751E-03	103SX
82	5.751E-04	104SX
83	2.326E-03	105SX
84	3.788E-03	106SX
97	2.113E-03	104T
100	2.213E-03	107T
103	1.888E-03	110T
104	3.013E-03	111T
135	2.338E-03	102U
136	2.551E-03	103U
138	3.201E-03	105U
139	2.088E-03	106U
140	3.676E-03	107U
141	1.313E-03	108U
142	3.101E-03	109U
144	2.226E-03	111U
150	1.250E-01	101AN
175	4.381E-01	101SY

Batch No. = 19, Time = 1161. days, Batch Vol = 9.868E+02 kgal
 Mass Tot = 4.664E+09 g, Na Con = 6.996E+00 M

152	4.967E-01	103AN
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WHC-SD-WM-TI-693 Rev. 0

Batch No. = 20, Time = 1182. days, Batch Vol = 8.705E+02 kgal
 Mass Tot = 4.123E+09 g, Na Con = 7.000E+00 M
 153 4.654E-01 104AN

Batch No. = 21, Time = 1203. days, Batch Vol = 9.366E+02 kgal
 Mass Tot = 4.420E+09 g, Na Con = 6.999E+00 M
 154 4.836E-01 105AN

Batch No. = 22, Time = 1226. days, Batch Vol = 1.000E+03 kgal
 Mass Tot = 4.729E+09 g, Na Con = 6.283E+00 M
 127 2.112E-01 118TX
 151 2.541E-01 102AN
 175 1.292E-01 101SY
 177 2.956E-02 103SY

Batch No. = 23, Time = 1250. days, Batch Vol = 1.000E+03 kgal
 Mass Tot = 4.735E+09 g, Na Con = 5.478E+00 M
 116 1.747E-01 107TX
 121 2.590E-02 112TX
 127 3.877E-01 118TX
 155 8.399E-02 106AN
 157 8.399E-02 101AP
 159 8.399E-02 103AP
 162 8.399E-02 106AP
 163 8.399E-02 107AP
 164 8.399E-02 108AP
 166 8.399E-02 102AW
 170 8.399E-02 106AW
 175 6.055E-02 101SY
 177 4.414E-02 103SY

Batch No. = 24, Time = 1273. days, Batch Vol = 1.000E+03 kgal
 Mass Tot = 4.731E+09 g, Na Con = 6.182E+00 M
 116 5.774E-02 107TX
 121 7.023E-02 112TX
 127 9.826E-02 118TX
 165 3.534E-01 101AW
 175 7.111E-03 101SY
 177 2.234E-03 103SY

Batch No. = 25, Time = 1292. days, Batch Vol = 8.529E+02 kgal
 Mass Tot = 3.682E+09 g, Na Con = 4.185E+00 M
 1 3.022E-04 101A
 7 2.959E-04 101AX
 32 5.050E-04 106BX
 40 5.484E-05 102BY
 41 6.887E-05 103BY
 43 2.500E-04 105BY
 44 2.219E-04 106BY
 47 1.122E-04 109BY

WHC-SD-WM-TI-693 Rev. 0

52	2.933E-05	102C
53	4.362E-04	103C
57	1.416E-04	107C
60	4.974E-05	110C
67	2.232E-04	101S
68	2.704E-04	102S
69	2.538E-04	103S
72	7.907E-05	106S
73	9.310E-05	107S
74	4.081E-05	108S
75	7.907E-05	109S
76	1.403E-05	110S
77	2.525E-04	111S
78	8.672E-05	112S
79	2.283E-04	101SX
80	2.117E-04	102SX
81	2.806E-04	103SX
82	5.866E-05	104SX
83	2.372E-04	105SX
84	3.864E-04	106SX
97	2.155E-04	104T
100	2.257E-04	107T
103	1.926E-04	110T
104	3.073E-04	111T
116	3.169E-02	107TX
121	4.015E-02	112TX
127	5.379E-02	118TX
135	2.385E-04	102U
136	2.602E-04	103U
138	3.265E-04	105U
139	2.130E-04	106U
140	3.749E-04	107U
141	1.339E-04	108U
142	3.163E-04	109U
144	2.270E-04	111U
150	1.275E-02	101AN
175	4.853E-02	101SY
177	1.207E-03	103SY

Batch No. = 26, Time = 1334. days, Batch Vol = 1.000E+03 kgal
 Mass Tot = 3.928E+09 g, Na Con = 1.019E+00 M

116	4.158E-03	107TX
121	5.268E-03	112TX
127	2.859E-02	118TX
151	2.590E-02	102AN
175	1.368E-02	101SY
177	3.171E-03	103SY

WHC-SD-WM-TI-693 Rev. 0

Batch No. = 27, Time = 1431. days, Batch Vol = 1.000E+03 kgal

Mass Tot = 4.738E+09 g, Na Con = 5.050E+00 M

116	5.229E-02	107TX
121	2.432E-01	112TX
127	9.012E-02	118TX
155	7.774E-03	106AN
157	7.774E-03	101AP
159	7.774E-03	103AP
162	7.774E-03	106AP
163	7.774E-03	107AP
164	7.774E-03	108AP
166	7.774E-03	102AW
170	7.774E-03	106AW
175	6.928E-03	101SY
177	4.470E-03	103SY

Batch No. = 28, Time = 1454. days, Batch Vol = 1.000E+03 kgal

Mass Tot = 4.740E+09 g, Na Con = 5.140E+00 M

115	6.668E-02	106TX
116	4.619E-03	107TX
121	2.144E-01	112TX
127	3.286E-02	118TX
165	2.827E-02	101AW
175	9.262E-03	101SY
177	3.676E-03	103SY

Batch No. = 29, Time = 1581. days, Batch Vol = 1.000E+03 kgal

Mass Tot = 4.779E+09 g, Na Con = 5.047E+00 M

115	3.662E-01	106TX
116	4.842E-03	107TX
121	3.973E-02	112TX
127	8.357E-03	118TX
151	1.436E-05	102AN
155	7.196E-04	106AN
157	7.196E-04	101AP
159	7.196E-04	103AP
162	7.196E-04	106AP
163	7.196E-04	107AP
164	7.196E-04	108AP
166	7.196E-04	102AW
170	7.196E-04	106AW
175	6.488E-04	101SY
177	4.155E-04	103SY

Batch No. = 30, Time = 1724. days, Batch Vol = 1.000E+03 kgal

Mass Tot = 4.752E+09 g, Na Con = 5.016E+00 M

115	3.621E-01	106TX
116	4.483E-04	107TX
117	2.055E-01	108TX
121	4.247E-03	112TX

WHC-SD-WM-TI-693 Rev. 0

127	7.741E-04	118TX
155	6.660E-05	106AN
157	6.660E-05	101AP
159	6.660E-05	103AP
162	6.660E-05	106AP
163	6.660E-05	107AP
164	6.660E-05	108AP
166	6.660E-05	102AW
170	6.660E-05	106AW
175	6.030E-05	101SY
177	3.852E-05	103SY

Batch No. = 31, Time = 1861. days, Batch Vol = 8.862E+02 kgal
 Mass Tot = 4.201E+09 g, Na Con = 4.856E+00 M

114	1.891E-04	105TX
115	1.254E-01	106TX
116	4.573E-05	107TX
117	5.580E-01	108TX
118	2.511E-01	109TX
121	4.620E-04	112TX
127	7.898E-05	118TX

Batch No. = 32, Time = 2024. days, Batch Vol = 1.000E+03 kgal
 Mass Tot = 4.731E+09 g, Na Con = 5.423E+00 M

114	7.560E-02	105TX
115	7.245E-03	106TX
116	3.051E-03	107TX
117	2.913E-02	108TX
118	3.550E-01	109TX
121	3.055E-02	112TX
127	5.803E-03	118TX
138	2.940E-03	105U
156	2.284E-01	107AN
175	5.365E-04	101SY
177	2.034E-04	103SY

Batch No. = 33, Time = 2055. days, Batch Vol = 1.000E+03 kgal
 Mass Tot = 4.533E+09 g, Na Con = 5.452E+00 M

114	3.223E-02	105TX
115	5.802E-02	106TX
116	7.658E-04	107TX
117	1.357E-01	108TX
118	2.072E-01	109TX
121	2.473E-02	112TX
127	3.772E-03	118TX
138	1.148E-03	105U
165	2.859E-03	101AW
175	9.480E-04	101SY
177	3.750E-04	103SY

WHC-SD-WM-TI-693 Rev. 0

Batch No. = 34, Time = 2083. days, Batch Vol = 8.392E+02 kgal

Mass Tot = 3.972E+09 g, Na Con = 4.982E+00 M

114	1.254E-01	105TX
115	2.969E-03	106TX
117	4.360E-03	108TX
118	4.055E-02	109TX
121	6.570E-03	112TX
127	7.935E-04	118TX
138	2.458E-01	105U
165	2.486E-05	101AW
175	2.728E-04	101SY
177	1.097E-04	103SY

Batch No. = 35, Time = 2105. days, Batch Vol = 9.461E+02 kgal

Mass Tot = 3.868E+09 g, Na Con = 2.249E+00 M

114	1.809E-02	105TX
115	7.250E-03	106TX
116	4.078E-04	107TX
117	4.317E-02	108TX
118	1.020E-01	109TX
121	3.761E-03	112TX
127	7.369E-04	118TX
138	6.713E-04	105U
156	2.330E-02	107AN
175	5.826E-05	101SY
177	2.178E-05	103SY

Batch No. = 36, Time = 2149. days, Batch Vol = 1.000E+03 kgal

Mass Tot = 3.987E+09 g, Na Con = 1.234E+00 M

1	3.276E-03	101A
7	3.213E-03	101AX
32	5.476E-03	106BX
40	5.876E-04	102BY
41	7.502E-04	103BY
43	2.713E-03	105BY
44	2.401E-03	106BY
47	1.225E-03	109BY
52	3.251E-04	102C
53	4.714E-03	103C
57	1.538E-03	107C
60	5.376E-04	110C
67	2.413E-03	101S
68	2.926E-03	102S
69	2.738E-03	103S
72	8.627E-04	106S
73	1.000E-03	107S
74	4.376E-04	108S
75	8.627E-04	109S
76	1.500E-04	110S
77	2.738E-03	111S

WHC-SD-WM-TI-693 Rev. 0

78	9.377E-04	112S
79	2.476E-03	101SX
80	2.288E-03	102SX
81	3.038E-03	103SX
82	6.376E-04	104SX
83	2.576E-03	105SX
84	4.188E-03	106SX
97	2.326E-03	104T
100	2.451E-03	107T
103	2.088E-03	110T
104	3.338E-03	111T
114	3.422E-03	105TX
115	2.265E-03	106TX
116	3.168E-05	107TX
117	1.397E-02	108TX
118	2.204E-02	109TX
121	2.119E-04	112TX
127	4.757E-05	118TX
135	2.588E-03	102U
136	2.813E-03	103U
138	3.660E-03	105U
139	2.313E-03	106U
140	4.063E-03	107U
141	1.450E-03	108U
142	3.438E-03	109U
144	2.451E-03	111U

Batch No. = 37, Time = 2197. days, Batch Vol = 1.000E+03 kgal
 Mass Tot = 4.298E+09 g, Na Con = 2.881E+00 M

114	7.317E-02	105TX
115	8.968E-04	106TX
117	4.752E-03	108TX
118	5.887E-03	109TX
121	3.983E-04	112TX
127	4.912E-05	118TX
136	5.537E-03	103U
138	1.449E-01	105U
158	8.399E-02	102AP
175	1.235E-03	101SY
177	7.968E-04	103SY

Batch No. = 38, Time = 2209. days, Batch Vol = 1.000E+03 kgal
 Mass Tot = 4.132E+09 g, Na Con = 1.944E+00 M

114	5.244E-02	105TX
115	1.072E-04	106TX
117	1.383E-04	108TX
118	1.686E-03	109TX
121	2.764E-04	112TX
127	3.309E-05	118TX
136	3.985E-03	103U

WHC-SD-WM-TI-693 Rev. 0

138	1.043E-01	105U
175	6.891E-03	101SY
177	4.464E-03	103SY

Batch No. = 39, Time = 2220. days, Batch Vol = 1.000E+03 kgal
 Mass Tot = 4.186E+09 g, Na Con = 2.165E+00 M

1	3.032E-04	101A
7	2.974E-04	101AX
32	5.069E-04	106BX
40	5.439E-05	102BY
41	6.944E-05	103BY
43	2.511E-04	105BY
44	2.222E-04	106BY
47	1.134E-04	109BY
52	3.009E-05	102C
53	4.363E-04	103C
57	1.423E-04	107C
60	4.976E-05	110C
67	2.234E-04	101S
68	2.708E-04	102S
69	2.534E-04	103S
72	7.985E-05	106S
73	9.258E-05	107S
74	4.050E-05	108S
75	7.985E-05	109S
76	1.389E-05	110S
77	2.534E-04	111S
78	8.679E-05	112S
79	2.291E-04	101SX
80	2.118E-04	102SX
81	2.812E-04	103SX
82	5.902E-05	104SX
83	2.384E-04	105SX
84	3.877E-04	106SX
97	2.153E-04	104T
100	2.268E-04	107T
103	1.933E-04	110T
104	3.090E-04	111T
114	9.001E-02	105TX
115	2.717E-04	106TX
116	1.479E-05	107TX
117	1.745E-03	108TX
118	7.548E-03	109TX
121	9.911E-05	112TX
127	2.226E-05	118TX
135	2.396E-04	102U
136	4.646E-03	103U
138	6.744E-02	105U
139	2.141E-04	106U
140	3.761E-04	107U

WHC-SD-WM-TI-693 Rev. 0

141	1.342E-04	108U
142	3.182E-04	109U
144	2.268E-04	111U

Batch No. = 40, Time = 2280. days, Batch Vol = 1.000E+03 kgal
 Mass Tot = 4.681E+09 g, Na Con = 4.740E+00 M

1	2.806E-05	101A
7	2.753E-05	101AX
32	4.692E-05	106BX
43	2.324E-05	105BY
44	2.057E-05	106BY
47	1.050E-05	109BY
53	4.038E-05	103C
57	1.318E-05	107C
67	2.067E-05	101S
68	2.506E-05	102S
69	2.346E-05	103S
77	2.346E-05	111S
79	2.121E-05	101SX
80	1.960E-05	102SX
81	2.603E-05	103SX
83	2.207E-05	105SX
84	3.588E-05	106SX
97	1.992E-05	104T
100	2.099E-05	107T
103	1.789E-05	110T
104	2.860E-05	111T
114	1.421E-01	105TX
115	2.515E-05	106TX
117	1.616E-04	108TX
118	6.986E-04	109TX
135	2.217E-05	102U
136	1.579E-01	103U
138	1.262E-01	105U
139	1.982E-05	106U
140	3.481E-05	107U
141	1.243E-05	108U
142	2.946E-05	109U
144	2.099E-05	111U

Batch No. = 41, Time = 2349. days, Batch Vol = 1.000E+03 kgal
 Mass Tot = 4.727E+09 g, Na Con = 5.037E+00 M

111	1.771E-01	102TX
113	2.926E-01	104TX
114	2.353E-02	105TX
116	5.121E-01	107TX
117	1.596E-05	108TX
118	6.902E-05	109TX
121	7.594E-02	112TX
127	5.858E-02	118TX

WHC-SD-WM-TI-693 Rev. 0

136	1.257E-01	103U
138	2.085E-02	105U
175	1.135E-02	101SY
177	5.456E-03	103SY

Batch No. = 42, Time = 2416. days, Batch Vol = 8.730E+02 kgal

Mass Tot = 4.132E+09 g, Na Con = 5.020E+00 M

111	5.394E-01	102TX
113	4.831E-01	104TX
114	2.194E-03	105TX
116	1.178E-01	107TX
120	7.614E-02	111TX
121	1.747E-02	112TX
127	1.348E-02	118TX
136	9.178E-02	103U
138	1.735E-03	105U
175	2.611E-03	101SY
177	1.255E-03	103SY

Batch No. = 43, Time = 2433. days, Batch Vol = 9.150E+02 kgal

Mass Tot = 4.285E+09 g, Na Con = 4.767E+00 M

114	1.330E-01	105TX
115	1.370E-04	106TX
117	5.435E-04	108TX
118	1.317E-03	109TX
121	1.581E-04	112TX
127	1.907E-05	118TX
136	1.606E-01	103U
138	6.066E-02	105U
140	2.884E-02	107U
158	8.567E-03	102AP
175	1.309E-04	101SY
177	8.324E-05	103SY

Batch No. = 44, Time = 2445. days, Batch Vol = 1.000E+03 kgal

Mass Tot = 4.737E+09 g, Na Con = 5.001E+00 M

111	1.343E-01	102TX
113	9.396E-02	104TX
114	4.975E-05	105TX
116	7.849E-03	107TX
120	4.588E-01	111TX
121	1.164E-03	112TX
127	8.978E-04	118TX
136	4.159E-02	103U
175	1.740E-04	101SY
177	8.363E-05	103SY

WHC-SD-WM-TI-693 Rev. 0

Batch No. = 45, Time = 2493. days, Batch Vol = 9.319E+02 kgal
 Mass Tot = 4.414E+09 g, Na Con = 4.998E+00 M

111	5.065E-03	102TX
113	3.543E-03	104TX
116	2.960E-04	107TX
119	5.179E-02	110TX
120	3.031E-01	111TX
121	4.389E-05	112TX
127	3.385E-05	118TX
136	4.691E-02	103U
140	1.419E-01	107U

Batch No. = 46, Time = 2528. days, Batch Vol = 1.000E+03 kgal
 Mass Tot = 4.730E+09 g, Na Con = 5.001E+00 M

111	1.020E-01	102TX
113	8.959E-02	104TX
114	2.152E-02	105TX
116	1.870E-02	107TX
118	1.011E-04	109TX
120	9.797E-02	111TX
121	2.789E-03	112TX
127	2.141E-03	118TX
136	1.545E-01	103U
138	6.446E-03	105U
139	4.112E-02	106U
140	2.397E-01	107U
175	4.152E-04	101SY
177	1.995E-04	103SY

Batch No. = 47, Time = 2551. days, Batch Vol = 8.008E+02 kgal
 Mass Tot = 3.423E+09 g, Na Con = 3.851E+00 M

111	1.234E-02	102TX
113	1.092E-02	104TX
114	1.711E-02	105TX
116	2.314E-03	107TX
118	8.120E-05	109TX
120	1.085E-02	111TX
121	3.565E-04	112TX
127	2.663E-04	118TX
136	3.826E-02	103U
138	5.048E-03	105U
139	3.303E-02	106U
140	6.411E-02	107U
175	5.185E-05	101SY
177	2.488E-05	103SY

WHC-SD-WM-TI-693 Rev. 0

Batch No. = 48, Time = 2580. days, Batch Vol = 9.798E+02 kgal
Mass Tot = 4.651E+09 g, Na Con = 5.000E+00 M

111	4.353E-04	102TX
113	3.045E-04	104TX
116	2.544E-05	107TX
119	3.286E-01	110TX
120	2.605E-02	111TX
136	4.032E-03	103U
139	1.557E-01	106U
140	1.496E-02	107U
141	9.679E-03	108U

Batch No. = 49, Time = 2592. days, Batch Vol = 9.349E+02 kgal
Mass Tot = 3.880E+09 g, Na Con = 2.870E+00 M

111	2.756E-02	102TX
113	2.446E-02	104TX
114	5.423E-03	105TX
115	1.093E-05	106TX
116	5.226E-03	107TX
117	1.411E-05	108TX
118	1.719E-04	109TX
120	2.307E-02	111TX
121	8.031E-04	112TX
127	6.011E-04	118TX
136	3.584E-02	103U
138	1.069E-02	105U
140	5.375E-02	107U
175	8.187E-04	101SY
177	5.110E-04	103SY

Batch No. = 50, Time = 2609. days, Batch Vol = 1.000E+03 kgal
Mass Tot = 4.490E+09 g, Na Con = 3.915E+00 M

114	5.076E-03	105TX
118	2.413E-05	109TX
119	1.772E-01	110TX
136	6.713E-03	103U
138	1.493E-03	105U
139	1.125E-01	106U
140	1.599E-02	107U
141	8.128E-02	108U

Batch No. = 51, Time = 2637. days, Batch Vol = 1.000E+03 kgal
Mass Tot = 4.714E+09 g, Na Con = 4.884E+00 M

58	7.052E-03	108C
59	7.052E-03	109C
60	2.520E-03	110C
61	7.052E-03	111C
62	7.052E-03	112C
111	3.558E-05	102TX
113	2.489E-05	104TX

WHC-SD-WM-TI-693 Rev. 0

114	1.072E-03	105TX
119	1.436E-01	110TX
120	2.130E-03	111TX
136	1.015E-03	103U
138	5.807E-04	105U
139	1.974E-01	106U
140	1.422E-02	107U
141	2.372E-01	108U

Batch No. = 52, Time = 2648. days, Batch Vol = 1.000E+03 kgal
 Mass Tot = 4.378E+09 g, Na Con = 3.667E+00 M

58	1.579E-01	108C
59	1.579E-01	109C
60	5.644E-02	110C
61	1.579E-01	111C
62	1.579E-01	112C
111	7.015E-04	102TX
113	6.225E-04	104TX
114	1.287E-02	105TX
116	1.330E-04	107TX
119	8.818E-02	110TX
120	5.872E-04	111TX
121	1.972E-05	112TX
127	1.521E-05	118TX
136	1.539E-03	103U
138	9.732E-03	105U
139	5.109E-02	106U
140	3.348E-03	107U
141	4.046E-02	108U

Batch No. = 53, Time = 2663. days, Batch Vol = 1.000E+03 kgal
 Mass Tot = 4.258E+09 g, Na Con = 2.481E+00 M

51	2.828E-02	101C
58	6.700E-02	108C
59	6.700E-02	109C
60	8.167E-02	110C
61	6.700E-02	111C
62	6.700E-02	112C
111	3.104E-04	102TX
112	1.783E-01	103TX
113	2.754E-04	104TX
114	1.966E-03	105TX
116	5.885E-05	107TX
119	6.416E-02	110TX
120	2.598E-04	111TX
121	1.026E-05	112TX
136	2.998E-03	103U
138	5.788E-04	105U
139	1.442E-02	106U
140	5.922E-03	107U

141 4.216E-02 108U

Batch No. = 54, Time = 2683. days, Batch Vol = 8.743E+02 kgal

Mass Tot = 3.759E+09 g, Na Con = 3.576E+00 M

51	7.110E-02	101C
58	2.238E-01	108C
59	2.238E-01	109C
60	2.251E-01	110C
61	2.238E-01	111C
62	2.238E-01	112C
114	4.532E-03	105TX
119	6.005E-03	110TX
120	8.906E-05	111TX
136	2.646E-04	103U
138	3.417E-03	105U
139	8.254E-03	106U
140	5.945E-04	107U
141	9.918E-03	108U

Batch No. = 55, Time = 2695. days, Batch Vol = 1.000E+03 kgal

Mass Tot = 4.320E+09 g, Na Con = 2.894E+00 M

58	1.462E-02	108C
59	1.462E-02	109C
60	5.224E-03	110C
61	1.462E-02	111C
62	1.462E-02	112C
111	6.493E-05	102TX
112	2.330E-01	103TX
113	5.761E-05	104TX
114	1.857E-03	105TX
116	1.231E-05	107TX
119	9.199E-02	110TX
120	5.435E-05	111TX
136	1.023E-03	103U
138	1.097E-03	105U
139	1.989E-02	106U
140	2.754E-03	107U
141	5.883E-02	108U

Batch No. = 56, Time = 2705. days, Batch Vol = 8.342E+02 kgal

Mass Tot = 3.948E+09 g, Na Con = 4.821E+00 M

110	1.193E-01	101TX
112	1.077E-01	103TX
119	1.505E-02	110TX
120	2.539E-04	111TX
136	3.929E-05	103U
139	2.222E-02	106U
140	1.508E-03	107U
141	2.995E-01	108U
142	5.802E-02	109U

WHC-SD-WM-TI-693 Rev. 0

Batch No. = 57, Time = 2716. days, Batch Vol = 1.000E+03 kgal
Mass Tot = 4.333E+09 g, Na Con = 2.956E+00 M

58	2.061E-02	108C
59	2.061E-02	109C
60	7.365E-03	110C
61	2.061E-02	111C
62	2.061E-02	112C
114	1.244E-01	105TX
136	6.193E-03	103U
138	9.404E-02	105U
139	5.201E-05	106U
140	6.364E-05	107U

Batch No. = 58, Time = 2727. days, Batch Vol = 9.103E+02 kgal
Mass Tot = 4.216E+09 g, Na Con = 3.634E+00 M

51	2.885E-03	101C
58	8.325E-03	108C
59	8.325E-03	109C
60	8.863E-03	110C
61	8.325E-03	111C
62	8.325E-03	112C
110	6.217E-01	101TX
111	3.828E-05	102TX
112	3.428E-01	103TX
113	3.397E-05	104TX
114	3.899E-04	105TX
119	2.594E-02	110TX
120	3.205E-05	111TX
123	1.167E-02	114TX
136	4.101E-04	103U
138	1.709E-04	105U
139	5.156E-03	106U
140	9.887E-04	107U
141	8.216E-02	108U
142	2.954E-02	109U

Batch No. = 59, Time = 2757. days, Batch Vol = 1.000E+03 kgal
Mass Tot = 4.139E+09 g, Na Con = 1.894E+00 M

51	2.699E-02	101C
55	3.371E-03	105C
58	5.848E-02	108C
59	5.848E-02	109C
60	6.658E-02	110C
61	5.848E-02	111C
62	5.848E-02	112C
110	1.052E-01	101TX
112	5.221E-02	103TX
114	4.447E-04	105TX
119	2.033E-03	110TX
123	2.788E-02	114TX

WHC-SD-WM-TI-693 Rev. 0

136	2.303E-05	103U
138	3.363E-04	105U
139	8.440E-04	106U
140	5.586E-05	107U
141	1.952E-02	108U
142	3.429E-02	109U

Batch No. = 60, Time = 2770. days, Batch Vol = 1.000E+03 kgal
 Mass Tot = 4.644E+09 g, Na Con = 4.385E+00 M

51	2.005E-01	101C
58	1.447E-03	108C
59	1.447E-03	109C
60	5.170E-04	110C
61	1.447E-03	111C
62	1.447E-03	112C
114	2.149E-02	105TX
136	3.289E-02	103U
138	8.913E-05	105U
139	2.321E-01	106U
140	2.611E-01	107U
142	9.441E-02	109U

Batch No. = 61, Time = 2783. days, Batch Vol = 8.648E+02 kgal
 Mass Tot = 3.575E+09 g, Na Con = 2.687E+00 M

51	8.848E-03	101C
58	2.096E-02	108C
59	2.096E-02	109C
60	2.555E-02	110C
61	2.096E-02	111C
62	2.096E-02	112C
110	7.735E-02	101TX
112	3.743E-02	103TX
119	1.246E-03	110TX
123	2.111E-02	114TX
139	2.061E-04	106U
140	1.291E-05	107U
141	8.941E-03	108U
142	2.483E-02	109U

Batch No. = 62, Time = 2820. days, Batch Vol = 1.000E+03 kgal
 Mass Tot = 4.593E+09 g, Na Con = 4.796E+00 M

51	5.072E-02	101C
55	1.853E-02	105C
58	2.754E-02	108C
59	2.754E-02	109C
60	3.313E-02	110C
61	2.754E-02	111C
62	2.754E-02	112C
110	2.632E-02	101TX
112	1.982E-02	103TX

114	1.531E-03	105TX
119	2.281E-03	110TX
120	3.591E-05	111TX
123	1.254E-01	114TX
136	2.301E-03	103U
138	3.113E-05	105U
139	1.935E-02	106U
140	1.842E-02	107U
141	4.345E-02	108U
142	1.104E-01	109U

Batch No. = 63, Time = 2847. days, Batch Vol = 1.000E+03 kgal
 Mass Tot = 4.248E+09 g, Na Con = 2.841E+00 M

51	4.720E-02	101C
55	2.731E-02	105C
58	2.400E-02	108C
59	2.400E-02	109C
60	2.919E-02	110C
61	2.400E-02	111C
62	2.400E-02	112C
110	2.704E-02	101TX
112	1.525E-02	103TX
114	1.089E-03	105TX
119	1.006E-03	110TX
120	1.103E-05	111TX
123	7.703E-02	114TX
136	1.669E-03	103U
139	1.279E-02	106U
140	1.330E-02	107U
141	1.553E-02	108U
142	2.583E-02	109U

Batch No. = 64, Time = 2859. days, Batch Vol = 1.000E+03 kgal
 Mass Tot = 4.270E+09 g, Na Con = 2.112E+00 M

51	1.427E-01	101C
55	1.148E-01	105C
58	9.780E-02	108C
59	9.780E-02	109C
60	1.186E-01	110C
61	9.780E-02	111C
62	9.780E-02	112C
114	4.434E-03	105TX
123	7.202E-02	114TX
136	2.208E-04	103U
138	3.353E-03	105U
142	1.166E-02	109U

WHC-SD-WM-TI-693 Rev. 0

Batch No. = 65, Time = 2870. days, Batch Vol = 1.000E+03 kgal
Mass Tot = 4.419E+09 g, Na Con = 3.543E+00 M

51	8.679E-02	101C
55	6.912E-02	105C
58	5.559E-02	108C
59	5.559E-02	109C
60	6.773E-02	110C
61	5.559E-02	111C
62	5.559E-02	112C
110	2.437E-03	101TX
112	1.834E-03	103TX
114	1.418E-04	105TX
119	2.112E-04	110TX
123	1.344E-01	114TX
136	2.130E-04	103U
139	1.791E-03	106U
140	1.705E-03	107U
141	4.022E-03	108U
142	3.010E-02	109U

Batch No. = 66, Time = 2880. days, Batch Vol = 8.249E+02 kgal
Mass Tot = 3.186E+09 g, Na Con = 5.953E-01 M

51	4.551E-03	101C
55	2.422E-03	105C
58	2.941E-03	108C
59	2.941E-03	109C
60	3.585E-03	110C
61	2.941E-03	111C
62	2.941E-03	112C
110	1.152E-02	101TX
112	6.500E-03	103TX
119	4.283E-04	110TX
123	2.543E-03	114TX
139	4.355E-04	106U
140	2.943E-05	107U
141	6.613E-03	108U
142	4.064E-03	109U

Batch No. = 67, Time = 2918. days, Batch Vol = 8.694E+02 kgal
Mass Tot = 3.313E+09 g, Na Con = 1.985E-01 M

51	1.598E-03	101C
55	8.505E-04	105C
58	1.033E-03	108C
59	1.033E-03	109C
60	1.259E-03	110C
61	1.033E-03	111C
62	1.033E-03	112C
110	4.049E-03	101TX
112	2.284E-03	103TX
119	1.505E-04	110TX

WHC-SD-WM-TI-693 Rev. 0

123	8.936E-04	114TX
139	1.530E-04	106U
140	1.034E-05	107U
141	2.323E-03	108U
142	1.428E-03	109U

Batch No. = 68, Time = 2934. days, Batch Vol = 1.000E+03 kgal
 Mass Tot = 4.323E+09 g, Na Con = 2.848E+00 M

51	2.380E-02	101C
55	1.807E-02	105C
58	1.433E-02	108C
59	1.433E-02	109C
60	1.747E-02	110C
61	1.433E-02	111C
62	1.433E-02	112C
110	2.255E-04	101TX
112	1.698E-04	103TX
114	1.788E-04	105TX
119	1.955E-05	110TX
123	1.450E-01	114TX
126	1.929E-02	117TX
134	9.266E-02	101U
136	2.746E-04	103U
139	1.965E-03	106U
140	2.182E-03	107U
141	3.723E-04	108U
142	2.363E-02	109U

Batch No. = 69, Time = 2979. days, Batch Vol = 1.000E+03 kgal
 Mass Tot = 4.695E+09 g, Na Con = 4.797E+00 M

51	2.235E-03	101C
55	1.697E-03	105C
58	1.346E-03	108C
59	1.346E-03	109C
60	1.640E-03	110C
61	1.346E-03	111C
62	1.346E-03	112C
110	2.118E-05	101TX
112	1.594E-05	103TX
114	1.679E-05	105TX
123	6.118E-02	114TX
126	1.359E-01	117TX
134	4.414E-02	101U
135	2.353E-01	102U
136	2.579E-05	103U
139	1.846E-04	106U
140	2.049E-04	107U
141	3.496E-05	108U
142	6.312E-03	109U

WHC-SD-WM-TI-693 Rev. 0

Batch No. = 70, Time = 3031. days, Batch Vol = 9.521E+02 kgal
 Mass Tot = 4.503E+09 g, Na Con = 4.982E+00 M

51	6.180E-04	101C
55	1.460E-04	105C
58	1.158E-04	108C
59	1.158E-04	109C
60	1.412E-04	110C
61	1.158E-04	111C
62	1.158E-04	112C
114	4.681E-05	105TX
123	4.157E-02	114TX
126	1.424E-01	117TX
134	2.917E-02	101U
135	2.533E-01	102U
136	7.202E-05	103U
139	5.086E-04	106U
140	5.718E-04	107U
142	6.250E-03	109U

Batch No. = 71, Time = 3042. days, Batch Vol = 1.000E+03 kgal
 Mass Tot = 4.693E+09 g, Na Con = 4.643E+00 M

51	5.600E-03	101C
55	4.112E-02	105C
58	2.221E-03	108C
59	2.221E-03	109C
60	2.702E-03	110C
61	2.221E-03	111C
62	2.221E-03	112C
110	2.502E-03	101TX
112	1.412E-03	103TX
114	2.321E-04	105TX
119	9.309E-05	110TX
123	1.256E-01	114TX
126	1.021E-01	117TX
134	4.304E-01	101U
135	9.105E-02	102U
136	3.565E-04	103U
139	2.609E-03	106U
140	2.835E-03	107U
141	1.438E-03	108U
142	5.069E-02	109U

Batch No. = 72, Time = 3054. days, Batch Vol = 1.000E+03 kgal
 Mass Tot = 4.254E+09 g, Na Con = 2.457E+00 M

51	1.821E-02	101C
55	1.474E-02	105C
58	1.229E-02	108C
59	1.229E-02	109C
60	1.492E-02	110C
61	1.229E-02	111C

WHC-SD-WM-TI-693 Rev. 0

62	1.229E-02	112C
114	4.104E-04	105TX
123	6.666E-03	114TX
126	7.102E-02	117TX
135	9.051E-02	102U
136	2.043E-05	103U
138	3.103E-04	105U
142	1.079E-03	109U
143	3.092E-01	110U

Batch No. = 73, Time = 3110. days, Batch Vol = 1.000E+03 kgal
 Mass Tot = 4.730E+09 g, Na Con = 4.831E+00 M

51	4.624E-05	101C
55	1.702E-02	105C
122	2.856E-03	113TX
123	9.842E-03	114TX
126	1.835E-01	117TX
134	1.602E-01	101U
135	1.223E-01	102U
139	5.352E-05	106U
140	6.020E-05	107U
142	4.737E-02	109U
143	3.011E-01	110U
145	2.857E-01	112U

Batch No. = 74, Time = 3124. days, Batch Vol = 8.667E+02 kgal
 Mass Tot = 4.100E+09 g, Na Con = 4.839E+00 M

55	7.267E-03	105C
122	2.149E-02	113TX
123	2.518E-03	114TX
126	7.750E-02	117TX
134	6.722E-02	101U
135	1.714E-02	102U
142	2.249E-02	109U
143	5.401E-02	110U
144	3.395E-01	111U
145	3.012E-01	112U

Batch No. = 75, Time = 3226. days, Batch Vol = 9.406E+02 kgal
 Mass Tot = 3.962E+09 g, Na Con = 3.130E+00 M

51	2.446E-05	101C
55	1.736E-03	105C
122	1.511E-03	113TX
123	2.688E-03	114TX
126	6.168E-02	117TX
134	1.752E-02	101U
135	2.328E-02	102U
139	2.831E-05	106U
140	3.184E-05	107U
142	1.907E-02	109U

143 7.643E-02 110U
145 1.511E-01 112U

Batch No. = 76, Time = 3237. days, Batch Vol = 1.000E+03 kgal

Mass Tot = 4.478E+09 g, Na Con = 3.873E+00 M

122 8.237E-02 113TX
123 4.551E-04 114TX
126 1.674E-02 117TX
134 3.180E-04 101U
135 2.921E-03 102U
137 1.146E-01 104U
142 5.234E-03 109U
143 1.689E-02 110U
144 3.118E-01 111U
145 5.825E-02 112U

Batch No. = 77, Time = 3280. days, Batch Vol = 1.000E+03 kgal

Mass Tot = 4.309E+09 g, Na Con = 2.795E+00 M

84 6.452E-03 106SX
122 1.705E-01 113TX
123 1.040E-04 114TX
124 3.539E-03 115TX
126 3.395E-03 117TX
134 7.269E-05 101U
135 6.676E-04 102U
137 1.096E-01 104U
142 1.080E-03 109U
143 3.479E-03 110U
144 4.505E-02 111U
145 1.119E-02 112U
146 1.153E-01 201U

Batch No. = 78, Time = 3292. days, Batch Vol = 1.000E+03 kgal

Mass Tot = 4.727E+09 g, Na Con = 4.887E+00 M

51 5.342E-04 101C
55 1.077E-02 105C
58 2.056E-04 108C
59 2.056E-04 109C
60 2.501E-04 110C
61 2.056E-04 111C
62 2.056E-04 112C
84 1.208E-02 106SX
110 2.316E-04 101TX
112 1.307E-04 103TX
114 2.317E-05 105TX
122 7.454E-02 113TX
123 1.535E-02 114TX
124 1.761E-03 115TX
126 9.072E-02 117TX
134 1.052E-01 101U

WHC-SD-WM-TI-693 Rev. 0

135	5.280E-02	102U
136	3.559E-05	103U
137	9.451E-02	104U
139	2.599E-04	106U
140	2.830E-04	107U
141	1.331E-04	108U
142	7.999E-02	109U
143	1.050E-01	110U
144	1.312E-01	111U
145	1.085E-01	112U
146	5.738E-02	201U

Batch No. = 79, Time = 3303. days, Batch Vol = 1.000E+03 kgal
 Mass Tot = 4.732E+09 g, Na Con = 4.949E+00 M

55	2.514E-03	105C
84	3.155E-02	106SX
122	2.068E-01	113TX
123	7.928E-04	114TX
124	6.517E-03	115TX
126	3.625E-02	117TX
134	2.320E-02	101U
135	5.544E-03	102U
137	1.758E-01	104U
142	1.297E-01	109U
143	1.737E-04	110U
144	1.195E-02	111U
145	9.686E-04	112U
146	2.123E-01	201U

Batch No. = 80, Time = 3321. days, Batch Vol = 8.142E+02 kgal
 Mass Tot = 3.850E+09 g, Na Con = 4.905E+00 M

55	1.313E-03	105C
84	9.625E-02	106SX
122	9.132E-02	113TX
123	4.515E-04	114TX
124	6.503E-02	115TX
126	1.440E-02	117TX
134	1.214E-02	101U
135	3.081E-03	102U
137	2.545E-01	104U
142	9.253E-03	109U
143	8.968E-03	110U
144	5.683E-02	111U
145	5.001E-02	112U
146	3.150E-01	201U

2 of 3

WHC-SD-WM-TI-693 Rev. 0

Batch No. = 81, Time = 3342. days, Batch Vol = 9.386E+02 kgal
 Mass Tot = 4.395E+09 g, Na Con = 4.750E+00 M

55	2.798E-04	105C
57	1.022E-01	107C
84	2.361E-01	106SX
122	2.703E-02	113TX
123	9.886E-05	114TX
124	8.040E-02	115TX
126	4.360E-03	117TX
134	2.589E-03	101U
135	6.852E-04	102U
137	2.261E-02	104U
142	1.454E-02	109U
143	3.548E-04	110U
144	4.595E-03	111U
145	1.141E-03	112U
146	2.592E-02	201U

Batch No. = 82, Time = 3373. days, Batch Vol = 1.000E+03 kgal
 Mass Tot = 4.480E+09 g, Na Con = 5.200E+00 M

51	4.786E-02	101C
55	1.225E-01	105C
57	1.034E-01	107C
58	3.093E-02	108C
59	3.093E-02	109C
60	3.770E-02	110C
61	3.093E-02	111C
62	3.093E-02	112C
63	1.948E-01	201C
64	1.948E-01	202C
65	1.948E-01	203C
66	1.948E-01	204C
84	2.082E-02	106SX
122	4.316E-02	113TX
123	8.714E-05	114TX
124	1.407E-02	115TX
126	8.304E-03	117TX
134	2.326E-03	101U
135	7.704E-03	102U
137	6.730E-02	104U
142	7.899E-04	109U
143	2.620E-02	110U
144	1.433E-02	111U
145	1.063E-02	112U
146	8.219E-02	201U

WHC-SD-WM-TI-693 Rev. 0

Batch No. = 83, Time = 3385. days, Batch Vol = 1.000E+03 kgal
Mass Tot = 4.727E+09 g, Na Con = 4.985E+00 M

84	2.387E-01	106SX
122	2.702E-02	113TX
124	1.400E-01	115TX
137	8.454E-02	104U
146	1.047E-01	201U

Batch No. = 84, Time = 3401. days, Batch Vol = 9.117E+02 kgal
Mass Tot = 3.709E+09 g, Na Con = 2.158E+00 M

51	1.453E-02	101C
55	3.726E-02	105C
57	2.194E-02	107C
58	9.391E-03	108C
59	9.391E-03	109C
60	1.145E-02	110C
61	9.391E-03	111C
62	9.391E-03	112C
63	5.914E-02	201C
64	5.914E-02	202C
65	5.914E-02	203C
66	5.914E-02	204C
84	1.007E-02	106SX
122	2.163E-02	113TX
123	4.201E-05	114TX
124	6.801E-03	115TX
126	1.884E-03	117TX
134	1.121E-03	101U
135	1.011E-03	102U
137	3.294E-02	104U
142	3.812E-04	109U
143	3.398E-03	110U
144	6.988E-03	111U
145	5.132E-03	112U
146	4.021E-02	201U

Batch No. = 85, Time = 3414. days, Batch Vol = 8.120E+02 kgal
Mass Tot = 3.837E+09 g, Na Con = 4.957E+00 M

55	4.067E-05	105C
57	1.485E-02	107C
82	5.372E-02	104SX
84	1.476E-01	106SX
122	1.472E-03	113TX
123	1.283E-05	114TX
124	1.159E-01	115TX
126	5.833E-04	117TX
134	3.753E-04	101U
135	8.969E-05	102U
137	1.884E-03	104U
142	2.098E-03	109U

WHC-SD-WM-TI-693 Rev. 0

146 2.334E-03 201U
148 6.360E-01 203U

Batch No. = 86, Time = 3441. days, Batch Vol = 8.774E+02 kgal

Mass Tot = 3.456E+09 g, Na Con = 1.124E+00 M

51 1.102E-02 101C
55 2.818E-02 105C
57 3.417E-02 107C
58 7.118E-03 108C
59 7.118E-03 109C
60 8.677E-03 110C
61 7.118E-03 111C
62 7.118E-03 112C
63 4.483E-02 201C
64 4.483E-02 202C
65 4.483E-02 203C
66 4.483E-02 204C
84 2.910E-03 106SX
122 2.530E-03 113TX
123 1.281E-05 114TX
124 1.986E-03 115TX
126 2.911E-03 117TX
134 3.420E-04 101U
135 3.295E-03 102U
137 7.573E-03 104U
142 1.144E-04 109U
143 1.123E-02 110U
144 1.727E-03 111U
145 1.532E-03 112U
146 9.382E-03 201U

Batch No. = 87, Time = 3456. days, Batch Vol = 1.000E+03 kgal

Mass Tot = 4.336E+09 g, Na Con = 3.010E+00 M

51 3.385E-03 101C
55 8.648E-03 105C
57 3.995E-03 107C
58 2.187E-03 108C
59 2.187E-03 109C
60 2.666E-03 110C
61 2.187E-03 111C
62 2.187E-03 112C
63 1.377E-02 201C
64 1.377E-02 202C
65 1.377E-02 203C
66 1.377E-02 204C
82 1.090E-01 104SX
84 1.666E-02 106SX
122 3.746E-03 113TX
124 8.423E-02 115TX
137 2.279E-03 104U

WHC-SD-WM-TI-693 Rev. 0

144	3.723E-04	111U
145	3.018E-05	112U
146	2.653E-03	201U
148	9.313E-02	203U

Batch No. = 88, Time = 3496. days, Batch Vol = 1.000E+03 kgal
 Mass Tot = 3.860E+09 g, Na Con = 4.599E-01 M

51	1.516E-03	101C
55	3.886E-03	105C
57	1.790E-03	107C
58	9.798E-04	108C
59	9.798E-04	109C
60	1.194E-03	110C
61	9.798E-04	111C
62	9.798E-04	112C
63	6.171E-03	201C
64	6.171E-03	202C
65	6.171E-03	203C
66	6.171E-03	204C
82	1.019E-02	104SX
84	2.546E-03	106SX
122	2.493E-03	113TX
124	8.537E-03	115TX
126	1.296E-04	117TX
134	1.101E-04	101U
135	2.807E-05	102U
137	3.458E-03	104U
142	3.757E-05	109U
143	9.085E-05	110U
144	7.226E-04	111U
145	5.067E-04	112U
146	4.208E-03	201U
148	8.701E-03	203U

Batch No. = 89, Time = 3508. days, Batch Vol = 1.000E+03 kgal
 Mass Tot = 4.714E+09 g, Na Con = 4.539E+00 M

51	4.421E-02	101C
55	1.138E-01	105C
57	1.129E-01	107C
58	2.855E-02	108C
59	2.855E-02	109C
60	3.481E-02	110C
61	2.855E-02	111C
62	2.855E-02	112C
63	1.797E-01	201C
64	1.797E-01	202C
65	1.797E-01	203C
66	1.797E-01	204C
82	1.152E-01	104SX
84	2.050E-02	106SX

110	2.144E-05	101TX
112	1.210E-05	103TX
122	2.194E-02	113TX
123	1.422E-03	114TX
124	8.750E-02	115TX
125	6.416E-03	116TX
126	1.551E-02	117TX
134	9.779E-03	101U
135	1.384E-02	102U
137	1.799E-02	104U
139	2.405E-05	106U
140	2.619E-05	107U
141	1.232E-05	108U
142	7.655E-03	109U
143	4.031E-02	110U
144	1.362E-02	111U
145	1.016E-02	112U
146	1.609E-02	201U
148	8.352E-02	203U

Batch No. = 90, Time = 3527. days, Batch Vol = 1.000E+03 kgal
 Mass Tot. = 4.477E+09 g, Na Con = 3.731E+00 M

51	1.833E-03	101C
55	4.685E-03	105C
57	5.443E-03	107C
58	1.185E-03	108C
59	1.185E-03	109C
60	1.444E-03	110C
61	1.185E-03	111C
62	1.185E-03	112C
63	7.460E-03	201C
64	7.460E-03	202C
65	7.460E-03	203C
66	7.460E-03	204C
82	1.464E-01	104SX
84	1.024E-02	106SX
122	8.495E-04	113TX
124	8.164E-02	115TX
125	3.811E-02	116TX
126	4.008E-04	117TX
135	4.994E-04	102U
137	2.296E-03	104U
143	1.706E-03	110U
144	6.018E-05	111U
145	4.220E-05	112U
146	2.838E-03	201U
148	2.531E-02	203U

WHC-SD-WM-TI-693 Rev. 0

Batch No. = 91, Time = 3538. days, Batch Vol = 9.987E+02 kgal
 Mass Tot = 4.097E+09 g, Na Con = 2.466E+00 M

51	3.354E-03	101C
55	5.332E-03	105C
57	6.285E-03	107C
58	2.220E-03	108C
59	2.220E-03	109C
60	2.701E-03	110C
61	2.220E-03	111C
62	2.220E-03	112C
63	6.092E-03	201C
64	6.092E-03	202C
65	6.092E-03	203C
66	6.092E-03	204C
82	2.292E-02	104SX
84	1.626E-02	106SX
114	4.186E-05	105TX
122	1.549E-04	113TX
123	6.814E-04	114TX
124	2.686E-02	115TX
125	1.078E-03	116TX
126	7.651E-03	117TX
134	4.151E-05	101U
135	9.678E-03	102U
137	1.837E-04	104U
138	3.165E-05	105U
142	3.421E-04	109U
143	3.303E-02	110U
146	2.276E-04	201U
148	7.035E-02	203U

Batch No. = 92, Time = 3549. days, Batch Vol = 9.735E+02 kgal
 Mass Tot = 4.355E+09 g, Na Con = 3.674E+00 M

51	6.889E-03	101C
55	1.769E-02	105C
57	1.889E-02	107C
58	4.450E-03	108C
59	4.450E-03	109C
60	5.424E-03	110C
61	4.450E-03	111C
62	4.450E-03	112C
63	2.801E-02	201C
64	2.801E-02	202C
65	2.801E-02	203C
66	2.801E-02	204C
82	1.252E-01	104SX
84	1.444E-02	106SX
122	3.132E-03	113TX
123	1.451E-04	114TX
124	6.408E-02	115TX

WHC-SD-WM-TI-693 Rev. 0

125	4.858E-02	116TX
126	2.125E-03	117TX
134	9.974E-04	101U
135	2.105E-03	102U
137	4.634E-03	104U
142	7.808E-04	109U
143	6.478E-03	11CU
144	1.389E-03	111U
145	1.037E-03	112U
146	5.108E-03	201U
148	3.359E-02	203U

Batch No. = 93, Time = 3577. days, Batch Vol = 8.821E+02 kgal
 Mass Tot = 4.075E+09 g, Na Con = 5.291E+00 M

1	5.411E-05	101A
7	5.242E-05	101AX
32	9.131E-05	106BX
40	1.015E-05	102BY
41	1.184E-05	103BY
43	9.644E-04	105BY
44	4.058E-05	106BY
47	2.029E-05	109BY
51	2.436E-02	101C
53	7.778E-05	103C
55	1.445E-02	105C
57	1.548E-03	107C
58	1.070E-02	108C
59	1.070E-02	109C
60	1.306E-02	110C
61	1.070E-02	111C
62	1.070E-02	112C
63	1.997E-03	201C
64	1.997E-03	202C
65	1.997E-03	203C
66	1.997E-03	204C
67	4.058E-05	101S
68	4.904E-05	102S
69	4.565E-05	103S
72	1.353E-05	106S
73	1.691E-05	107S
75	1.353E-05	109S
77	4.565E-05	111S
78	1.522E-05	112S
79	4.058E-05	101SX
80	3.720E-05	102SX
81	5.073E-05	103SX
82	3.782E-02	104SX
83	4.227E-05	105SX
84	7.583E-04	106SX
97	3.889E-05	104T

WHC-SD-WM-TI-693 Rev. 0

100	4.058E-05	107T
103	3.551E-05	110T
104	5.580E-05	111T
114	8.303E-04	105TX
123	1.118E-01	114TX
124	2.438E-02	115TX
125	2.193E-03	116TX
135	4.227E-05	102U
136	1.325E-03	103U
138	5.918E-05	105U
139	9.057E-03	106U
140	1.021E-02	107U
141	2.367E-05	108U
142	6.231E-02	109U
144	4.058E-05	111U
148	3.886E-03	203U
167	1.691E-02	103AW
168	1.691E-02	104AW
169	1.691E-02	105AW
176	1.691E-02	102SY

Batch No. = 94, Time = 3593. days, Batch Vol = 9.855E+02 kgal
 Mass Tot = 4.662E+09 g, Na Con = 4.858E+00 M

82	1.061E-01	104SX
83	7.188E-02	105SX
125	1.815E-01	116TX
147	9.090E-01	202U
149	9.090E-01	204U

Batch No. = 95, Time = 3605. days, Batch Vol = 1.000E+03 kgal
 Mass Tot = 4.703E+09 g, Na Con = 4.888E+00 M

43	3.984E-02	105BY
51	1.812E-04	101C
55	4.630E-04	105C
57	5.394E-04	107C
58	1.171E-04	108C
59	1.171E-04	109C
60	1.427E-04	110C
61	1.171E-04	111C
62	1.171E-04	112C
63	7.372E-04	201C
64	7.372E-04	202C
65	7.372E-04	203C
66	7.372E-04	204C
82	1.297E-01	104SX
83	4.812E-02	105SX
84	3.040E-03	106SX
122	3.137E-04	113TX
124	9.389E-02	115TX
125	5.306E-02	116TX

WHC-SD-WM-TI-693 Rev. 0

126	3.710E-05	117TX
135	4.622E-05	102U
137	9.481E-04	104U
143	1.579E-04	110U
146	1.174E-03	201U
148	2.433E-03	203U

Batch No. = 96, Time = 3617. days, Batch Vol = 1.000E+03 kgal
 Mass Tot = 4.643E+09 g, Na Con = 4.504E+00 M

43	1.628E-01	105BY
51	6.998E-02	101C
55	1.788E-01	105C
57	2.171E-01	107C
58	4.522E-02	108C
59	4.522E-02	109C
60	5.512E-02	110C
61	4.522E-02	111C
62	4.522E-02	112C
63	2.848E-01	201C
64	2.848E-01	202C
65	2.848E-01	203C
66	2.848E-01	204C
82	2.900E-02	104SX
84	5.642E-04	106SX
122	6.388E-05	113TX
124	2.139E-02	115TX
125	4.882E-03	116TX
137	1.998E-04	104U
146	2.476E-04	201U

Batch No. = 97, Time = 3626. days, Batch Vol = 8.308E+02 kgal
 Mass Tot = 3.541E+09 g, Na Con = 3.592E+00 M

43	4.850E-02	105BY
51	2.218E-02	101C
55	5.668E-02	105C
57	6.940E-02	107C
58	1.433E-02	108C
59	1.433E-02	109C
60	1.747E-02	110C
61	1.433E-02	111C
62	1.433E-02	112C
63	9.027E-02	201C
64	9.027E-02	202C
65	9.027E-02	203C
66	9.027E-02	204C
82	8.318E-03	104SX
84	5.899E-03	106SX
122	5.620E-05	113TX
124	9.746E-03	115TX
125	3.911E-04	116TX

WHC-SD-WM-TI-693 Rev. 0

126	2.341E-05	117TX
134	1.506E-05	101U
137	6.666E-05	104U
142	8.419E-05	109U
146	8.258E-05	201U
148	2.553E-02	203U

Batch No. = 98, Time = 3647. days, Batch Vol = 1.000E+03 kgal
 Mass Tot = 4.481E+09 g, Na Con = 3.894E+00 M

43	3.982E-03	105BY
51	1.740E-04	101C
55	4.446E-04	105C
57	5.376E-04	107C
58	1.124E-04	108C
59	1.124E-04	109C
60	1.370E-04	110C
61	1.124E-04	111C
62	1.124E-04	112C
63	7.081E-04	201C
64	7.081E-04	202C
65	7.081E-04	203C
66	7.081E-04	204C
82	2.958E-02	104SX
83	9.201E-02	105SX
84	5.021E-04	106SX
122	2.904E-05	113TX
124	1.650E-02	115TX
125	1.069E-01	116TX
137	8.775E-05	104U
143	1.461E-05	110U
146	1.087E-04	201U
147	4.683E-02	202U
148	1.470E-03	203U
149	4.683E-02	204U

Batch No. = 99, Time = 3657. days, Batch Vol = 8.984E+02 kgal
 Mass Tot = 3.538E+09 g, Na Con = 1.160E+00 M

43	1.630E-02	105BY
51	7.457E-03	101C
55	1.906E-02	105C
57	2.336E-02	107C
58	4.819E-03	108C
59	4.819E-03	109C
60	5.874E-03	110C
61	4.819E-03	111C
62	4.819E-03	112C
63	3.035E-02	201C
64	3.035E-02	202C
65	3.035E-02	203C
66	3.035E-02	204C

WHC-SD-WM-TI-693 Rev. 0

82	3.214E-03	104SX
84	2.279E-03	106SX
122	2.171E-05	113TX
124	3.765E-03	115TX
125	1.511E-04	116TX
137	2.575E-05	104U
142	3.252E-05	109U
146	3.190E-05	201U
148	9.862E-03	203U

Batch No. = 100, Time = 3669. days, Batch Vol = 1.000E+03 kgal
 Mass Tot = 4.727E+09 g, Na Con = 4.961E+00 M

43	1.899E-01	105BY
51	5.765E-03	101C
55	1.473E-02	105C
57	1.788E-02	107C
58	3.725E-03	108C
59	3.725E-03	109C
60	4.541E-03	110C
61	3.725E-03	111C
62	3.725E-03	112C
63	2.346E-02	201C
64	2.346E-02	202C
65	2.346E-02	203C
66	2.346E-02	204C
82	1.365E-02	104SX
83	9.410E-02	105SX
84	4.547E-05	106SX
124	8.702E-03	115TX
125	8.525E-02	116TX
137	1.611E-05	104U
146	1.995E-05	201U
147	2.479E-02	202U
149	2.479E-02	204U

Batch No. = 101, Time = 3679. days, Batch Vol = 9.397E+02 kgal
 Mass Tot = 4.421E+09 g, Na Con = 4.882E+00 M

43	2.369E-01	105BY
51	1.847E-04	101C
55	4.719E-04	105C
57	5.726E-04	107C
58	1.193E-04	108C
59	1.193E-04	109C
60	1.455E-04	110C
61	1.193E-04	111C
62	1.193E-04	112C
63	7.516E-04	201C
64	7.516E-04	202C
65	7.516E-04	203C
66	7.516E-04	204C

82	1.427E-02	104SX
83	7.325E-02	105SX
84	5.122E-05	106SX
124	1.102E-02	115TX
125	5.272E-02	116TX
146	1.108E-05	201U
147	4.776E-03	202U
148	1.500E-04	203U
149	4.776E-03	204U

Batch No. = 102, Time = 3689. days, Batch Vol = 8.623E+02 kgal
 Mass Tot = 3.394E+09 g, Na Con = 1.244E+00 M

43	3.918E-03	105BY
51	6.703E-05	101C
55	1.713E-04	105C
57	2.079E-04	107C
58	4.331E-05	108C
59	4.331E-05	109C
60	5.280E-05	110C
61	4.331E-05	111C
62	4.331E-05	112C
63	2.728E-04	201C
64	2.728E-04	202C
65	2.728E-04	203C
66	2.728E-04	204C
82	1.635E-02	104SX
84	3.117E-04	106SX
122	2.464E-05	113TX
124	1.158E-02	115TX
125	2.182E-03	116TX
137	7.707E-05	104U
146	9.548E-05	201U
148	5.308E-04	203U

Batch No. = 103, Time = 3700. days, Batch Vol = 8.835E+02 kgal
 Mass Tot = 4.188E+09 g, Na Con = 5.008E+00 M

82	1.166E-03	104SX
83	1.463E-01	105SX
125	1.615E-01	116TX
147	9.993E-03	202U
149	9.993E-03	204U

Batch No. = 104, Time = 3715. days, Batch Vol = 9.526E+02 kgal
 Mass Tot = 3.655E+09 g, Na Con = 4.248E-01 M

43	1.511E-03	105BY
51	2.355E-05	101C
55	6.018E-05	105C
57	7.306E-05	107C
58	1.522E-05	108C
59	1.522E-05	109C

WHC-SD-WM-TI-693 Rev. 0

60	1.855E-05	110C
61	1.522E-05	111C
62	1.522E-05	112C
63	9.586E-05	201C
64	9.586E-05	202C
65	9.586E-05	203C
66	9.586E-05	204C
82	6.142E-03	104SX
84	1.172E-04	106SX
124	4.361E-03	115TX
125	8.336E-04	116TX
137	2.982E-05	104U
146	3.694E-05	201U
148	1.865E-04	203U

Batch No. = 105, Time = 3752. days, Batch Vol = 1.000E+03 kgal
 Mass Tot = 3.920E+09 g, Na Con = 8.077E-01 M

43	2.521E-02	105BY
51	4.022E-03	101C
55	1.028E-02	105C
57	1.248E-02	107C
58	2.599E-03	108C
59	2.599E-03	109C
60	3.168E-03	110C
61	2.599E-03	111C
62	2.599E-03	112C
63	1.637E-02	201C
64	1.637E-02	202C
65	1.637E-02	203C
66	1.637E-02	204C
82	1.263E-03	104SX
83	8.710E-03	105SX
124	8.055E-04	115TX
125	7.891E-03	116TX
147	2.294E-03	202U
149	2.294E-03	204U

Batch No. = 106, Time = 3763. days, Batch Vol = 1.000E+03 kgal
 Mass Tot = 4.285E+09 g, Na Con = 2.679E+00 M

41	1.631E-01	103BY
43	5.918E-02	105BY
51	6.527E-05	101C
55	1.668E-04	105C
57	2.024E-04	107C
58	4.217E-05	108C
59	4.217E-05	109C
60	5.141E-05	110C
61	4.217E-05	111C
62	4.217E-05	112C
63	2.656E-04	201C

WHC-SD-WM-TI-693 Rev. 0

64	2.656E-04	202C
65	2.656E-04	203C
66	2.656E-04	204C
82	1.499E-03	104SX
83	1.491E-02	105SX
84	2.684E-05	106SX
124	1.018E-03	115TX
125	1.669E-02	116TX
146	1.178E-05	201U
147	1.018E-03	202U
149	1.018E-03	204U

Batch No. = 107, Time = 3796. days, Batch Vol = 9.886E+02 kgal

Mass Tot = 4.690E+09 g, Na Con = 5.003E+00 M

83	2.461E-01	105SX
87	1.757E-01	109SX
125	6.339E-03	116TX

Batch No. = 108, Time = 3843. days, Batch Vol = 1.000E+03 kgal

Mass Tot = 4.690E+09 g, Na Con = 4.785E+00 M

41	4.947E-01	103BY
43	7.590E-03	105BY
55	1.616E-05	105C
57	1.962E-05	107C
63	2.574E-05	201C
64	2.574E-05	202C
65	2.574E-05	203C
66	2.574E-05	204C
82	1.387E-04	104SX
83	1.380E-03	105SX
124	9.419E-05	115TX
125	1.545E-03	116TX
147	9.426E-05	202U
149	9.426E-05	204U

Batch No. = 109, Time = 3877. days, Batch Vol = 1.000E+03 kgal

Mass Tot = 4.649E+09 g, Na Con = 4.727E+00 M

41	7.375E-02	103BY
43	1.075E-02	105BY
82	3.321E-05	104SX
83	1.720E-02	105SX
85	2.163E-01	107SX
87	3.438E-01	109SX
89	4.659E-02	111SX
125	3.338E-03	116TX
147	1.833E-04	202U
149	1.833E-04	204U

WHC-SD-WM-TI-693 Rev. 0

Batch No. = 110, Time = 3945. days, Batch Vol = 1.000E+03 kgal
Mass Tot = 4.408E+09 g, Na Con = 3.133E+00 M

41	1.712E-02	103BY
43	4.694E-03	105RY
80	1.105E-02	102SX
82	1.058E-05	104SX
83	5.523E-03	105SX
85	1.224E-01	107SX
86	2.637E-01	108SX
87	1.288E-01	109SX
89	1.277E-01	111SX
125	1.425E-03	116TX
147	8.126E-05	202U
149	8.126E-05	204U

Batch No. = 111, Time = 3957. days, Batch Vol = 1.000E+03 kgal
Mass Tot = 4.618E+09 g, Na Con = 3.547E+00 M

41	5.499E-02	103BY
43	1.229E-02	105BY
51	4.035E-04	101C
55	1.031E-03	105C
57	1.251E-03	107C
58	2.607E-04	108C
59	2.607E-04	109C
60	3.178E-04	110C
61	2.607E-04	111C
62	2.607E-04	112C
63	1.642E-03	201C
64	1.642E-03	202C
65	1.642E-03	203C
66	1.642E-03	204C
80	5.848E-03	102SX
82	1.459E-04	104SX
83	4.910E-03	105SX
85	3.219E-01	107SX
86	1.396E-01	108SX
87	1.729E-01	109SX
89	3.623E-01	111SX
124	8.053E-05	115TX
125	3.540E-03	116TX
147	3.971E-04	202U
149	3.971E-04	204U

Batch No. = 112, Time = 3977. days, Batch Vol = 9.993E+02 kgal
Mass Tot = 4.193E+09 g, Na Con = 2.536E+00 M

41	6.144E-03	103BY
43	2.059E-03	105BY
80	8.868E-03	102SX
83	9.655E-04	105SX
85	5.377E-02	107SX

WHC-SD-WM-TI-693 Rev. 0

86	2.117E-01	108SX
87	3.336E-02	109SX
89	9.778E-02	111SX
125	5.891E-04	116TX
147	3.575E-05	202U
149	3.575E-05	204U

Batch No. = 113, Time = 4000. days, Batch Vol = 1.000E+03 kgal
 Mass Tot = 4.463E+09 g, Na Con = 3.556E+00 M

41	7.159E-02	103BY
43	3.291E-02	105BY
51	3.021E-05	101C
55	7.718E-05	105C
57	9.369E-05	107C
58	1.952E-05	108C
59	1.952E-05	109C
60	2.379E-05	110C
61	1.952E-05	111C
62	1.952E-05	112C
63	1.229E-04	201C
64	1.229E-04	202C
65	1.229E-04	203C
66	1.229E-04	204C
80	1.059E-01	102SX
82	1.971E-04	104SX
83	8.858E-03	105SX
85	3.282E-02	107SX
86	8.401E-02	108SX
87	3.517E-02	109SX
89	3.518E-02	111SX
124	1.201E-04	115TX
125	7.801E-03	116TX
147	4.471E-04	202U
149	4.471E-04	204U

Batch No. = 114, Time = 4010. days, Batch Vol = 8.142E+02 kgal
 Mass Tot = 3.849E+09 g, Na Con = 4.558E+00 M

41	6.167E-02	103BY
43	2.483E-04	105BY
46	7.355E-01	108BY
53	2.626E-01	103C
55	2.082E-05	105C
57	1.449E-01	107C
63	3.316E-05	201C
64	3.316E-05	202C
65	3.316E-05	203C
66	3.316E-05	204C
80	1.181E-04	102SX
83	9.916E-05	105SX
85	6.502E-03	107SX

WHC-SD-WM-TI-693 Rev. 0

86	2.820E-03	108SX
87	3.493E-03	109SX
89	7.317E-03	111SX
125	7.150E-05	116TX

Batch No. = 115, Time = 4021. days, Batch Vol = 9.149E+02 kgal
Mass Tot = 3.577E+09 g, Na Con = 7.997E-01 M

41	1.547E-03	103BY
43	5.557E-04	105BY
80	2.533E-03	102SX
83	1.414E-04	105SX
85	1.358E-02	107SX
86	6.046E-02	108SX
87	6.784E-03	109SX
89	2.609E-02	111SX
125	1.561E-04	116TX

Batch No. = 116, Time = 4048. days, Batch Vol = 8.079E+02 kgal
Mass Tot = 3.355E+09 g, Na Con = 1.865E+00 M

41	9.073E-03	103BY
46	1.102E-01	108BY
53	3.935E-02	103C
57	2.170E-02	107C
80	7.244E-02	102SX
83	2.242E-04	105SX
85	5.722E-03	107SX
86	1.873E-02	108SX
87	5.562E-03	109SX
89	7.358E-03	111SX

Batch No. = 117, Time = 4069. days, Batch Vol = 1.000E+03 kgal
Mass Tot = 3.941E+09 g, Na Con = 8.848E-01 M

43	8.238E-03	105BY
55	1.514E-05	105C
57	1.838E-05	107C
63	2.412E-05	201C
64	2.412E-05	202C
65	2.412E-05	203C
66	2.412E-05	204C
80	2.438E-02	102SX
82	3.209E-05	104SX
83	7.779E-04	105SX
85	1.546E-02	107SX
86	4.056E-02	108SX
87	1.487E-02	109SX
89	1.812E-02	111SX
124	2.660E-05	115TX
125	1.345E-04	116TX

WHC-SD-WM-TI-693 Rev. 0

Batch No. = 118, Time = 4106. days, Batch Vol = 1.000E+03 kgal

Mass Tot = 4.586E+09 g, Na Con = 3.840E+00 M

41	7.063E-03	103BY
43	5.519E-04	105BY
44	1.124E-01	106BY
46	2.765E-02	108BY
52	5.275E-02	102C
53	2.951E-01	103C
80	1.541E-03	102SX
83	4.918E-05	105SX
85	1.089E-01	107SX
86	2.564E-03	108SX
87	3.845E-02	109SX
89	1.274E-01	111SX

Batch No. = 119, Time = 4128. days, Batch Vol = 9.066E+02 kgal

Mass Tot = 3.537E+09 g, Na Con = 8.820E-01 M

41	1.839E-03	103BY
46	2.233E-02	108BY
53	7.975E-03	103C
57	4.398E-03	107C
80	1.503E-02	102SX
85	2.258E-03	107SX
86	1.206E-02	108SX
87	7.847E-04	109SX
89	4.912E-03	111SX

Batch No. = 120, Time = 4139. days, Batch Vol = 1.000E+03 kgal

Mass Tot = 4.719E+09 g, Na Con = 4.897E+00 M

41	6.659E-04	103BY
43	5.203E-05	105BY
44	7.570E-02	106BY
46	2.607E-03	108BY
52	4.973E-03	102C
53	2.782E-02	103C
80	1.453E-04	102SX
83	8.866E-02	105SX
85	1.027E-02	107SX
86	2.417E-04	108SX
87	3.625E-03	109SX
89	1.201E-02	111SX
125	1.655E-01	116TX

Batch No. = 121, Time = 4150. days, Batch Vol = 8.907E+02 kgal

Mass Tot = 4.120E+09 g, Na Con = 4.639E+00 M

41	5.554E-03	103BY
44	6.239E-02	106BY
46	8.280E-02	108BY
52	2.928E-02	102C
53	1.879E-01	103C

WHC-SD-WM-TI-693 Rev. 0

57	1.328E-02	107C
80	1.172E-01	102SX
81	7.097E-03	103SX
85	3.557E-03	107SX
86	2.515E-02	108SX
87	1.236E-03	109SX
89	8.894E-03	111SX

Batch No. = 122, Time = 4181. days, Batch Vol = 1.000E+03 kgal
 Mass Tot = 4.369E+09 g, Na Con = 1.979E+00 M

41	6.976E-04	103BY
44	7.958E-02	106BY
46	8.066E-03	108BY
52	1.184E-01	102C
53	4.879E-03	103C
57	1.550E-03	107C
80	5.186E-03	102SX
83	9.135E-03	105SX
85	9.535E-04	107SX
86	1.356E-03	108SX
87	3.355E-04	109SX
89	1.367E-03	111SX
125	1.705E-02	116TX

Batch No. = 123, Time = 4205. days, Batch Vol = 8.442E+02 kgal
 Mass Tot = 3.956E+09 g, Na Con = 3.830E+00 M

41	7.116E-05	103BY
44	8.118E-03	106BY
46	8.227E-04	108BY
52	7.771E-02	102C
53	4.977E-04	103C
57	1.581E-04	107C
80	1.292E-01	102SX
81	1.100E-01	103SX
83	9.318E-04	105SX
85	9.726E-05	107SX
86	9.061E-04	108SX
87	3.422E-05	109SX
89	2.840E-04	111SX
125	1.739E-03	116TX

Batch No. = 124, Time = 4220. days, Batch Vol = 8.694E+02 kgal
 Mass Tot = 3.588E+09 g, Na Con = 2.608E+00 M

41	2.514E-04	103BY
43	1.770E-02	105BY
46	3.053E-03	108BY
51	1.273E-05	101C
53	1.090E-03	103C
55	3.253E-05	105C
57	6.407E-04	107C

WHC-SD-WM-TI-693 Rev. 0

60	1.003E-05	110C
63	5.182E-05	201C
64	5.182E-05	202C
65	5.182E-05	203C
66	5.182E-05	204C
80	5.241E-02	102SX
82	6.894E-05	104SX
83	3.911E-04	105SX
85	6.007E-03	107SX
86	4.050E-02	108SX
87	2.087E-03	109SX
89	1.465E-02	111SX
124	5.716E-05	115TX
125	2.561E-04	116TX

Batch No. = 125, Time = 4252. days, Batch Vol = 1.000E+03 kgal

Mass Tot = 4.310E+09 g, Na Con = 2.658E+00 M

41	3.126E-04	103BY
52	7.694E-03	102C
80	1.247E-01	102SX
81	8.342E-02	103SX
85	7.681E-03	107SX
86	2.069E-02	108SX
87	2.669E-03	109SX
89	1.288E-02	111SX

Batch No. = 126, Time = 4263. days, Batch Vol = 9.434E+02 kgal

Mass Tot = 3.763E+09 g, Na Con = 1.233E+00 M

41	9.786E-04	103BY
43	5.976E-03	105BY
44	8.842E-03	106BY
52	1.411E-02	102C
55	1.098E-05	105C
57	1.333E-05	107C
63	1.748E-05	201C
64	1.748E-05	202C
65	1.748E-05	203C
66	1.748E-05	204C
80	1.701E-02	102SX
82	2.326E-05	104SX
83	4.362E-04	105SX
85	1.696E-02	107SX
86	1.349E-02	108SX
87	5.893E-03	109SX
89	2.238E-02	111SX
124	1.928E-05	115TX
125	6.544E-04	116TX

WHC--SD-WM-TI-693 Rev. 0

Batch No. = 127, Time = 4327. days, Batch Vol = 8.076E+02 kgal
Mass Tot = 3.806E+09 g, Na Con = 3.351E+00 M

44	1.742E-01	106BY
52	1.268E-01	102C

Batch No. = 128, Time = 4349. days, Batch Vol = 8.250E+02 kgal
Mass Tot = 3.449E+09 g, Na Con = 1.789E+00 M

43	8.159E-04	105BY
44	2.295E-02	106BY
52	2.633E-02	102C
80	1.113E-02	102SX
81	6.841E-02	103SX
83	1.803E-05	105SX
85	5.067E-04	107SX
86	3.498E-03	108SX
87	1.761E-04	109SX
89	1.251E-03	111SX
125	1.181E-05	116TX

Batch No. = 129, Time = 4361. days, Batch Vol = 1.000E+03 kgal
Mass Tot = 4.252E+09 g, Na Con = 3.105E+00 M

43	2.249E-03	105BY
44	1.404E-02	106BY
46	3.453E-03	108BY
52	9.007E-03	102C
53	3.686E-02	103C
80	8.637E-02	102SX
81	3.019E-02	103SX
83	4.970E-05	105SX
85	2.745E-03	107SX
86	1.924E-02	108SX
87	9.537E-04	109SX
89	6.832E-03	111SX
125	3.254E-05	116TX

Batch No. = 130, Time = 4391. days, Batch Vol = 1.000E+03 kgal
Mass Tot = 4.668E+09 g, Na Con = 4.715E+00 M

44	5.134E-02	106BY
52	5.375E-02	102C
81	5.070E-02	103SX
83	6.499E-04	105SX
121	1.206E-01	112TX
125	1.213E-03	116TX
177	2.451E-02	103SY

Batch No. = 131, Time = 4402. days, Batch Vol = 9.113E+02 kgal
Mass Tot = 3.914E+09 g, Na Con = 3.690E+00 M

43	6.942E-05	105BY
44	2.587E-02	106BY
46	1.273E-03	108BY

52	2.982E-02	102C
53	1.358E-02	103C
80	2.131E-02	102SX
81	4.020E-02	103SX
83	2.759E-04	105SX
85	5.782E-04	107SX
86	4.097E-03	108SX
87	2.009E-04	109SX
89	1.447E-03	111SX
125	5.132E-04	116TX

Batch No. = 132, Time = 4412. days, Batch Vol = 8.642E+02 kgal
 Mass Tot = 4.032E+09 g, Na Con = 2.973E+00 M

41	3.189E-05	103BY
42	2.558E-03	104BY
44	1.271E-01	106BY
52	1.455E-01	102C
80	1.272E-02	102SX
81	1.220E-02	103SX
85	7.834E-04	107SX
86	2.111E-03	108SX
87	2.722E-04	109SX
89	1.314E-03	111SX
121	8.769E-03	112TX
177	1.783E-03	103SY

Batch No. = 133, Time = 4434. days, Batch Vol = 8.563E+02 kgal
 Mass Tot = 3.693E+09 g, Na Con = 3.755E+00 M

42	6.502E-03	104BY
44	2.208E-02	106BY
52	2.216E-02	102C
80	1.591E-03	102SX
81	2.690E-02	103SX
83	6.629E-05	105SX
85	4.210E-05	107SX
86	2.989E-04	108SX
87	1.463E-05	109SX
89	1.055E-04	111SX
121	3.458E-02	112TX
125	1.237E-04	116TX
177	7.031E-03	103SY

Batch No. = 134, Time = 4444. days, Batch Vol = 8.641E+02 kgal
 Mass Tot = 3.406E+09 g, Na Con = 1.055E+00 M

44	1.139E-02	106BY
46	4.530E-04	108BY
52	1.610E-02	102C
53	4.836E-03	103C
80	5.346E-03	102SX
81	5.209E-04	103SX

WHC-SD-WM-TI-693 Rev. 0

83	3.286E-04	105SX
85	1.415E-04	107SX
86	1.004E-03	108SX
87	4.917E-05	109SX
89	3.546E-04	111SX
125	6.134E-04	116TX

Batch No. = 135, Time = 4455. days, Batch Vol = 9.348E+02 kgal
 Mass Tot = 4.434E+09 g, Na Con = 4.844E+00 M

80	2.711E-02	102SX
81	2.233E-01	103SX
85	7.175E-04	107SX
86	5.093E-03	108SX
87	2.493E-04	109SX
89	1.798E-03	111SX
92	1.738E-01	114SX
96	3.838E-01	103T
104	3.043E-02	111T
125	5.968E-03	116TX

Batch No. = 136, Time = 4465. days, Batch Vol = 8.100E+02 kgal
 Mass Tot = 3.368E+09 g, Na Con = 2.919E+00 M

44	1.610E-03	106BY
52	4.393E-03	102C
80	4.189E-02	102SX
81	3.240E-02	103SX
85	9.767E-04	107SX
86	6.963E-03	108SX
87	3.394E-04	109SX
89	2.453E-03	111SX

Batch No. = 137, Time = 4490. days, Batch Vol = 9.179E+02 kgal
 Mass Tot = 3.911E+09 g, Na Con = 1.825E+00 M

42	1.081E-01	104BY
44	6.483E-04	106BY
46	1.595E-04	108BY
52	3.710E-02	102C
53	1.702E-03	103C
54	4.981E-02	104C
80	4.322E-03	102SX
81	2.283E-02	103SX
85	1.144E-04	107SX
86	8.119E-04	108SX
87	3.974E-05	109SX
89	2.866E-04	111SX
92	1.564E-02	114SX
96	3.454E-02	103T
104	2.738E-03	111T
121	6.068E-03	112TX
125	5.371E-04	116TX

WHC-SD-WM-TI-693 Rev. 0

177 1.234E-03 103SY

Batch No. = 138, Time = 4512. days, Batch Vol = 8.540E+02 kgal

Mass Tot = 3.338E+09 g, Na Con = 9.711E-01 M

44	5.668E-04	106BY
52	1.543E-03	102C
80	1.469E-02	102SX
81	1.137E-02	103SX
85	3.426E-04	107SX
86	2.442E-03	108SX
87	1.190E-04	109SX
89	8.604E-04	111SX

Batch No. = 139, Time = 4525. days, Batch Vol = 1.000E+03 kgal

Mass Tot = 4.153E+09 g, Na Con = 2.643E+00 M

42	4.473E-02	104BY
44	4.875E-03	106BY
52	1.896E-02	102C
54	1.947E-02	104C
80	9.536E-04	102SX
81	1.245E-02	103SX
85	2.524E-05	107SX
86	1.791E-04	108SX
89	6.324E-05	111SX
92	6.111E-03	114SX
96	1.350E-02	103T
104	1.070E-03	111T
121	1.092E-02	112TX
125	2.099E-04	116TX
177	2.221E-03	103SY

Batch No. = 140, Time = 4560. days, Batch Vol = 9.523E+02 kgal

Mass Tot = 3.772E+09 g, Na Con = 1.274E+00 M

42	1.957E-02	104BY
44	4.973E-04	106BY
52	7.390E-03	102C
54	8.904E-03	104C
80	6.054E-03	102SX
81	8.172E-03	103SX
85	1.422E-04	107SX
86	1.014E-03	108SX
87	4.943E-05	109SX
89	3.572E-04	111SX
92	2.795E-03	114SX
96	6.174E-03	103T
104	4.894E-04	111T
121	1.957E-03	112TX
125	9.600E-05	116TX
177	3.979E-04	103SY

WHC-SD-WM-TI-693 Rev. 0

Batch No. = 141, Time = 4572. days, Batch Vol = 9.509E+02 kgal
Mass Tot = 3.650E+09 g, Na Con = 3.613E-01 M

42	2.923E-04	104BY
44	4.274E-03	106BY
52	6.445E-03	102C
81	4.213E-04	103SX
83	1.274E-04	105SX
121	1.002E-03	112TX
125	2.378E-04	116TX
177	2.037E-04	103SY

Batch No. = 142, Time = 4585. days, Batch Vol = 1.000E+03 kgal
Mass Tot = 4.318E+09 g, Na Con = 2.033E+00 M

42	9.393E-02	104BY
44	7.315E-02	106BY
52	8.287E-02	102C
81	2.233E-04	103SX
83	3.156E-05	105SX
121	5.309E-04	112TX
125	5.892E-05	116TX
177	1.079E-04	103SY

Batch No. = 143, Time = 4604. days, Batch Vol = 1.000E+03 kgal
Mass Tot = 4.619E+09 g, Na Con = 4.149E+00 M

42	2.709E-02	104BY
44	2.110E-02	106BY
52	2.390E-02	102C
81	1.254E-01	103SX
121	1.531E-04	112TX
122	1.502E-01	113TX
125	1.700E-05	116TX
177	3.113E-05	103SY

Batch No. = 144, Time = 4615. days, Batch Vol = 9.404E+02 kgal
Mass Tot = 3.608E+09 g, Na Con = 3.785E-01 M

42	5.827E-03	104BY
52	2.106E-03	102C
54	2.686E-03	104C
80	2.108E-03	102SX
81	2.543E-03	103SX
85	4.947E-05	107SX
86	3.526E-04	108SX
87	1.719E-05	109SX
89	1.242E-04	111SX
92	8.431E-04	114SX
96	1.863E-03	103T
104	1.477E-04	111T
121	3.272E-04	112TX
125	2.896E-05	116TX
177	6.653E-05	103SY

WHC-SD-WM-TI-693 Rev. 0

Batch No. = 145, Time = 4627. days, Batch Vol = 1.000E+03 kgal
Mass Tot = 4.689E+09 g, Na Con = 3.122E+00 M

42	2.598E-01	104BY
44	1.804E-02	106BY
45	9.287E-03	107BY
52	3.885E-02	102C
54	2.319E-01	104C
81	6.448E-03	103SX
121	3.095E-03	112TX
122	6.167E-03	113TX
177	6.292E-04	103SY

Batch No. = 146, Time = 4653. days, Batch Vol = 9.656E+02 kgal
Mass Tot = 4.033E+09 g, Na Con = 2.432E+00 M

42	7.482E-02	104BY
44	1.205E-02	106BY
45	9.489E-03	107BY
52	1.595E-02	102C
54	4.985E-02	104C
80	4.630E-05	102SX
81	1.009E-03	103SX
92	2.967E-04	114SX
96	6.554E-04	103T
104	5.196E-05	111T
121	3.930E-04	112TX
122	5.536E-04	113TX
125	1.069E-05	116TX
177	7.989E-05	103SY

Batch No. = 147, Time = 4664. days, Batch Vol = 1.000E+03 kgal
Mass Tot = 4.642E+09 g, Na Con = 3.806E+00 M

42	1.967E-01	104BY
44	1.953E-03	106BY
45	3.466E-02	107BY
52	6.936E-03	102C
54	2.423E-01	104C
81	1.194E-02	103SX
121	7.932E-04	112TX
122	1.390E-02	113TX
177	1.613E-04	103SY

Batch No. = 148, Time = 4696. days, Batch Vol = 1.000E+03 kgal
Mass Tot = 4.729E+09 g, Na Con = 4.116E+00 M

79	2.080E-01	101SX
81	1.056E-02	103SX
92	2.356E-01	114SX
96	8.196E-02	103T
102	3.487E-01	109T
104	4.198E-01	111T
122	9.379E-03	113TX

125 1.274E-03 116TX

Batch No. = 149, Time = 4707. days, Batch Vol = 8.948E+02 kgal

Mass Tot = 3.704E+09 g, Na Con = 1.986E+00 M

42	6.400E-02	104BY
44	3.505E-03	106BY
45	1.562E-02	107BY
52	6.028E-03	102C
54	6.727E-02	104C
79	5.703E-04	101SX
81	1.368E-03	103SX
92	2.591E-04	114SX
96	1.190E-03	103T
104	9.431E-05	111T
121	3.435E-04	112TX
122	1.418E-03	113TX
125	1.866E-05	116TX
177	6.983E-05	103SY

Batch No. = 150, Time = 4736. days, Batch Vol = 9.542E+02 kgal

Mass Tot = 4.055E+09 g, Na Con = 2.819E+00 M

42	4.492E-02	104BY
44	1.285E-03	106BY
45	3.349E-02	107BY
52	1.449E-03	102C
54	5.984E-02	104C
68	4.393E-04	102S
79	2.816E-02	101SX
81	1.272E-03	103SX
92	3.495E-02	114SX
96	1.418E-02	103T
102	4.145E-02	109T
104	5.724E-02	111T
122	9.566E-04	113TX
125	2.205E-04	116TX

Batch No. = 151, Time = 4748. days, Batch Vol = 1.000E+03 kgal

Mass Tot = 4.114E+09 g, Na Con = 1.729E+00 M

41	8.911E-03	103BY
42	2.198E-02	104BY
43	5.833E-03	105BY
45	3.875E-03	107BY
52	5.532E-04	102C
54	2.737E-02	104C
63	1.138E-05	201C
64	1.138E-05	202C
65	1.138E-05	203C
66	1.138E-05	204C
79	1.929E-02	101SX
80	9.804E-03	102SX

WHC-SD-WM-TI-693 Rev. 0

81	1.018E-03	103SX
82	1.824E-05	104SX
83	8.199E-04	105SX
85	3.796E-02	107SX
86	7.776E-03	108SX
87	1.539E-02	109SX
89	4.411E-02	111SX
92	2.185E-02	114SX
96	7.602E-03	103T
102	3.234E-02	109T
104	3.893E-02	111T
121	9.123E-05	112TX
122	8.698E-04	113TX
124	1.112E-05	115TX
125	8.403E-04	116TX
147	4.138E-05	202U
149	4.138E-05	204U
177	1.855E-05	103SY

Batch No. = 152, Time = 4782. days, Batch Vol = 1.000E+03 kgal
 Mass Tot = 4.100E+09 g, Na Con = 2.363E+00 M

42	1.232E-02	104BY
44	3.430E-04	106BY
45	9.216E-03	107BY
52	3.869E-04	102C
54	1.646E-02	104C
68	2.490E-03	102S
79	2.868E-02	101SX
81	3.585E-04	103SX
92	4.391E-02	114SX
96	1.074E-02	103T
102	3.331E-02	109T
104	8.000E-02	111T
125	1.670E-04	116TX

Batch No. = 153, Time = 4792. days, Batch Vol = 8.631E+02 kgal
 Mass Tot = 4.015E+09 g, Na Con = 3.711E+00 M

42	3.529E-04	104BY
44	7.445E-05	106BY
45	4.776E-01	107BY
52	8.397E-05	102C
54	9.939E-02	104C
79	4.101E-02	101SX
81	2.855E-03	103SX
92	6.897E-02	114SX
96	8.555E-02	103T
104	6.782E-03	111T
125	1.330E-03	116TX

WHC-SD-WM-TI-693 Rev. 0

Batch No. = 154, Time = 4803. days, Batch Vol = 9.091E+02 kgal

Mass Tot = 4.236E+09 g, Na Con = 4.465E+00 M

15	4.339E-01	105B
41	9.090E-04	103BY
42	2.242E-03	104BY
43	5.950E-04	105BY
45	2.647E-01	107BY
52	5.642E-05	102C
54	2.252E-02	104C
79	1.012E-02	101SX
80	1.000E-03	102SX
81	6.716E-04	103SX
83	8.363E-05	105SX
85	3.872E-03	107SX
86	7.932E-04	108SX
87	1.570E-03	109SX
89	4.499E-03	111SX
92	1.595E-02	114SX
96	1.779E-02	103T
102	3.299E-03	109T
104	5.320E-03	111T
122	8.872E-05	113TX
125	3.503E-04	116TX

Batch No. = 155, Time = 4812. days, Batch Vol = 8.146E+02 kgal

Mass Tot = 3.209E+09 g, Na Con = 1.159E+00 M

42	4.593E-03	104BY
45	3.835E-03	107BY
54	6.669E-03	104C
68	1.009E-03	102S
79	1.164E-02	101SX
81	1.462E-04	103SX
92	1.781E-02	114SX
96	4.380E-03	103T
102	1.350E-02	109T
104	3.242E-02	111T
125	6.811E-05	116TX

Batch No. = 156, Time = 4852. days, Batch Vol = 1.000E+03 kgal

Mass Tot = 4.187E+09 g, Na Con = 2.867E+00 M

15	9.488E-02	105B
42	1.232E-03	104BY
44	3.430E-05	106BY
45	5.871E-02	107BY
52	3.868E-05	102C
54	5.959E-03	104C
68	8.998E-03	102S
79	3.518E-02	101SX
81	4.195E-04	103SX
92	1.906E-02	114SX

WHC-SD-WM-TI-693 Rev. 0

96	1.257E-02	103T
102	8.439E-03	109T
104	2.105E-02	111T
125	1.955E-04	116TX

Batch No. = 157, Time = 4880. days, Batch Vol = 1.000E+03 kgal
 Mass Tot = 4.704E+09 g, Na Con = 4.927E+00 M

15	2.666E-01	105B
17	2.350E-01	107B
42	2.404E-05	104BY
45	1.145E-03	107BY
54	1.162E-04	104C
68	2.646E-01	102S
79	6.863E-04	101SX
92	3.719E-04	114SX
96	2.452E-04	103T
102	1.646E-04	109T
104	4.105E-04	111T

Batch No. = 158, Time = 4891. days, Batch Vol = 1.000E+03 kgal
 Mass Tot = 4.635E+09 g, Na Con = 4.096E+00 M

68	8.083E-02	102S
79	2.792E-01	101SX
81	6.982E-03	103SX
92	7.265E-02	114SX
96	9.011E-02	103T
102	9.569E-02	109T
104	2.367E-02	111T
122	4.762E-03	113TX
125	1.401E-03	116TX

Batch No. = 159, Time = 4901. days, Batch Vol = 8.768E+02 kgal
 Mass Tot = 3.441E+09 g, Na Con = 9.619E-01 M

15	2.228E-02	105B
45	1.357E-02	107BY
54	1.013E-03	104C
68	5.181E-03	102S
79	1.658E-02	101SX
81	1.821E-04	103SX
92	6.336E-03	114SX
96	5.457E-03	103T
102	1.830E-03	109T
104	4.780E-03	111T
125	8.486E-05	116TX

Batch No. = 160, Time = 4912. days, Batch Vol = 8.852E+02 kgal
 Mass Tot = 3.782E+09 g, Na Con = 3.428E+00 M

15	8.783E-03	105B
17	7.742E-03	107B
45	3.774E-05	107BY

WHC-SD-WM-TI-693 Rev. 0

68	3.482E-02	102S
79	9.378E-02	101SX
81	2.553E-03	103SX
92	2.462E-02	114SX
96	3.053E-02	103T
102	3.695E-02	109T
104	8.814E-03	111T
122	1.839E-03	113TX
125	4.747E-04	116TX

Batch No. = 161, Time = 4949. days, Batch Vol = 1.000E+03 kgal

Mass Tot = 4.394E+09 g, Na Con = 3.053E+00 M

15	7.858E-03	105B
45	4.786E-03	107BY
54	3.573E-04	104C
68	7.790E-02	102S
79	1.733E-02	101SX
81	1.030E-03	103SX
88	4.480E-01	110SX
90	4.829E-02	112SX
92	6.989E-02	114SX
96	3.087E-02	103T
99	5.793E-01	106T
101	2.293E-01	108T
102	2.037E-01	109T
104	9.615E-02	111T
125	4.799E-04	116TX

Batch No. = 162, Time = 4961. days, Batch Vol = 1.000E+03 kgal

Mass Tot = 4.121E+09 g, Na Con = 1.874E+00 M

68	3.384E-02	102S
79	5.420E-02	101SX
81	1.720E-03	103SX
88	1.178E-01	110SX
90	1.270E-02	112SX
92	3.147E-02	114SX
96	2.436E-02	103T
99	1.523E-01	106T
101	6.029E-02	108T
102	7.539E-02	109T
104	3.034E-02	111T
122	1.087E-03	113TX
125	3.788E-04	116TX

Batch No. = 163, Time = 4987. days, Batch Vol = 1.000E+03 kgal

Mass Tot = 4.695E+09 g, Na Con = 4.625E+00 M

15	6.146E-02	105B
17	2.853E-01	107B
28	3.763E-01	102BX
45	2.094E-02	107BY

WHC-SD-WM-TI-693 Rev. 0

49	8.148E-02	111BY
54	3.307E-05	104C
68	1.490E-01	102S
78	1.123E-02	112S
79	1.031E-02	101SX
81	7.012E-04	103SX
88	8.083E-02	110SX
90	3.387E-02	112SX
92	2.111E-02	114SX
96	2.101E-02	103T
99	5.362E-02	106T
100	2.051E-01	107T
101	2.959E-01	108T
102	1.886E-02	109T
104	1.034E-02	111T
125	3.267E-04	116TX

Batch No. = 164, Time = 4998. days, Batch Vol = 1.000E+03 kgal
 Mass Tot = 4.282E+09 g, Na Con = 3.231E+00 M

15	2.773E-02	105B
17	1.303E-01	107B
28	1.18E-01	102BX
42	1.480E-03	104BY
45	1.059E-02	107BY
49	1.238E-01	111BY
54	2.149E-03	104C
68	3.742E-03	102S
78	9.943E-03	112S
79	7.543E-05	101SX
90	4.567E-02	112SX
91	6.277E-02	113SX
92	1.269E-04	114SX
93	6.277E-02	115SX
96	1.573E-04	103T
104	1.247E-05	111T

Batch No. = 165, Time = 5010. days, Batch Vol = 1.000E+03 kgal
 Mass Tot = 4.276E+09 g, Na Con = 2.560E+00 M

15	3.240E-02	105B
17	1.522E-01	107B
28	2.008E-01	102BX
42	2.228E-03	104BY
45	1.093E-02	107BY
49	4.347E-02	111BY
52	2.078E-04	102C
54	2.271E-03	104C
68	7.765E-02	102S
78	5.989E-03	112S
79	1.022E-02	101SX
81	3.942E-04	103SX

88	2.100E-02	110SX
90	1.569E-02	112SX
92	9.177E-03	114SX
96	1.138E-02	103T
100	1.094E-01	107T
101	1.465E-01	108T
104	9.023E-04	111T
121	3.427E-05	112TX
125	1.770E-04	116TX

Batch No. = 166, Time = 5022. days, Batch Vol = 1.000E+03 kgal
 Mass Tot = 4.302E+09 g, Na Con = 2.627E+00 M

15	2.767E-03	105B
45	1.685E-03	107BY
49	1.050E-01	111BY
54	1.253E-04	104C
68	2.511E-02	102S
78	3.100E-02	112S
79	1.406E-02	101SX
81	7.349E-04	103SX
88	1.047E-01	110SX
90	8.400E-02	112SX
91	7.616E-02	113SX
92	2.403E-02	114SX
93	7.616E-02	115SX
96	1.951E-02	103T
99	1.068E-01	106T
101	4.228E-02	108T
102	3.959E-02	109T
104	1.917E-02	111T
122	1.006E-04	113TX
125	3.034E-04	116TX

Batch No. = 167, Time = 5033. days, Batch Vol = 1.000E+03 kgal
 Mass Tot = 3.945E+09 g, Na Con = 8.738E-01 M

1	3.276E-03	101A
7	3.213E-03	101AX
32	5.476E-03	106BX
40	5.876E-04	102BY
41	7.502E-04	103BY
43	2.713E-03	105BY
44	2.401E-03	106BY
47	1.225E-03	109BY
52	3.251E-04	102C
53	4.714E-03	103C
57	1.611E-03	107C
60	5.376E-04	110C
67	2.413E-03	101S
68	2.926E-03	102S
69	2.738E-03	103S

WHC-SD-WM-TI-693 Rev. 0

72	8.627E-04	106S
73	1.000E-03	107S
74	4.376E-04	108S
75	8.627E-04	109S
76	1.500E-04	110S
77	2.738E-03	111S
78	9.377E-04	112S
79	4.835E-03	101SX
80	2.288E-03	102SX
81	3.234E-03	103SX
82	1.662E-03	104SX
83	2.576E-03	105SX
84	4.915E-03	106SX
92	7.495E-04	114SX
96	9.297E-04	103T
97	2.326E-03	104T
100	2.451E-03	107T
102	3.955E-03	109T
103	2.088E-03	110T
104	4.095E-03	111T
122	2.038E-04	113TX
124	1.200E-03	115TX
125	6.261E-05	116TX
135	2.589E-03	102U
136	2.813E-03	103U
138	3.538E-03	105U
139	2.313E-03	106U
140	4.063E-03	107U
141	1.450E-03	108U
142	3.449E-03	109U
144	2.451E-03	111U
146	1.017E-05	201U
148	3.143E-03	203U

Batch No. = 168, Time = 5045. days, Batch Vol = 1.000E+03 kgal
 Mass Tot = 4.250E+09 g, Na Con = 3.104E+00 M

49	7.514E-02	111BY
68	1.868E-02	102S
78	2.217E-02	112S
79	1.451E-02	101SX
81	4.925E-04	103SX
88	6.713E-02	110SX
90	5.925E-02	112SX
91	5.448E-02	113SX
92	1.705E-02	114SX
93	5.448E-02	115SX
96	1.476E-02	103T
99	6.632E-02	106T
101	2.626E-02	108T
102	2.333E-02	109T

104 1.190E-02 111T
125 2.295E-04 116TX

Batch No. = 169, Time = 5056. days, Batch Vol = 9.551E+02 kgal
Mass Tot = 4.522E+09 g, Na Con = 4.927E+00 M

15 1.202E-02 105B
17 5.955E-02 107B
21 4.665E-02 111B
28 7.958E-02 102BX
45 4.380E-03 107BY
49 3.332E-01 111BY
68 4.661E-02 102S
78 3.785E-03 112S
79 3.098E-03 101SX
81 2.140E-04 103SX
88 1.750E-02 110SX
90 1.037E-02 112SX
92 5.595E-03 114SX
96 6.413E-03 103T
99 5.469E-03 106T
100 6.915E-02 107T
101 9.477E-02 108T
102 1.924E-03 109T
104 1.393E-03 111T
125 9.972E-05 116TX

Batch No. = 170, Time = 5070. days, Batch Vol = 1.000E+03 kgal
Mass Tot = 3.940E+09 g, Na Con = 1.066E+00 M

15 2.741E-04 105B
45 1.669E-04 107BY
49 2.306E-02 111BY
54 1.246E-05 104C
68 6.287E-03 102S
78 6.806E-03 112S
79 5.628E-03 101SX
81 1.740E-04 103SX
88 2.168E-02 110SX
90 1.830E-02 112SX
91 1.672E-02 113SX
92 5.692E-03 114SX
93 1.672E-02 115SX
96 4.964E-03 103T
99 2.175E-02 106T
101 8.611E-03 108T
102 7.851E-03 109T
104 3.947E-03 111T
125 7.719E-05 116TX

WHC-SD-WM-TI-693 Rev. 0

Batch No. = 171, Time = 5082. days, Batch Vol = 1.000E+03 kgal
 Mass Tot = 4.422E+09 g, Na Con = 3.602E+00 M

15	6.219E-03	105B
17	2.922E-02	107B
28	3.853E-02	102BX
42	1.256E-04	104BY
45	2.204E-03	107BY
49	2.801E-02	111BY
54	1.823E-04	104C
68	1.778E-02	102S
78	1.485E-01	112S
79	1.052E-02	101SX
81	7.322E-04	103SX
88	4.010E-02	110SX
90	4.589E-02	112SX
91	1.426E-02	113SX
92	1.771E-02	114SX
93	1.426E-02	115SX
96	2.194E-02	103T
99	2.274E-04	106T
101	9.003E-05	108T
102	7.999E-05	109T
104	1.776E-03	111T
125	3.412E-04	116TX

Batch No. = 172, Time = 5093. days, Batch Vol = 1.000E+03 kgal
 Mass Tot = 4.349E+09 g, Na Con = 3.039E+00 M

15	2.313E-03	105B
17	1.134E-02	107B
21	3.952E-01	111B
28	1.509E-02	102BX
36	1.294E-01	110BX
45	8.220E-04	107BY
49	7.723E-02	111BY
68	6.822E-03	102S
78	3.854E-02	112S
79	1.720E-03	101SX
81	1.197E-04	103SX
88	6.738E-03	110SX
90	2.201E-02	112SX
91	2.227E-02	113SX
92	2.893E-03	114SX
93	2.227E-02	115SX
96	3.588E-03	103T
100	6.602E-03	107T
101	8.841E-03	108T
104	2.844E-04	111T
125	5.579E-05	116TX

WHC-SD-WM-TI-693 Rev. 0

Batch No. = 173, Time = 5111. days, Batch Vol = 1.000E+03 kgal
 Mass Tot = 4.666E+09 g, Na Con = 4.700E+00 M

26	8.383E-01	204B
36	5.752E-01	110BX
37	5.493E-01	111BX
49	8.245E-03	111BY
68	2.067E-03	102S
78	2.433E-03	112S
79	1.626E-03	101SX
81	5.471E-05	103SX
88	7.399E-03	110SX
90	6.505E-03	112SX
91	5.979E-03	113SX
92	1.885E-03	114SX
93	5.979E-03	115SX
96	1.632E-03	103T
99	7.319E-03	106T
101	2.898E-03	108T
102	2.580E-03	109T
104	1.314E-03	111T
125	2.538E-05	116TX

Batch No. = 174, Time = 5152. days, Batch Vol = 1.000E+03 kgal
 Mass Tot = 3.939E+09 g, Na Con = 1.169E+00 M

15	8.362E-04	105B
17	4.024E-03	107B
21	7.987E-02	111B
28	5.336E-03	102BX
36	2.615E-02	110BX
45	2.906E-04	107BY
49	1.726E-02	111BY
68	1.429E-03	102S
78	7.922E-03	112S
79	3.476E-04	101SX
81	2.420E-05	103SX
88	1.362E-03	110SX
90	5.056E-03	112SX
91	5.336E-03	113SX
92	5.846E-04	114SX
93	5.336E-03	115SX
96	7.251E-04	103T
100	1.334E-03	107T
101	1.787E-03	108T
104	5.748E-05	111T
125	1.127E-05	116TX

WHC-SD-WM-TI-693 Rev. 0

Batch No. = 175, Time = 5164. days, Batch Vol = 1.000E+03 kgal

Mass Tot = 4.724E+09 g, Na Con = 4.987E+00 M

26	9.948E-03	204B
36	6.826E-03	110BX
37	6.518E-03	111BX
49	9.784E-05	111BY
68	2.452E-05	102S
77	1.039E-01	111S
78	2.594E-01	112S
79	1.930E-05	101SX
88	8.779E-05	110SX
90	7.719E-05	112SX
91	7.095E-05	113SX
92	2.236E-05	114SX
93	7.095E-05	115SX
96	1.937E-05	103T
99	8.685E-05	106T
101	3.438E-05	108T
102	3.062E-05	109T
104	1.560E-05	111T

Batch No. = 176, Time = 5175. days, Batch Vol = 1.000E+03 kgal

Mass Tot = 4.431E+09 g, Na Con = 4.063E+00 M

4	2.989E-01	104A
5	1.674E-01	105A
15	7.986E-04	105B
17	3.885E-03	107B
21	1.120E-01	111B
26	5.284E-02	204B
28	5.165E-03	102BX
36	7.292E-02	110BX
37	1.377E-01	111BX
42	1.162E-05	104BY
45	2.910E-04	107BY
49	2.488E-02	111BY
50	1.168E-01	112BY
54	2.377E-02	104C
68	4.002E-03	102S
78	2.520E-02	112S
79	1.644E-03	101SX
81	1.143E-04	103SX
88	7.702E-03	110SX
90	1.161E-02	112SX
91	8.342E-03	113SX
92	2.922E-03	114SX
93	8.342E-03	115SX
96	3.424E-03	103T
99	2.077E-03	106T
100	1.871E-03	107T
101	3.328E-03	108T

102	7.306E-04	109T
104	6.074E-04	111T
125	5.324E-05	116TX

Batch No. = 177, Time = 5187. days, Batch Vol = 1.000E+03 kgal
 Mass Tot = 4.241E+09 g, Na Con = 2.392E+00 M

15	3.300E-03	105B
17	1.551E-02	107B
28	2.045E-02	102BX
42	2.270E-04	104BY
45	1.114E-03	107BY
49	6.204E-03	111BY
52	2.117E-05	102C
54	2.313E-04	104C
68	2.141E-02	102S
78	1.148E-01	112S
79	9.338E-03	101SX
81	6.176E-04	103SX
88	3.473E-02	110SX
90	3.056E-02	112SX
91	1.288E-03	113SX
92	1.501E-02	114SX
93	1.288E-03	115SX
96	1.846E-02	103T
99	1.568E-03	106T
100	1.115E-02	107T
101	1.555E-02	108T
102	5.514E-04	109T
104	1.717E-03	111T
125	2.871E-04	116TX

Batch No. = 178, Time = 5204. days, Batch Vol = 9.258E+02 kgal
 Mass Tot = 4.381E+09 g, Na Con = 4.979E+00 M

26	5.441E-04	204B
36	3.733E-04	110BX
37	3.565E-04	111BX
68	1.892E-03	102S
77	3.130E-01	111S
78	4.312E-02	112S
79	1.176E-03	101SX
81	8.183E-05	103SX
88	4.470E-03	110SX
90	3.974E-03	112SX
92	1.977E-03	114SX
96	2.452E-03	103T
100	1.335E-01	107T
104	1.952E-04	111T
125	3.813E-05	116TX
130	1.328E-01	103TY

WHC-SD-WM-TI-693 Rev. 0

Batch No. = 179, Time = 5215. days, Batch Vol = 1.000E+03 kgal
Mass Tot = 4.294E+09 g, Na Con = 2.790E+00 M

15	6.202E-05	105B
17	3.156E-04	107B
21	1.620E-01	111B
28	4.236E-04	102BX
36	5.379E-02	110BX
45	2.307E-05	107BY
49	1.318E-02	111BY
68	1.188E-03	102S
77	9.546E-02	111S
78	2.188E-02	112S
79	6.131E-04	101SX
81	4.267E-05	103SX
88	2.340E-03	110SX
90	7.799E-03	112SX
91	7.873E-03	113SX
92	1.031E-03	114SX
93	7.873E-03	115SX
96	1.279E-03	103T
100	1.316E-01	107T
101	4.557E-04	108T
104	1.014E-04	111T
125	1.988E-05	116TX
130	1.306E-01	103TY

Batch No. = 180, Time = 5226. days, Batch Vol = 9.410E+02 kgal
Mass Tot = 4.452E+09 g, Na Con = 4.884E+00 M

4	1.364E-01	104A
5	7.641E-02	105A
27	1.571E-01	101BX
37	4.704E-02	111BX
50	6.276E-01	112BY
54	1.084E-02	104C

Batch No. = 181, Time = 5253. days, Batch Vol = 1.000E+03 kgal
Mass Tot = 4.231E+09 g, Na Con = 2.395E+00 M

15	1.821E-05	105B
17	9.520E-05	107B
21	2.125E-02	111B
28	1.285E-04	102BX
36	7.028E-03	110BX
49	2.335E-03	111BY
67	8.061E-02	101S
68	2.147E-04	102S
77	1.095E-01	111S
78	3.201E-03	112S
79	8.398E-05	101SX
88	3.233E-04	110SX
90	1.031E-03	112SX

WHC-SD-WM-TI-693 Rev. 0

91	1.027E-03	113SX
92	1.412E-04	114SX
93	1.027E-03	115SX
96	1.752E-04	103T
100	2.434E-02	107T
101	1.822E-04	108T
104	1.389E-05	111T
130	1.839E-01	103TY

Batch No. = 182, Time = 5282. days, Batch Vol = 9.083E+02 kgal
 Mass Tot = 4.248E+09 g, Na Con = 4.573E+00 M

3	2.360E-01	103A
4	6.802E-03	104A
5	3.610E-03	105A
20	4.014E-01	110B
21	2.168E-03	111B
27	3.424E-01	101BX
28	1.311E-05	102BX
34	6.781E-01	108BX
36	7.169E-04	110BX
37	2.345E-03	111BX
48	9.625E-02	110BY
49	2.382E-04	111BY
50	3.129E-02	112BY
54	5.405E-04	104C
67	8.223E-03	101S
68	2.190E-05	102S
77	1.117E-02	111S
78	3.265E-04	112S
88	3.297E-05	110SX
90	1.051E-04	112SX
91	1.047E-04	113SX
92	1.441E-05	114SX
93	1.047E-04	115SX
96	1.787E-05	103T
100	2.482E-03	107T
101	1.858E-05	108T
130	1.876E-02	103TY

Batch No. = 183, Time = 5291. days, Batch Vol = 8.088E+02 kgal
 Mass Tot = 3.727E+09 g, Na Con = 5.175E+00 M

3	1.256E-01	103A
20	4.313E-01	110B
21	4.982E-02	111B
27	3.594E-01	101BX
34	1.454E-01	108BX
36	1.658E-02	110BX
49	3.326E-03	111BY
68	2.969E-04	102S
77	3.359E-02	111S

WHC-SD-WM-TI-693 Rev. 0

78	7.008E-03	112S
79	1.845E-04	101SX
81	1.284E-05	103SX
88	7.011E-04	110SX
90	2.378E-03	112SX
91	2.412E-03	113SX
92	3.103E-04	114SX
93	2.412E-03	115SX
96	3.849E-04	103T
100	4.618E-02	107T
104	3.051E-05	111T
130	4.594E-02	103TY

Batch No. = 184, Time = 5331. days, Batch Vol = 1.000E+03 kgal
 Mass Tot = 4.526E+09 g, Na Con = 4.115E+00 M

3	1.974E-01	103A
20	3.125E-02	110B
21	3.610E-03	111B
27	2.604E-02	101BX
34	1.053E-02	108BX
36	1.201E-03	110BX
48	2.168E-01	110BY
49	2.410E-04	111BY
67	2.524E-02	101S
68	2.151E-05	102S
77	3.397E-02	111S
78	6.874E-04	112S
79	1.337E-05	101SX
88	5.080E-05	110SX
90	1.723E-04	112SX
91	1.747E-04	113SX
92	2.248E-05	114SX
93	1.747E-04	115SX
96	2.789E-05	103T
100	7.119E-03	107T
130	5.712E-02	103TY

Batch No. = 185, Time = 5354. days, Batch Vol = 9.303E+02 kgal
 Mass Tot = 4.396E+09 g, Na Con = 4.891E+00 M

1	8.397E-02	101A
3	7.650E-02	103A
4	1.154E-03	104A
5	6.463E-04	105A
20	7.129E-02	110B
21	3.682E-04	111B
27	6.074E-02	101BX
34	1.161E-01	108BX
36	1.225E-04	110BX
37	3.979E-04	111BX
48	2.737E-01	110BY

49	2.458E-05	111BY
50	5.309E-03	112BY
54	9.169E-05	104C
67	5.106E-03	101S
76	4.131E-04	110S
77	4.292E-03	111S
78	7.482E-05	112S
90	1.757E-05	112SX
91	1.782E-05	113SX
93	1.782E-05	115SX
100	8.252E-04	107T
130	7.238E-03	103TY

Batch No. = 186, Time = 5367. days, Batch Vol = 8.413E+02 kgal
 Mass Tot = 3.989E+09 g, Na Con = 5.004E+00 M

1	5.048E-02	101A
3	2.537E-01	103A
5	4.098E-01	105A
21	1.628E-02	111B
36	5.419E-03	110BX
48	1.339E-01	110BY
49	1.087E-03	111BY
68	9.705E-05	102S
77	1.069E-02	111S
78	1.576E-03	112S
79	6.030E-05	101SX
88	2.291E-04	110SX
90	7.772E-04	112SX
91	7.882E-04	113SX
92	1.014E-04	114SX
93	7.882E-04	115SX
96	1.258E-04	103T
100	1.509E-02	107T
130	1.502E-02	103TY

Batch No. = 187, Time = 5381. days, Batch Vol = 1.000E+03 kgal
 Mass Tot = 4.621E+09 g, Na Con = 5.143E+00 M

3	3.756E-02	103A
4	2.805E-02	104A
5	1.571E-02	105A
15	7.493E-05	105B
17	3.645E-04	107B
21	9.293E-02	111B
26	4.957E-03	204B
28	4.845E-04	102BX
36	3.427E-02	110BX
37	1.292E-02	111BX
45	2.730E-05	107BY
48	4.326E-02	110BY
49	7.836E-03	111BY

WHC-SD-WM-TI-693 Rev. 0

50	1.096E-02	112BY
54	2.230E-03	104C
67	7.391E-02	101S
68	8.667E-04	102S
76	3.141E-03	110S
77	1.301E-01	111S
78	1.438E-02	112S
79	4.594E-04	101SX
81	3.197E-05	103SX
88	1.882E-03	110SX
90	5.023E-03	112SX
91	4.772E-03	113SX
92	7.874E-04	114SX
93	4.772E-03	115SX
96	9.579E-04	103T
99	1.949E-04	106T
100	8.550E-02	107T
101	3.122E-04	108T
102	6.854E-05	109T
104	1.075E-04	111T
125	1.489E-05	116TX
130	2.032E-01	103TY

Batch No. = 188, Time = 5412. days, Batch Vol = 8.953E+02 kgal
 Mass Tot = 3.694E+09 g, Na Con = 2.792E+00 M

3	5.518E-03	103A
20	1.896E-02	110B
21	2.190E-03	111B
27	1.580E-02	101BX
34	6.389E-03	108BX
36	7.287E-04	110BX
49	1.462E-04	111BY
67	6.887E-02	101S
68	1.973E-04	102S
76	1.522E-02	110S
77	3.141E-02	111S
78	3.127E-03	112S
79	1.226E-04	101SX
88	4.658E-04	110SX
90	4.912E-04	112SX
91	1.060E-04	113SX
92	2.061E-04	114SX
93	1.060E-04	115SX
96	2.557E-04	103T
100	1.504E-02	107T
104	2.027E-05	111T
130	1.496E-02	103TY

WHC-SD-WM-TI-693 Rev. 0

Batch No. = 189, Time = 5423. days, Batch Vol = 1.000E+03 kgal
Mass Tot = 4.659E+09 g, Na Con = 5.052E+00 M

1	7.353E-02	101A
3	1.365E-02	103A
4	1.050E-01	104A
5	7.670E-02	105A
20	3.240E-03	110B
21	7.098E-04	111B
22	5.941E-01	112B
26	1.856E-02	204B
27	2.763E-03	101BX
32	5.152E-01	106BX
34	5.472E-03	108BX
36	1.297E-02	110BX
37	4.838E-02	111BX
38	2.731E-01	112BX
48	8.955E-02	110BY
49	4.738E-05	111BY
50	4.127E-02	112BY
54	8.346E-03	104C
67	2.602E-02	101S
76	8.678E-03	110S
77	4.660E-04	111S
78	6.870E-05	112S
90	3.387E-05	112SX
91	3.436E-05	113SX
93	3.436E-05	115SX
100	6.579E-04	107T
130	6.545E-04	103TY

Batch No. = 190, Time = 5435. days, Batch Vol = 1.000E+03 kgal
Mass Tot = 4.198E+09 g, Na Con = 2.956E+00 M

1	1.232E-02	101A
3	1.288E-02	103A
4	1.920E-02	104A
5	1.075E-02	105A
20	2.833E-02	110B
21	2.119E-03	111B
26	3.363E-03	204B
27	2.381E-02	101BX
34	2.306E-02	108BX
36	3.013E-03	110BX
37	8.823E-03	111BX
48	3.607E-02	110BY
49	1.414E-04	111BY
50	8.213E-03	112BY
54	1.525E-03	104C
67	6.938E-02	101S
68	1.324E-04	102S
76	2.436E-02	110S

WHC-SD-WM-TI-693 Rev. 0

77	2.089E-02	111S
78	2.130E-03	112S
79	8.226E-05	101SX
88	3.126E-04	110SX
90	3.525E-04	112SX
91	1.026E-04	113SX
92	1.383E-04	114SX
93	1.026E-04	115SX
96	1.716E-04	103T
100	1.042E-02	107T
104	1.360E-05	111T
130	1.036E-02	103TY

Batch No. = 191, Time = 5459. days, Batch Vol = 8.061E+02 kgal
 Mass Tot = 3.237E+09 g, Na Con = 1.884E+00 M

1	4.826E-03	101A
3	2.956E-03	103A
4	4.398E-02	104A
5	2.463E-02	105A
20	3.914E-03	110B
26	7.762E-03	204B
27	3.338E-03	101BX
34	6.611E-03	108BX
36	5.326E-03	110BX
37	2.025E-02	111BX
48	1.413E-02	110BY
50	1.746E-02	112BY
54	3.495E-03	104C
67	1.629E-02	101S
76	7.138E-03	110S

Batch No. = 192, Time = 5477. days, Batch Vol = 1.000E+03 kgal
 Mass Tot = 4.104E+09 g, Na Con = 2.041E+00 M

1	1.376E-02	101A
3	2.385E-03	103A
4	2.427E-02	104A
5	1.704E-02	105A
20	2.999E-04	110B
21	1.367E-04	111B
22	1.144E-01	112B
26	4.290E-03	204B
27	2.558E-04	101BX
32	9.924E-02	106BX
34	5.065E-04	108BX
36	2.989E-03	110BX
37	1.118E-02	111BX
38	5.260E-02	112BX
48	1.608E-02	110BY
50	9.504E-03	112BY
54	1.929E-03	104C

67	5.892E-02	101S
68	6.113E-05	102S
76	2.666E-02	110S
77	9.892E-03	111S
78	9.362E-04	112S
79	3.799E-05	101SX
88	1.443E-04	110SX
90	1.332E-04	112SX
92	6.389E-05	114SX
96	7.924E-05	103T
100	4.386E-03	107T
130	4.363E-03	103TY

Batch No. = 193, Time = 5506. days, Batch Vol = 8.473E+02 kgal
 Mass Tot = 3.522E+09 g, Na Con = 2.935E+00 M

1	1.217E-02	101A
3	2.806E-03	103A
4	2.569E-05	104A
5	2.662E-03	105A
20	1.516E-03	110B
21	1.052E-04	111B
22	8.804E-02	112B
27	1.293E-03	101BX
32	7.636E-02	106BX
34	2.561E-03	108BX
36	3.501E-05	110BX
38	4.048E-02	112BX
48	1.701E-02	110BY
50	1.182E-04	112BY
67	4.957E-02	101S
76	3.213E-02	110S
77	6.906E-05	111S
78	1.018E-05	112S
100	9.750E-05	107T
130	9.700E-05	103TY

Batch No. = 194, Time = 5518. days, Batch Vol = 1.000E+03 kgal
 Mass Tot = 4.310E+09 g, Na Con = 2.836E+00 M

1	7.298E-02	101A
3	2.207E-04	103A
4	2.247E-03	104A
5	1.577E-03	105A
20	2.776E-05	110B
21	1.265E-05	111B
22	1.059E-02	112B
26	3.970E-04	204B
27	2.367E-05	101BX
32	9.186E-03	106BX
34	4.688E-05	108BX
36	2.766E-04	110BX

37	1.035E-03	111BX
38	2.655E-01	112BX
39	5.752E-02	101BY
48	1.488E-03	110BY
50	8.797E-04	112BY
54	1.785E-04	104C
67	1.418E-02	101S
68	2.901E-05	102S
76	4.398E-03	110S
77	4.710E-03	111S
78	4.439E-04	112S
79	1.803E-05	101SX
88	6.850E-05	110SX
90	6.135E-05	112SX
92	3.032E-05	114SX
96	3.760E-05	103T
100	2.055E-03	107T
130	2.044E-03	103TY

Batch No. = 195, Time = 5552. days, Batch Vol = 8.578E+02 kgal
 Mass Tot = 3.624E+09 g, Na Con = 2.301E+00 M

1	5.722E-02	101A
3	4.026E-04	103A
20	5.331E-04	110B
27	4.547E-04	101BX
34	9.004E-04	108BX
38	2.056E-01	112BX
39	4.538E-02	101BY
48	1.925E-03	110BY
50	4.156E-05	112BY
67	1.128E-03	101S
76	7.309E-04	110S

Batch No. = 196, Time = 5566. days, Batch Vol = 1.000E+03 kgal
 Mass Tot = 4.283E+09 g, Na Con = 2.612E+00 M

1	7.062E-02	101A
3	2.043E-05	103A
4	2.080E-04	104A
5	1.460E-04	105A
22	9.803E-04	112B
26	3.675E-05	204B
32	8.502E-04	106BX
36	2.561E-05	110BX
37	9.578E-05	111BX
38	4.576E-02	112BX
39	1.182E-01	101BY
48	1.377E-04	110BY
50	8.143E-05	112BY
54	1.652E-05	104C
67	4.382E-03	101S

WHC-SD-WM-TI-693 Rev. 0

68	1.089E-05	102S
76	1.085E-03	110S
77	1.770E-03	111S
78	1.667E-04	112S
88	2.572E-05	110SX
90	2.291E-05	112SX
92	1.138E-05	114SX
96	1.412E-05	103T
100	7.697E-04	107T
130	7.657E-04	103TY

Batch No. = 197, Time = 5577. days, Batch Vol = 1.000E+03 kgal
 Mass Tot = 3.871E+09 g, Na Con = 6.534E-01 M

1	2.401E-03	101A
3	1.418E-03	103A
4	8.162E-03	104A
5	4.889E-03	105A
20	2.681E-03	110B
21	2.131E-04	111B
22	1.056E-02	112B
26	1.440E-03	204B
27	2.252E-03	101BX
32	9.159E-03	106BX
34	2.181E-03	108BX
36	1.059E-03	110BX
37	3.757E-03	111BX
38	4.855E-03	112BX
48	4.796E-03	110BY
49	1.422E-05	111BY
50	3.256E-03	112BY
54	6.485E-04	104C
67	1.328E-02	101S
68	1.260E-05	102S
76	6.165E-03	110S
77	1.984E-03	111S
78	2.028E-04	112S
88	2.975E-05	110SX
90	3.395E-05	112SX
91	1.031E-05	113SX
92	1.317E-05	114SX
93	1.031E-05	115SX
96	1.633E-05	103T
100	9.974E-04	107T
130	9.922E-04	103TY

Batch No. = 198, Time = 5611. days, Batch Vol = 1.000E+03 kgal
 Mass Tot = 4.491E+09 g, Na Con = 3.902E+00 M

1	5.100E-02	101A
3	1.295E-02	103A
38	1.692E-02	112BX

WHC-SD-WM-TI-693 Rev. 0

39	9.015E-02	101BY
48	1.491E-02	110BY
67	1.096E-01	101S
76	1.265E-01	110S
77	2.169E-03	111S
78	1.235E-05	112S
100	2.595E-04	107T
130	3.699E-03	103TY

Batch No. = 199, Time = 5623. days, Batch Vol = 1.000E+03 kgal
 Mass Tot = 4.389E+09 g, Na Con = 3.412E+00 M

1	1.852E-02	101A
3	6.302E-03	103A
4	2.220E-03	104A
5	6.000E-03	105A
17	2.885E-05	107B
20	1.183E-03	110B
21	7.682E-03	111B
22	1.582E-01	112B
26	3.924E-04	204B
27	9.856E-04	101BX
28	3.835E-05	102BX
32	1.372E-01	106BX
34	3.986E-04	108BX
36	2.821E-03	110BX
37	1.023E-03	111BX
38	7.273E-02	112BX
48	2.416E-02	110BY
49	6.420E-04	111BY
50	8.673E-04	112BY
54	1.765E-04	104C
67	1.398E-01	101S
68	7.054E-05	102S
76	1.554E-01	110S
77	1.052E-02	111S
78	1.176E-03	112S
79	3.757E-05	101SX
88	1.536E-04	110SX
90	4.131E-04	112SX
91	3.935E-04	113SX
92	6.436E-05	114SX
93	3.935E-04	115SX
96	7.834E-05	103T
99	1.543E-05	106T
100	7.070E-03	107T
101	2.471E-05	108T
130	1.639E-02	103TY

WHC-SD-WM-TI-693 Rev. 0

Batch No. = 200, Time = 5634. days, Batch Vol = 9.986E+02 kgal
Mass Tot = 4.679E+09 g, Na Con = 4.673E+00 M

1	1.006E-01	101A
3	1.108E-04	103A
4	6.376E-04	104A
5	3.820E-04	105A
20	2.094E-04	110B
21	1.665E-05	111B
22	8.250E-04	112B
26	1.125E-04	204B
27	1.760E-04	101BX
32	7.155E-04	106BX
34	1.704E-04	108BX
36	8.272E-05	110BX
37	2.936E-04	111BX
38	5.099E-03	112BX
39	3.065E-01	101BY
48	3.747E-04	110BY
50	2.544E-04	112BY
54	5.067E-05	104C
67	1.038E-03	101S
76	4.816E-04	110S
77	1.550E-04	111S
78	1.584E-05	112S
100	7.792E-05	107T
130	7.752E-05	103TY

Batch No. = 201, Time = 5645. days, Batch Vol = 9.049E+02 kgal
Mass Tot = 3.742E+09 g, Na Con = 2.813E+00 M

1	4.690E-04	101A
3	7.559E-05	103A
5	1.205E-04	105A
17	2.089E-05	107B
22	4.007E-03	112B
28	2.755E-05	102BX
32	3.475E-03	106BX
38	1.842E-03	112BX
48	5.252E-04	110BY
67	7.507E-02	101S
68	2.887E-05	102S
76	9.019E-02	110S
78	1.551E-04	112S
79	1.260E-05	101SX
88	4.686E-05	110SX
90	4.141E-05	112SX
92	2.025E-05	114SX
96	2.492E-05	103T
100	1.946E-05	107T
101	2.095E-05	108T

WHC-CD-WM-TI-693 Rev. 0

Batch No. = 202, Time = 5655. days, Batch Vol = 9.069E+02 kgal
 Mass Tot = 4.283E+09 g, Na Con = 4.822E+00 M

1	8.876E-02	101A
3	1.321E-03	103A
6	2.246E-01	106A
23	8.600E-01	201B
30	8.600E-01	104BX
35	1.130E-01	109BX
38	1.726E-03	112BX
39	6.798E-02	101BY
48	1.521E-03	110BY
67	1.118E-02	101S
76	1.290E-02	110S
77	2.212E-04	111S
100	2.647E-05	107T
130	3.773E-04	103TY

Batch No. = 203, Time = 5667. days, Batch Vol = 1.000E+03 kgal
 Mass Tot = 4.689E+09 g, Na Con = 4.674E+00 M

1	1.375E-01	101A
3	5.850E-04	103A
4	2.225E-04	104A
5	5.673E-04	105A
20	1.097E-04	110B
21	7.111E-04	111B
22	1.472E-02	112B
26	3.933E-05	204B
27	9.140E-05	101BX
32	1.277E-02	106BX
34	3.725E-05	108BX
36	2.632E-04	110BX
37	1.025E-04	111BX
38	1.048E-02	112BX
39	1.982E-01	101BY
48	2.247E-03	110BY
49	5.943E-05	111BY
50	8.694E-05	112BY
54	1.769E-05	104C
67	1.330E-02	101S
76	1.447E-02	110S
77	1.118E-03	111S
78	1.225E-04	112S
88	1.632E-05	110SX
90	4.011E-05	112SX
91	3.643E-05	113SX
93	3.643E-05	115SX
100	7.174E-04	107T
130	1.579E-03	103TY

WHC-SD-WM-TI-693 Rev. 0

Batch No. = 204, Time = 5677. days, Batch Vol = 8.833E+02 kgal
 Mass Tot = 3.904E+09 g, Na Con = 3.229E+00 M

1	1.983E-02	101A
4	3.193E-01	104A
5	1.789E-01	105A
7	3.278E-04	101AX
22	1.153E-05	112B
26	5.645E-02	204B
32	5.686E-04	106BX
36	3.873E-02	110BX
37	1.471E-01	111BX
38	5.380E-04	112BX
39	2.846E-02	101BY
40	5.994E-05	102BY
41	7.652E-05	103BY
43	2.767E-04	105BY
44	2.449E-04	106BY
47	1.250E-04	109BY
49	2.488E-03	111BY
50	1.248E-01	112BY
52	3.316E-05	102C
53	4.808E-04	103C
54	2.537E-02	104C
57	1.643E-04	107C
60	5.484E-05	110C
67	1.273E-02	101S
68	8.134E-04	102S
69	2.793E-04	103S
72	8.800E-05	106S
73	1.020E-04	107S
74	4.464E-05	108S
75	8.800E-05	109S
76	1.517E-02	110S
77	3.001E-04	111S
78	8.320E-04	112S
79	6.882E-04	101SX
80	2.334E-04	102SX
81	3.432E-04	103SX
82	1.695E-04	104SX
83	2.627E-04	105SX
84	5.013E-04	106SX
88	2.224E-03	110SX
90	1.962E-03	112SX
91	1.804E-03	113SX
92	5.712E-04	114SX
93	1.804E-03	115SX
96	4.968E-04	103T
97	2.372E-04	104T
99	2.196E-03	106T
100	2.590E-04	107T

101	8.696E-04	108T
102	1.176E-03	109T
103	2.130E-04	110T
104	8.049E-04	111T
122	2.078E-05	113TX
124	1.224E-04	115TX
125	1.264E-05	116TX
135	2.640E-04	102U
136	2.869E-04	103U
138	3.609E-04	105U
139	2.359E-04	106U
140	4.145E-04	107U
141	1.479E-04	108U
142	3.518E-04	109U
144	2.500E-04	111U
148	3.206E-04	203U

Batch No. = 205, Time = 5690. days, Batch Vol = 8.884E+02 kgal
 Mass Tot = 3.501E+09 g, Na Con = 1.259E+00 M

3	5.526E-03	103A
48	6.364E-03	110BY
67	2.765E-02	101S
76	3.068E-02	110S
77	9.256E-04	111S
100	1.108E-04	107T
130	1.579E-03	103TY

Batch No. = 206, Time = 5701. days, Batch Vol = 9.311E+02 kgal
 Mass Tot = 4.396E+09 g, Na Con = 4.563E+00 M

1	1.837E-02	101A
3	5.967E-05	103A
4	2.270E-05	104A
5	5.787E-05	105A
20	1.119E-05	110B
21	7.253E-05	111B
22	1.502E-03	112B
32	1.303E-03	106BX
36	2.685E-05	110BX
37	1.045E-05	111BX
38	1.069E-03	112BX
39	2.652E-02	101BY
48	2.292E-04	110BY
67	1.487E-03	101S
71	1.036E-01	105S
76	1.644E-03	110S
77	1.141E-04	111S
78	1.022E-01	112S
90	4.247E-01	112SX
91	5.838E-01	113SX
93	5.838E-01	115SX

WHC-SD-WM-TI-693 Rev. 0

100	7.317E-05	107T
103	2.244E-02	110T
130	1.987E-02	103TY
131	1.352E-01	104TY
132	1.229E-01	105TY

Batch No. = 207, Time = 5712. days, Batch Vol = 1.000E+03 kgal
Mass Tot = 4.477E+09 g, Na Con = 3.662E+00 M

1	9.331E-03	101A
3	1.134E-03	103A
6	3.815E-01	106A
23	9.603E-02	201B
30	9.603E-02	104BX
35	1.261E-02	109BX
39	6.564E-03	101BY
48	1.306E-03	110BY
67	5.813E-04	101S
71	8.943E-02	105S
76	9.487E-05	110S
77	1.900E-04	111S
100	2.273E-05	107T
103	3.549E-01	110T
128	1.318E-01	101TY
130	3.241E-04	103TY

Batch No. = 208, Time = 5722. days, Batch Vol = 8.438E+02 kgal
Mass Tot = 3.988E+09 g, Na Con = 4.993E+00 M

1	1.300E-02	101A
6	5.697E-04	106A
38	6.110E-04	112BX
39	3.968E-02	101BY
67	7.853E-04	101S
71	1.054E-01	105S
76	5.190E-03	110S
78	4.777E-02	112S
103	1.127E-01	110T
128	2.106E-04	101TY
130	9.644E-02	103TY
131	6.615E-01	104TY
132	6.021E-01	105TY
133	1.098E-02	106TY

Batch No. = 209, Time = 5738. days, Batch Vol = 9.700E+02 kgal
Mass Tot = 4.054E+09 g, Na Con = 2.989E+00 M

1	3.033E-03	101A
6	3.985E-02	106A
23	9.203E-03	201B
30	9.203E-03	104BX
35	1.209E-03	109BX
38	1.005E-04	112BX

WHC-SD-WM-TI-693 Rev. 0

39	7.156E-03	101BY
67	1.059E-02	101S
71	3.288E-02	105S
76	3.703E-02	110S
78	7.859E-03	112S
103	6.891E-02	110T
128	1.384E-02	101TY
130	1.587E-02	103TY
131	1.088E-01	104TY
132	1.047E-01	105TY
133	6.325E-02	106TY

Batch No. = 210, Time = 5749. days, Batch Vol = 9.094E+02 kgal
 Mass Tot = 4.281E+09 g, Na Con = 4.849E+00 M

1	9.517E-04	101A
2	7.872E-01	102A
3	1.157E-04	103A
6	1.708E-01	106A
8	5.237E-02	102AX
23	9.795E-03	201B
30	9.795E-03	104BX
35	3.983E-01	109BX
39	6.695E-04	101BY
48	1.333E-04	110BY
67	5.929E-05	101S
71	9.122E-03	105S
77	1.938E-05	111S
103	3.620E-02	110T
128	1.344E-02	101TY
130	3.306E-05	103TY

Batch No. = 211, Time = 5759. days, Batch Vol = 9.188E+02 kgal
 Mass Tot = 4.249E+09 g, Na Con = 5.226E+00 M

1	2.116E-03	101A
6	8.493E-02	106A
23	1.534E-02	201B
30	1.534E-02	104BX
35	2.015E-03	109BX
39	1.956E-03	101BY
67	6.290E-03	101S
71	8.160E-02	105S
76	1.840E-01	110S
78	1.473E-02	112S
90	6.119E-02	112SX
91	8.411E-02	113SX
93	8.411E-02	115SX
103	1.830E-01	110T
128	2.992E-02	101TY
130	2.840E-03	103TY
131	1.948E-02	104TY

132	5.995E-02	105TY
133	4.623E-01	106TY

Batch No. = 212, Time = 5777. days, Batch Vol = 9.258E+02 kgal
 Mass Tot = 4.283E+09 g, Na Con = 5.186E+00 M

1	2.036E-04	101A
2	1.398E-01	102A
6	3.039E-02	106A
8	9.304E-03	102AX
35	7.054E-02	109BX
39	2.953E-04	101BY
67	1.837E-03	101S
69	4.590E-02	103S
71	1.044E-01	105S
76	5.372E-02	110S
78	4.794E-03	112S
90	1.991E-02	112SX
91	2.738E-02	113SX
93	2.738E-02	115SX
94	8.673E-02	101T
103	3.694E-02	110T
108	2.948E-01	203T
128	2.936E-01	101TY
130	9.244E-04	103TY
131	6.340E-03	104TY
132	1.809E-02	105TY
133	1.349E-01	106TY

Batch No. = 213, Time = 5790. days, Batch Vol = 8.493E+02 kgal
 Mass Tot = 4.022E+09 g, Na Con = 5.004E+00 M

8	7.677E-01	102AX
9	5.807E-01	103AX
35	2.996E-01	109BX
47	1.008E-02	109BY

Batch No. = 214, Time = 5807. days, Batch Vol = 8.946E+02 kgal
 Mass Tot = 3.639E+09 g, Na Con = 2.397E+00 M

2	4.426E-02	102A
6	7.417E-03	106A
8	2.945E-03	102AX
35	2.233E-02	109BX
67	3.389E-03	101S
69	1.453E-02	103S
71	2.670E-02	105S
76	4.239E-03	110S
94	2.745E-02	101T
103	6.315E-05	110T
108	9.332E-02	203T
128	9.210E-02	101TY
132	2.689E-05	105TY

133 2.942E-04 106TY

Batch No. = 215, Time = 5884. days, Batch Vol = 1.000E+03 kgal

Mass Tot = 4.729E+09 g, Na Con = 4.944E+00 M

6	8.712E-03	106A
8	6.196E-03	102AX
9	4.687E-03	103AX
35	2.418E-03	109BX
47	2.894E-01	109BY
67	2.285E-03	101S
69	4.883E-02	103S
71	2.847E-02	105S
75	6.431E-02	109S
76	6.706E-02	110S
94	5.591E-02	101T
103	4.483E-02	110T
108	1.101E-02	203T
128	1.409E-02	101TY
132	1.540E-02	105TY
133	1.685E-01	106TY

Batch No. = 216, Time = 5897. days, Batch Vol = 1.000E+03 kgal

Mass Tot = 4.650E+09 g, Na Con = 4.843E+00 M

8	1.300E-01	102AX
9	9.834E-02	103AX
35	5.073E-02	109BX
47	1.706E-03	109BY
67	5.005E-05	101S
69	2.841E-01	103S
71	9.679E-02	105S
75	5.700E-03	109S
76	1.469E-03	110S
94	3.443E-01	101T
103	7.919E-04	110T
108	2.217E-01	203T
128	2.189E-01	101TY
132	3.372E-04	105TY
133	3.690E-03	106TY

Batch No. = 217, Time = 5933. days, Batch Vol = 1.000E+03 kgal

Mass Tot = 4.724E+09 g, Na Con = 5.016E+00 M

6	1.096E-03	106A
8	2.301E-03	102AX
9	1.741E-03	103AX
35	8.980E-04	109BX
47	4.763E-01	109BY
67	2.880E-04	101S
69	9.754E-03	103S
71	4.780E-03	105S
75	8.553E-03	109S

WHC-SD-WM-TI-693 Rev. 0

76	8.451E-03	110S
94	1.140E-02	101T
103	5.648E-03	110T
108	4.090E-03	203T
128	4.442E-03	101TY
132	1.941E-03	105TY
133	2.123E-02	106TY

Batch No. = 218, Time = 5978. days, Batch Vol = 1.000E+03 kgal
 Mass Tot = 4.460E+09 g, Na Con = 3.741E+00 M

1	7.286E-04	101A
6	6.770E-04	106A
8	1.133E-04	102AX
9	8.567E-05	103AX
35	4.419E-05	109BX
38	3.424E-05	112BX
39	2.223E-03	101BY
47	5.639E-02	109BY
67	2.267E-04	101S
69	8.339E-02	103S
71	2.684E-02	105S
75	1.317E-01	109S
76	5.652E-03	110S
78	2.677E-03	112S
94	1.030E-01	101T
95	2.555E-02	102T
103	9.848E-03	110T
105	6.476E-02	112T
106	6.476E-02	201T
107	6.476E-02	202T
108	3.161E-02	203T
128	3.145E-02	101TY
130	5.404E-03	103TY
131	3.707E-02	104TY
132	3.497E-02	105TY
133	1.409E-02	106TY

Batch No. = 219, Time = 5989. days, Batch Vol = 9.387E+02 kgal
 Mass Tot = 3.830E+09 g, Na Con = 2.203E+00 M

1	5.912E-04	101A
6	2.522E-02	106A
8	2.198E-02	102AX
9	1.663E-02	103AX
23	6.085E-03	201B
30	6.085E-03	104BX
35	9.377E-03	109BX
39	4.159E-04	101BY
47	2.886E-04	109BY
67	2.808E-04	101S
69	4.969E-02	103S

WHC-SD-WM-TI-693 Rev. 0

71	2.469E-02	105S
75	3.256E-03	109S
76	8.240E-03	110S
94	6.014E-02	101T
103	2.797E-02	110T
108	3.812E-02	203T
128	4.636E-02	101TY
132	1.892E-03	105TY
133	2.070E-02	106TY

Batch No. = 220, Time = 6019. days, Batch Vol = 1.000E+03 kgal
 Mass Tot = 4.336E+09 g, Na Con = 2.881E+00 M

1	3.485E-04	101A
6	2.943E-04	106A
7	3.195E-02	101AX
8	1.048E-05	102AX
9	1.044E-01	103AX
10	3.552E-01	104AX
16	3.830E-03	106B
25	3.552E-01	203B
29	3.552E-01	103BX
38	1.638E-05	112BX
39	1.063E-03	101BY
47	3.858E-02	109BY
67	9.775E-05	101S
69	2.218E-02	103S
71	2.921E-02	105S
75	3.509E-02	109S
76	2.390E-03	110S
78	1.280E-03	112S
94	3.613E-02	101T
95	6.822E-03	102T
97	2.580E-02	104T
98	1.026E-01	105T
103	4.512E-03	110T
105	1.729E-02	112T
106	1.729E-02	201T
107	1.729E-02	202T
108	2.901E-02	203T
128	8.403E-03	101TY
130	2.585E-03	103TY
131	1.773E-02	104TY
132	1.665E-02	105TY
133	5.948E-03	106TY

Batch No. = 221, Time = 6034. days, Batch Vol = 9.545E+02 kgal
 Mass Tot = 3.772E+09 g, Na Con = 1.324E+00 M

1	2.277E-04	101A
2	1.808E-02	102A
6	1.274E-02	106A

7	1.730E-03	101AX
8	1.203E-03	102AX
9	5.653E-03	103AX
10	1.924E-02	104AX
16	2.074E-04	106B
23	2.343E-03	201B
25	1.924E-02	203B
29	1.924E-02	103BX
30	2.343E-03	104BX
35	9.428E-03	109BX
39	1.602E-04	101BY
47	1.807E-03	109BY
67	1.066E-04	101S
69	6.718E-03	103S
71	1.526E-02	105S
75	1.240E-03	109S
76	3.129E-03	110S
94	1.265E-02	101T
95	2.413E-04	102T
97	1.397E-03	104T
98	5.557E-03	105T
103	1.075E-02	110T
105	6.117E-04	112T
106	6.117E-04	201T
107	6.117E-04	202T
108	3.953E-02	203T
128	4.128E-02	101TY
132	7.185E-04	105TY
133	7.862E-03	106TY

Batch No. = 222, Time = 6046. days, Batch Vol = 1.000E+03 kgal
 Mass Tot = 4.055E+09 g, Na Con = 1.562E+00 M

1	2.010E-05	101A
6	7.023E-04	106A
8	3.052E-03	102AX
9	2.309E-03	103AX
35	1.191E-03	109BX
39	2.914E-05	101BY
47	1.278E-02	109BY
67	1.909E-04	101S
69	3.930E-02	103S
71	1.192E-02	105S
75	5.169E-02	109S
76	5.584E-03	110S
78	4.731E-04	112S
90	1.965E-03	112SX
91	2.702E-03	113SX
93	2.702E-03	115SX
94	4.836E-02	101T
95	9.878E-03	102T

103	3.813E-03	110T
105	2.504E-02	112T
106	2.504E-02	201T
107	2.504E-02	202T
108	1.757E-02	203T
128	1.760E-02	101TY
130	9.123E-05	103TY
131	6.257E-04	104TY
132	1.850E-03	105TY
133	1.403E-02	106TY

Batch No. = 223, Time = 6057. days, Batch Vol = 1.000E+03 gal
 Mass Tot = 3.864E+09 g, Na Con = 4.981E-01 M

1	1.151E-04	101A
6	2.896E-04	106A
7	2.957E-03	101AX
8	1.072E-03	102AX
9	1.047E-02	103AX
10	3.288E-02	104AX
16	3.545E-04	106B
25	3.288E-02	203B
29	3.288E-02	103BX
35	4.184E-04	109BX
39	3.418E-04	101BY
47	3.585E-03	109BY
67	8.201E-05	101S
69	4.597E-03	103S
71	4.879E-03	105S
75	3.576E-03	109S
76	2.251E-03	110S
78	5.397E-04	112S
90	5.752E-04	112SX
91	7.907E-04	113SX
93	7.907E-04	115SX
94	6.417E-03	101T
95	6.315E-04	102T
97	2.388E-03	104T
98	9.499E-03	105T
103	2.451E-03	110T
105	1.600E-03	112T
106	1.600E-03	201T
107	1.600E-03	202T
108	4.589E-03	203T
128	2.754E-03	101TY
130	8.367E-04	103TY
131	5.739E-03	104TY
132	5.730E-03	105TY
133	5.638E-03	106TY

WHC-SD-WM-TI-693 Rev. 0

Batch No. = 224, Time = 6072. days, Batch Vol = 9.015E+02 kgal
Mass Tot = 3.699E+09 g, Na Con = 2.528E+00 M

1	7.989E-05	101A
6	3.410E-03	106A
7	1.231E-02	101AX
9	4.023E-02	103AX
10	1.369E-01	104AX
16	1.476E-03	106B
23	8.222E-04	201B
25	1.369E-01	203B
29	1.369E-01	103BX
30	8.222E-04	104BX
35	1.080E-04	109BX
39	5.620E-05	101BY
47	1.286E-02	109BY
67	3.843E-05	101S
69	5.574E-03	103S
71	1.032E-02	105S
75	8.825E-03	109S
76	1.128E-03	110S
94	1.025E-02	101T
95	1.718E-03	102T
97	9.944E-03	104T
98	3.955E-02	105T
103	3.789E-03	110T
105	4.353E-03	112T
106	4.353E-03	201T
107	4.353E-03	202T
108	1.005E-02	203T
128	3.265E-03	101TY
132	2.589E-04	105TY
133	2.833E-03	106TY

Batch No. = 225, Time = 6087. days, Batch Vol = 1.000E+03 kgal
Mass Tot = 3.838E+09 g, Na Con = 4.298E-01 M

1	1.945E-05	101A
2	6.308E-03	102A
6	1.384E-03	106A
7	2.737E-04	101AX
8	5.189E-04	102AX
9	9.695E-04	103AX
10	3.043E-03	104AX
16	3.281E-05	106B
25	3.043E-03	203B
29	3.043E-03	103BX
35	3.221E-03	109BX
39	4.439E-05	101BY
47	3.319E-04	109BY
67	8.692E-05	101S
69	2.496E-03	103S

WHC-SD-WM-TI-693 Rev. 0

71	5.123E-03	105S
75	3.310E-04	109S
76	2.529E-03	110S
78	2.570E-04	112S
90	9.132E-04	112SX
91	1.255E-03	113SX
93	1.255E-03	115SX
94	4.506E-03	101T
95	5.845E-05	102T
97	2.211E-04	104T
98	8.792E-04	105T
103	1.822E-03	110T
105	1.481E-04	112T
106	1.481E-04	201T
107	1.481E-04	202T
108	1.372E-02	203T
128	1.349E-02	101TY
130	1.174E-04	103TY
131	8.050E-04	104TY
132	1.312E-03	105TY
133	6.350E-03	106TY

Batch No. = 226, Time = 6127. days, Batch Vol = 1.000E+03 kgal
 Mass Tot = 4.464E+09 g, Na Con = 3.771E+00 M

6	1.238E-05	106A
7	1.005E-01	101AX
9	1.279E-02	103AX
10	4.352E-02	104AX
16	6.506E-01	106B
25	4.352E-02	203B
29	4.352E-02	103BX
47	2.340E-02	109BY
69	1.772E-03	103S
71	2.972E-03	105S
75	2.806E-03	109S
76	1.038E-04	110S
90	3.293E-05	112SX
91	4.527E-05	113SX
93	4.527E-05	115SX
94	3.259E-03	101T
95	5.460E-04	102T
97	3.161E-03	104T
98	1.257E-02	105T
103	7.001E-05	110T
105	1.384E-03	112T
106	1.384E-03	201T
107	1.384E-03	202T
108	3.195E-03	203T
128	6.669E-04	101TY
131	1.049E-05	104TY

WHC-SD-WM-TI-693 Rev. 0

132 3.335E-05 105TY
133 2.607E-04 106TY

Batch No. = 227, Time = 6139. days, Batch Vol = 1.000E+03 kgal
Mass Tot = 4.220E+09 g, Na Con = 2.202E+00 M

2 2.212E-03 102A
6 4.356E-04 106A
8 4.296E-04 102AX
9 2.137E-04 103AX
35 1.226E-03 109BX
47 1.183E-03 109BY
67 1.953E-05 101S
69 1.372E-01 103S
71 4.739E-03 105S
75 7.975E-02 109S
76 5.714E-04 110S
78 4.379E-05 112S
90 1.819E-04 112SX
91 2.501E-04 113SX
93 2.501E-04 115SX
94 1.799E-02 101T
95 2.663E-01 102T
97 7.033E-02 104T
103 3.824E-04 110T
105 1.000E-02 112T
106 1.000E-02 201T
107 1.000E-02 202T
108 1.002E-02 203T
128 9.910E-03 101TY
131 5.792E-05 104TY
132 1.838E-04 105TY
133 1.435E-03 106TY

Batch No. = 228, Time = 6150. days, Batch Vol = 1.000E+03 kgal
Mass Tot = 4.083E+09 g, Na Con = 1.890E+00 M

1 8.887E-05 101A
6 2.311E-03 106A
7 3.066E-02 101AX
9 3.862E-03 103AX
10 1.314E-02 104AX
16 1.987E-01 106B
25 1.314E-02 203B
29 1.314E-02 103BX
39 1.637E-04 101BY
47 7.132E-03 109BY
67 6.072E-04 101S
69 5.350E-04 103S
71 7.709E-03 105S
75 8.471E-04 109S
76 1.773E-02 110S

78	1.660E-03	112S
90	6.566E-03	112SX
91	9.026E-03	113SX
93	9.026E-03	115SX
94	9.839E-04	101T
95	1.649E-04	102T
97	9.545E-04	104T
98	3.796E-03	105T
103	1.239E-02	110T
105	4.179E-04	112T
106	4.179E-04	201T
107	4.179E-04	202T
108	9.648E-04	203T
128	1.054E-03	101TY
130	4.659E-04	103TY
131	3.196E-03	104TY
132	6.974E-03	105TY
133	4.453E-02	106TY

Batch No. = 229, Time = 6164. days, Batch Vol = 1.000E+03 kgal
 Mass Tot = 4.656E+09 g, Na Con = 4.377E+00 M

2	3.788E-04	102A
6	8.426E-05	106A
7	5.987E-02	101AX
8	3.116E-05	102AX
9	5.439E-02	103AX
10	1.851E-01	104AX
14	2.162E-01	104B
16	7.611E-02	106B
25	1.851E-01	203B
29	1.851E-01	103BX
31	4.810E-01	105BX
35	1.934E-04	109BX
47	1.625E-02	109BY
69	1.125E-01	103S
71	1.301E-02	105S
75	6.359E-02	109S
76	2.026E-04	110S
78	1.616E-05	112S
90	5.788E-05	112SX
91	7.957E-05	113SX
93	7.957E-05	115SX
94	1.527E-02	101T
95	2.242E-01	102T
97	7.284E-02	104T
98	5.346E-02	105T
103	1.381E-04	110T
105	6.628E-03	112T
106	6.628E-03	201T
107	6.628E-03	202T

WHC-SD-WM-TI-693 Rev. 0

108	1.476E-02	203T
128	3.979E-03	101TY
131	4.931E-05	104TY
132	9.131E-05	105TY
133	5.089E-04	106TY

Batch No. = 230, Time = 6177. days, Batch Vol = 1.000E+03 kgal
 Mass Tot = 4.670E+09 g, Na Con = 4.544E+00 M

2	4.098E-04	102A
6	8.532E-05	106A
7	1.513E-01	101AX
8	5.664E-05	102AX
9	2.883E-02	103AX
10	9.802E-02	104AX
14	4.305E-01	104B
16	2.284E-02	106B
19	9.269E-02	109B
25	9.802E-02	203B
29	9.802E-02	103BX
31	2.604E-01	105BX
35	2.182E-04	109BX
47	8.156E-03	109BY
69	1.278E-02	103S
71	6.279E-03	105S
75	7.393E-03	109S
76	1.351E-04	110S
78	1.241E-05	112S
90	4.653E-05	112SX
91	6.396E-05	113SX
93	6.396E-05	115SX
94	4.217E-03	101T
95	2.465E-02	102T
97	1.363E-02	104T
98	2.832E-02	105T
103	9.464E-05	110T
105	9.307E-04	112T
106	9.307E-04	201T
107	9.307E-04	202T
108	7.053E-03	203T
128	1.356E-03	101TY
131	3.153E-05	104TY
132	5.966E-05	105TY
133	3.393E-04	106TY

Batch No. = 231, Time = 6189. days, Batch Vol = 9.870E+02 kgal
 Mass Tot = 4.599E+09 g, Na Con = 4.625E+00 M

6	2.357E-04	106A
7	3.127E-03	101AX
9	3.939E-04	103AX
10	1.340E-03	104AX

WHC-SD-WM-TI-693 Rev. 0

16	2.026E-02	106B
25	1.340E-03	203B
29	1.340E-03	103BX
39	1.669E-05	101BY
47	7.275E-04	109BY
67	6.193E-05	101S
69	5.457E-05	103S
71	2.900E-02	105S
75	1.519E-01	109S
76	1.808E-03	110S
78	1.694E-04	112S
90	6.698E-04	112SX
91	9.207E-04	113SX
93	9.207E-04	115SX
94	1.206E-02	101T
95	1.682E-05	102T
97	3.160E-01	104T
98	1.410E-01	105T
103	1.264E-03	110T
105	4.262E-05	112T
106	4.262E-05	201T
107	4.262E-05	202T
108	2.834E-02	203T
109	8.292E-01	204T
128	1.075E-04	101TY
129	3.390E-01	102TY
130	4.752E-05	103TY
131	3.260E-04	104TY
132	7.113E-04	105TY
133	4.542E-03	106TY

Batch No. = 232, Time = 6199. days, Batch Vol = 8.670E+02 kgal
 Mass Tot = 3.640E+09 g, Na Con = 2.169E+00 M

2	3.864E-05	102A
7	6.065E-02	101AX
9	7.469E-03	103AX
10	2.541E-02	104AX
14	1.586E-01	104B
16	1.403E-02	106B
19	4.037E-02	109B
25	2.541E-02	203B
29	2.541E-02	103BX
31	4.906E-02	105BX
35	1.973E-05	109BX
47	2.455E-03	109BY
69	1.174E-02	103S
71	1.768E-03	105S
75	6.908E-03	109S
76	2.300E-05	110S
94	2.047E-03	101T

WHC-SD-WM-TI-693 Rev. 0

95	2.295E-02	102T
97	7.904E-03	104T
98	7.341E-03	105T
103	1.548E-05	110T
105	8.839E-04	112T
106	8.839E-04	201T
107	8.839E-04	202T
108	1.985E-03	203T
128	5.054E-04	101TY
133	5.777E-05	106TY

Batch No. = 233, Time = 6224. days, Batch Vol = 1.000E+03 kgal
 Mass Tot = 4.658E+09 g, Na Con = 4.880E+00 M

7	9.950E-02	101AX
19	2.173E-01	109B
33	4.597E-01	107BX
69	6.711E-03	103S
70	4.006E-02	104S
71	1.162E-04	105S
75	6.685E-03	109S
94	6.132E-04	101T
95	1.341E-02	102T
97	3.553E-03	104T
105	3.883E-04	112T
106	3.883E-04	201T
107	3.883E-04	202T
108	1.883E-04	203T
128	1.858E-04	101TY
129	7.019E-02	102TY

Batch No. = 234, Time = 6238. days, Batch Vol = 9.970E+02 kgal
 Mass Tot = 4.619E+09 g, Na Con = 4.672E+00 M

7	3.169E-02	101AX
9	5.038E-03	103AX
10	1.714E-02	104AX
14	6.520E-02	104B
16	3.536E-03	106B
19	2.622E-02	109B
25	1.714E-02	203B
29	1.714E-02	103BX
31	4.560E-02	105BX
33	4.752E-02	107BX
47	1.393E-03	109BY
70	7.219E-02	104S
71	3.835E-02	105S
75	8.756E-02	109S
94	4.121E-02	101T
95	1.064E-01	102T
97	1.139E-01	104T
98	1.912E-01	105T

WHC-SD-WM-TI-693 Rev. 0

105	2.697E-01	112T
106	2.697E-01	201T
107	2.697E-01	202T
108	3.838E-02	203T

Batch No. = 235, Time = 6260. days, Batch Vol = 8.069E+02 kgal
 Mass Tot = 3.418E+09 g, Na Con = 3.388E+00 M

7	9.874E-03	101AX
14	1.498E-02	104B
16	6.803E-04	106B
19	3.970E-02	109B
47	2.021E-05	109BY
69	2.588E-03	103S
70	3.964E-02	104S
71	7.966E-03	105S
75	2.548E-02	109S
94	1.052E-02	101T
95	3.470E-02	102T
97	2.526E-02	104T
98	3.949E-02	105T
105	7.500E-02	112T
106	7.500E-02	201T
107	7.500E-02	202T
108	8.001E-03	203T
128	7.166E-05	101TY
129	2.707E-02	102TY

Batch No. = 236, Time = 6273. days, Batch Vol = 9.149E+02 kgal
 Mass Tot = 4.221E+09 g, Na Con = 4.823E+00 M

2	4.180E-05	102A
7	2.703E-02	101AX
9	1.514E-02	103AX
10	5.150E-02	104AX
14	9.352E-02	104B
16	5.976E-03	106B
19	9.455E-03	109B
25	5.150E-02	203B
29	5.150E-02	103BX
31	1.370E-01	105BX
35	2.225E-05	109BX
47	4.058E-03	109BY
69	1.304E-03	103S
70	4.436E-02	104S
71	4.026E-02	105S
75	6.870E-02	109S
76	1.378E-05	110S
94	3.113E-02	101T
95	6.182E-02	102T
97	1.332E-01	104T
98	2.004E-01	105T

WHC-SD-WM-TI-693 Rev. 0

105	1.504E-01	112T
106	1.504E-01	201T
107	1.504E-01	202T
108	4.037E-02	203T
109	5.959E-02	204T
128	1.383E-04	101TY
129	2.436E-02	102TY
133	3.461E-05	106TY

Batch No. = 237, Time = 6285. days, Batch Vol = 9.243E+02 kgal
 Mass Tot = 4.369E+09 g, Na Con = 4.534E+00 M

7	6.269E-02	101AX
19	5.589E-02	109B
33	1.701E-01	107BX
40	2.221E-01	102BY
69	6.845E-04	103S
70	5.990E-02	104S
71	5.048E-03	105S
75	2.762E-02	109S
94	6.647E-03	101T
95	2.034E-02	102T
97	3.642E-02	104T
98	2.511E-02	105T
105	4.812E-02	112T
106	4.812E-02	201T
107	4.812E-02	202T
108	5.061E-03	203T
109	7.497E-02	204T
128	1.896E-05	101TY
129	3.781E-02	102TY

Batch No. = 238, Time = 6308. days, Batch Vol = 9.816E+02 kgal
 Mass Tot = 4.331E+09 g, Na Con = 2.376E+00 M

7	2.213E-03	101AX
14	5.599E-03	104B
16	2.542E-04	106B
19	1.655E-03	109B
70	1.572E-01	104S
71	9.161E-03	105S
73	1.377E-01	107S
75	4.154E-02	109S
94	1.757E-02	101T
95	5.836E-02	102T
97	2.763E-02	104T
98	4.567E-02	105T
105	1.479E-01	112T
106	1.479E-01	201T
107	1.479E-01	202T
108	9.170E-03	203T

WHC-SD-WM-TI-693 Rev. 0

Batch No. = 239, Time = 6318. days, Batch Vol = 8.440E+02 kgal
Mass Tot = 3.474E+09 g, Na Con = 2.732E+00 M

7	1.653E-02	101AX
19	2.329E-02	109B
33	3.517E-02	107BX
40	6.340E-02	102BY
69	1.002E-03	103S
70	5.985E-03	104S
71	1.736E-05	105S
75	9.986E-04	109S
94	9.160E-05	101T
95	2.003E-03	102T
97	5.307E-04	104T
105	5.800E-05	112T
106	5.800E-05	201T
107	5.800E-05	202T
108	2.813E-05	203T
128	2.776E-05	101TY
129	1.049E-02	102TY

Batch No. = 240, Time = 6339. days, Batch Vol = 9.216E+02 kgal
Mass Tot = 3.836E+09 g, Na Con = 2.549E+00 M

7	6.877E-04	101AX
9	7.229E-04	103AX
10	2.460E-03	104AX
14	2.940E-03	104B
16	2.161E-04	106B
25	2.460E-03	203B
29	2.460E-03	103BX
31	6.542E-03	105BX
47	1.912E-04	109BY
70	5.603E-02	104S
71	4.456E-03	105S
73	5.207E-02	107S
75	1.523E-02	109S
94	6.702E-03	101T
95	2.052E-02	102T
97	1.319E-02	104T
98	2.222E-02	105T
105	5.201E-02	112T
106	5.201E-02	201T
107	5.201E-02	202T
108	4.460E-03	203T

Batch No. = 241, Time = 6358. days, Batch Vol = 9.250E+02 kgal
Mass Tot = 3.634E+09 g, Na Con = 1.185E+00 M

7	6.768E-03	101AX
14	2.161E-03	104B
16	9.812E-05	106B
19	4.434E-03	109B

WHC-SD-WM-TI-693 Rev. 0

33	1.387E-02	107BX
40	2.500E-02	102BY
70	3.489E-03	104S
71	1.142E-03	105S
75	3.303E-03	109S
94	1.483E-03	101T
95	4.259E-03	102T
97	3.446E-03	104T
98	5.695E-03	105T
105	1.079E-02	112T
106	1.079E-02	201T
107	1.079E-02	202T
108	1.143E-03	203T

Batch No. = 242, Time = 6369. days, Batch Vol = 1.000E+03 kgal
 Mass Tot = 3.836E+09 g, Na Con = 3.628E-01 M

7	5.325E-04	101AX
19	4.751E-03	109B
69	3.486E-04	103S
70	8.543E-03	104S
71	5.892E-04	105S
75	3.467E-03	109S
94	7.942E-04	101T
95	2.893E-03	102T
97	4.360E-03	104T
98	2.907E-03	105T
105	5.587E-03	112T
106	5.587E-03	201T
107	5.587E-03	202T
108	5.935E-04	203T
109	8.681E-03	204T
129	7.194E-03	102TY

Batch No. = 243, Time = 6405. days, Batch Vol = 1.000E+03 kgal
 Mass Tot = 3.834E+09 g, Na Con = 4.047E-01 M

7	2.512E-03	101AX
14	7.375E-04	104B
16	3.349E-05	106B
19	1.691E-03	109B
33	5.193E-03	107BX
40	9.362E-03	102BY
70	1.284E-03	104S
71	3.964E-04	105S
75	1.165E-03	109S
94	5.149E-04	101T
95	1.485E-03	102T
97	1.224E-03	104T
98	1.976E-03	105T
105	3.746E-03	112T
106	3.746E-03	201T

WHC-SD-WM-TI-693 Rev. 0

107	3.746E-03	202T
108	3.968E-04	203T
109	9.467E-05	204T
129	7.846E-05	102TY

Batch No. = 244, Time = 6417. days, Batch Vol = 1.000E+03 gal
 Mass Tot = 3.810E+09 g, Na Con = 1.955E-01 M

7	2.326E-04	101AX
9	2.445E-04	103AX
10	8.320E-04	104AX
14	9.946E-04	104B
16	7.309E-05	106B
25	8.320E-04	203B
29	8.320E-04	103BX
31	2.213E-03	105BX
47	6.469E-05	109BY
70	2.210E-03	104S
71	9.133E-04	105S
75	1.999E-03	109S
94	7.712E-04	101T
95	1.638E-03	102T
97	3.496E-03	104T
98	4.553E-03	105T
105	4.151E-03	112T
106	4.151E-03	201T
107	4.151E-03	202T
108	9.142E-04	203T
109	2.968E-03	204T
129	1.213E-03	102TY

Batch No. = 245, Time = 6452. days, Batch Vol = 9.428E+02 gal
 Mass Tot = 3.679E+09 g, Na Con = 8.625E-01 M

7	7.991E-04	101AX
19	5.129E-04	109B
33	1.874E-03	107BX
40	3.378E-03	102BY
70	1.695E-02	104S
71	1.529E-03	105S
75	8.180E-03	109S
94	1.999E-03	101T
95	5.760E-03	102T
97	1.095E-02	104T
98	7.624E-03	105T
105	1.460E-02	112T
106	1.460E-02	201T
107	1.460E-02	202T
108	1.531E-03	203T
109	2.276E-02	204T
129	9.305E-03	102TY

WHC-SD-WM-TI-693 Rev. 0

Batch No. = 246, Time = 6463. days, Batch Vol = 1.000E+03 kgal
 Mass Tot = 4.695E+09 g, Na Con = 4.823E+00 M

7	2.640E-02	101AX
10	2.981E-05	104AX
14	3.563E-05	104B
25	2.981E-05	203B
29	2.981E-05	103BX
31	7.928E-05	105BX
40	5.776E-01	102BY
70	7.916E-05	104S
71	3.272E-05	105S
75	7.164E-05	109S
94	2.763E-05	101T
95	5.867E-05	102T
97	1.252E-04	104T
98	1.631E-04	105T
105	1.487E-04	112T
106	1.487E-04	201T
107	1.487E-04	202T
108	3.275E-05	203T
109	1.063E-04	204T
129	4.347E-05	102TY

Batch No. = 247, Time = 6473. days, Batch Vol = 8.502E+02 kgal
 Mass Tot = 3.695E+09 g, Na Con = 2.724E+00 M

7	1.853E-03	101AX
9	1.872E-03	103AX
10	6.370E-03	104AX
14	7.636E-03	104B
16	5.606E-04	106B
19	4.836E-05	109B
25	6.370E-03	203B
29	6.370E-03	103BX
31	1.694E-02	105BX
33	1.485E-04	107BX
40	2.677E-04	102BY
47	4.953E-04	109BY
70	2.663E-02	104S
71	6.234E-03	105S
73	2.757E-01	107S
75	1.120E-02	109S
94	5.600E-03	101T
95	1.261E-02	102T
97	1.815E-02	104T
98	3.108E-02	105T
105	3.195E-02	112T
106	3.195E-02	201T
107	3.195E-02	202T
108	6.240E-03	203T

WHC-SD-WM-TI-693 Rev. 0

Batch No. = 248, Time = 6486. days, Batch Vol = 8.256E+02 kgal
Mass Tot = 3.915E+09 g, Na Con = 4.529E+00 M

7	1.122E-01	101AX
18	5.315E-01	108B
19	1.155E-01	109B
33	2.207E-01	107BX
40	1.440E-02	102BY
70	5.061E-02	104S
75	3.660E-03	109S
129	8.867E-02	102TY

Batch No. = 249, Time = 6527. days, Batch Vol = 9.266E+02 kgal
Mass Tot = 4.188E+09 g, Na Con = 5.090E+00 M

7	1.968E-03	101AX
40	4.305E-02	102BY
70	5.162E-02	104S
71	4.991E-04	105S
72	3.273E-02	106S
73	1.810E-01	107S
75	3.438E-03	109S
94	1.102E-03	101T
95	3.797E-03	102T
97	1.507E-03	104T
98	2.488E-03	105T
105	9.622E-03	112T
106	9.622E-03	201T
107	9.622E-03	202T
108	4.996E-04	203T
129	1.916E-02	102TY

Batch No. = 250, Time = 6539. days, Batch Vol = 1.000E+03 kgal
Mass Tot = 4.469E+09 g, Na Con = 2.899E+00 M

7	8.054E-04	101AX
40	1.763E-02	102BY
70	1.215E-01	104S
71	4.230E-04	105S
72	1.022E-01	106S
73	1.541E-01	107S
75	4.717E-03	109S
94	9.363E-04	101T
95	3.228E-03	102T
97	1.276E-03	104T
98	2.109E-03	105T
105	8.181E-03	112T
106	8.181E-03	201T
107	8.181E-03	202T
108	4.234E-04	203T
129	5.979E-02	102TY

WHC-SD-WM-TI-693 Rev. 0

Batch No. = 251, Time = 6558. days, Batch Vol = 8.492E+02 kgal
Mass Tot = 4.008E+09 g, Na Con = 4.805E+00 M

7	1.805E-02	101AX
18	8.546E-02	108B
19	1.858E-02	109B
33	3.550E-02	107BX
40	2.315E-03	102BY
70	2.001E-02	104S
71	3.334E-05	105S
72	4.811E-02	106S
73	1.215E-02	107S
74	1.991E-01	108S
75	1.014E-03	109S
94	7.381E-05	101T
95	2.544E-04	102T
97	1.006E-04	104T
98	1.662E-04	105T
105	6.449E-04	112T
106	6.449E-04	201T
107	6.449E-04	202T
108	3.337E-05	203T
129	2.026E-02	102TY

Batch No. = 252, Time = 6571. days, Batch Vol = 8.457E+02 kgal
Mass Tot = 3.403E+09 g, Na Con = 1.631E+00 M

7	8.574E-05	101AX
40	1.876E-03	102BY
70	3.081E-02	104S
71	7.993E-04	105S
72	1.087E-02	106S
73	2.910E-02	107S
75	4.513E-03	109S
94	1.769E-03	101T
95	6.100E-03	102T
97	2.411E-03	104T
98	3.985E-03	105T
105	1.546E-02	112T
106	1.546E-02	201T
107	1.546E-02	202T
108	8.000E-04	203T
129	6.364E-03	102TY

Batch No. = 253, Time = 6612. days, Batch Vol = 9.761E+02 kgal
Mass Tot = 3.773E+09 g, Na Con = 5.479E-01 M

70	8.806E-03	104S
71	3.458E-04	105S
73	2.424E-02	107S
75	1.839E-03	109S
94	7.656E-04	101T
95	2.640E-03	102T

WHC-SD-WM-TI-693 Rev. 0

97	1.043E-03	104T
98	1.724E-03	105T
105	6.689E-03	112T
106	6.689E-03	201T
107	6.689E-03	202T
108	3.462E-04	203T

Batch No. = 254, Time = 6622. days, Batch Vol = 8.511E+02 kgal
 Mass Tot = 3.912E+09 g, Na Con = 3.031E+00 M

7	3.858E-02	101AX
9	1.207E-03	103AX
10	4.107E-03	104AX
16	4.428E-05	106B
19	3.402E-01	109B
25	4.107E-03	203B
29	4.107E-03	103BX
40	1.798E-03	102BY
47	3.857E-04	109BY
69	2.513E-02	103S
70	1.614E-01	104S
71	7.527E-04	105S
72	1.042E-02	106S
73	1.572E-02	107S
75	2.561E-02	109S
76	1.063E-05	110S
94	2.684E-03	101T
95	5.025E-02	102T
97	1.364E-02	104T
98	1.401E-03	105T
105	2.409E-03	112T
106	2.409E-03	201T
107	2.409E-03	202T
108	1.045E-03	203T
128	7.537E-04	101TY
129	2.672E-01	102TY
133	2.670E-05	106TY

Batch No. = 255, Time = 6633. days, Batch Vol = 9.324E+02 kgal
 Mass Tot = 3.765E+09 g, Na Con = 1.388E+00 M

3	6.929E-04	103A
7	3.330E-05	101AX
15	1.354E-02	105B
17	6.364E-02	107B
28	8.393E-02	102BX
40	7.286E-04	102BY
45	4.571E-03	107BY
48	7.980E-04	110BY
49	1.817E-02	111BY
67	3.551E-04	101S
68	3.162E-02	102S

70	4.859E-03	104S
71	1.289E-05	105S
72	4.223E-03	106S
73	4.696E-03	107S
75	1.706E-04	109S
76	5.795E-05	110S
77	1.161E-04	111S
78	2.504E-03	112S
79	2.339E-03	101SX
81	1.681E-04	103SX
88	8.778E-03	110SX
90	6.558E-03	112SX
92	3.391E-03	114SX
94	2.854E-05	101T
95	9.838E-05	102T
96	4.206E-03	103T
97	3.888E-05	104T
98	6.427E-05	105T
100	4.575E-02	107T
101	6.125E-02	108T
102	6.674E-04	109T
104	4.487E-04	111T
105	2.493E-04	112T
106	2.493E-04	201T
107	2.493E-04	202T
108	1.290E-05	203T
122	3.322E-05	113TX
125	6.540E-05	116TX
129	2.472E-03	102TY
130	1.980E-04	103TY

Batch No. = 256, Time = 6639. days, Batch Vol = 5.091E+02 kgal
 Mass Tot = 1.941E+09 g, Na Con = 1.908E-01 M

70	5.992E-04	104S
71	1.706E-05	105S
73	6.213E-03	107S
75	9.070E-05	109S
94	3.776E-05	101T
95	1.302E-04	102T
97	5.144E-05	104T
98	8.502E-05	105T
105	3.299E-04	112T
106	3.299E-04	201T
107	3.299E-04	202T
108	1.707E-05	203T

WHC-SD-WM-TI-693 Rev. 0

Batch No. = 257, Time = 6655. days, Batch Vol = 5.217E+02 kgal
Mass Tot = 1.989E+09 g, Na Con = 1.747E-01 M

70	2.500E-03	104S
71	1.047E-04	105S
73	2.323E-03	107S
75	5.565E-04	109S
94	2.317E-04	101T
95	7.987E-04	102T
97	3.156E-04	104T
98	5.217E-04	105T
105	2.024E-03	112T
106	2.024E-03	201T
107	2.024E-03	202T
108	1.048E-04	203T

Batch No. = 258, Time = 6662. days, Batch Vol = 5.183E+02 kgal
Mass Tot = 1.976E+09 g, Na Con = 1.877E-01 M

7	1.172E-05	101AX
40	2.564E-04	102BY
70	1.710E-03	104S
72	1.486E-03	106S
73	1.653E-03	107S
75	6.003E-05	109S
94	1.004E-05	101T
95	3.462E-05	102T
97	1.368E-05	104T
98	2.262E-05	105T
105	8.775E-05	112T
106	8.775E-05	201T
107	8.775E-05	202T
129	8.698E-04	102TY

Batch No. = 259, Time = 6671. days, Batch Vol = 8.126E+02 kgal
Mass Tot = 3.838E+09 g, Na Con = 4.970E+00 M

7	3.594E-03	101AX
18	1.702E-02	108B
19	3.700E-03	109B
33	7.069E-03	107BX
40	4.610E-04	102BY
70	4.327E-03	104S
72	1.103E-02	106S
73	2.615E-03	107S
74	2.680E-01	108S
75	2.122E-04	109S
94	1.589E-05	101T
95	5.478E-05	102T
97	2.165E-05	104T
98	3.579E-05	105T
105	1.388E-04	112T
106	1.388E-04	201T

107 1.388E-04 202T
129 4.216E-03 102TY

Batch No. = 260, Time = 6686. days, Batch Vol = 6.742E+02 kgal

Mass Tot = 3.190E+09 g, Na Con = 4.997E+00 M

11 8.369E-01 101B
12 8.369E-01 102B
13 8.369E-01 103B
18 3.020E-01 108B
24 8.369E-01 202B

Batch No. = 261, Time = 6698. days, Batch Vol = 1.000E+03 kgal

Mass Tot = 4.722E+09 g, Na Con = 5.009E+00 M

70 1.302E-04 104S
72 5.310E-04 106S
73 1.258E-04 107S
74 3.560E-01 108S
129 6.623E-05 102TY

Batch No. = 262, Time = 6708. days, Batch Vol = 6.028E+02 kgal

Mass Tot = 2.721E+09 g, Na Con = 5.667E+00 M

7 6.661E-04 101AX
11 1.104E-01 101B
12 1.104E-01 102B
13 1.104E-01 103B
18 4.301E-02 108B
19 6.857E-04 109B
24 1.104E-01 202B
33 1.310E-03 107BX
40 8.543E-05 102BY
70 8.126E-04 104S
72 2.089E-03 106S
73 4.950E-04 107S
74 7.912E-02 108S
75 3.933E-05 109S
95 1.015E-05 102T
105 2.573E-05 112T
106 2.573E-05 201T
107 2.573E-05 202T
129 7.867E-04 102TY

Batch No. = 263, Time = 6729. days, Batch Vol = 9.719E+02 kgal

Mass Tot = 4.589E+09 g, Na Con = 4.956E+00 M

72 3.723E-01 106S
73 6.305E-02 107S

WHC-SD-WM-TI-693 Rev. 0

Batch No. = 264, Time = 6747. days, Batch Vol = 7.406E+02 kgal
Mass Tot = 3.044E+09 g, Na Con = 2.667E+00 M

7	2.619E-04	101AX
11	3.296E-02	101B
12	3.296E-02	102B
13	3.296E-02	103B
18	1.313E-02	108B
19	2.697E-04	109B
24	3.296E-02	202B
33	5.151E-04	107BX
40	3.360E-05	102BY
70	3.165E-04	104S
72	2.755E-02	106S
73	4.721E-03	107S
74	2.288E-02	108S
75	1.547E-05	109S
105	1.012E-05	112T
106	1.012E-05	201T
107	1.012E-05	202T
129	3.072E-04	102TY

Batch No. = 265, Time = 6821. days, Batch Vol = 9.252E+02 kgal
Mass Tot = 3.596E+09 g, Na Con = 8.316E-01 M

7	1.010E-04	101AX
11	1.286E-02	101B
12	1.286E-02	102B
13	1.286E-02	103B
18	5.120E-03	108B
19	1.040E-04	109B
24	1.286E-02	202B
33	1.987E-04	107BX
40	1.296E-05	102BY
70	1.216E-04	104S
72	1.033E-02	106S
73	1.770E-03	107S
74	9.280E-03	108S
129	1.185E-04	102TY

Batch No. = 266, Time = 6832. days, Batch Vol = 8.476E+02 kgal
Mass Tot = 3.240E+09 g, Na Con = 3.079E-01 M

7	3.547E-05	101AX
11	4.535E-03	101B
12	4.535E-03	102B
13	4.535E-03	103B
18	1.805E-03	108B
19	3.651E-05	109B
24	4.535E-03	202B
33	6.975E-05	107BX
70	4.269E-05	104S
72	3.992E-03	106S

WHC-SD-WM-TI-693 Rev. 0

73	6.833E-04	107S
74	2.644E-03	108S
129	4.160E-05	102TY

Batch No. = 267, Time = 6884. days, Batch Vol = 7.303E+02 kgal
 Mass Tot = 3.265E+09 g, Na Con = 3.707E+00 M

72	1.648E-01	106S
73	2.312E-04	107S
74	4.913E-02	108S

Batch No. = 268, Time = 7034. days, Batch Vol = 7.731E+02 kgal
 Mass Tot = 3.354E+09 g, Na Con = 3.317E+00 M

72	1.747E-01	106S
74	1.517E-03	108S

WHC-SD-WM-TI-693 Rev. 0

APPENDIX D

Batches Generated by SIMAN for Simulating HLW Processing

Courtesy of R. S. Wittman

WHC-SD-WM-TI-693 Rev. 0

Batch No. = 1, Time = 2901. days, Batch Vol = 9.500E+02 kgal
Mass Tot = 4.863E+09 g, Mass Sol = 1.558E+09 g

114	1.425E-03	105TX
115	3.077E-01	106TX
116	2.917E-01	107TX
117	3.190E-01	108TX
118	1.191E-01	109TX
121	1.581E-01	112TX
127	8.287E-01	118TX
151	3.369E-01	102AN
169	9.779E-01	105AW
171	1.000E+00	101AY
175	9.960E-01	101SY
176	9.411E-01	102SY
177	9.517E-01	103SY

Batch No. = 2, Time = 3089. days, Batch Vol = 7.482E+02 kgal
Mass Tot = 3.457E+09 g, Mass Sol = 8.462E+08 g

114	1.311E-01	105TX
115	6.125E-01	106TX
116	4.363E-02	107TX
117	6.774E-01	108TX
118	8.368E-01	109TX
121	3.046E-01	112TX
127	6.550E-02	118TX
138	5.456E-03	105U
151	6.631E-01	102AN
172	1.000E+00	102AY
175	1.076E-03	101SY
176	2.337E-03	102SY

Batch No. = 3, Time = 3274. days, Batch Vol = 8.126E+02 kgal
Mass Tot = 3.689E+09 g, Mass Sol = 8.303E+08 g

111	8.551E-01	102TX
113	8.986E-01	104TX
114	5.951E-01	105TX
115	7.988E-02	106TX
116	6.562E-01	107TX
117	3.622E-03	108TX
118	4.414E-02	109TX
120	1.921E-01	111TX
121	3.459E-01	112TX
127	1.048E-01	118TX
136	8.435E-01	103U
138	7.904E-01	105U
139	9.680E-02	106U
140	4.556E-01	107U
169	2.212E-02	105AW
173	1.000E+00	101AZ
174	1.000E+00	102AZ

WHC-SD-WM-TI-693 Rev. 0

175 2.877E-03 101SY
176 5.608E-02 102SY

Batch No. = 4, Time = 3389. days, Batch Vol = 8.640E+02 kgal
Mass Tot = 3.564E+09 g, Mass Sol = 5.178E+08 g

51 1.386E-01 101C
58 5.976E-01 108C
59 5.976E-01 109C
60 5.029E-01 110C
61 5.976E-01 111C
62 5.976E-01 112C
114 2.469E-01 105TX
136 1.312E-02 103U
138 2.042E-01 105U
156 1.000E+00 107AN
167 5.976E-01 103AW

Batch No. = 5, Time = 3507. days, Batch Vol = 8.323E+02 kgal
Mass Tot = 3.379E+09 g, Mass Sol = 5.299E+08 g

51 3.772E-01 101C
55 2.914E-01 105C
58 2.437E-01 108C
59 2.437E-01 109C
60 3.010E-01 110C
61 2.437E-01 111C
62 2.437E-01 112C
110 1.500E-01 101TX
111 1.449E-01 102TX
112 1.355E-01 103TX
113 1.014E-01 104TX
116 8.470E-03 107TX
119 5.308E-01 110TX
120 8.079E-01 111TX
121 1.256E-03 112TX
136 1.014E-01 103U
139 4.003E-01 106U
140 1.907E-01 107U
141 6.480E-01 108U
142 7.958E-02 109U
167 2.437E-01 103AW

Batch No. = 6, Time = 3621. days, Batch Vol = 7.887E+02 kgal
Mass Tot = 3.201E+09 g, Mass Sol = 5.135E+08 g

51 2.385E-01 101C
110 8.500E-01 101TX
112 8.645E-01 103TX
114 2.542E-02 105TX
119 4.692E-01 110TX
122 5.882E-03 113TX
123 5.841E-01 114TX

WHC--SD-WM-TI-693 Rev. 0

126	3.761E-01	117TX
134	2.141E-01	101U
135	3.042E-01	102U
136	4.198E-02	103U
139	5.030E-01	106U
140	3.537E-01	107U
141	3.520E-01	108U
142	5.263E-01	109U
143	2.205E-01	110U
145	5.885E-01	112U

Batch No. = 7, Time = 3728. days, Batch Vol = 8.446E+02 kgal
 Mass Tot = 3.471E+09 g, Mass Sol = 4.830E+08 g

51	5.601E-02	101C
55	2.197E-01	105C
57	6.865E-02	107C
58	3.619E-02	108C
59	3.619E-02	109C
60	4.470E-02	110C
61	3.619E-02	111C
62	3.619E-02	112C
63	2.279E-01	201C
64	2.279E-01	202C
65	2.279E-01	203C
66	2.279E-01	204C
84	1.594E-01	106SX
122	6.286E-01	113TX
123	4.146E-01	114TX
124	9.578E-02	115TX
126	4.015E-01	117TX
134	7.472E-01	101U
135	4.655E-01	102U
137	7.374E-01	104U
142	1.576E-01	109U
143	7.379E-02	110U
144	1.000E+00	111U
145	4.115E-01	112U
146	6.747E-01	201U
167	3.619E-02	103AW

Batch No. = 8, Time = 3836. days, Batch Vol = 8.672E+02 kgal
 Mass Tot = 3.569E+09 g, Mass Sol = 4.870E+08 g

51	7.830E-02	101C
55	2.043E-01	105C
57	3.784E-01	107C
58	5.059E-02	108C
59	5.059E-02	109C
60	6.249E-02	110C
61	5.059E-02	111C
62	5.059E-02	112C

WHC-SD-WM-TI-693 Rev. 0

63	3.186E-01	201C
64	3.186E-01	202C
65	3.186E-01	203C
66	3.186E-01	204C
82	1.183E-01	104SX
84	5.211E-01	106SX
122	1.447E-01	113TX
123	1.326E-03	114TX
124	2.752E-01	115TX
125	2.952E-03	116TX
126	2.224E-01	117TX
134	3.879E-02	101U
135	2.303E-01	102U
137	1.717E-01	104U
142	2.364E-01	109U
143	7.057E-01	110U
146	2.127E-01	201U
148	8.287E-01	203U
167	5.059E-02	103AW

Batch No. = 9, Time = 3939. days, Batch Vol = 8.337E+02 kgal
 Mass Tot = 3.430E+09 g, Mass Sol = 4.624E+08 g

43	6.217E-02	105BY
55	1.991E-03	105C
57	2.510E-03	107C
63	3.171E-03	201C
64	3.171E-03	202C
65	3.171E-03	203C
66	3.171E-03	204C
82	7.326E-01	104SX
84	3.195E-01	106SX
122	2.906E-02	113TX
124	6.041E-01	115TX
125	1.273E-01	116TX
137	9.092E-02	104U
146	1.126E-01	201U
148	1.713E-01	203U

Batch No. = 10, Time = 4059. days, Batch Vol = 8.707E+02 kgal
 Mass Tot = 3.578E+09 g, Mass Sol = 4.820E+08 g

41	3.410E-01	103BY
43	3.868E-01	105BY
51	1.103E-01	101C
55	2.817E-01	105C
57	3.553E-01	107C
58	7.126E-02	108C
59	7.126E-02	109C
60	8.801E-02	110C
61	7.126E-02	111C
62	7.126E-02	112C

63	4.488E-01	201C
64	4.488E-01	202C
65	4.488E-01	203C
66	4.488E-01	204C
82	1.185E-01	104SX
83	4.227E-01	105SX
85	4.947E-02	107SX
87	1.190E-01	109SX
125	5.474E-01	116TX
147	1.000E+00	202U
149	1.000E+00	204U
167	7.126E-02	103AW

Batch No. = 11, Time = 4169. days, Batch Vol = 8.824E+02 kgal
 Mass Tot = 3.616E+09 g, Mass Sol = 4.970E+08 g

80	3.168E-02	102SX
83	2.875E-01	105SX
85	4.698E-01	107SX
86	7.142E-01	108SX
87	7.139E-01	109SX
89	3.837E-01	111SX
125	6.945E-03	116TX

Batch No. = 12, Time = 4318. days, Batch Vol = 8.376E+02 kgal
 Mass Tot = 3.435E+09 g, Mass Sol = 4.612E+08 g

41	6.590E-01	103BY
43	2.683E-03	105BY
46	9.488E-01	108BY
53	3.825E-01	103C
57	1.940E-01	107C
80	1.484E-01	102SX
85	4.445E-01	107SX
86	3.625E-02	108SX
87	1.545E-01	109SX
89	5.269E-01	111SX

Batch No. = 13, Time = 4532. days, Batch Vol = 8.212E+02 kgal
 Mass Tot = 3.378E+09 g, Mass Sol = 4.339E+08 g

43	5.483E-01	105BY
44	2.212E-01	106BY
46	5.124E-02	108BY
52	9.852E-02	102C
53	6.175E-01	103C
57	1.159E-03	107C
63	1.465E-03	201C
64	1.465E-03	202C
65	1.465E-03	203C
66	1.465E-03	204C
80	3.770E-01	102SX
81	1.439E-02	103SX

82	3.065E-02	104SX
83	1.826E-01	105SX
85	2.944E-02	107SX
86	1.997E-01	108SX
87	1.023E-02	109SX
89	7.202E-02	111SX
124	2.502E-02	115TX
125	1.121E-01	116TX

Batch No. = 14, Time = 4635. days, Batch Vol = 8.376E+02 kgal
 Mass Tot = 3.434E+09 g, Mass Sol = 4.635E+08 g

44	3.919E-01	106BY
52	4.061E-01	102C
80	1.719E-02	102SX
81	1.360E-01	103SX
83	1.072E-01	105SX
86	3.049E-03	108SX
89	1.076E-03	111SX
125	1.877E-01	116TX

Batch No. = 15, Time = 4732. days, Batch Vol = 8.059E+02 kgal
 Mass Tot = 3.314E+09 g, Mass Sol = 4.355E+08 g

42	1.247E-02	104BY
44	2.488E-01	106BY
52	2.582E-01	102C
80	3.926E-01	102SX
81	3.732E-01	103SX
85	5.636E-03	107SX
86	4.095E-02	108SX
87	1.958E-03	109SX
89	1.430E-02	111SX
121	1.756E-01	112TX
177	4.457E-02	103SY

Batch No. = 16, Time = 4833. days, Batch Vol = 8.110E+02 kgal
 Mass Tot = 3.317E+09 g, Mass Sol = 4.588E+08 g

42	4.439E-01	104BY
44	1.381E-01	106BY
45	2.315E-02	107BY
52	2.091E-01	102C
54	1.574E-01	104C
80	3.297E-02	102SX
81	2.814E-01	103SX
86	5.851E-03	108SX
89	2.065E-03	111SX
92	1.996E-01	114SX
96	4.409E-01	103T
104	3.802E-02	111T
121	1.003E-02	112TX
125	6.856E-03	116TX

177 2.544E-03 103SY

Batch No. = 17, Time = 4929. days, Batch Vol = 7.663E+02 kgal
Mass Tot = 3.130E+09 g, Mass Sol = 4.289E+08 g

42	5.436E-01	104BY
45	9.995E-02	107BY
52	2.809E-02	102C
54	6.382E-01	104C
79	3.732E-03	101SX
81	2.350E-03	103SX
92	5.901E-03	114SX
96	7.319E-03	103T
121	4.596E-03	112TX
177	1.166E-03	103SY

Batch No. = 18, Time = 5031. days, Batch Vol = 8.029E+02 kgal
Mass Tot = 3.291E+09 g, Mass Sol = 4.620E+08 g

15	5.663E-01	105B
45	8.224E-01	107BY
54	1.249E-01	104C
68	1.771E-02	102S
79	2.738E-01	101SX
81	6.497E-03	103SX
92	4.174E-01	114SX
96	1.803E-01	103T
102	2.571E-01	109T
104	6.798E-01	111T
125	2.805E-03	116TX

Batch No. = 19, Time = 5145. days, Batch Vol = 9.037E+02 kgal
Mass Tot = 3.711E+09 g, Mass Sol = 5.094E+08 g

68	1.426E-01	102S
79	6.354E-01	101SX
81	1.800E-01	103SX
92	1.635E-01	114SX
96	2.027E-01	103T
102	3.912E-01	109T
104	9.099E-02	111T
122	1.917E-01	113TX
125	3.153E-03	116TX

Batch No. = 20, Time = 5246. days, Batch Vol = 8.351E+02 kgal
Mass Tot = 3.440E+09 g, Mass Sol = 4.572E+08 g

15	4.267E-01	105B
17	9.629E-01	07B
28	9.498E-01	102BX
45	5.173E-02	107BY
49	5.411E-01	111BY
68	4.808E-01	102S
78	7.992E-02	112S

WHC-SD-WM-TI-693 Rev. 0

79	4.052E-02	101SX
81	2.783E-03	103SX
88	8.197E-01	110SX
90	3.015E-01	112SX
91	2.432E-01	113SX
92	1.400E-01	114SX
93	2.432E-01	115SX
96	7.726E-02	103T
99	1.000E+00	106T
101	3.959E-01	108T
102	3.517E-01	109T
104	1.826E-01	111T
125	1.201E-03	116TX

Batch No. = 21, Time = 5480. days, Batch Vol = 9.202E+02 kgal
 Mass Tot = 3.808E+09 g, Mass Sol = 5.126E+08 g

3	1.484E-01	103A
15	7.008E-03	105B
17	3.710E-02	107B
20	5.096E-01	110B
21	9.825E-01	111B
27	4.247E-01	101BX
28	5.021E-02	102BX
34	1.718E-01	108BX
36	3.080E-01	110BX
45	2.735E-03	107BY
49	4.577E-01	111BY
68	3.222E-01	102S
77	3.373E-01	111S
78	4.105E-01	112S
79	2.401E-02	101SX
81	1.696E-03	103SX
88	9.960E-02	110SX
90	1.089E-01	112SX
91	4.481E-02	113SX
92	3.796E-02	114SX
93	4.481E-02	115SX
96	4.708E-02	103T
100	7.797E-01	107T
101	6.041E-01	108T
104	4.060E-03	111T
130	2.808E-01	103TY

Batch No. = 22, Time = 5625. days, Batch Vol = 8.552E+02 kgal
 Mass Tot = 3.521E+09 g, Mass Sol = 4.819E+08 g

4	8.553E-01	104A
5	4.791E-01	105A
26	1.000E+00	204B
36	6.861E-01	110BX
37	9.501E-01	111BX

50	3.341E-01	112BY
54	6.796E-02	104C
67	2.076E-01	101S
68	3.667E-02	102S
76	4.336E-02	110S
77	4.026E-01	111S
78	3.174E-01	112S
79	2.252E-02	101SX
81	1.591E-03	103SX
88	8.044E-02	110SX
90	7.152E-02	112SX
92	3.560E-02	114SX
96	4.416E-02	103T
100	1.736E-01	107T
104	3.808E-03	111T
130	1.625E-01	103TY

Batch No. = 23, Time = 5729. days, Batch Vol = 8.228E+02 kgal
 Mass Tot = 3.376E+09 g, Mass Sol = 4.680E+08 g

1	3.011E-01	101A
3	5.757E-01	103A
4	1.447E-01	104A
5	5.210E-01	105A
20	4.904E-01	110B
21	1.748E-02	111B
22	1.000E+00	112B
27	5.753E-01	101BX
32	1.000E+00	106BX
34	8.282E-01	108BX
36	3.317E-03	110BX
37	4.990E-02	111BX
38	4.597E-01	112BX
48	6.822E-01	110BY
49	1.167E-03	111BY
50	6.659E-01	112BY
54	1.150E-02	104C
67	1.588E-01	101S
76	9.725E-02	110S
77	1.229E-02	111S
78	1.731E-03	112S
100	1.723E-02	107T
130	1.612E-02	103TY

Batch No. = 24, Time = 5838. days, Batch Vol = 8.652E+02 kgal
 Mass Tot = 3.553E+09 g, Mass Sol = 4.850E+08 g

3	2.760E-01	103A
48	3.178E-01	110BY
67	6.181E-01	101S
76	4.587E-01	110S
77	2.479E-01	111S

WHC-SD-WM-TI-693 Rev. 0

78	1.349E-03	112S
100	2.944E-02	107T
130	3.948E-01	103TY

Batch No. = 25, Time = 6137. days, Batch Vol = 8.479E+02 kgal
 Mass Tot = 3.497E+09 g, Mass Sol = 4.763E+08 g

1	4.117E-01	101A
6	3.298E-03	106A
8	9.335E-01	102AX
9	7.061E-01	103AX
35	3.643E-01	109BX
38	5.403E-01	112BX
39	6.891E-01	101BY
47	1.263E-02	109BY
67	1.838E-03	101S
69	3.926E-01	103S
71	2.632E-01	105S
75	1.346E-02	109S
76	2.833E-02	110S
78	6.171E-02	112S
94	4.439E-01	101T
103	1.649E-01	110T
108	2.843E-01	203T
128	2.818E-01	101TY
130	1.218E-01	103TY
131	8.353E-01	104TY
132	7.652E-01	105TY
133	6.831E-02	106TY

Batch No. = 26, Time = 6244. days, Batch Vol = 8.695E+02 kgal
 Mass Tot = 3.587E+09 g, Mass Sol = 4.827E+08 g

1	2.872E-01	101A
6	8.193E-01	106A
23	1.000E+00	201B
30	1.000E+00	104BX
35	1.313E-01	109BX
39	3.108E-01	101BY
67	1.077E-02	101S
71	3.401E-01	105S
76	2.942E-01	110S
78	1.274E-01	112S
90	5.173E-01	112SX
91	7.111E-01	113SX
93	7.111E-01	115SX
103	7.804E-01	110T
128	2.063E-01	101TY
130	2.401E-02	103TY
131	1.647E-01	104TY
132	2.169E-01	105TY
133	7.361E-01	106TY

WHC-SD-WM-TI-693 Rev. 0

Batch No. = 27, Time = 6353. days, Batch Vol = 8.770E+02 kgal
Mass Tot = 3.617E+09 g, Mass Sol = 4.891E+08 g

2	1.000E+00	102A
6	1.775E-01	106A
7	6.085E-02	101AX
8	6.653E-02	102AX
9	1.834E-01	103AX
10	6.240E-01	104AX
16	6.728E-03	106B
25	6.240E-01	203B
29	6.240E-01	103BX
35	5.044E-01	109BX
47	9.279E-01	109BY
67	2.815E-03	101S
69	2.791E-01	103S
71	2.270E-01	105S
75	3.181E-01	109S
76	7.805E-02	110S
94	3.785E-01	101T
95	4.687E-02	102T
97	4.804E-02	104T
98	1.803E-01	105T
103	5.460E-02	110T
105	1.188E-01	112T
106	1.188E-01	201T
107	1.188E-01	202T
108	5.425E-01	203T
128	5.033E-01	101TY
132	1.786E-02	105TY
133	1.953E-01	106TY

Batch No. = 28, Time = 6463. days, Batch Vol = 8.767E+02 kgal
Mass Tot = 3.606E+09 g, Mass Sol = 4.947E+08 g

7	1.744E-01	101AX
9	1.105E-01	103AX
10	3.760E-01	104AX
14	4.494E-01	104B
16	3.303E-02	106B
19	4.972E-01	109B
25	3.760E-01	203B
29	3.760E-01	103BX
31	1.000E+00	105BX
47	3.012E-02	109BY
69	3.283E-01	103S
70	2.178E-01	104S
71	8.213E-02	105S
75	2.715E-01	109S
94	7.777E-02	101T
95	6.857E-01	102T
97	3.769E-01	104T

98	3.830E-01	105T
105	2.035E-01	112T
106	2.035E-01	201T
107	2.035E-01	202T
108	8.549E-02	203T
128	8.488E-03	101TY
129	3.815E-01	102TY

Batch No. = 29, Time = 6575. days, Batch Vol = 8.949E+02 kgal
 Mass Tot = 3.688E+09 g, Mass Sol = 5.060E+08 g

7	3.865E-01	101AX
14	5.506E-01	104B
16	9.602E-01	106B
19	1.628E-01	109B
47	2.940E-02	109BY
70	2.379E-01	104S
71	7.595E-02	105S
75	3.248E-01	109S
94	7.405E-02	101T
95	1.784E-01	102T
97	5.378E-01	104T
98	3.786E-01	105T
105	4.522E-01	112T
106	4.522E-01	201T
107	4.522E-01	202T
108	7.602E-02	203T
109	1.000E+00	204T
129	4.088E-01	102TY

Batch No. = 30, Time = 6686. days, Batch Vol = 8.742E+02 kgal
 Mass Tot = 3.588E+09 g, Mass Sol = 5.013E+08 g

7	2.000E-01	101AX
19	2.010E-01	109B
33	7.346E-01	107BX
40	3.300E-01	102BY
70	4.752E-02	104S
71	1.353E-03	105S
73	5.050E-01	107S
75	7.346E-03	109S
94	2.994E-03	101T
95	1.032E-02	102T
97	4.324E-03	104T
98	6.743E-03	105T
105	2.616E-02	112T
106	2.616E-02	201T
107	2.616E-02	202T
108	1.354E-03	203T

3 of 3

WHC-SD-WM-TI-693 Rev. 0

Batch No. = 31, Time = 6825. days, Batch Vol = 9.486E+02 kgal
Mass Tot = 3.899E+09 g, Mass Sol = 5.151E+08 g

7	3.186E-02	101AX
40	6.524E-01	102BY
70	4.206E-01	104S
71	1.026E-02	105S
72	1.667E-01	106S
73	4.077E-01	107S
74	3.950E-01	108S
75	5.977E-02	109S
94	2.272E-02	101T
95	7.834E-02	102T
97	3.282E-02	104T
98	5.118E-02	105T
105	1.985E-01	112T
106	1.985E-01	201T
107	1.985E-01	202T
108	1.027E-02	203T
129	9.526E-02	102TY

Batch No. = 32, Time = 7039. days, Batch Vol = 8.261E+02 kgal
Mass Tot = 3.421E+09 g, Mass Sol = 4.174E+08 g

7	1.463E-01	101AX
11	1.000E+00	101B
12	1.000E+00	102B
13	1.000E+00	103B
18	1.000E+00	108B
19	1.389E-01	109B
24	1.000E+00	202B
33	2.654E-01	107BX
40	1.756E-02	102BY
70	7.617E-02	104S
72	8.332E-01	106S
73	8.720E-02	107S
74	6.049E-01	108S
75	5.044E-03	109S
129	1.144E-01	102TY

WHC-SD-WM-TI-693 Rev. 0

APPENDIX E

Values Currently Tracked for the
Retrieval Sequence and Blending Strategy Decision Analysis

Courtesy of P. J. Certa

Table 14 - Value Tree

TOP-LEVEL VALUE	VALUE	MEASURE
Safety	Cumulative Risk	Integrated radionuclide PSI for fire/explosion scenario.
		Integrated radionuclide PSI for groundwater scenario.
Schedule	TPA Milestones	Cumulative SST Retrieval Plot
		Delta SST Retrieval Plot
		HLW Process Completion Variance
		LLW Process Completion Variance
	Keep Plants Running	Cumulative throughput of LLW Pretreatment / Vitrification Plants
		Cumulative throughput of HLW Vitrification Plant
Cost	HLW Glass Disposal	Immobilized HLW Volume
	HLW Feed Variability	Pretreated HLW Composition Plots
Funding Profile	SST Retrieval Capital	Capital cost profile of retrieval projects
	SST Retrieval O&E	Duration retrieval activities occur in farm
Logistics	Complexity	Number of farms with tanks being retrieved
		Number of tanks being retrieved
	Resources - equipment	Number of sound tanks being retrieved
		Number of leaking tanks being retrieved
Robustness	Changes in retrieval sequence	For promising alternatives, calculate the above measures for a perturbed retrieval sequence.
	Changes in other inputs	For promising alternatives, calculate the above measures for perturbed model inputs.

Table 15 - Safety Related Measures

VALUE	MEASURE	DISCUSSION
Cumulative Risk	Integrated radionuclide PSI for fire/explosion scenario.	The cumulative risk of continued storage of waste (until retrieval) will be estimated by summing the product of the PSI for a tank by the number of years before that tank is retrieved over all of the tanks. The value may be normalized by dividing by the value that would occur if all tanks were retrieved on September 30, 2018.
	Integrated radionuclide PSI for groundwater scenario.	
Watch List	Plot remaining number of watch list tanks. Plot against mission time.	Improved understanding of the risk presented by the watch-list tanks suggest that they present a similar risk as the other tanks.
Leakers	Plot remaining number of leakers. Plot against mission time.	This measure is biased.
Drainable Liquid	Plot drainable liquid remaining in the SSTs. Plot against mission time.	The integrated radionuclide PSI for the groundwater scenario will probably be a better measure than drainable liquid.

Note: Shaded cells correspond to values and measures not being explored during this analysis.

Table 16 - Schedule (TPA) Related Measures

VALUE	MEASURE	DISCUSSION
TPA Milestones	<u>Cumulative SST Retrieval Plot.</u> The number of SSTs retrieved and being retrieved against mission time. Overlay the stair step schedule corresponding to the TPA milestones.	<p>Meet TPA Milestones governing retrieval and processing of waste.</p> <p>There is a series of TPA milestones (M-45-05-T01... M-45-05-T15) that specify the number of (additional) SST tanks for which retrieval must be initiated. These specify a SST retrieval schedule (not sequence) when taken together with milestones M-45-03-T01, M-45-03-T02, M-45-03A (related to demonstrating SST retrieval technology and C-106).</p> <p>There are TPA milestones (M-51-00, M-60-00) that specify when all HLW and LLW vitrification must be complete. Both are due 12/31/2028.</p>
	<u>Delta SST Retrieval Plot.</u> Plot the difference between (the number of SST tanks retrieved and being retrieved) and the schedule corresponding to the TPA milestones. Indicate the location of TPA milestones on the x-axis.	
	<u>HLW Process Completion Variance.</u> List the difference between the TPA Milestone and the actual completion date for HLW Processing. <u>LLW Process Completion Variance.</u> List the difference between the TPA Milestone and the actual completion date for LLW Processing.	

Note: Shaded cells correspond to values and measures not being explored during this analysis.

Table 17 - Schedule (Keep Plants Running) Related Measures

VALUE	MEASURE	DISCUSSION
Keep Plant Running	<p>Cumulative throughput of LLW Pretreatment / <u>Vitrification Plants</u>. Plot against mission time. Overlay with integrated plant capacity (instantaneous maximum) starting at plant commissioning date.</p>	<p>Keep the processing plants running, and near capacity. There is a desire to avoid shutdown of the processing plants (LLW pretreatment, LLW Vitrification, and HLW Vitrification) due to lack of feed. Besides complicating operations, a lengthy shutdown may result in the need to obtain formal restart permission.</p>
	<p>The LLW Pretreatment and Vitrification plants are close-coupled therefore the cumulative throughput plots are the same.</p>	
	<p>Cumulative throughput of <u>HLW Vitrification Plant</u>. Plot against mission time. Overlay with integrated plant capacity (instantaneous maximum) starting at plant commissioning date.</p>	

Table 18 - Cost Related Measures

VALUE	MEASURE	DISCUSSION
HLW Glass Disposal	<u>Immobilized HLW Volume</u> . Compare with the total-blend and no-blend bounding cases using same working inventory, solubility data, and specifications.	A major system cost is the allocated cost for disposal of HLW glass, driven by the volume of the immobilized HLW. Up to \$2 billion could be saved by blending.
HLW Variability	<u>Pretreated HLW Composition Plots</u> .	HLW Feed variability affects costs (though volume, melter design, and glass formulation and qualification efforts), but may not be sufficiently independent from immobilized HLW volume. May be changed to an Other Metric.
Waste Form Types	<u>Number of HLW Waste Form Types</u> . Estimate of the number of waste forms, based upon clustering of composition data in feed batches to the HLW Vitrification Plant.	Cost of HLW glass formulation and qualification work is driven by the number of waste forms requiring qualification and the variability within for a given waste form. This measure is not be readily quantifiable and will not be used for the FY 1995 work. In general, WOL loading is increase by better blending and this implies a more uniform waste and perhaps fewer waste types requiring qualification.
LLW Feed Variability	<u>Melter Feed composition plots</u> . Estimated composition of feed to the LLW Vitrification Melter. Plot against mission time.	Baseline strategies do not provide for long time-scale blending of LLW. Overall, the Waste oxide loading in LLW glass is limited by Na. This measure should reflect the addition of glass formers to yield a target glass composition. An estimate of the variability in the LLW melter feed is needed to support melter and glass development. This is expected to be non-discriminatory. If so, it will be provided as one of the other metrics; otherwise it will be "elevate" to a measure.

Note: Shaded cells correspond to values and measures not being explored during this analysis.

Table 19 - Funding Profile

VALUE	MEASURE	DISCUSSION
SST Retrieval Capital	<u>Capital Cost Profile for Retrieval Projects.</u>	Baseline retrieval strategy upgrades the infrastructure and retrieval systems on a farm-by-farm basis (with possible exception of the first retrieval project). Assume that the cost to upgrade each farm is proportional to the number of tanks in the farm and that the cost is spread out over xxxx years prior to initiation of retrieval of the first tank in the farm. The shape of the cost profile can be approximated by adding the contributions from each farm. This measure will be a relative measure where each tank contributes one unit to the capital cost.
SST Retrieval O&E	<u>Duration retrieval activities occur in farm.</u> Show on a gannt chart.	Another retrieval system cost will be the cost operate a farm and maintain its infrastructure. These costs will be roughly proportional to the length of time a farm is active (time between retrieval of first tank and last tank).

Table 20 - Logistics Related Measures

VALUE	MEASURE	DISCUSSION
Physical Interference	<u>Number of interfering tanks.</u>	Avoid physical interference between retrieval equipment. This measure will not be used at this time due to: 1) rules for physical interference have not been defined until the retrieval architecture for both leaking and non-leaking tanks is better developed, and 2) the restriction on only two simultaneous retrieval activities per annex implies that at most two tanks could be retrieved within a given farm. This is not likely to cause interference.
	<u>Number of farms with tanks being retrieved.</u> Plot against mission time.	Avoid large numbers of complex (multiple) retrieval operations. As more tanks and farms undergo retrieval activities, the planning, coordination, and execution of operations and maintenance becomes more complicated.
Complexity	<u>Number of tanks being retrieved.</u> Plot against mission time.	Number of transfers are not build into the model code at this time.
	<u>Number of transfers.</u>	
	<u>Number of sound tanks being retrieved.</u> Plot against mission time.	
Resources - equipment	<u>Number of leaking tanks being retrieved.</u> Plot against mission time.	Equipment (sluicers or other systems) are needed to retrieve waste. It is desirable to maintain the use of these resources within reasonable limits. These measures will probably be non-discriminatory (since the operating scenario limits the number of tanks being retrieved simultaneously to eight), but may be needed to assess the impact of relaxing that constraint during sensitivity studies.

Table 21 - Robustness Related Measures

VALUE	MEASURE	DISCUSSION
Changes in Retrieval Sequence	<u>Examine above measures for perturbed retrieval sequence.</u>	<p>Example. A random number (say between 0 and 5) could be added to the position of each tank in the sequence, resulting in a new sequence where all tanks are retrieved in the same general time-frame, but the order is jumbled. The order of the first several tanks could be fixed to due logistics reasons and other commitments. Each alternative sequence should be tested with the same perturbed mapping.</p> <p>To reduce the effort, only promising alternatives will be tested.</p>
Changes in other measures	<u>Examine above measures for perturbed model inputs.</u>	<p>Sensitivity study of important model inputs. The dynamic model can support Monte-Carlo type simulations if needed. The primary inputs to be studied are:</p> <ul style="list-style-type: none"> Alternative HLW glass feed specification. Alternative TWRS Flowsheet Inventory. Number of simultaneous retrieval activities supported by each retrieval annex. <p>Of secondary importance are:</p> <ul style="list-style-type: none"> HLW Vitrification startup date delay. LLW Vitrification startup date delay. Alternative LLW glass feed specification.

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