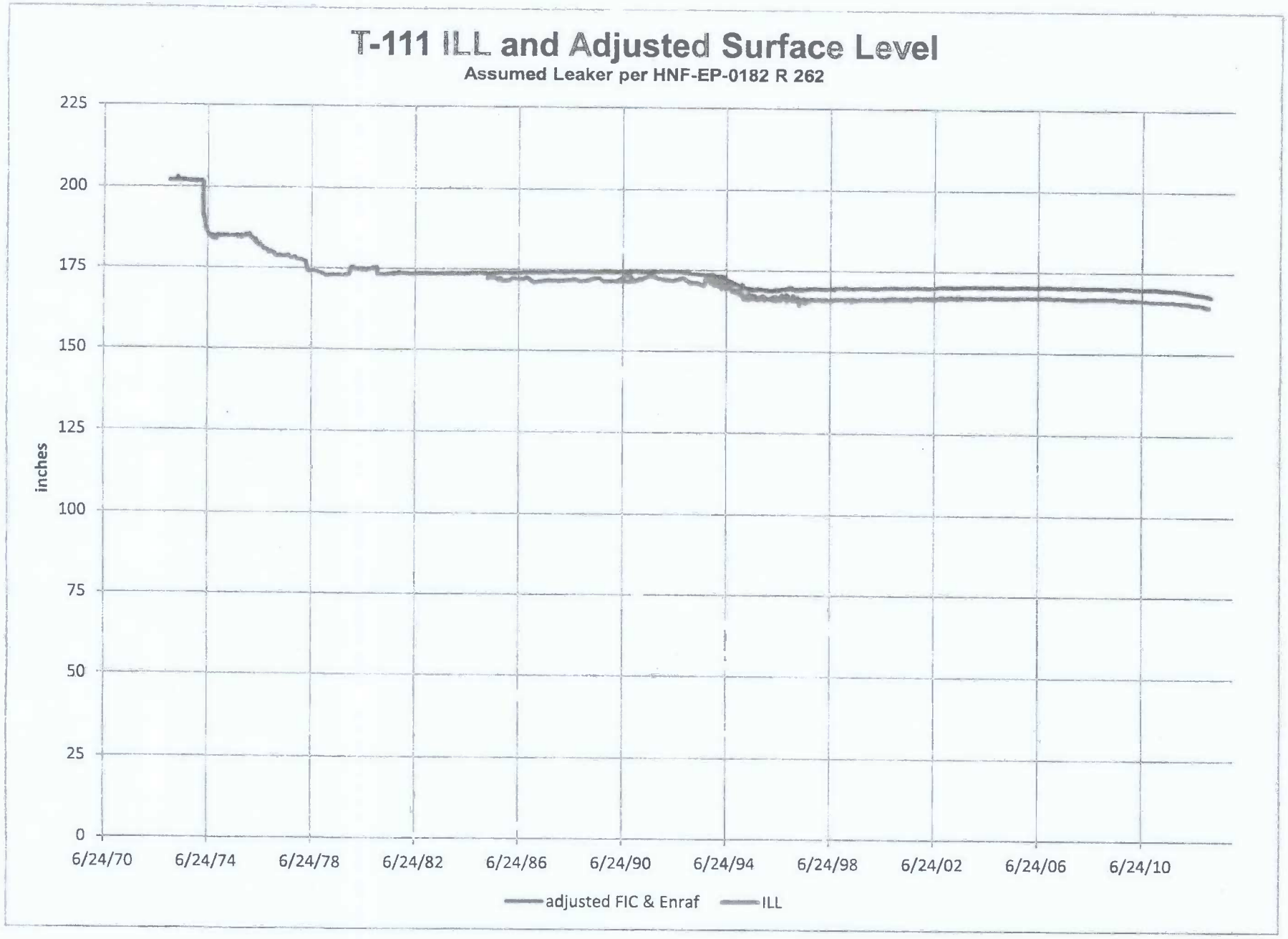
Meyers, Colleen A

From: Trenchard, Glyn D
Sent: Friday, February 15, 2013 12:08 PM
To: Shrader, Todd A
Subject: FW: T-111
Attachments: T-111 level.pdf

This chart shows both the surface level (ENRAF now and manual tape on the older readings) as well as the interstitial liquid level (ILL). It shows the 1974 pumping and the 1994/5 Interim Stabilization.


T-111 ILL and Adjusted Surface Level
Assumed Leaker per HNF-EP-0182 R 262
inches
225
200
175
150
125
100
75
50
25
0
6/24/70
6/24/74
6/24/78
6/24/82
6/24/86
6/24/90
6/24/94
6/24/98
6/24/02
6/24/06
6/24/10
adjusted FIC & Enraf
ILL

Meyers, Colleen A

From: Trenchard, Glyn D
Sent: Friday, February 15, 2013 4:22 PM
To: Shrader, Todd A
Cc: Fletcher, Thomas W
Subject: Fwd: Liquid Observation Well Drawings
Attachments: H-2-93715 Sh. 3 Rev. 0 [D9018293].pdf; ATT00001.htm; H-2-93715 Sh. 2 Rev. 2 [D9018287].pdf; ATT00002.htm

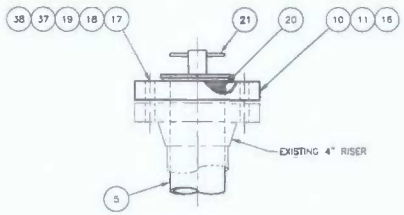
LOW info

Sent from my iPad

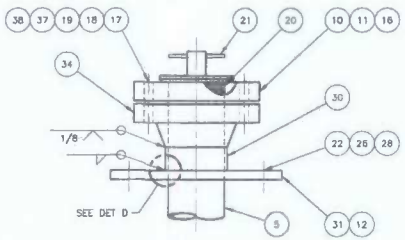
Begin forwarded message:

> **From:** "Washenfelder, Dennis J" <Dennis_J_Washenfelder@rl.gov>
> **Date:** February 15, 2013, 3:05:10 PM PST
> **To:** "Trenchard, Glyn D" <Glyn_D_Trenchard@orp.doe.gov>
> **Subject: Liquid Observation Well Drawings**
>
> Glyn:
>
> The two attached drawings show the liquid observation well dimensions and a sample of the overall lengths that are installed in some of the tanks.
>
> Dennis

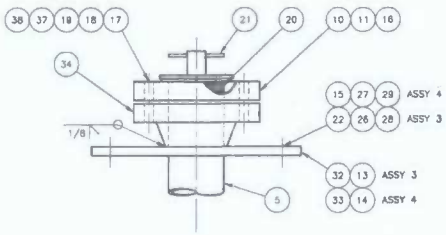
Dennis J. Washenfelder
Washington River Protection Solutions LLC
509-373-2641 Work
509-531-5386 Cell



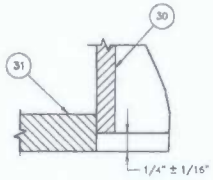
DETAIL A
SCALE: NONE



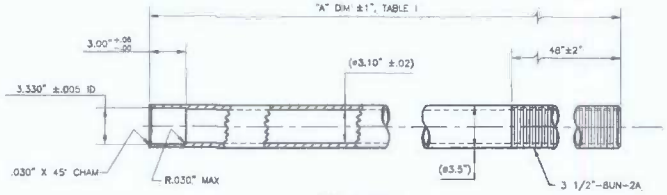
DETAIL B
SCALE: NONE



DETAIL C
SCALE: NONE



DETAIL D
SCALE: 1 1/2" = 1"



23 TUBE
SCALE: 1/4"=1'-0"

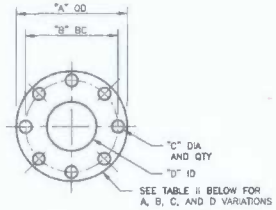
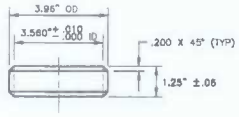


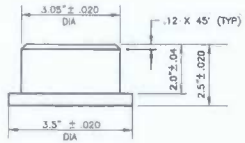
TABLE II

PART NO	DIMENSIONS (INCHES)			
	"A"	"B"	"C"	"D"
11	9	7 1/2	0.75-8 HOLES	5"
12	11	9 1/2	0.875-8 HOLES	7 3/16"
13	13 1/2	11 3/4	0.875-8 HOLES	9 3/16"
14	19	17	1.0-12 HOLES	13 3/8"

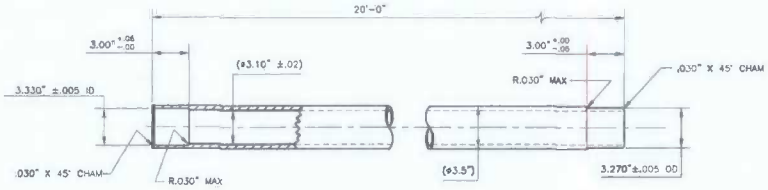
11 12 13 14 GASKET
SCALE: NONE



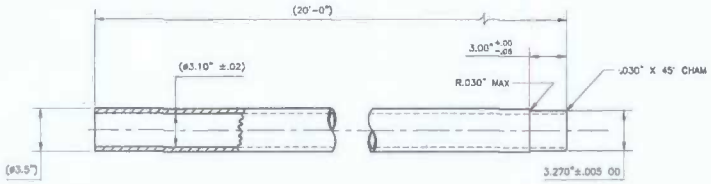
40 RING
SCALE: NONE



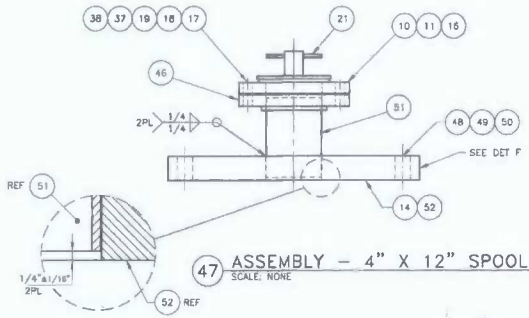
41 END PLUG
SCALE: NONE



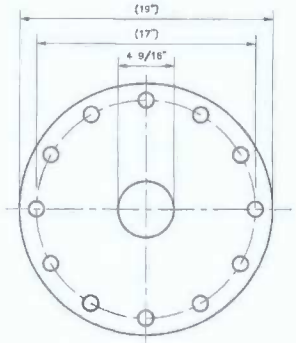
24 TUBE
SCALE: 1/4"=1'-0"



25 TUBE
SCALE: 1/4"=1'-0"



47 ASSEMBLY – 4" X 12" SPOOL PIECE
SCALE: NONE



DETAIL F
SCALE: NONE

DWG NO	TITLE	REF NUMBER	TITLE
DRAWING TRACEABILITY LIST		REFERENCES NEXT USED ON SH 1	

REVISIONS

NAME	DATE
D.A. MATEO	

U.S. DEPARTMENT OF ENERGY
Office of River Protection

PIPING
LIQUID OBSERVATION WELL
ASSY AND DET

SIZE F | BLDG NO 200C 2500 6007 | DWG NO H-2-93715 | REV 0
SCALE SHOWN | ECN 608795 | SHEET 1 OF

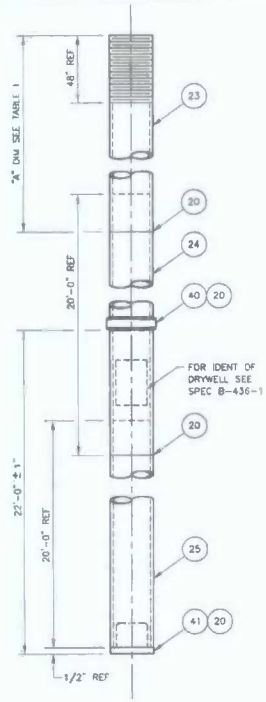
10783

TABLE I

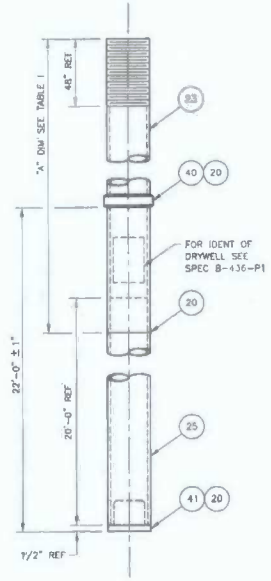
TANK NO.	RISER NO.	ELEVATIONS: TOP OF RISER FLG (FT)	ELEVATIONS: ℄ TANK BOTTOM (FEET)	REFERENCE DWG NO.	TOP OF RISER FLANGE WITH SPOOL PIECE (FEET)	℄ EL BOTTOM OF TANK AT RISER	RADIUS FROM ℄ TANK (FEET)	"A" DIMENSION (FEET)	L.O.W. OVERALL LENGTH ****	REQUIRED ASSEMBLY #: SPOOL DETAIL ON H-2-93715	REQUIRED ASSEMBLY #: PIPE GUIDE PN	
TANK-101-A	R-19	690.58	636.73	H-2-37850	———	636.40	24.3	14.00	53.99	———	9	1
TANK-103-A	R-19	688.74	636.73	H-2-37850	———	633.79	28.3	14.78	54.78	———	9	1
TANK-101-AX	R-9A	681.60	628.42	H-2-37854	———	628.83	12.5	15.00	55.54	———	9	1
TANK-104-B	R-6	654.28	615.00	H-2-37851	———	616.09	32.99	20.00 ASSY 6	38.02	———	7	4
TANK-105-B	R-5	653.16	614.00	H-2-37851	———	615.09	33.25	20.00 ASSY 6	37.90	———	7	1
TANK-111-BX	R-5	656.08	619.00	H-2-37852	———	618.10	33.25	20.00 ASSY 6	39.81	———	7	1
TANK-101-BY	R-9A	650.65	602.65	H-2-37853	———	603.34	20.75	9.00	49.54	DET E SH 2	8	1
TANK-102-BY	R-1	648.93	601.85	H-2-37853	———	601.86	8.0	10.00	49.05	DET E SH 2	8	1
TANK-103-BY	R-10A	648.34	600.65	H-2-37853	648.84	601.34	20.75	8.00	47.13	DET C SH 3	8	4
TANK-104-BY	R-10C	650.34***	602.65	H-2-37853	———	603.34	20.75	9.00	48.54	———	8	1
TANK-105-BY	R-10A	649.42	601.85	H-2-37853	649.72	602.34	20.75	8.00	47.21	DET C SH 3	8	4
TANK-106-BY	R-10B	646.32	600.65	H-2-37853	646.62	601.34	20.75	6.00	46.61	DET E SH 2	8	4
TANK-107-BY ●	R-7	649.94	602.65	H-2-37853	———	602.82	6.0	7.41	47.81	DET E SH 2	8	4
TANK-109-BY	R-12B	648.02	600.65	H-2-37853	648.49	601.34	20.75	9.00	48.54	DET C SH 3	8	4
TANK-110-BY	R-3	649.82	602.65	H-2-37853	———	602.91	8.0	9.00	49.54	DET E SH 2	8	1
TANK-111-BY	R-1	649.83	601.65	H-2-37853	647.83	601.86	8.0	8.00	47.80	———	8	1
TANK-112-BY	R-15	649.01	600.65	H-2-37853	649.33	601.61	29.35	10.00	49.54	DET B SH 3	8	2
TANK-101-S	R-2	665.94	620.43	H-2-37381	———	620.73	9.0	7.00	46.54	———	8	1
TANK-102-S	R-5	665.05	619.43	H-2-37381	———	619.35	6.0	5.83	45.53	———	8	4
TANK-103-S	R-2	664.09	618.43	H-2-37381	———	618.66	9.0	7.00	46.54	———	8	1
TANK-105-S	R-14	665.14	619.43	H-2-37381	———	619.63	6.0	7.00	46.54	———	8	1
TANK-108-S	R-16	665.11	619.43	H-2-37381	———	619.86	9.0	7.00	46.54	———	8	1
TANK-110-S	R-2	666.35	620.43	H-2-37381	———	620.66	9.0	8.00	47.54	———	8	1
TANK-111-S	R-16	665.11	619.43	H-2-37381	———	620.42	30.0	7.00	46.54	———	8	1
TANK-101-SX	R-14	663.95	611.11	H-2-37855	———	611.69	30.0	15.00	53.54	———	9	1
TANK-102-SX	R-14	663.14	610.11	H-2-37855	———	610.69	30.0	15.00	53.54	———	9	1
TANK-103-SX	R-14	662.25	609.11	H-2-37855	———	610.10	30.0	12.00	51.98	———	8	1
TANK-104-SX ▲	R-16	663.65	611.11	H-2-37855	———	612.10	30.0	N/A	51.38	———	–	■
TANK-105-SX	R-16	663.10	611.11	H-2-37855	———	612.10	30.0**	11.00	50.38	———	8	1
TANK-106-SX	R-14	662.07	609.11	H-2-37855	———	610.10	30.0**	12.00	51.80	———	9	4
TANK-104-T	R-1	673.81	635.00	H-2-37909	———	636.10	33.25	20.00 ASSY 6	39.79	———	7	1
TANK-110-T	R-5	673.80	635.00	H-2-37909	———	636.10	33.25	20.00 ASSY 6	39.79	———	7	1
TANK-111-T	R-7	672.82	634.00	H-2-37909	673.29	635.08	32.75	20.00 ASSY 6	39.79	DET C SH 3	7	4
TANK-102-TX	R-11A	672.95	623.73	H-2-37910	———	624.42	20.75	10.00	49.54	———	8	1
TANK-105-TX	R-9A	674.70	624.73	H-2-37910	———	624.99	20.75**	10.00	49.54	———	8	1
TANK-106-TX	R-11A	672.93	623.73	H-2-37910	673.26	623.99	20.75**	6.77	48.77	DET C SH 3	8	1
TANK-108-TX	R-9A	669.56	621.73	H-2-37910	———	621.90	9.0	10.00	49.54	DET E SH 2	8	1
TANK-109-TX ▲	R-3	672.13	624.73	H-2-37910	———	624.99	8.0	9.00	48.54	———	8	1
TANK-111-TX	R-11B	669.93***	622.73	H-2-37910	———	622.99	20.75**	6.77	47.77	DET E SH 2	8	1
TANK-113-TX	R-4	672.08	624.73	H-2-37910	———	624.99	8.0	9.00	48.54	———	8	1
TANK-116-TX	R-005	672.05	624.73	H-2-37910	673.38	624.73	8.0	———	47.88	———	8	●
TANK-117-TX	R-7	671.22	628.73	H-2-37910	———	623.90	5.0	9.00	48.63	———	8	1
TANK-102-U	R-2	665.94	627.00	H-2-37381	———	628.08	32.90	20.00 ASSY 6	39.79	———	7	1
TANK-103-U	R-19	664.60	626.00	H-2-37381	———	626.99	30.0	19.00 ASSY 6	39.79	———	7	1
TANK-105-U	R-19	665.78	627.00	H-2-37381	———	627.99	30.0	20.00 ASSY 6	39.79	———	7	1
TANK-106-U	R-9	664.71	626.00	H-2-37381	———	626.99	30.0	20.00 ASSY 6	39.79	———	7	1
TANK-107-U	R-19	666.94	628.00	H-2-37381	———	626.99	30.0	21.00 ASSY 6	39.79	———	7	1
TANK-108-U	R-19	665.65	627.00	H-2-37381	———	627.99	30.0	20.00 ASSY 6	39.79	———	7	1
TANK-109-U	R-9	664.68	626.00	H-2-37381	———	628.99	30.0	16.00 ASSY 6	35.52	———	7	1
TANK-111-U	R-19	665.70	627.00	H-2-37381	———	627.99	30.0	20.00 ASSY 6	39.79	———	7	1
TANK-106-S	R-4	664.05	618.43	H-2-37381	———	618.31	9.0	5.57	45.57	———	8	1
TANK-109-S ▲	R-8	664.05	618.43	H-2-37381	664.52	618.63	6.0	8.00	47.54	DET C SH 3	8	4
TANK-112-S ▲	R-8	663.90	618.43	H-2-37381	664.37	618.63	6.0	8.00	47.54	DET C SH 3	8	4
TANK-110-TX ▲	R-13B	671.18	623.73	H-2-37910	671.65	623.73	0.0	10.00	50.54	DET E SH 2	8	4
TANK-112-TX	R-12A	669.58***	621.73	H-2-37910	669.91	621.99	20.75**	7.42	47.54	DET C SH 3	8	1
TANK-114-TX ▲	R-7	671.16	623.73	H-2-37910	671.63	623.90	5.0	10.00	49.54	DET C SH 3	8	4
TANK-115-TX ▲	R-9A	669.38	622.73	H-2-37910	———	623.42	20.75	8.00	48.54	DET E SH 2	8	1
TANK-118-TX ▲	R-5	671.12	622.73	H-2-37910	671.59	622.90	5.0	11.00	50.54	DET C SH 3	8	4

(TABLE CONTINUED ON SHEET 4)

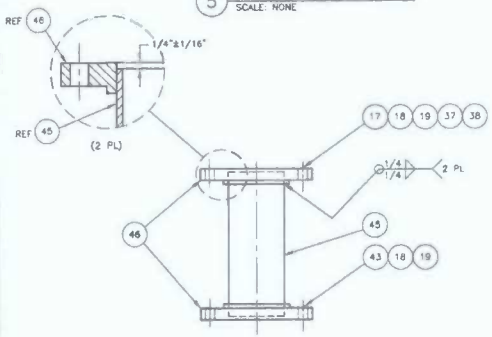
** ASSUMED RADIUS (FIELD VERIFY)
*** ASSUMED ELEVATION (FIELD VERIFY)
● LEFT PROTOTYPE L.O.W. IN PLACE
▲ REMOVE EXISTING (L.O.W.) PRIOR TO INSTALLATION OF NEW (L.O.W.)
■ REQUIRED ASSEMBLY PER H-2-91289, STEEL L.O.W.
◆ REQUIRED ASSEMBLY PER H-2-91289, TEFZEL L.O.W.
**** NOMINAL LENGTH FROM BOTTOM OF L.O.W. FLANGE TO END OF L.O.W. ASSUMES L.O.W. INSERTED TO WITHIN 2" OF BOTTOM (FIELD VERIFY).
● REQUIRED ASSEMBLY PER H-2-91924, FRP LOW



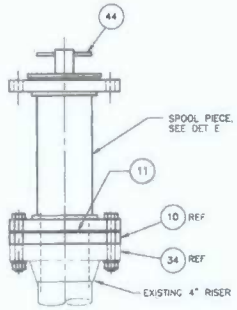
5 PROBE SUB ASSY
SCALE: NONE



6 PROBE SUB ASSY
SCALE: NONE



DETAIL E
SCALE: NONE



42 ASSEMBLY-4" SPOOL PIECE
SCALE: NONE

DWG NO	TITLE	REF NUMBER	TITLE
H-2-91924	FIBERGLASS LIQUID LEVEL INSTL		

DRAWING TRACEABILITY LIST — REFERENCES — NEXT USED ON SH 1

REV	DATE	DESCRIPTION	DRAWN	CHECKED
2	1/20	REDRAWN PER ECN 664834 AND REVISED PER ECNS 671047, 604349, 604350, 608795, 663818, 663817, 663819, 663824, 671717 AND ED-19850 & ED-19885 (SOME INFO MOVED TO NEW SHEETS 3 & 4)		

REVISIONS

SEE REVISION 0

NAME: MILES MAYFIELD

U.S. DEPARTMENT OF ENERGY
Office of River Protection

PIPING
LIQUID OBSERVATION WELL
ASSY AND DET

SIZE	SCALE NO	SHEET NO	DWG NO	REV
F	2000	2500 / 5007	H-2-93715	2

SCALE: SHOWN | BY: NONE | SHEET 2 OF

18577

Meyers, Colleen A

From: Charboneau, Briant L
Sent: Friday, February 15, 2013 3:35 PM
To: Charboneau, Stacy L
Subject: T-111 Location and 200 West Pump and Treatment Facility
Attachments: wmaT.pptx; 200 West Pump and Treatment Wells.pptx

Importance: High

The first slide shows the T Tank Farm area with the location of the monitoring wells and the closest groundwater pump and treatment extraction well. Tank T-111 is the bottom middle tank on this slide.

The second slide (200 West Pump and Treatment wells) shows the location of the all the 200 West Pump and Treatment Facility extraction and injection wells along with the location of the T Tank Farm.

U.S. DEPARTMENT OF
ENERGY

MEDIA CONTACTS:
Lori Gamache, ORP, (509) 372-9130

FOR IMMEDIATE RELEASE:
January XX, 2013

(b)(5) **CONFIRMS A DECREASE OF LIQUID LEVEL IN HANFORD SINGLE-SHELL TANK**

RICHLAND – The U.S. Department of Energy (DOE) Office of River Protection (ORP) and its Tank Farms operations contractor Washington River Protection Solutions (WRPS) have determined that liquid levels in Hanford single-shell tank (SST) T-111 are decreasing.

This tank was classified as an assumed leaker in 1979. (b)(5)
(b)(5)

Data indicates the current rate of loss of waste from the tank could be in the range of 150 to 300 gallons per year.

Tank T-111 is a 530,000 gallon capacity underground storage tank built between 1943-44, and put into service in 1945. T-111 currently contains approximately 447,000 gallons of sludge, a mixture of solids and liquids with a mud-like consistency.

In February 1995 interim stabilization was completed for this tank, which means less than 5,000 gallons of supernatant liquid and less than 50,000 gallons of drainable interstitial liquid remained. The sludge in tank T-111 is estimated to still contain approximately 38,000 gallons of drainable interstitial liquid.

(b)(5)

###

Meyers, Colleen A

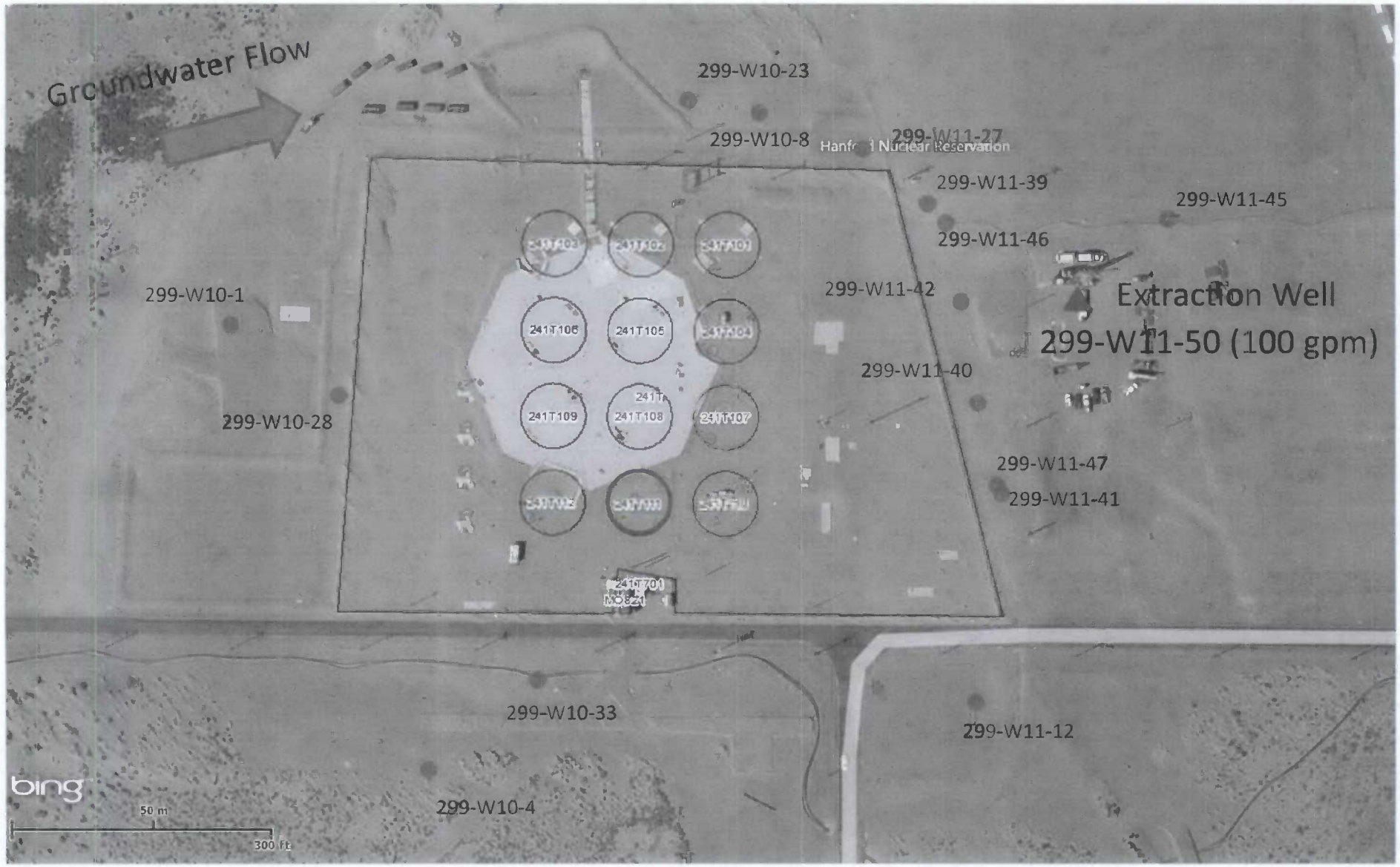
From: Charboneau, Briant L
Sent: Friday, February 15, 2013 3:35 PM
To: Charboneau, Stacy L
Subject: T-111 Location and 200 West Pump and Treatment Facility
Attachments: wmaT.pptx; 200 West Pump and Treatment Wells.pptx

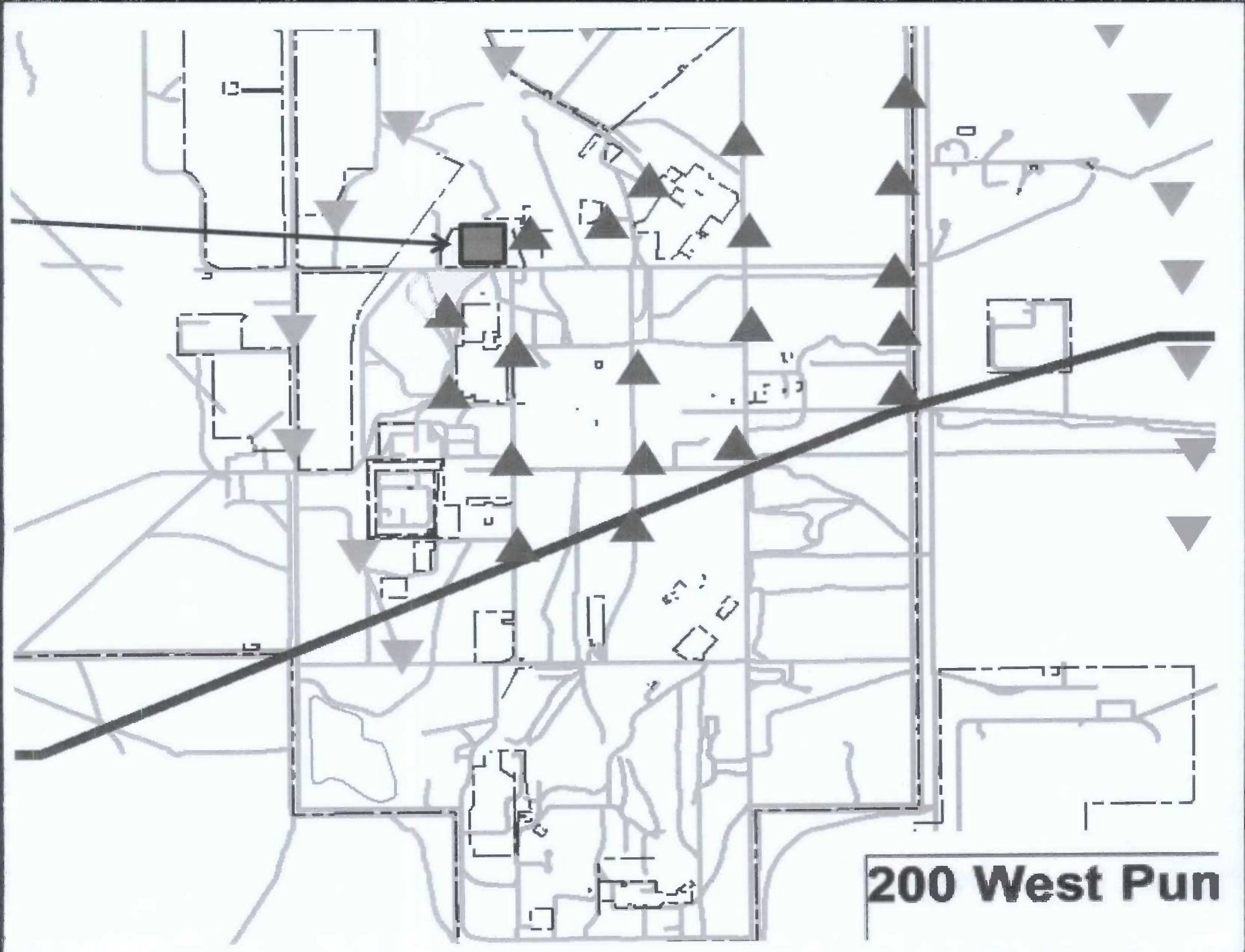
Importance: High

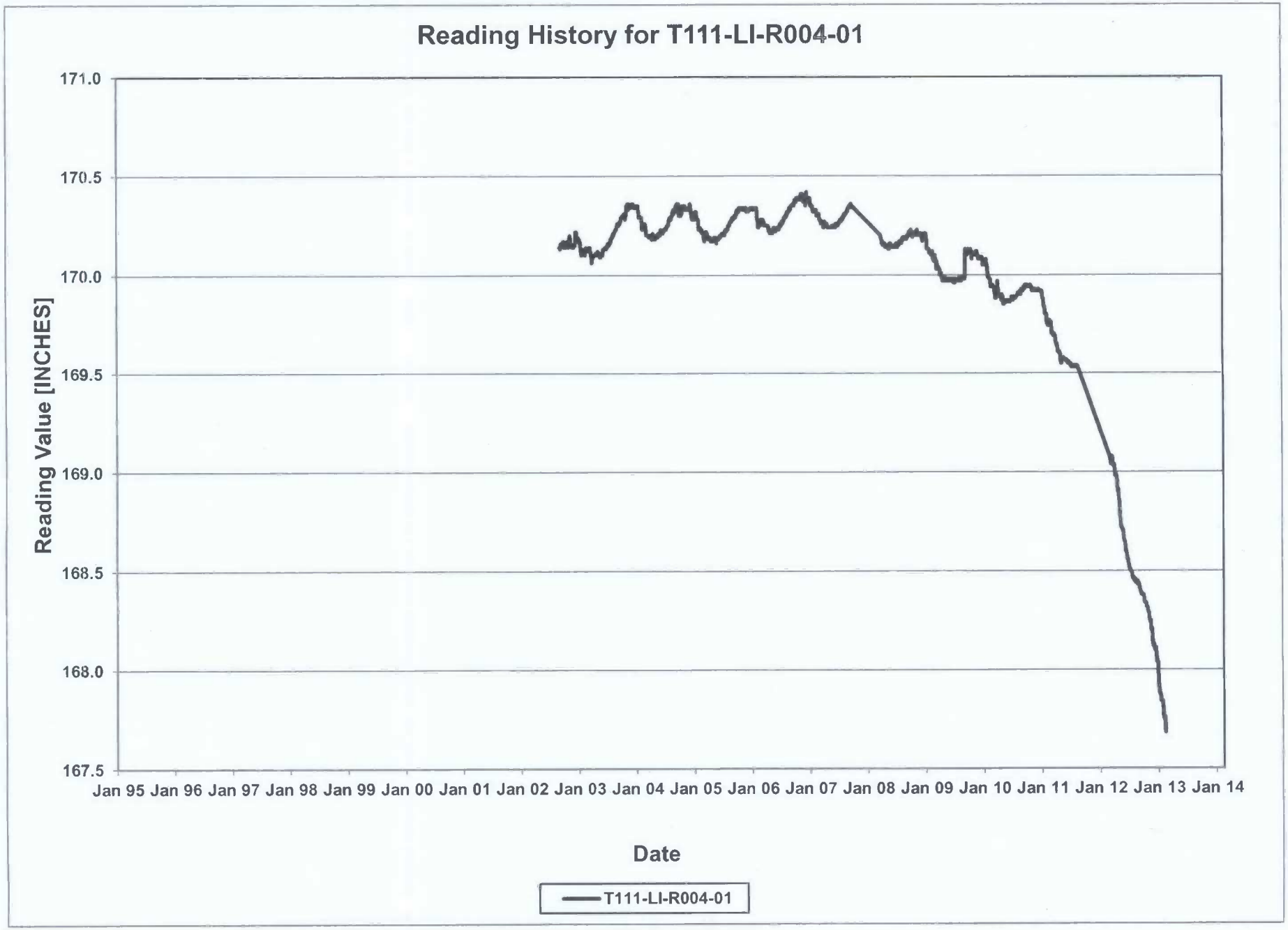
The first slide shows the T Tank Farm area with the location of the monitoring wells and the closest groundwater pump and treatment extraction well. Tank T-111 is the bottom middle tank on this slide.

The second slide (200 West Pump and Treatment wells) shows the location of the all the 200 West Pump and Treatment Facility extraction and injection wells along with the location of the T Tank Farm.

"T" Tank Farm – 200 West Area




200 West Pun


Reading History for T111-LI-R004-01
171.0
170.5
170.0
169.5
169.0
168.5
168.0
167.5
Reading Value [INCHES]
Jan 95 Jan 96 Jan 97 Jan 98 Jan 99 Jan 00 Jan 01 Jan 02 Jan 03 Jan 04 Jan 05 Jan 06 Jan 07 Jan 08 Jan 09 Jan 10 Jan 11 Jan 12 Jan 13 Jan 14
Date
T111-LI-R004-01

Meyers, Colleen A

From: Williams, Alice
Sent: Friday, February 15, 2013 5:41 AM
To: Charboneau, Stacy L
Subject: RE: (b)(5) Data for T Farm

Thanks.

-----Original Message-----
From: Charboneau, Stacy L
Sent: Friday, February 15, 2013 12:05 AM
To: Smith, Kevin W (ORP); Williams, Alice
Cc: Fletcher, Thomas W; Charboneau, Briant L; Trummell, Candice
Subject: (b)(5) Data for T Farm

Kevin and Alice,

I've just completed reviewing the (b)(5)
(b)(5)

Have a good night,

Stacy

Meyers, Colleen A

From: Trenchard, Glyn D
Sent: Friday, February 15, 2013 4:21 PM
To: Shrader, Todd A
Cc: Fletcher, Thomas W
Subject: Fwd: Sketch and Brief Description of Liquid Observation Well Neutron Probe
Attachments: SD-WM-PTR-001 LOW Neutron Probe Description.pdf; ATT00001.htm

basic info but I though you may want it for your growing library

Glyn

Sent from my iPad

Begin forwarded message:

> **From:** "Washenfelder, Dennis J" <Dennis_J_Washenfelder@rl.gov>
> **Date:** February 15, 2013, 3:02:39 PM PST
> **To:** "Trenchard, Glyn D" <Glyn_D_Trenchard@orp.doe.gov>
> **Cc:** "Little, David B" <David_B_Little@rl.gov>, "Roxburgh, Robert T" <Robert_T_Roxburgh@rl.gov>, "Schofield, John S" <John_S_Schofield@rl.gov>
> **Subject: Sketch and Brief Description of Liquid Observation Well Neutron Probe**
>
> Glyn:
>
> The attachment includes a brief description of the liquid observation well neutron probe and an assembly sketch.
>
> Dennis
>
> Dennis J. Washenfelder
> Washington River Protection Solutions LLC
> 509-373-2641 Work
> 509-531-5386 Cell

Meyers, Colleen A

From: Charboneau, Stacy L
Sent: Wednesday, February 20, 2013 11:29 AM
To: Gamache, Lori M
Subject: Fw: T-111
Attachments: TY-105.xlsx; T-204.xlsx; T-203.xlsx; B-204.xlsx; B-203.xlsx

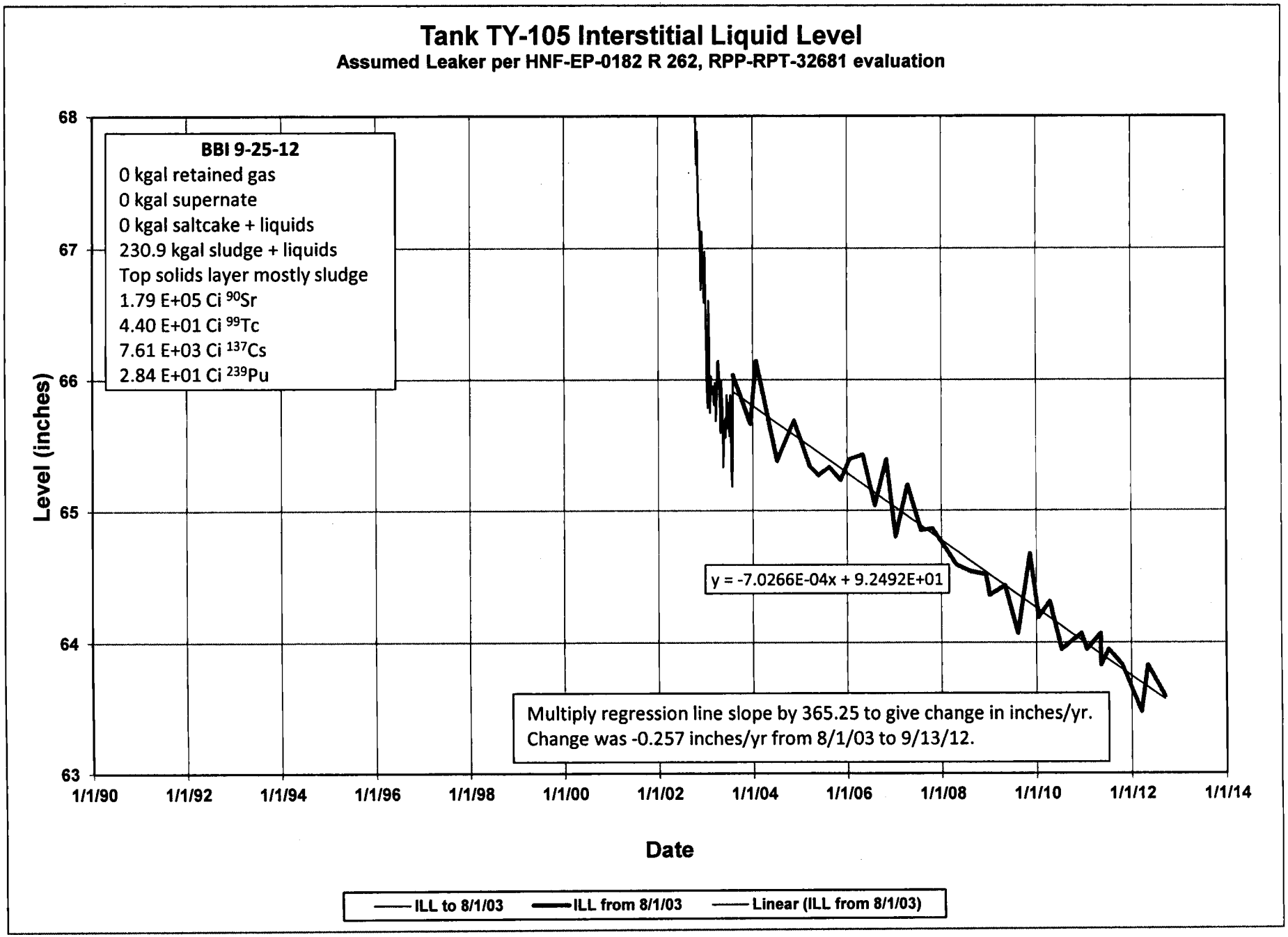
---

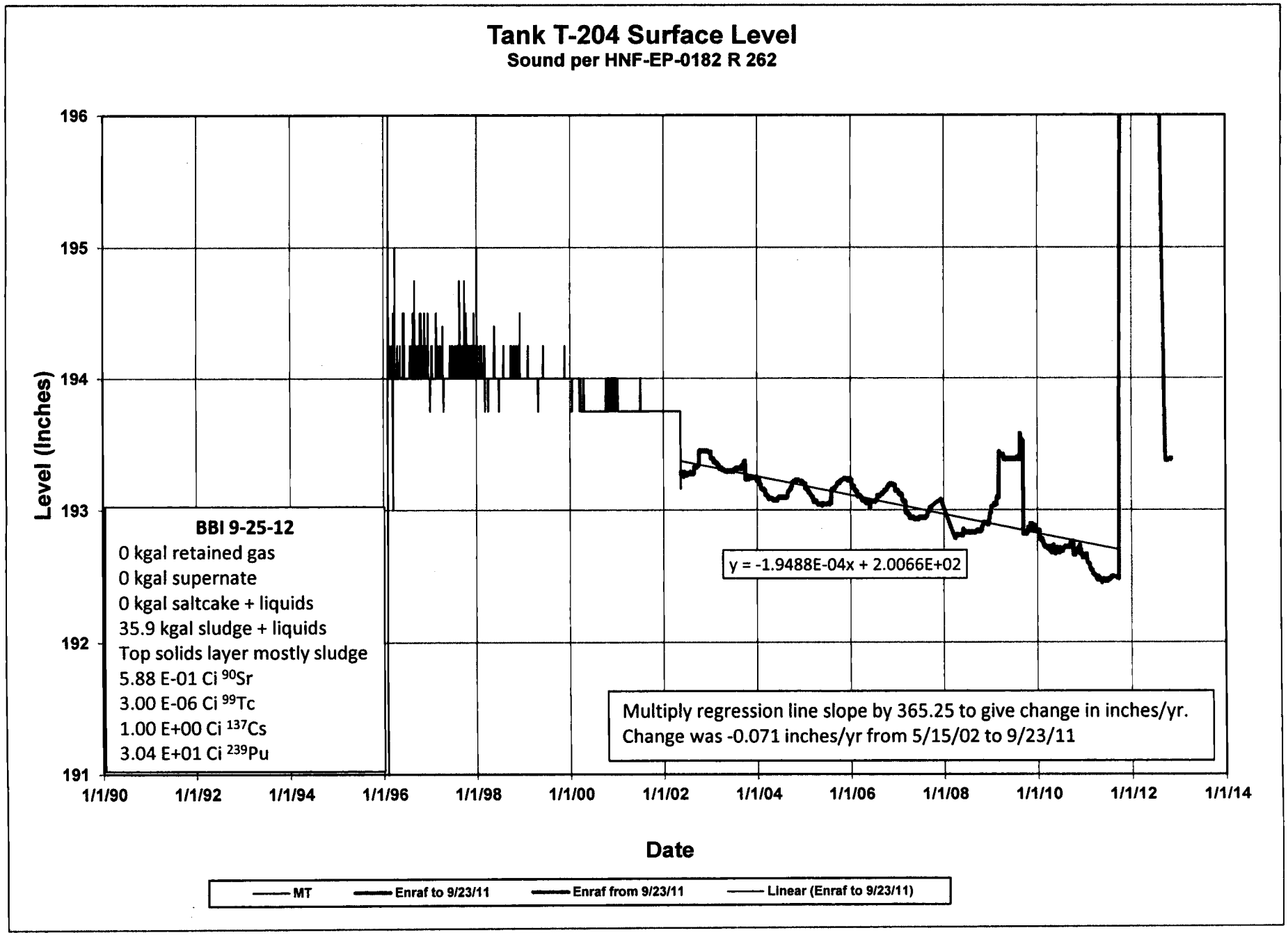
From: Fletcher, Thomas W
Sent: Wednesday, February 20, 2013 10:58 AM
To: Smith, Kevin W (ORP)
Cc: Trummell, Candice S; Charboneau, Stacy L; Shrader, Todd A; Trenchard, Glyn D
Subject: FW: T-111

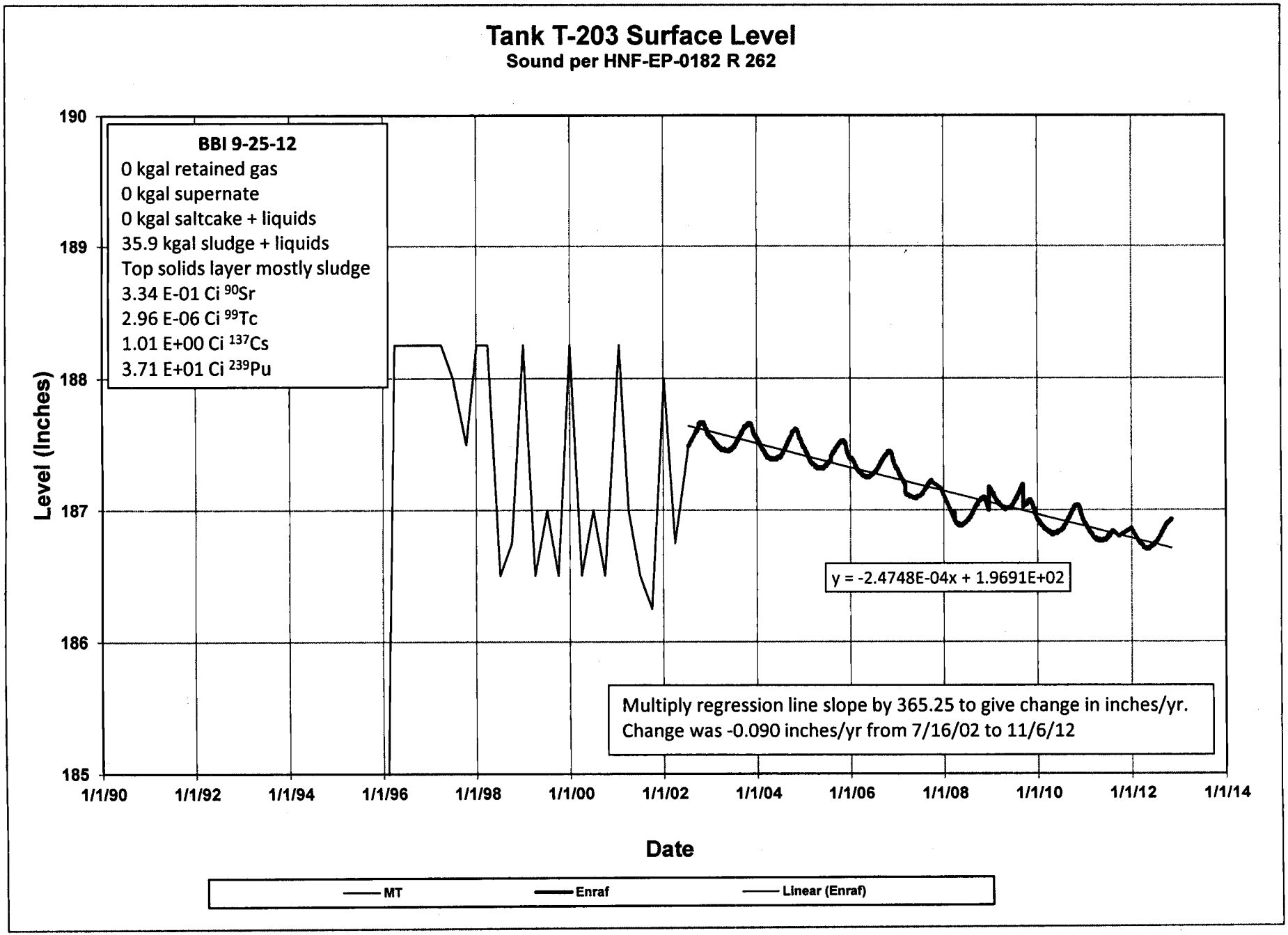
Kevin,

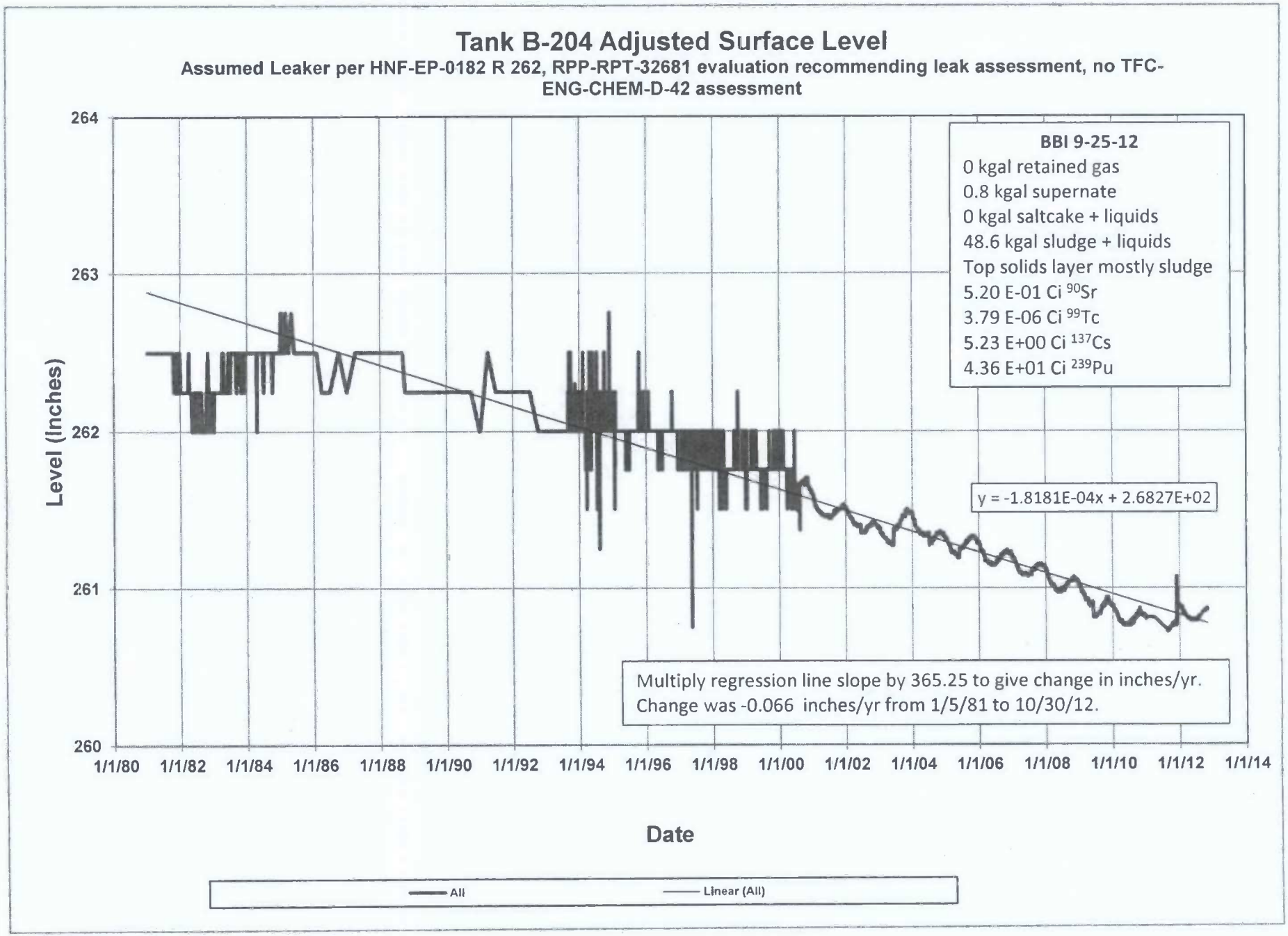
Attached is the "raw" data to (b)(5)
(b)(5)

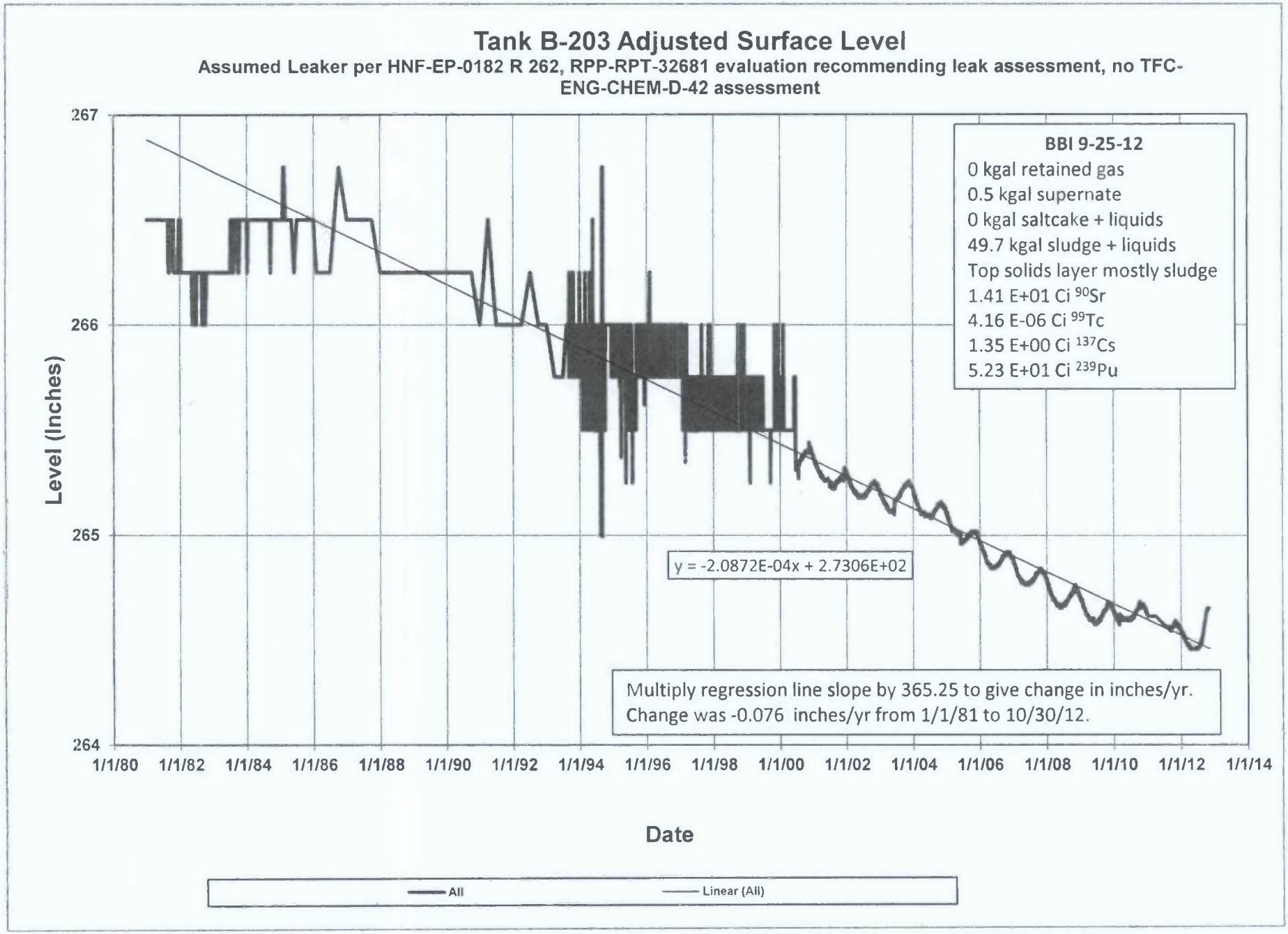
Thanks,
Tom Fletcher, PE, PMP
Assistant Manager of Tank Farms
Tank Farm Project – Office of River Protection
Phone: 509.376.3434 | | **Fax:** 509.372.1350 | | **Cell:** 509.539.2828


Tank TY-105 Interstitial Liquid Level
Assumed Leaker per HNF-EP-0182 R 262, RPP-RPT-32681 evaluation
BBI 9-25-12
0 kgal retained gas
0 kgal supernate
0 kgal saltcake + liquids
230.9 kgal sludge + liquids
Top solids layer mostly sludge
1.79 E+05 Ci 90Sr
4.40 E+01 Ci 99Tc
7.61 E+03 Ci 137Cs
2.84 E+01 Ci 239Pu
y = -7.0266E-04x + 9.2492E+01
Multiply regression line slope by 365.25 to give change in inches/yr.
Change was -0.257 inches/yr from 8/1/03 to 9/13/12.
Level (inches)
68
67
66
65
64
63
1/1/90
1/1/92
1/1/94
1/1/96
1/1/98
1/1/00
1/1/02
1/1/04
1/1/06
1/1/08
1/1/10
1/1/12
1/1/14
Date
ILL to 8/1/03
ILL from 8/1/03
Linear (ILL from 8/1/03)


Tank T-204 Surface Level
Sound per HNF-EP-0182 R 262
Level (Inches)
196
195
194
193
192
191
1/1/90
1/1/92
1/1/94
1/1/96
1/1/98
1/1/00
1/1/02
1/1/04
1/1/06
1/1/08
1/1/10
1/1/12
1/1/14
Date
BBI 9-25-12
0 kgal retained gas
0 kgal supernate
0 kgal saltcake + liquids
35.9 kgal sludge + liquids
Top solids layer mostly sludge
5.88 E-01 Ci 90Sr
3.00 E-06 Ci 99Tc
1.00 E+00 Ci 137Cs
3.04 E+01 Ci 239Pu
y = -1.9488E-04x + 2.0066E+02
Multiply regression line slope by 365.25 to give change in inches/yr.
Change was -0.071 inches/yr from 5/15/02 to 9/23/11
MT
Enraf to 9/23/11
Enraf from 9/23/11
Linear (Enraf to 9/23/11)


Tank T-203 Surface Level
Sound per HNF-EP-0182 R 262
BBI 9-25-12
0 kgal retained gas
0 kgal supernate
0 kgal saltcake + liquids
35.9 kgal sludge + liquids
Top solids layer mostly sludge
3.34 E-01 Ci 90Sr
2.96 E-06 Ci 99Tc
1.01 E+00 Ci 137Cs
3.71 E+01 Ci 239Pu
y = -2.4748E-04x + 1.9691E+02
Multiply regression line slope by 365.25 to give change in inches/yr.
Change was -0.090 inches/yr from 7/16/02 to 11/6/12
Level (Inches)
190
189
188
187
186
185
1/1/90
1/1/92
1/1/94
1/1/96
1/1/98
1/1/00
1/1/02
1/1/04
1/1/06
1/1/08
1/1/10
1/1/12
1/1/14
Date
MT
Enraf
Linear (Enraf)


Tank B-204 Adjusted Surface Level
Assumed Leaker per HNF-EP-0182 R 262, RPP-RPT-32681 evaluation recommending leak assessment, no TFC-ENG-CHEM-D-42 assessment
BBI 9-25-12
0 kgal retained gas
0.8 kgal supernate
0 kgal saltcake + liquids
48.6 kgal sludge + liquids
Top solids layer mostly sludge
5.20 E-01 Ci 90Sr
3.79 E-06 Ci 99Tc
5.23 E+00 Ci 137Cs
4.36 E+01 Ci 239Pu
y = -1.8181E-04x + 2.6827E+02
Multiply regression line slope by 365.25 to give change in inches/yr.
Change was -0.066 inches/yr from 1/5/81 to 10/30/12.
Level (Inches)
264
263
262
261
260
1/1/80
1/1/82
1/1/84
1/1/86
1/1/88
1/1/90
1/1/92
1/1/94
1/1/96
1/1/98
1/1/00
1/1/02
1/1/04
1/1/06
1/1/08
1/1/10
1/1/12
1/1/14
Date
All
Linear (All)


Tank B-203 Adjusted Surface Level
Assumed Leaker per HNF-EP-0182 R 262, RPP-RPT-32681 evaluation recommending leak assessment, no TFC-ENG-CHEM-D-42 assessment
BBI 9-25-12
0 kgal retained gas
0.5 kgal supernate
0 kgal saltcake + liquids
49.7 kgal sludge + liquids
Top solids layer mostly sludge
1.41 E+01 Ci 90Sr
4.16 E-06 Ci 99Tc
1.35 E+00 Ci 137Cs
5.23 E+01 Ci 239Pu
y = -2.0872E-04x + 2.7306E+02
Multiply regression line slope by 365.25 to give change in inches/yr.
Change was -0.076 inches/yr from 1/1/81 to 10/30/12.
Level (Inches)
267
266
265
264
1/1/80
1/1/82
1/1/84
1/1/86
1/1/88
1/1/90
1/1/92
1/1/94
1/1/96
1/1/98
1/1/00
1/1/02
1/1/04
1/1/06
1/1/08
1/1/10
1/1/12
1/1/14
Date
All
Linear (All)

Meyers, Colleen A

From:	Trenchard, Glyn D
Sent:	Thursday, March 21, 2013 4:15 PM
To:	Olds, Theodore E (Erik)
Cc:	Gamache, Lori M
Subject:	FW: Tank Leak Assessment Process
Attachments:	TFC-ENG-CHEM-D-42,_Tank_Leak_Assessment_Process.pdf

Info for FOIA 2013-00721

Glyn Trenchard
DOE - ORP
509-373-4016
509-438-0448

From: Trenchard, Glyn D
Sent: Sunday, February 24, 2013 2:10 PM
To: Shrader, Todd A
Subject: Tank Leak Assessment Process

Todd – Here is a copy of the contractor's Leak Assessment process. I will try to find some completed reports to send. (b)(5)

(b)(5)

Glyn

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1.0 PURPOSE AND SCOPE

This guidance document defines a process for investigating, evaluating, and reporting a potential tank leak within the tank farms facility. It includes the process, products, responsibilities, and time frame required. When directed by management, the same process can also be used to evaluate any proposed change in a tank's leak status (i.e., "assumed leaker" to "sound").

This guidance document includes the following key components:

- Methods of initiating the evaluation process, including applicable data thresholds,
- Allotted times for completing each step,
- Personnel responsible for each step in the process,
- Description of the process for determining the tank leak classification (assumed leaker or sound), and
- Declaration of resulting tank classification.

This guidance document may be applied to any nuclear waste storage tank within the tank farms facility, including single-shell tanks (SSTs), double-shell tanks (DSTs), aging waste tanks, and all active catch tanks. Additional tanks or facilities may also be evaluated using this process when directed by management. The primary focus of this process is leak assessment (level decreases), but it can also be used to assess intrusions (level increases) or any other proposed change in tank status at the direction of management.

The process described in this document applies to any Hanford high-level waste tank suspected of having an active leak to the environment, regardless of current classification. The process described in this section will result in the tank being classified as "sound" or "assumed leaker."

2.0 IMPLEMENTATION

This guidance document is effective on the date shown in the header.

3.0 RESPONSIBILITIES

Responsibilities are contained within Section 4.0.

4.0 GUIDANCE

4.1 Initial Indications/Data Anomalies

With the release of RPP-9937, "Single-Shell Tank System Leak Detection and Monitoring Function and Requirements Document," as a primary Tri-Party Agreement document, many of the SSTs are now exempt from environmentally-driven leak detection requirements. Any tank that does not require leak detection monitoring (LDM) per RPP-9937 and is not in retrieval status as defined in OSD-T-151-00031 is exempt from the requirements of this guidance document; however, this guidance document may be applied to those tanks when directed by management.

Any data point that is outside the allowable criteria shall be evaluated for the effects of barometric pressure, and the data corrected for those effects where applicable.

If a corrected data point exceeds the tank level decrease criteria (specification limits) as established in OSD-T-151-00031, the following actions shall be performed:

Assigned System Engineer/Delegated Design Authority	1. Request that the equipment used to obtain the data be checked for mechanical, electrical, and/or calibration problems that might invalidate the data point.
	2. Request that the anomalous data be re-sampled within three working days to verify repeatability. If the repeat data is also below the decrease criteria and no equipment problems are identified, the data is considered to be "verified."
	3. If the data anomaly is verified or if it is indeterminate, issue a Problem Evaluation Request (PER) within one working day of the repeat reading. As soon as the data anomaly is verified, the required data collection frequency for the device used to record the anomaly, (normally surface level or Interstitial Liquid Level), shall immediately become "weekly," regardless of the original frequency.
	4. Notify the shift office to collect any additional data on a temporary round sheet per TFC-OPS-OPER-C-08. The weekly readings shall continue until discontinued by direction of the Technical Integration, Central Processing and DST/SST Integrity (TICP&I) Manager.
Base Operations System Engineering Manager	5. Assign responsible engineer(s) to evaluate alternate causes and collect any additional tank data that is required.
Responsible Engineer(s)	6. Evaluate common alternate explanations for the data variations, (i.e., other than a tank leak). The initial assessment shall be completed within three working days. Common alternate explanations include, (but are not limited to), weather changes, (temperature, barometric pressure response, etc.), instrument problems, (calibration and electrical problems), waste surface problems, ventilation rate variations affecting evaporation, waste transfers and drainbacks, and waste disturbing field operations.
Base Operations System Engineering Manager	7. If a viable alternate explanation is identified, the PER shall be closed, citing that explanation.
Responsible Engineer(s)	8. If a data anomaly is verified or indeterminate and no viable alternate explanation is identified within the allowable time period, (three working days), recommend that the formal leak assessment process be initiated, and the PER shall be updated to reflect this information.
TCIP&I Manager	9. Review the available information and recommendations, and, if warranted, or if notified that an Unexplained High Resolution

		Resistivity (HRR) Anomaly exists, officially initiate the formal leak assessment process.
	10.	If the assessment involves a monitored catch tank or vault, request that the Base Operation Central Shift Manger notify the Environmental On-Call in accordance with TFC-ESHQ-ENV_FS-C-01, to report this initiation to Ecology within seven calendar days.
Base Operations System Engineering Manager	11.	Notify the appropriate tank farm facility manager, and request funding to perform a formal leak assessment.
TCIP&I Manager	12.	Assign a Leak Assessment Coordinator and a team of analysts with the necessary range of expertise to thoroughly evaluate all available data per Section 4.2.2 of this document.
Base Operations System Engineering Manager	13.	Notify the DOE Office of River Protection (ORP) via e-mail that a formal leak assessment has been initiated.

4.2 Leak Assessment Process

4.2.1 General

There are four ways that a leak assessment can be initiated:

1. An anomalous data point (below allowable tolerance) is verified and no viable alternative explanation is identified within the allowable time period. (See Section 4.1.)

2. Direction is received through the appropriate contracting process requesting that the Tank Farm contractor perform a leak assessment on a particular tank.

   (Spectral logging of drywells surrounding the waste tanks is presently performed outside of the primary tank farm operator contract. If these companies determine from the spectral data that a tank currently classified as "sound" may have leaked in the past, or that a tank may be currently leaking, they typically notify Washington River Protection Solutions, LLC (WRPS) and ORP of their findings. Upon receipt of written direction from ORP, the leak assessment process shall be initiated.)

3. An Unexplained HRR Anomaly is deemed to exist for a tank in retrieval status.

4. A formal leak assessment may be initiated at the request of WRPS management on any tank, at any time, for any reason.

The formal leak assessment process is based on probabilistic analysis to assess the mathematical likelihood (probability) that a specific tank is leaking or has leaked. The technical basis for the process and additional details and examples of the methodology for implementing the process can be found in HNF-3747, "Tank Leak Assessment Technical Background." For each step, a description of the process, products, and responsibilities is provided.

4.2.2 Leak Assessment Participants

Participants in the assessment process will be an assigned group of analysts and an assessment coordinator. For a typical single shell tank, the group of analysts should include expertise in the following areas:

- In-tank data - a person with extensive knowledge and experience in reviewing, analyzing, and interpreting in-tank (i.e., surface liquid level and liquid observation well) data;
- Ex-tank data - a person with extensive knowledge and experience in reviewing, analyzing, and interpreting ex-tank drywell and lateral survey data, or HRR data if leak assessment process was initiated due to an Unexplained HRR Anomaly; and
- Tank operations and processes - a person with extensive knowledge and experience with operations of the tank, tank history, tank waste characteristics, and in-tank processes.

The same person may provide expertise in more than one area.

Additional analysts may be included, particularly as specific additional expertise is identified as relevant for the specific assessment. The makeup of the panel may be adjusted to complement the available data. (Example: If a catch tank is being evaluated and no drywell data is available, one might consider adding a facility configuration specialist in place of the ex-tank specialist.)

The assessment coordinator will be a person familiar with this process and the technical basis underlying it, with particular knowledge of the probabilistic assessment processes.

4.2.3 Review Available Information

Leak probability assessment consists of seven steps and results in a recommendation regarding classification of the tank as "assumed leaker" or "sound." Guidance and examples of implementation of these steps are provided in HNF-3747.

Assessment Coordinator	1.	Identify all relevant information and provide to participating analysts. This information includes surface level measurements, liquid observation well measurements, historical or recent gross gamma logs and spectral gamma logs for drywells near the tank, HRR data as applicable for a tank in retrieval status, tank process history, and all available corroborating evidence. See Tables 1 and 2 for specific information relating to in-tank and ex-tank data, respectively.
Assigned Analysts	2.	Independently review information and make preliminary interpretations and identify questions/additional information needed.

4.2.4 Develop Specific Hypotheses, Identify Relevant Data

Assessment Coordinator

1. Convene workshop with participating analysts to:
   - Develop specific leak and non-leak hypotheses. Participants must agree on these hypotheses (though they do not need to agree on the relative likelihoods).
   - Identify the specific data that are relevant to the leak determination and the features (e.g., patterns) of those data. Specifically, for the data in Tables 1 and 2, the analysts shall answer the yes/no/NA question for each potential data element and the questions for corroborating evidence.

Assigned Analysts

2. After the workshop, review the data provided, and any additional information that may be identified. This review has two purposes:
   - Confirm the hypotheses developed in the workshop; and
   - Provide information needed for the assessment of probabilities in the next step.

Assessment Coordinator

3. Confirm with analysts that the hypotheses are still valid. Any changes in hypotheses must be agreed upon by all participating analysts.

4.2.5 Assess Leak Probability

Assessment Coordinator

1. Work with each analyst individually to assess the necessary probabilistic input required to complete Table 3.

   Detailed explanation of this table and the process for eliciting these probabilities is provided in HNF-3747. Specifically, the necessary probabilities are listed below (subject to the limitations noted on Table 3):

   - Prior probability that the tank is leaking or has leaked without consideration of the specific data initiating this process. This establishes any pre-evaluation bias and is typically established at 0.50 (no pre-evaluation bias, either for or against a leak).
   - Conditional probabilities for in-tank data (for both surface liquid level and liquid observation well, if both are available and relevant) given the leak (L) and non-leak (NL) hypotheses. Also, conditional probabilities as needed based on level of independence between in-tank data
   - Conditional probabilities for ex-tank data (for both gross gamma logs and spectral gamma logs, if both are available and relevant) given the leak (L) and non-leak (NL) hypotheses. Also, conditional probabilities as needed based on level of independence between ex-tank data.

- If in-tank and ex-tank data are not independent of each other, conditional probabilities are needed to define level of dependence.

Assessment Coordinator/Analysts

2. The basis for the assessments should be thoroughly documented by the coordinator and reviewed and concurred with by the analysts.

4.2.6 Prepare Assessment Report

Assessment Coordinator

1. Compile the revised assessments into a preliminary report. Report shall include the following key elements:

   - Summary of tank history
   - Summary of available data reviewed
   - Discussion of hypotheses considered
   - Summary of the analysts' assessment
   - Summary of resulting mathematical probabilities, including completed data sheets.

2. Provide the report to the analysts for review and concurrence.

   Concurrence will be based on the report providing an accurate description of assessed probabilities and the basis for them. It does not necessarily indicate agreement with the assessments of other analysts.

4.2.7 Present Results to the Executive Safety Review Board

The Executive Safety Review Board (ESRB) is the decision authority for determining the classification of a tank (either "assumed leaker" or "sound").

Assessment Coordinator

1. Notify the appropriate ESRB secretary of need to convene a ESRB meeting.

2. Present results of the panel assessments to the appropriate ESRB.

ESRB

3. Dictate any additional actions, including declaration of a previously undeclared "assumed leaker."

   The following guidelines are used to qualify as an "assumed leaker":

   - The posterior probability from the assessments of the leaker hypothesis is greater than .5, and
   - The combined likelihood ratio favors the leaker hypothesis (i.e., is greater than 1.0).

The ESRB review of the tank leak assessment process and documentation of ESRB decisions will be performed in accordance with TFC-CHARTER-10.

Base Operations System Engineering Manager

4. If the "assumed leaker" declaration by the ESRB involves a monitored catch tank or vault, request that the Base Operation Central Shift Manger notify the Environmental On-Call in accordance with TFC-ESHQ-ENV_FS-C-01, and report this to Ecology within seven calendar days.

4.2.8 Prepare Final Assessment Report

Assessment Coordinator

1. Prepare final assessment report with review and concurrence by the other participants as an update of the preliminary assessment report based on the workshop to revise/reconcile assessments. The final report is to be approved by the TCIP&I Manager.

   NOTE: This report shall include the final ESRB decision and shall be released as an engineering document per the requirements of TFC-ENG-DESIGN-C-25, for tracking and retrieval purposes. ORP must be on final distribution.

4.2.9 Prepare Impact Report and Options Analysis – Catch Tank or Vault "Leak"

Environmental Protection

1. If the "assumed leaker" declaration by the ESRB involves a monitored catch tank or vault, assist ORP to submit to Ecology, within 30 days of ESRB declaration, a report that includes:

   - An evaluation of the potential threat to human health and the environment.
   - A recommendation for a short term response or an options analysis (see RPP-PLAN-48438).

Environmental Protection

2. If the "assumed leaker" declaration by the ESRB involves a monitored catch tank or vault, prepare an options analysis (see RPP-PLAN-48438) and assist ORP in submittal to Ecology as a Hanford Federal Facility Agreement and Consent Order secondary document.

4.2.10 Reports and Documentation

- Preliminary Assessment Report - prepared by the tank leak assessment coordinator to include the specific probabilistic assessments of the analysts, the technical rationales for these assessments, the probability of the tank being a leaker based on these assessments, and the significant differences and the apparent reasons for these differences among the analysts. It is a "working document" provided to the analysts prior to the revision/ reconciliation workshop, and may also be provided to the ESRB members prior to their decision.

- Final Assessment Report - prepared by the tank leak assessment coordinator with review and concurrence by the other participants as an update of the Preliminary Assessment

Report based on the workshop to revise/reconcile assessments. This report shall include the final ESRB decision and shall be released as an engineering document for tracking and retrieval purposes.

- If necessary, change the official tank status as reported in HNF-EP-0182, "Waste Tank Summary Report."

5.0 DEFINITIONS

Data element. Specific information from a particular source that may be relevant to tank leak determination. Generally, data elements will include surface liquid level, liquid observation well measurements, gross gamma logs from drywells and laterals, data from leak detection pits, and spectral gamma logs.

Ex-tank measures. Leak monitoring data from measures taken outside the tank, i.e., from drywells, leak detection pits, and laterals.

Gross gamma logs. Measures of the change in radioactivity in the soil over time based on total gamma counts in specific reference intervals.

HRR data. Soil resistivity data obtained from a high resolution resistivity (HRR) leak detection system installed on a tank for use during waste retrieval activity.

Hypotheses. Possible explanations for observed data. Generally, one hypothesis considered will be that the tank has leaked or is leaking. In most cases, one or more non-leak hypotheses will also be developed and considered.

Initiating data. Data from leak monitoring or other sources (e.g., spectral gamma logging) that exceed specified requirements, thus initiating further required actions.

In-tank measures. Leak monitoring data from measures taken inside the tank, i.e., surface liquid level and interstitial liquid level.

Likelihood ratio. The ratio of two probabilities that specifies the relative chance that specific data (e.g., changes in surface liquid level) are the result of one hypothesis (e.g., tank has leaked) versus another (e.g., season/weather variation).

Preliminary determination. The process for determining whether initiating data can be explained with an acceptable degree of certainty by some operations or processes other than the tank leaking.

Prior probability. The probability that a tank has leaked or is leaking before initiating data are available.

Probability. A measure of the state of knowledge or belief about the likelihood that a specific state of nature (e.g., a tank has leaked or is leaking) is true. Probability must be between 0 (absolute certainty that the state of nature is not true) and 1 (absolute certainty that the state of nature is true).

Spectral gamma logs. Measures of the concentration of individual gamma-ray-emitting radionuclides in the sediments surrounding drywells.

Unexplained HRR Anomaly. An HRR anomaly which has been evaluated as described in RPP-32477 and documented as requiring entry into the tank leak assessment process.

6.0 RECORDS

The following records are generated during the performance of this guidance document:

- Final Assessment Report, which includes the following:
  - Leak assessment report
  - Email notification to ORP.

The record custodian identified in the Company Records Inventory and Disposition Schedule (RIDS) is responsible for record retention in accordance with TFC-BSM-IRM_DC-C-02.

7.0 REFERENCES

1. HNF-3747, "Tank Leak Assessment Technical Background."

2. MAC-HGLP 1.8.1, "Hanford Tank Farms Vadose Zone Monitoring Project, Baseline Monitoring Plan."

3. OSD-T-151-00031, "Operating Specifications for Tank Farm Leak Detection and Single Shell Tank Intrusion Detection."

4. RPP-16922, "Environmental Specification Requirements."

5. RPP-32477, "High Resolution Resistivity Leak Detection Data Processing and Evaluation Methods and Requirements."

6. "Statistical Decision Theory and Bayesian Analysis," Second Edition, 1985, J. O. Berger, Springer-Verlag, New York, New York.

7. TFC-BSM-AD-C-01, "Administrative Document Development and Maintenance."

Table 1. Example of Categorization of In-Tank Data.

SURFACE LEVEL MEASUREMENTS

ENRAF

	Mark Best Choice, Y/N/NA		
Unexplained, repeatable drop>tolerance	Yes	No	NA
Significant drop	Yes	No	NA
Significant trend change	Yes	No	NA

FIC

Unexplained, repeatable drop>tolerance	Yes	No	NA
Significant drop	Yes	No	NA
Significant trend change	Yes	No	NA

M.T.

Unexplained, repeatable drop>tolerance	Yes	No	NA
Significant drop	Yes	No	NA
Significant trend change	Yes	No	NA

LOW MEASUREMENTS

Unexplained, repeatable drop>tolerance	Yes	No	NA
Significant drop	Yes	No	NA
Significant trend change	Yes	No	NA

CORROBORATING EVIDENCE

Thermocouple	Leak	Other	NA
Salt well screen	Leak	Other	NA
SHMS	Leak	Other	NA
Photos/Videos	Leak	Other	NA
Weather (e.g., bar. pressure, precipitation, temperature)	Leak	Other	NA
Process History	Leak	Other	NA
Drywell drilling logs	Leak	Other	NA
Occurrence reports	Leak	Other	NA
Construction history	Leak	Other	NA
GREs	Leak	Other	NA
Equipment maintenance calibration	Leak	Other	NA
Waste characterstics	Leak	Other	NA
In-tank operations (e.g., core samples, equipment installation, etc.)	Leak	Other	NA
Intrusion and Ventilation Information	Leak	Other	NA
Other (specify)	Leak	Other	NA

Table 2. Example of Categorization of Ex-Tank Data.

SPECTRAL GAMMA LOGS Mark Best Choice

Radionuclides			
Man-made?	Yes	No	NA
Multiple?	Yes	No	NA
Distribution			
Peak at bottom of tank?	Actual data		No or NA
Peak near surface?	Actual data		No or NA
Increased activity in between?	Actual data		No or NA
Increased activity below tank?	Actual data		No or NA
Activity across boreholes			
Multiple boreholes?	Yes	No	NA
Consistent across boreholes?	Yes	No	NA
Activity over time			
Increased activity?	Yes	No	NA

HISTORICAL OR RECENT GROSS GAMMA LOGS

Distribution			
Sign. peak at bottom of tank?	Actual data		No or NA
Sign. peak near surface?	Actual data		No or NA
Sign. increased activity in between?	Actual data		No or NA
Sign. increased activity below tank?	Actual data		No or NA
Activity across boreholes			
Multiple boreholes?	Yes	No	NA
Consistent across boreholes?	Yes	No	NA
Activity over time			
Abrupt increase (bottom)?	Yes	No	NA
Abrupt increase (elsewhere)?	Yes	No	NA
Gradual increase (bottom)?	Yes	No	NA
Gradual increase (elsewhere)?	Yes	No	NA

CORROBORATIVE EVIDENCE

Moisture Probe	Leak	Other	NA
Psychrometrics	Leak	Other	NA
Bore Hole Core Sample	Leak	Other	NA
Laterals	Leak	Other	NA
Weather	Leak	Other	NA
Process History	Leak	Other	NA
Drywell drilling logs	Leak	Other	NA
Occurrence reports	Leak	Other	NA
Construction history	Leak	Other	NA
GREs	Leak	Other	NA
Equipment maintenance calibration	Leak	Other	NA
Waste characteristics	Leak	Other	NA
In-tank operations	Leak	Other	NA
Equipment failure	Leak	Other	NA
Other (specify)	Leak	Other	NA

HRR Data

HRR Anomaly Evaluation Record	Leak	Other	NA

Table 3. Example of Elicitation Form and Formulas.

Hypotheses:

Leaker: _____

Non-Leaker: _____

_____

_____

		True State		Likelihood Ratio
		L	NL	(L:NL)
Prior Probability				_____
Cond. Probabilities				
In Tank	SLD	_____	_____	_____
	LOW	_____	_____	_____
	SLD/LOW	_____	_____	_____
	LOW/SLD			
Ex tank	GGL	_____	_____	_____
	SGL	_____	_____	_____
	HRR	_____	_____	_____
	GGL/SGL	_____	_____	_____
	SGL/GGL			
Combined	In	_____	_____	_____
	Ex	_____	_____	_____
	In/Ex	_____	_____	_____
	Ex/In			
Combined Likelihood Ratio				_____
Posterior Probability				
Calculated		_____	_____	_____
Assessed				

Notes: Shaded entries are calculated
SLD: Surface Level Drop Data
LOW: Liquid Observation Well Data
GGL: Gross Gamma Count Data
SLG: Spectral Gamma Count Data
HRR: High Resolution Resistivity Data

Figure 3. Example of Elicitation Form and Formulas. (cont.)

Notes:

For a clear answer to the probability, the leak assessment coordinator should ask for only one set of data each for the in-tank and ex-tank evaluations.

Specifically, for in-tank evaluation use only one of the pairs, SLD and LOW | SLD (read as LOW given SLD), or LOW and SLD | LOW.

Similarly, for ex-tank evaluation, use only one of the pairs, GGL and SGL | GGL or SGL and GGL | SGL. HRR evaluation may be used alone or in combination with one of these pairs.

If P(In) and P(Ex) are determined to be independent, then, P(Combined)=P(In)*P(Ex), and the conditional probabilities in this section are not needed. If the probabilities are dependent, then either P(Combined)= P(In)*P(Ex | In), or P(Combined) = P(Ex)*P(In | Ex), but not both.

The highlighted blanks in Table 3 are calculated using Baye's rule as described above. (Reference: *Statistical Decision Theory and Bayesian Analysis*, Second Edition, 1985, Springer-Verlag, New York, New York).

Meyers, Colleen A

From: Gamache, Lori M
Sent: Monday, February 25, 2013 3:31 PM
To: Hardy, Cameron M

The Department is working to determine the status of these tanks. Options include (b)(5) (b)(5) (b)(5) (b)(5) The Department has one of the largest groundwater pump and treat systems in the nation operating to treat groundwater contaminants. The state-of-the-art facility started operation in July 2012. The 200 West Pump and Treat System was designed to both clean up groundwater and contain key contaminants within the central part of Hanford. The pump and treat system is located near central Hanford and treats 2 million gallons of groundwater per month. In doing so, the system contains and removes key contaminants such as uranium, carbon tetrachloride, and technetium-99. This pump and treat system was designed to have capacity added to it as needed.

The Department of Energy and its contractors have put in place deliberate interim measures to slow contamination from reaching the groundwater and have employed groundwater treatment systems and wells to both monitor and extract contaminated groundwater.

Lori Gamache
Public Affairs Specialist
U.S. Department of Energy
(509) 372-9130

Meyers, Colleen A

From: Olds, Theodore E (Erik)
Sent: Tuesday, March 26, 2013 10:20 AM
To: Meyers, Colleen A
Subject: For FOIA Request
Attachments: Draft QA Tanks 022713 Rev1.docx

From: Gamache, Lori M
Sent: Wednesday, February 27, 2013 5:53 PM
To: Trummell, Candice S; Geisler, Lindsey Nmn
Cc: Smith, Kevin W (ORP); Charboneau, Stacy L; Harrington, Paul G; Fletcher, Thomas W; Trenchard, Glyn D; Olds, Theodore E (Erik); Meyer, Carrie C; Jones, Colin J; Gamache, Lori M
Subject: Draft Q&As on Tanks

Candice,

Per your email yesterday morning, attached are responses to the questions on our tanks. These responses have been reviewed and approved by Kevin.

Thanks,
Lori

Lori Gamache
Public Affairs Specialist
U.S. Department of Energy
(509) 372-9130

Meyers, Colleen A

From: Charboneau, Briant L
Sent: Thursday, February 21, 2013 7:56 PM
To: Fletcher, Thomas W
Cc: McCormick, Matthew S; Smith, Kevin W (ORP); Charboneau, Stacy L; Shoop, Doug S; Hildebrand, R D (Doug)
Subject: Question # 2 related to T Farm
Attachments: Capture241-T-111.png

Here is some information help address question #2.

2. Plume control: Same questions: How do we do it, when did it start (assume it will vary given the tanks) how do we measure what the plume is doing (e.g., is shrinking, is growing, is it changes direction). Also, this should include quantities of contaminants of concern data as well.

The plume under T Farm is controlled by a large scale pump and treatment system, the 200 West Pump and Treatment Facility. This facility started operations in July 2012. The T Farm is located well within the boundaries of the capture zone. Two extractions wells located next to the T Farm were used to remediate the emerging Tc-99 plume from 2007 to 2012. This water was treated at the 200 Effluent Treatment Facility. The current plume capture was modeled prior to construction of the 200 West Pump and Treatment Facility. This model was then updated based upon the actual operating data. This analysis shows the T Farm is clearly within the capture zone. The attached figure graphically illustrates the location of Tank T-111 (shown as a yellow circle on the figure) is within the capture zone. An additional capture zone analysis is also being performed based on hydraulic head data instead of modeling data. Previous analysis have shown the only difference between the two analysis methods is area the outer edges of the capture zones. Since T Farm is not close to the edge of the capture zone, this hydraulic head data should also indicate that T Farm is within the capture zone.

The general direction of groundwater flow for the T Farm area changed slightly when the 200-ZP-1 Pump and Treatment Facility and the extraction wells sending water to Effluent Treatment Facility were shut down and the 200 West Pump and Treatment Facility started. The flow was traveling east and now the northern section of T Farm travels east and the southern section of T Farm travels southeast.

The key contaminate listed in the table (200-ZP-1 at a Glance) below are all being treated at the 200 West Pump and Treatment Facility except Tritium. All contaminate within the groundwater sent to the Effluent Treatment Facility were removed except tritium. The other groundwater treatment occurring in this area was from the 200-ZP-1 Pump and Treatment Facility. This facility did not extract groundwater near the from the T Farm area. This facility's mission was to reduce the mass of carbon tetrachloride within the hot spot areas, that is the areas that exceed 400 times the drink water standard (5 µg/L). That maximum average concentration of carbon tetrachloride was 1400 times (7000 µg/L) the drinking water standard.

We currently only track the mass of nitrates (calculated as Kgs of nitrogen) and mass of carbon tetrachloride. In January 2013, the 200 West Pump and Treatment Facility, which is still in the process of ramping up the flow rate, processed 64.2 million gallons and removed 3690 Kgs of nitrogen and 291 Kgs of carbon tetrachloride.

200-ZP-1 at a Glance

T Plant Operations: 1944 to 1956 (Plutonium Separation)

Plutonium Finishing Plant Operations: 1949 to 1989

2011 Groundwater Monitoring

Contaminant	Drinking Water Standard	Maximum Concentration	Plume Area[a] (km^2)
Carbon Tetrachloride	5 µg/L	3,900 µg/L	10.8/13.3[b]
Nitrate	45 mg/L	2,740 mg/L	8.3
Iodine-129	1 pCi/L	22.5 pCi/L	0.50
Tritium	20,000 pCi/L	420,000 pCi/L	0.39
Chromium	100/48 µg/L[c, d]	522 µg/L[e]	0.20/0.07
Trichloroethene	5 µg/L	11 µg/L	0.20
Technetium-99	900 pCi/L	7,600 pCi/L	0.08

Remediation

Groundwater pump-and-treat (interim action):

- 1996–2011, removed 13,503 kg carbon tetrachloride

Soil vapor extraction (expedited response action):

- 1991–2011, removed 79,945 kg carbon tetrachloride

Final action record of decision issued in 2008.

Groundwater pump-and-treat (final action):

- Scheduled to begin operating in 2012

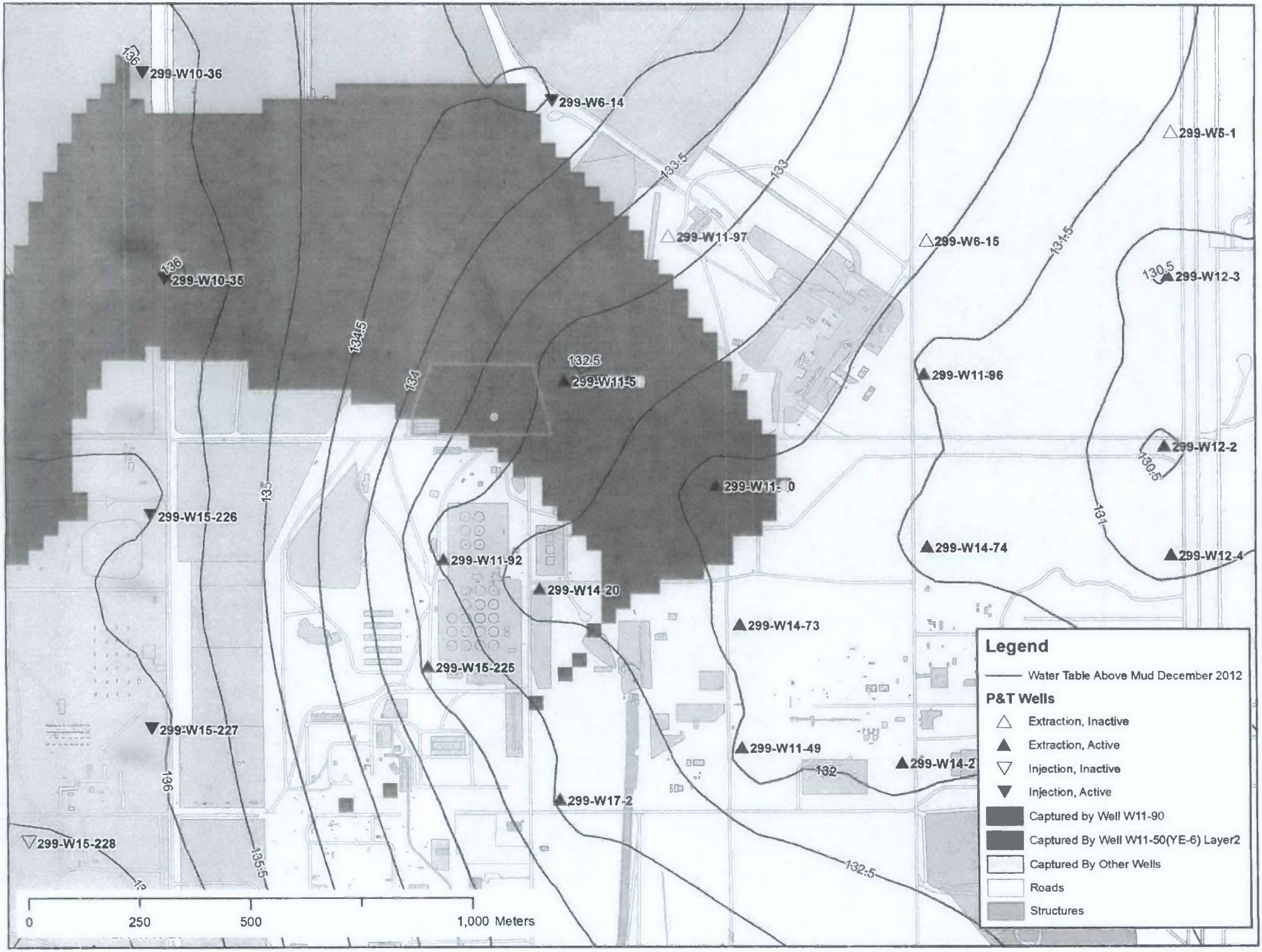
a. Estimated area above listed drinking water standard.

b. Area in upper part of unconfined aquifer/Area of full plume footprint, all depths in unconfined aquifer.

c. 100 µg/L federal drinking water standard for total chromium.

d. 48 µg/L groundwater cleanup standard for hexavalent chromium.

e. Value is for unfiltered total chromium.


299-W10-36
299-W6-14
299-W5-1
299-W11-97
299-W6-15
299-W10-35
299-W12-3
299-W11-96
299-W11-5
299-W12-2
299-W15-226
299-W14-74
299-W12-4
299-W11-92
299-W14-20
299-W14-73
299-W15-225
299-W15-227
299-W11-49
299-W14-2
299-W17-2
299-W15-228
136
135.5
135
134.5
134
133.5
133
132.5
132
131.5
131
130.5
0
250
500
1,000 Meters
Legend
Water Table Above Mud December 2012
P&T Wells
Extraction, Inactive
Extraction, Active
Injection, Inactive
Injection, Active
Captured by Well W11-90
Captured By Well W11-50(YE-6) Layer2
Captured By Other Wells
Roads
Structures

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DRAFT

Q. What is the capacity of each of the 6 suspect tanks?

- T-111 - 530,000 gallons
- TY-105 - 758,000 gallons
- B-203 - 55,000 gallons
- B-204 - 55,000 gallons
- T-203 - 55,000 gallons
- T-204 - 55,000 gallons

Q. How much sludge waste and how much liquid waste does each tank hold?

- T-111 - 447,000 gallons sludge; 38,000 gallons of drainable liquid
- TY-105 - 231,000 gallons sludge; 12,000 gallons of drainable liquid
- B-203 - 49,000 gallons sludge; 6,000 gallons of drainable liquid, including 1,000 gallons supernatant
- B-204 - 49,000 gallons sludge; 6,000 gallons of drainable liquid, including 1,000 gallons supernatant
- T-203 - 36,000 gallons sludge; 5,000 gallons of drainable liquid
- T-204 - 36,000 gallons sludge; 5,000 gallons of drainable liquid

Q. How will the Department confirm the tanks are/are not leaking?

(b)(5)

Q. Does DOE consider any of these six tanks to be TRU waste?

(b)(5)

Q. Is it presumed that the sludge is unlikely to leak? Is the leak potential limited to the liquid in each tank?

(b)(5)

Q. Aren't some of these tanks known leakers?

(b)(5)

Q. Can you explain the single-shell tank monitoring program?

A. Hanford's underground tanks are regularly monitored in accordance with regulatory requirements. Workers use specialized measuring devices lowered through access pipes from the ground surface into

the tank to measure changes in waste level. Tank levels are monitored on a risk-prioritized basis. Tank levels are monitored (b)(5) an intrusion is detected. Visual inspections are also conducted by lowering video cameras into the tanks, (b)(5)
(b)(5)

(b)(5)

Q. Is DOE improving monitoring of the tanks?

A. ORP maintains a tank monitoring program for all 177 underground storage tanks located on the Hanford site. (b)(5)
(b)(5)

Q. (b)(5)

(b)(5)

(b)(5)

Q. Is there any sort of emergency work carried out at Hanford Site to stop leaks of radioactive waste from those six underground tanks. If yes, what exactly is being done/have the leaks stopped?

A. There are no emergency actions under way at this time. The material leaving the tanks does not pose any immediate risk to the public.

To reduce the risk of leaking, pumpable liquids were already removed from these tanks in the 1980s and 1990s through a process known as interim stabilization. That process does leave a certain amount of liquid contained within the pores of the sludge and saltcake. That remaining liquid could continue to leak from tanks. (b)(5) DOE is evaluating some new technical techniques that might help mitigate the leaks in some of the tanks, such as installing surface barriers to slow potential intrusion of rain water or snow melt.

Q. If not, clarify the amount of liquid coming out of the six tanks in question.

(b)(5)

(b)(5)

Q. How many tanks are being looked at for increased analysis?

A. A total of 20 Hanford tanks are being examined for signs of potential leaks, based on the most recent analysis of information available. Updated information collected by the integrity monitoring program will be evaluated as it is received.

Q. What will you do to address the remainder of the tanks?

A. ORP maintains a tank monitoring program for all 177 tanks on site, consistent with regulatory requirements (149 single-shell and 28 double-shell). The primary purpose of the single-shell tank monitoring program has been to monitor infiltration of water into the tanks such that the tank contents could not potentially exceed the interim stabilization criteria. DOE recently determined monitoring actions were structured to identify short-term liquid level changes rather than identifying slow leaks over longer periods of time. We have changed our monitoring procedures to identify these types of liquid level decreases. Twenty tanks were determined to have liquid level decreases that need to be further evaluated.

Additional evaluation includes estimates of liquid evaporation rate, review of tank conditions such as surface conditions (liquid/solid interface), and video confirmation of liquid level measuring equipment accuracy. Six of these 20 are considered high-priority for completing the tank leak assessment, as the liquid level decreases have no apparent cause besides leakage. These are the 6 tanks that (b)(5)

(b)(5) (b)(5)

(b)(5)

Q. How has the state of NM responded to discussions on the expansion of WIPP?

A. Requires Headquarters response.

(b)(5)

(b)(5)

Q. What is the capacity of each of the 6 suspect tanks?

- T-111 - 530,000 gallons
- TY-105 - 758,000 gallons
- B-203 - 55,000 gallons
- B-204 - 55,000 gallons
- T-203 - 55,000 gallons
- T-204 - 55,000 gallons

Q. How much sludge waste and how much liquid waste does each tank hold?

- T-111 - 447,000 gallons sludge; 38,000 gallons of drainable liquid
- TY-105 - 231,000 gallons sludge; 12,000 gallons of drainable liquid
- B-203 - 49,000 gallons sludge; 6,000 gallons of drainable liquid, including 1,000 gallons supernatant
- B-204 - 49,000 gallons sludge; 6,000 gallons of drainable liquid, including 1,000 gallons supernatant
- T-203 - 36,000 gallons sludge; 5,000 gallons of drainable liquid
- T-204 - 36,000 gallons sludge; 5,000 gallons of drainable liquid

Q. How will the Department confirm the tanks are/are not leaking?

A. Evaluation includes estimates of liquid evaporation rate, review of tank conditions such as surface conditions (liquid/solid interface), and video confirmation of liquid level measuring equipment accuracy.

Q. Does DOE consider any of these six tanks to be TRU waste?

A. We believe five of these tanks are Transuranic waste. The tanks are T-111, B-203, B-204, T-203, and T-204.

Q. Is it presumed that the sludge is unlikely to leak? Is the leak potential limited to the liquid in each tank?

A. Legacy tank waste is one of the largest risks in the Department's Environmental Management program, and that is why one of our major priorities is to get the waste out of the single shell tanks and immobilize it as quickly as possible. Pumpable liquids have already been removed from the tanks. That process does leave a certain amount of liquid contained within the pores of the sludges and saltcake that are left behind in the tanks. Some of the liquid in the sludge can potentially seep from the tank. The solid waste is not very mobile and hence unlikely to leak from the tank and the waste solids that are still in the tank would not spread easily through the soil. Even tanks that have been put through the stabilization process can expect to have residual leaks from time to time, since the conditions that caused it to leak can't be repaired.

Q. Aren't some of these tanks known leakers?

A. Yes, tanks T-111, TY-105, B-203, and B-204 are assumed leakers. Here is their history:

- T-111 - Assumed leaker since 1979; interim stabilized in 1995
- T-105 - Assumed leaker since 1960; interim stabilized in 1983
- B-203 - Assumed leaker since 1983; interim stabilized in 1984

- B-204 - Assumed leaker since 1984; interim stabilized in 1984

Q. Can you explain the single-shell tank monitoring program?

A. Hanford's underground tanks are regularly monitored in accordance with regulatory requirements. Workers use specialized measuring devices lowered through access pipes from the ground surface to the tank below to measure changes in waste level. Tank levels are monitored on a risk prioritized but a minimum of quarterly unless an intrusion is detected, then the monitoring frequency increases to weekly. Visual inspections are also conducted using video cameras lowered into the tanks, but preparations to access portals (known as risers) is a time consuming process that can take weeks to accomplish.

Measurements—including waste level, in-tank temperature and radiation monitoring of the surrounding soil—help experts classify the tanks in two categories:

- Sound, meaning surveillance data does not indicate a liquid loss attributed to a breach in the tank.
- Assumed leaker, meaning surveillance date indicated a loss of liquid to the environment attributed to a tank breach.

Leaking tanks have been a part of the cleanup challenge at Hanford since the first assumed leakers were identified in 1959. Over the past five decades, it's assumed 67 of Hanford's 149 single-shell tanks have leaked as much as 1 million gallons of waste into the surrounding soil. (Note: there is a rigorous process used to formally declare a tank as a leaking or assumed leaking tank.)

Important actions have been taken over the years to reduce the threat of tank leaks. Most of the pumpable liquid has been removed from the tanks. This effort substantially reduces the risk posed by the tank waste, but does not completely eliminate the risk of leakage or seepage.

In addition, quarterly inspections are performed to help manage the risk of the remaining sludge and saltcake waste stored in the tanks by preventing additional liquid from entering the tanks. These inspections ensure any seams in the infrastructure surrounding the tanks are sealed with tape or foam, and that the seals are in proper working order. Efforts to reduce intrusion are important because they keep unwanted liquid out of the tanks that would potentially make the waste more mobile and increase the risk of leaks.

Monitoring does not prevent the tanks from leaking. It is a safeguard put in place to help safely manage the waste and mitigate its impact on the surrounding environment. As the tanks continue to age, there is an increased probability that more and more tanks will continue to fail and leak. Our planned actions to mitigate the risk from leaks in the tanks is retrieve the remaining solids (moist sludge and saltcake) and treat it in the Waste Treatment Plant being built at Hanford or ship certain portions of it to the Waste Isolation Pilot Plant in New Mexico when permitted to do so.

Q. Is DOE improving monitoring of the tanks?

A. ORP maintains a tank monitoring program for all 177 underground storage tanks located on the Hanford site. We recently determined monitoring actions were structured to quickly identify short term liquid level changes rather than identifying slow leaks over longer periods of time. We are rebalancing our monitoring procedures to include faster identification of slow leaks over longer periods of time. The Department is currently evaluating new technical options to improve monitoring of the tanks, including

high fidelity in-tank camera systems that will provide higher resolution imaging, better lighting, and be deployed on a more stable platform.

Q. And why has it been determined 6 tanks when originally one?

A. ORP maintains a tank monitoring program, for all 177 tanks on site, consistent with regulatory requirements, (149 single-shell and 28 double-shell tanks). Sixty-seven single-shell tanks have been classified as assumed leakers. Double-shell tank AY-102 has recently been classified as assumed leaker from primary tank.

Through our monitoring program, recently waste level changes have been identified in a number of tanks where leaks are potentially occurring. Some tanks were selected for further evaluation. T-111 shows the most noticeable downward trend. Other tanks showing a slower decrease in waste level include B-203, B-204, T-203, T-204 and TY-105. These are the six tanks referenced by Washington Gov. Jay Inslee last week. Four of these six tanks are classified as assumed leakers dating back to 1960.

Q. Is there any sort of emergency work carried out at Hanford Nuclear Reservation to stop leaks of radioactive waste from those six underground tanks. If yes, what exactly is being done/have the leaks stopped? If not, clarify the amount of liquid coming out of the six tanks in question.

A. There are no emergency actions under way at this time. The material leaving the tanks does not pose any immediate public risk, as it estimated to take decades for it to reach groundwater and then additional time before it would reach public drinking water sources.

To reduce the risk of leaking, pumpable liquids were already removed from these tanks in the 1980s and 1990s through a process known as interim stabilization. That process does leave a certain amount of liquid contained within the pores of the sludges and saltcake that are left behind in the tanks. That liquid can continue to leak from tanks. We continue to manage the tanks in accordance with regulatory requirements. Under current regulations, no action is required or expected to stop leaks in tanks that are interim stabilized. Options to address are also very limited. DOE is evaluating some new technical techniques that might help mitigate the leaks in some of the tanks, such as installing surface barriers to slow potential intrusion of rain water or snow melt and accelerate retrieval of tanks containing contact-handled transuranic wastes.

Q. If not, clarify the amount of liquid coming out of the six tanks in question.

A. Two of the six tanks, T-111 and TY-105, may be leaking at a suspected rate of up to 150 to 300 gallons a year. The four smaller tanks may be leaking at a suspected rate of 15 to 20 gallons a year.

Q. How confident is DOE that it is only 6 tanks and no more than are leaking? How many tanks are being looked at for increased analysis?

A. DOE is performing a comprehensive review of the data right now. Though the Department is confident the number of tanks requiring additional review has been narrowed down appropriately, it's too early to determine whether the data will reveal additional leaking tanks. As part of an ongoing monitoring program, all 149 single-shell tanks have been assessed, including the 67 assumed leakers. From that, a total of 20 tanks are being examined more closely for signs of potential leaks.

Q. How will you make improvements?

A. DOE is evaluating options that might mitigate the leaks in some of the tanks, such as installing surface barriers to slow potential intrusion of rain water or snow melt and accelerated retrieval of tanks containing contact-handled transuranic wastes. Our planned actions to mitigate the risk from leaks in the tanks is to retrieve the remaining solids (moist sludge and saltcake) and treat it in the Waste Treatment Plant being built at Hanford or ship certain portions of it to the Waste Isolation Pilot Plant in New Mexico when permitted.

Q. How many tanks are being looked at for increased analysis?

A. A total of 20 Hanford tanks are being examined for signs of potential leaks, based on the most recent analysis of information available. Updated information collected by the integrity monitoring program will be evaluated when received.

Q. What will you do to address the remainder of the tanks?

A. ORP maintains a robust tank monitoring program for all 177 tanks on site, consistent with regulatory requirements (149 single-shell and 28 double-shell). The primary purpose of the single-shell tank monitoring program has been to monitor infiltration of water into the tanks such that the tank contents could not potentially exceed the interim stabilization criteria. DOE recently determined monitoring actions were structured to identify short term liquid level changes rather than identifying slow leaks over longer periods of time. We have changed our monitoring procedures to identify these types of liquid level decreases. Eighty-three tanks were determined to have had changes to the liquid levels in the tanks. Of those, 43 were determined to have nominal changes that are not of concern. Twenty were determined to have increases in liquid levels that need to be closely monitored and evaluated. Twenty were determined to have liquid level decreases that need to be further evaluated.

Additional evaluation includes estimates of liquid evaporation rate, review of tank conditions such as surface conditions (liquid/solid interface), and video confirmation of liquid level measuring equipment accuracy. Six of these 20 are considered high-priority for completing the tank leak assessment, as the liquid level decreases have no apparent cause besides leakage. These are the 6 that Inslee stated are leaking. Evaluation has been completed on 1 tank, T-111, and it was determined to be leaking. T-111 is one of the 67 identified assumed leakers. Tank T-111 and 4 of the remaining 5 high-priority tanks are classified as TRU waste, and DOE plans to retrieve, treat, and ship this waste to WIPP.

Q. How has the state of NM responded to discussions on the expansion of WIPP?

A. Requires Headquarters response.

Q. Can you speak to the rumor that the GTCC EIS is coming out soon and includes an expansion of WIPP? Would it require a change in law?

A. Requires Headquarters response.

Meyers, Colleen A

From: Charboneau, Stacy L
Sent: Tuesday, February 19, 2013 9:21 AM
To: Gamache, Lori M
Subject: Fw: Decreasing levels in Hanford single-shell tank T-111

From: Sondag, Joseph M
Sent: Tuesday, February 19, 2013 08:51 AM
To: 'Ed Westbrook (ed.westbrook@emcbc.doe.gov)' <ed.westbrook@emcbc.doe.gov>; Goldsmith, Robert; Hutton, James; Moury, Matthew B
Cc: Irwin, Robert M (Mat); Fletcher, Thomas W; Trenchard, Glyn D; Charboneau, Stacy L
Subject: Decreasing levels in Hanford single-shell tank T-111

All,

Pursuant to the DOE ORP Event Notification Procedure, this e-mail serves as follow-up to information discussed with Mr. Westbrook on 2/16.

On Friday, February 15, 2013 DOE-ORP announced in a press release that liquid levels in Hanford single-shell tank T-111 were decreasing. The issue was reported as a Significance Category (SC) – 3 event under the following criteria:

- **Group 5.A, Releases, (1)* SC-3:** Any release (onsite or offsite) of a hazardous or extremely hazardous substance, including -radionuclides from a DOE facility above federally permitted releases in a quantity equal to or exceeding the federal reportable quantities specified (See specifications in 40 CFR Part 302, Designation, Reportable Quantities, and Notification, 40 CFR Part 355, Emergency Planning and Notification, and CERCLA Section 101[10], Federally Permitted Releases.)

The following subgroup reporting criteria will be included in the report:

- **Group 10, Management Concerns and Issues, (4)* SC-4:** Any occurrence that may result in a significant concern by affected state, tribal, or local officials, press, or general population; that could damage the credibility of the Department; or that may result in inquiries to Headquarters.

Please refer to the General Announcement for additional details.

Thanks

Joe Sondag
Facility Representative
Tank Farms Operations Division
Department of Energy - Office of River Protection
Office: (509) 373-9179
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GENERAL ANNOUNCEMENT

Department of Energy

ORP No. 13-019

Office of River Protection
P.O. Box 450
Richland, Washington 99352

Issued: 2-15-2013

To: ALL ORP STAFF
Subject: ORP Confirms A Decrease of Liquid Level in Hanford Single-Shell Tank

OFFICE OF RIVER PROTECTION CONFIRMS A DECREASE OF LIQUID LEVEL IN HANFORD SINGLE-SHELL TANK

RICHLAND – The U.S. Department of Energy (DOE) Office of River Protection (ORP) and its Tank Farms operations contractor Washington River Protection Solutions (WRPS) have determined that liquid levels in Hanford single-shell tank (SST) T-111 are decreasing. The specific cause of the liquid level decrease in Tank T-111 has not been determined.

Monitoring wells in the T Tank Farm, where Tank T-111 is located, have not identified significant changes in concentrations of chemicals or radionuclides in the soil. DOE is continuing to monitor its network of monitoring wells in the area of T Tank Farm and is evaluating possible next steps.

This tank was classified as an assumed leaker in 1979. In February 1995, interim stabilization was completed for this tank. In order to achieve interim stabilization, the pumpable liquids were removed in accordance with agreements with the State of Washington.

Data indicates the current rate of loss of liquids from the tank could be in the range of 150 to 300 gallons over the course of a year.

Tank T-111 is a 530,000-gallon capacity underground storage tank built between 1943-44, and put into service in 1945. T-111 currently contains approximately 447,000 gallons of sludge, a mixture of solids and liquids with a mud-like consistency. There are a total of 177 tanks at the Hanford site.

The cleanup of radioactive and chemical tank waste at Hanford and protection of the environment, public and workers remains a top priority for the Department and its Environmental Management mission. The Department will continue to work closely with the State of Washington, Congress and other key stakeholders to address this situation and continue progress on this important mission at Hanford.

###

Tank	Primary Monitoring Device (Note1)	Monitoring Frequency	Specification Limit (Note 2)	LDM or Intrusion
BY-106	LOW	Quarterly	ILLSL	Intrusion
BY-107	LOW	Quarterly	ILLSL	Intrusion
BY-108	LOW	Quarterly	ILLSL	Intrusion
BY-109	LOW	Quarterly	ILLSL	Intrusion
BY-110	LOW	Quarterly	ILLSL	Intrusion
BY-111	LOW	Quarterly	ILLSL	Intrusion
BY-112	LOW	Quarterly	ILLSL	Intrusion
C-101	ENRAF	Quarterly	+3.0 in.	Intrusion
C-102	ENRAF	Quarterly	-3.0 in.	LDM
C103	ENRAF	Quarterly	+3.0 in.	Intrusion
C-104	ENRAF	Quarterly	+3.0 in.	Intrusion
C-105	ENRAF	Quarterly	+3.0 in.	Intrusion
C-106	ENRAF	Quarterly	+3.0 in.	Intrusion
C-107	ENRAF	Quarterly	+3.0 in.	Intrusion
C-108	ENRAF	Quarterly	+3.0 in.	Intrusion
C-109	ENRAF	Quarterly	+3.0 in.	Intrusion
C-110	ENRAF	Quarterly	+3.0 in.	Intrusion
C-111	ENRAF	Quarterly	+3.0 in.	Intrusion
C-112	ENRAF	Quarterly	+3.0 in.	Intrusion
C-201	ENRAF	Quarterly	+3.0 in.	Intrusion
C-202	ENRAF	Quarterly	+3.0 in.	Intrusion
C-203	ENRAF	Quarterly	+3.0 in.	Intrusion
C-204	ENRAF	Quarterly	+3.0 in.	Intrusion
S-101	LOW	Quarterly	ILLSL	Intrusion
S-102	ENRAF	Quarterly	+3.0 in.	Intrusion
S-103	LOW	Quarterly	ILLSL	Intrusion
S-104	LOW	Quarterly	ILLSL	Intrusion
S-105	LOW	Quarterly	ILLSL	Intrusion
S-106	LOW	Quarterly	ILLSL	Intrusion
S-107	LOW	Quarterly	ILLSL	Intrusion
S-108	LOW	Quarterly	ILLSL	Intrusion
S-109	LOW	Quarterly	ILLSL	Intrusion
S-110	LOW	Quarterly	ILLSL	Intrusion
S-111	LOW	Quarterly	ILLSL	Intrusion
S-112	ENRAF	Quarterly	+3.0 in.	Intrusion
SX-101	LOW	Quarterly	ILLSL	Intrusion
SX-102	LOW	Quarterly	ILLSL	Intrusion
SX-103	LOW	Quarterly	ILLSL	Intrusion
SX-104	LOW	Quarterly	ILLSL	Intrusion
SX-105	LOW	Quarterly	ILLSL	Intrusion
SX-106	LOW	Quarterly	ILLSL	Intrusion
SX-107	ENRAF	Quarterly	+3.0 in.	Intrusion
SX-108	ENRAF	Quarterly	+3.0 in.	Intrusion
SX-109	ENRAF	Quarterly	+3.0 in.	Intrusion
SX-110	ENRAF	Quarterly	+3.0 in.	Intrusion

Tank	Primary Monitoring Device (Note1)	Monitoring Frequency	Specification Limit (Note 2)	LDM or Intrusion
SX-111	LOW	Quarterly	ILLSL	Intrusion
SX-112	LOW	Quarterly	ILLSL	Intrusion
SX-113	ENRAF	Quarterly	+3.0 in.	Intrusion
SX-114	ENRAF	Quarterly	+3.0 in.	Intrusion
SX-115	ENRAF	Quarterly	+3.0 in.	Intrusion
T-101	LOW	Quarterly	ILLSL	Intrusion
T-102	ENRAF	Quarterly	-1.0 in.	LDM
T-103	ENRAF	Quarterly	+3.0 in.	Intrusion
T-104	LOW	Quarterly	ILLSL	Intrusion
T-105	ENRAF	Quarterly	+3.0 in.	Intrusion
T-106	ENRAF	Quarterly	+3.0 in.	Intrusion
T-107	ENRAF	Quarterly	+1.0 in.	Intrusion
T-108	ENRAF	Quarterly	+1.0 in.	Intrusion
T-109	LOW	Quarterly	ILLSL	Intrusion
T-110	LOW	Quarterly	ILLSL	Intrusion
T-111	LOW	Quarterly	ILLSL	Intrusion
T-112	ENRAF	Quarterly	-1.0 in.	LDM
T-201	ENRAF	Quarterly	+1.0 in.	Intrusion
T-202	ENRAF	Quarterly	+1.0 in.	Intrusion
T-203	ENRAF	Quarterly	+3.0 in.	Intrusion
T-204	ENRAF	Quarterly	+1.0 in.	Intrusion
TX-101	ENRAF	Quarterly	+1.0 in.	Intrusion
TX-102	LOW	Quarterly	ILLSL	Intrusion
TX-103	LOW	Quarterly	ILLSL	Intrusion
TX-104	LOW	Quarterly	ILLSL	Intrusion
TX-105	LOW	Quarterly	ILLSL	Intrusion
TX-106	LOW	Quarterly	ILLSL	Intrusion
TX-107	ENRAF	Quarterly	+3.0 in.	Intrusion
TX-108	ENRAF	Quarterly	+3.0 in.	Intrusion
TX-109	LOW	Quarterly	ILLSL	Intrusion
TX-110	LOW	Quarterly	ILLSL	Intrusion
TX-111	LOW	Quarterly	ILLSL	Intrusion
TX-112	LOW	Quarterly	ILLSL	Intrusion
TX-113	LOW	Quarterly	ILLSL	Intrusion
TX-114	LOW	Quarterly	ILLSL	Intrusion
TX-115	LOW	Quarterly	ILLSL	Intrusion
TX-116	LOW	Quarterly	ILLSL	Intrusion
TX-117	LOW	Quarterly	ILLSL	Intrusion
TX-118	LOW	Quarterly	ILLSL	Intrusion
TY-101	ENRAF	Quarterly	+3.0 in.	Intrusion
TY-102	ENRAF	Quarterly	+1.0 in.	Intrusion
TY-103	LOW	Quarterly	ILLSL	Intrusion
TY-104	ENRAF	Quarterly	+1.0 in.	Intrusion
TY-105	LOW	Quarterly	ILLSL	Intrusion

Tank	Primary Monitoring Device (Note1)	Monitoring Frequency	Specification Limit (Note 2)	LDM or Intrusion
TY-106	ENRAF	Quarterly	+3.0 in.	Intrusion
U-101	ENRAF	Quarterly	+1.0 in.	Intrusion
U-102	LOW	Quarterly	ILLSL	Intrusion
U-103	LOW	Quarterly	ILLSL	Intrusion
U-104	ENRAF	Quarterly	+3.0 in.	Intrusion
U-105	LOW	Quarterly	ILLSL	Intrusion
U-106	LOW	Quarterly	ILLSL	Intrusion
U-107	LOW	Quarterly	ILLSL	Intrusion
U-108	LOW	Quarterly	ILLSL	Intrusion
U-109	LOW	Quarterly	ILLSL	Intrusion
U-110	LOW	Quarterly	ILLSL	Intrusion
U-111	LOW	Quarterly	ILLSL	Intrusion
U-112	ENRAF	Quarterly	+3.0 in.	Intrusion
U-201	ENRAF	Quarterly	+2.0 in.	Intrusion
U-202	ENRAF	Quarterly	+2.0 in.	Intrusion
U-203	ENRAF	Quarterly	+3.0 in.	Intrusion
U-204	ENRAF	Quarterly	+1.0 in.	Intrusion

Note 1: ENRAF is the trade name of the electrical conductivity probes used to measure liquid level within a tank.

Note 2: ILLSL is the interstitial liquid level specification limit and has acceptance criteria of +/- 3 standard deviations from trend baseline, or -1.2 inches, whichever is larger.

Meyers, Colleen A

From:	Fletcher, Thomas W
Sent:	Tuesday, February 19, 2013 9:39 PM
To:	Charboneau, Stacy L
Cc:	Shrader, Todd A; Smith, Kevin W (ORP); Trenchard, Glyn D; Clark, Wyatt C; Little, David B
Subject:	Hanford Single Shell Tank Intrusion
Attachments:	Hanford Single Shell Tank Intrusion.doc; ATT00001.htm

All,

Attached and below is my first cut at the response to (b)(5) (b)(5) Special thanks to Glyn for the original draft and Wyatt and David Little for staying here at the office to support. I'm headed home and any changes we need I will make tomorrow.

Question #1 - (b)(5) (b)(5)

Background:

Interim Stabilization: The Hanford SSTs have been Interim Stabilized. (b)(5) (b)(5)

(b)(5)

Todd's Question - Basis of notification if ILL was +/- 3 standard deviations from trend baseline

Interim stabilization typically removed liquid waste until the retrieval rate drops to 0.05 gpm or less. At this point, capillary action prevents most of the remaining liquid from draining from the solids. The 3 standard deviations was applied to account for the rate of change of the capillary action of the interstitial liquid level as it migrated towards equilibrium at the saltwell pump on a quarterly basis. This allow the rebound of the interstitial liquid to continue without false alarms. In retrospect, once a tank had reached equilibrium the use of the 3 standard deviations should have been discontinued and replaced with an absolute measurement of tank level change. While this approach is not driven by the regulatory framework it would have been a appropriate best management practice. As part of the initial investigation of SST intrusion, this opportunity for improvement was identified and actions are underway.

(b)(5)

Background:

Interim Stabilization: The Hanford SSTs have been Interim Stabilized. (b)(5)

(b)(5)

(b)(5)

(b)(5)

CH2M HILL DOCUMENT RELEASE FORM

(1) Document Number:	RPP-13300	(2) New Revision Number: 1	☐ New ☐ Page Change ☑ Full Revision ☐ Cancel
(3) Impacted Documents:	none	(4) File Index Number:	
		(5) Effective Date:	December 16, 2004
(6) Document Title:	Origin of Wastes in the B-200 and T-200 Series Single-Shell Tanks		
(7) Change/Release Description:	see Record of Revision form		
(8) Change Justification:	Incorporated additional information on wastes types discharged to B-200 and T-200 series tanks. Revised tank waste characterization discussion to reflect tank waste information network system information as of October 2004.		

(9) Approvals:

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(b) Responsible Manager (Print/Sign): Stewart M. Mackay *SMMackay*	Date: 12/15/2004
(c) Reviewer (Optional, Print/Sign):	Date:
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(14) Release Approval (Print/Sign): *T. D. Aardal / Janis Aardal* Date: 12-16-2004

A-6003-881 (08/04)

ORIGIN OF WASTES IN THE B-200 AND T-200 SERIES SINGLE-SHELL TANKS

M. E. Johnson
CH2M HILL Hanford Group, Inc.
Richland, WA 99352
U.S. Department of Energy Contract DE-AC27-99RL14047

EDT/ECN: 821328 UC:
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B&R Code: Total Pages: ~~176~~ 178 MF 12-16-04

Key Words: Hanford, single-shell tank, B-201, B-202, B-203, B-204, T-201, T-202, T-203, T-204, 224 building waste

Abstract: Tanks B-201 through B-204 and T-201 through T-204 received waste from the plutonium concentration activities conducted in the 224-B and 224-T buildings from October 1946 through June 1952. Tanks B-201 through B-204 also received miscellaneous flush solutions from deactivation activities conducted in the 221-B Bismuth Phosphate Plant and the 224-B building.

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DEC 16 2004
DATE:
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J. Aardal 12-16-04
Release Approval Date

Release Stamp

Approved For Public Release

Tank Farm Contractor (TFC) **RECORD OF REVISION**	(1) Document Number RPP-13300	Page 1

(2) Title
Origin of Wastes in the B-200 and T-200 Series Single-Shell Tanks

Change Control Record

(3) Revision	(4) Description of Change - Replace, Add, and Delete Pages	Authorized for Release (5) Resp. Engr. (print/sign/date)	(6) Resp. Mrg. (print/sign/date)
RS 1	Add - Section 2.1: Added discussion that plutonium precipitate separated from uranium and fission products was washed three times and the wash water combined with the uranium and fission product solution. Add - Section 2.1: Spent nuclear fuel reprocessing completed in the 221 BiPO4 process when plutonium was separated from the metal waste. Add: Figure 1: Added "Wastes Streams from" Bismuth Phosphate Process to figure title. Add: Section 2.2.1: Included the word "Plant" after "221" designation. Included the word "building" after "224" designation. Add - Section 3: Expanded discussion on types of records reviewed and information available in each of these records. Add - Section 3.2: Discussed the dissolvers metal waste equipment and other equipment in the 221-B Plant were flushed with nitric acid from July 1952 through September 1952, which would have removed any residual high-levle waset present in this equipment. Therefore, equipment flushing conducted after the nitric acid flushing would not have generated high-level waste. Discussed the water flushes of equipment conducted during 1954 through 1955 were discharged to cribs and cited reference documents. Add - Sections 3.4.1.1 & 3.4.2: Discussed certain historical records were not declassified until the 1990's which would have prevented the authors of WHC-MR-0132 and LA-UR-97-311 from knowing that the B-200 and T-200 series tanks were actually placed in service in 1946 instead of 1952. Add - Section 4.0: Discussed Hanford Site best basis inventories (BBIs) for tank	Michael E Johnson 10/18/04 Michael E. Johnson	SMackay 12/15/04. STEWART MACKAY

MEJ 12/15/04

Tank Farm Contractor (TFC) **RECORD OF REVISION (continued)**	(1) Document Number RPP-13300	Page 2

Change Control Record

(3) Revision	(4) Description of Change - Replace, Add, and Delete Pages	Authorized for Release	
		(5) Resp. Engr. (print/sign/date)	(6) Resp. Mrg. (print/sign/date)
	wastes. Indicated analyses of core samples and waste templates are the basis for the gross alpha and transuranic elements concentrations reported. Replaced the B-201 and B-202 inventories for transuranic elements with the B-200 and T-200 series tanks BBIs for transuranic elements.		

RPP-13300
Revision 1

ORIGIN OF WASTES IN THE B-200 AND T-200 SERIES SINGLE-SHELL TANKS

M. E. Johnson
CH2M HILL Hanford Group, Inc.

Date Published
October 2004

CH2MHILL
Hanford Group, Inc.

Post Office Box 1500
Richland, Washington

Prepared for the U.S. Department of Energy
Office of River Protection

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SUMMARY

A review of historical documents was conducted to determine the origin of the wastes stored in single-shell tanks 241-B-201 through 241-B-204 and 241-T-201 through 241-T-204. This review was conducted to support disposition of the wastes in these tanks.

The wastes stored in tanks 241-B-201 through 241-B-204 and tanks 241-T-201 through 241-T-204 were determined to originate from plutonium concentration activities conducted from October 1946 through June 1952 in the 224-B and 224-T Concentration buildings. The 224-B and 224-T Concentration buildings received the plutonium nitrate solution that was separated from the irradiated reactor fuel as part of reprocessing activities conducted in the 221-B and 221-T Bismuth Phosphate plants. Tanks 241-B-201 through 241-B-204 also received miscellaneous flush solutions from deactivation activities conducted at the 221-B Bismuth Phosphate Plant and 224-B Concentration building. No other types of waste were transferred to these tanks.

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B WHC-MR-0132, A HISTORY OF THE 200 AREA TANK FARMS - TANKS 241-B-201 THROUGH 241-B-204 AND TANKS 241-T-201 THROUGH 241-T-204 ..... B-1

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LIST OF TERMS

1C	first cycle of the decontamination process
2C	second decontamination cycle wastes
Ci	Curies
CW	coating waste
kg	kilograms
ηCi/g	nanocuries per gram
MW	metal waste
NCRW	neutralized cladding waste
PAS	PUREX acidified sludge
PSN	PUREX supernate neutralized
PSS	PUREX sludge supernate
PUREX	plutonium-uranium extraction
REDOX	reduction-oxidation
RSN	REDOX supernate neutralized
TBP	tri-butyl phosphate
TIC	total inorganic carbon
TOC	total organic carbon
WSTRS	Waste Status and Transaction Record Summary
μCi/g	microcuries per gram
μg/g	micrograms per gram

1.0 INTRODUCTION

This document discusses the origins of wastes presently stored in single-shell tanks 241-B-201 through 241-B-204 and tanks 241-T-201 through 241-T-204. Section 2.0 provides a description of the different types of wastes that were generated at the Hanford Site chemical processing plants and transferred to the underground storage tanks. A basic understanding of the different types of wastes that were generated at the Hanford Site is provided for the reader to comprehend the waste types transferred to tanks 241-B-201 through 241-B-204 and tanks 241-T-201 through 241-T-204, as discussed in Section 3.0. Section 4.0 summarizes the waste types that were transferred into these tanks.

2.0 TYPES OF TANK WASTE GENERATED AT THE HANFORD SITE CHEMICAL PROCESSING PLANTS

There are 149 single-shell tanks and 28 double-shell underground storage tanks located at the Hanford Site. These tanks received supernatants and precipitated sludges originating from the reprocessing of spent nuclear fuels, research and development, plutonium processing, and waste management activities.

There were numerous spent nuclear fuel reprocessing, research, and development, plutonium processing, and waste management activities conducted at the Hanford Site starting in 1944. 221-T Plant (T-Plant), first used for reprocessing of spent nuclear fuel in December 1944, operated until March 1956 using the bismuth phosphate process. The 221-B Plant (B-Plant) reprocessed spent nuclear fuel from April 1945 to June 1952 using the bismuth phosphate process. The bismuth phosphate process was based on carrier precipitation batch chemistry. The plutonium product solutions from the B-Plant and T-Plant were transferred to the 224-B and 224-T buildings for concentration. B-Plant was later renovated and used from 1963 through 1986 to recover the fission products cesium and strontium from the wastes stored in single-shell tanks.

Later, B- and T-Plants were replaced by the REDOX (reduction-oxidation) and PUREX (plutonium-uranium extraction) plants using continuous solvent extraction processes for separating uranium and plutonium from dissolved, spent nuclear fuels. The REDOX plant operated from January 1952 through November 1966 and PUREX operated intermittently from January 1956 to early 1990). Uranium was recovered from the wastes stored in the single-shell tanks from operation of the bismuth phosphate plants using a tributyl phosphate solvent extraction process in the tri-butyl phosphate (TBP) Plant (221-U building). The Hot Semiworks, building 201-C, was operated from 1949 through 1967 as a research and development facility for many of the Hanford Site chemical processes (e.g., REDOX, TBP, B-Plant strontium separations, PUREX process tests). All of these facilities generated numerous sources of radioactive mixed wastes that are stored in the single-shell tanks and double-shell tanks.

In addition to the operations conducted in the processing plants, there were numerous activities conducted within the underground storage tanks, including evaporation, cesium precipitation using ferrocyanide, and discharge of supernatants to underground cribs. These spent nuclear fuel reprocessing, research and development, plutonium processing, and waste management activities resulted in the mixing and alteration of the different waste types within several (but not all) of the 149 single-shell tanks and 28 double-shell tanks.

The spent nuclear fuel reprocessing, research and development, plutonium processing, and waste management activities conducted in the processing plants are described in the following sections. Refer to DOE/RL-97-02; *National Register of Historic Places Multiple Property Document Form - Historic, Archaeological and Traditional Cultural Properties of the Hanford Site, Washington February* for additional details on these processes.

As will be shown in Section 3.0, none of the spent nuclear fuel processing wastes from these operations were received into tanks 241-B-201 through 241-B-204 or 241-T-201 through 241-T-204. These tanks only received waste from the 224-B and 224-T plutonium concentration buildings. The B-200 series tanks also receive wastes from equipment cleaning. The process operations conducted in the 221-B, 224-B, 221-T and 224-T are discussed in the following subsections to provide an understanding of the waste types generated in these facilities.

2.1 BISMUTH PHOSPHATE PROCESS: B- AND T-PLANTS

B- and T-Plants were constructed in 1944 through 1945 to separate plutonium from spent nuclear fuel using the bismuth phosphate process. Figure 1 shows a summary of the 221-B and 221-T Plant bismuth phosphate process, which is referred to throughout this discussion.

In the bismuth phosphate process, the aluminum cladding of spent nuclear fuel elements was dissolved in boiling sodium nitrate solution, to which sodium hydroxide was slowly added (HW-10475-C, page 403). The cladding removal waste, sometimes referred to as Coating Waste (CW), was transferred to single-shell underground storage tanks. (See item [1] in Figure 1)

Reprocessing of the spent nuclear fuel commenced with the dissolution of the uranium fuel. The fuel element uranium cores (see item [2] in Figure 1) were dissolved in nitric acid (HW-10475-C, chapter IV, page 405). Water and sulfuric acid were added to the dissolved uranium metal solution and the mixture was then transferred to the plutonium extraction section. The sulfuric acid formed a uranyl sulfate complex that prevented uranium precipitation as a phosphate in the subsequent plutonium extraction step (HW-10475-C, page 418).

Plutonium was extracted from the acid solution by addition of bismuth nitrate and phosphoric acid to form a bismuth phosphate carrier precipitate (HW-10475-C, page 503). The plutonium and bismuth phosphate carrier precipitate was centrifuged and washed three times with water to separate the acidic supernatant from the plutonium precipitate, (see item [3] in Figure 1). The acidic solution remaining after the plutonium precipitation contained about 99 percent of the uranium, about 90% of the fission products. This separation process also removed and reduced the gamma radiation activity level in the plutonium precipitate by a factor of 10. However,

zirconium is phosphate insoluble and zirconium-95 (10 percent of the activity) stayed with the plutonium product. The acidic uranium solution was then neutralized and transferred to the underground single-shell tanks as Metal Waste (MW). Recent laboratory testing of the bismuth phosphate flowsheet confirms this partitioning of radionuclides (internal letter 7G300-02-NWK-024, "Bismuth Phosphate Process Radionuclide Partition Factors for the Hanford Defined Waste Model"). The laboratory tests indicate the percentage of cecium-137 and strontium-90 partitioned to the metal waste may have been as high as 100 percent and 89 percent respectively.

After separating and washing the plutonium precipitate from the metal waste, reprocessing of spent nuclear fuel was completed in the 221 Plant Bismuth Phosphate process. Plutonium decontamination was conducted in the remainder of the 221 Plant Bismuth Phosphate process. The plutonium bearing cake was dissolved in nitric acid and further decontamination of the plutonium to separate fission products was conducted (HW-10475-C, chapter VI). Sodium bismuthate, sodium dichromate, or potassium permanganate was added to oxidize the plutonium to the +6 valence-state. This step caused the bismuth phosphate to precipitate phosphate insoluble fission products ("by-product precipitation"), leaving the plutonium in solution. The precipitate was separated from the plutonium-bearing solution using centrifuges and washed to remove soluble plutonium. The plutonium was reduced to the +4 valence state to form a precipitate that could be separated from the remaining soluble fission products by centrifugation.

The fission products separated from the plutonium product during this first cycle of the decontamination process (designated as 1C) were combined with the coating removal waste and transferred to single-shell tanks. The 1C waste (see item [4] in Figure 1), contained approximately 10 percent of all fission products and approximately 1.4 percent of the plutonium present in the original fuel charged to the plant (HW-23043, pages 20 and 22). After 1951, the Bismuth Phosphate process flowsheet was modified to include cerium and zirconium scavenger precipitation in the 1C by-product step to remove lanthanide and zirconium radionuclides from the plutonium product (HW-23043, page 16).

The plutonium solids from the first decontamination cycle were dissolved in nitric acid. A second decontamination cycle (see item [5] in Figure 1) was conducted to reduced the gamma activity level by a factor of 10,000 from that in the previous dissolved metal solution, giving an overall process decontamination factor of 100,000 below that of the original solution (HW-10475-C, page 627). The second decontamination step essentially repeated the steps previously described for the first cycle decontamination. The second decontamination cycle wastes (designated as 2C) were also transferred to the single-shell tanks. The 2C waste contained less than 0.1 percent of the uranium and fission products and about 0.4 percent of the plutonium present in the original fuel charged to the plant (HW-23043, pages 26 and 28). The plutonium product from the bismuth phosphate process was subsequently transferred to the 224-B or 224-T building for concentration.

Table 1 provides the estimated compositions of the neutralized CW, MW, 1C, and 2C waste solutions generated from the bismuth phosphate plants based on the October 1, 1951 flowsheet (HW-23043). Additional analyses of the supernatant fraction of MW, 1C, and 2C that was stored in single-shell tanks are provided in Tables 2 and 3. These sample analyses support previous statements regarding the partitioning of fission products to the various Bismuth Phosphate Plant

Waste Streams. Specifically, 90% of the fission products were partitioned to the metal waste as evident by the Cs-137 concentration provided in Table 3. About 10% of the fission products partitioned to the 1C waste, as demonstrated by the gross beta and gross gamma radionuclides analyses provided in Table 2 and the Cs-137 analyses provided in Table 2. The 2C waste contained less than 0.1% of the fission products, as evident from information provided in Table 2.

Figure 1 Waste Streams from Bismuth Phosphate Process

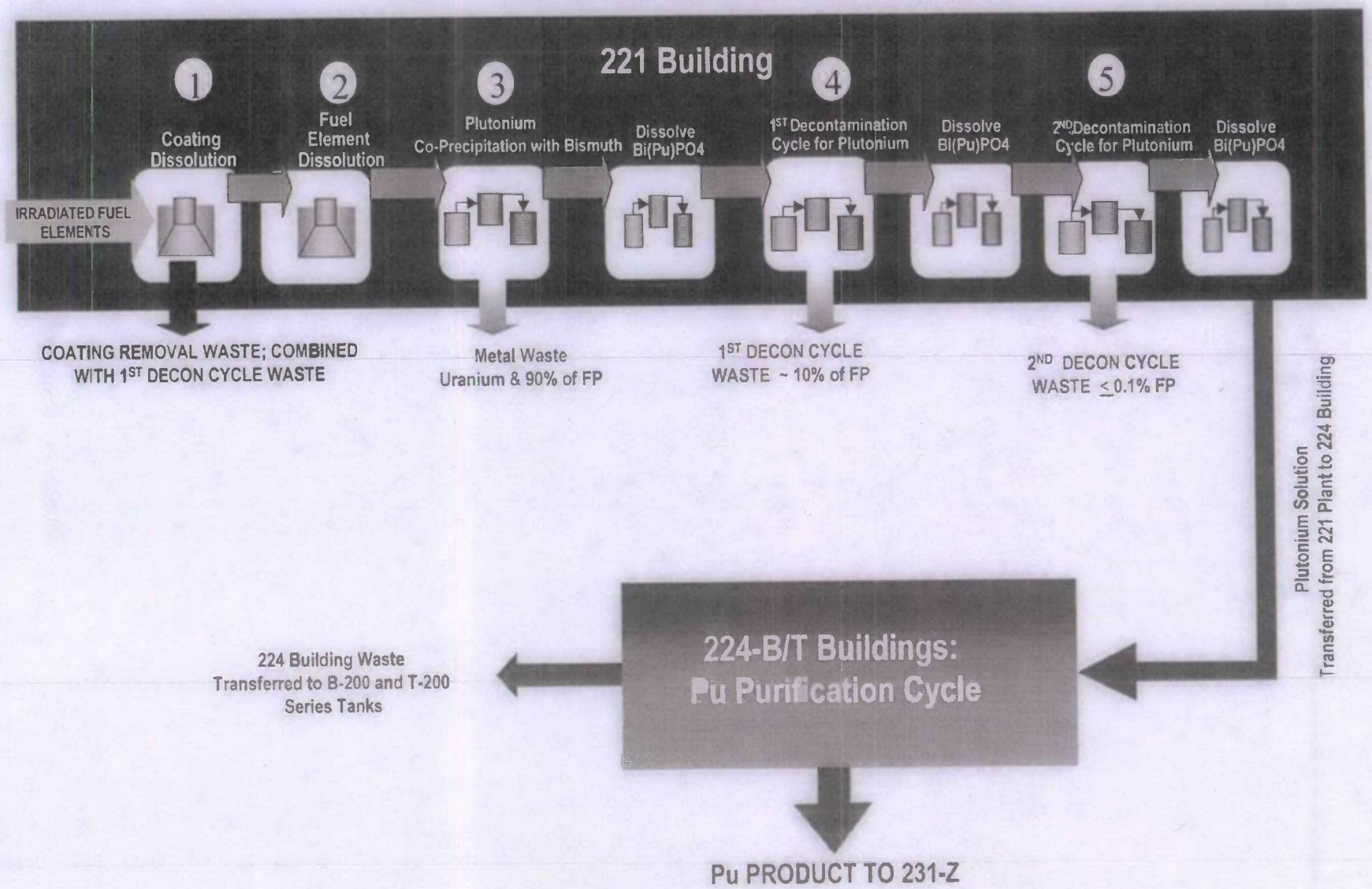


Table 1 Estimated Composition of Bismuth Phosphate Plant Wastes
From October 1, 1951 Flowsheet [1]

Analyte[2]	Coating Removal Waste[7]	Metal Waste[7]	First Decontamination Cycle (1C) Waste	Second Decontamination Cycle (2C) Waste	224 Building Waste
Plutonium	3.3E-04	2.0E-04	6.0E-07 [4]	1.6E-07 [5]	1.68E-04[6]
Uranium	0.15		0.235 [4]	Not reported	2.04E-05
Gamma	6.6E+04	1.3E+07	2.3E+06 [4]	1.13E+04 [5]	1.13E+02[6]
Sodium Aluminate ($NaAlO_2$)	95.1				
Sodium Hydroxide (NaOH)	43.6				
Sodium Nitrate ($NaNO_3$)	61.8				
Sodium Nitrite ($NaNO_2$)	56.0				
Sodium Silicate ($NaSiO_3$)	4.3				
Uranyl nitrate (UHN) [3]		132			
Fluorine (F)					5.6
Nitrate (NO_3)		9.7	93.1	61.3	42.4
Sulfate (SO_4)		24.4	4.73	3.61	0.35
Phosphate (PO_4)		25.2	26.2	23.0	3.05
Sodium (Na)		83.2	47.3	36.7	36.8
Bismuth (Bi)			2.59	1.31	1.18
Cerium (Ce)			0.030		
Lanthanum (La)					0.49
Manganese (Mn)					0.33
Zirconium (Zr)			0.030		
Iron (Fe)			1.37	1.82	
Chrome (Cr)			0.16	0.06	0.17
Ammonia (NH_4)			1.98	1.71	0.12
Silicon Hexa-Fluoride (SiF_6)			4.35	3.67	
Volume per Batch (gallons)	795	2,380	2,040	2,090	2,200

Notes:

(1) See HW-23043

(2) Analyses are reported in grams per liter, except for gamma activity, which is counts/minute/mL.

(3) HW-23043 page 31 notes that uranium is not actually present in this form, but is probably as $NaUO_2PO_4$ and $Na_4(UO_2)_2CO_3$.

(4) Pu and Gamma concentrations were calculated from the compositions of tanks 13-4 and 14-3 (HW-23043 pages 20 and 22).

(5) Pu and Gamma concentrations were calculated from the compositions of tanks 18-4 and 19-3 (HW-23043 pages 26 and 28).

(6) Pu and Gamma concentrations were calculated from the compositions of tanks A-4, D-4, B-3, and F-8 (HW-23043 pages 39, 44, 48, and 54)

(7) The coating waste batch size is based on 6,600-lbs uranium, but that the metal waste dissolution batch size is based on 2,200-lbs uranium.

Table 2 Analyses of Bismuth Phosphate Process Supernatants

Waste Type[1,2]	Tank	pH	Pu µGm/liter	Gross Beta millicuries/liter	Gross Gamma millicuries/liter	Date Sampled
Metal Waste	T-101	10.1	70	200[5]	70[5]	12-12-1946
Metal Waste	T-101	10	35	110	25	7-01-1947
Metal Waste	T-102	9.9	60	120	20	7-01-1947
Metal Waste	T-103	9.8	60	150	20	7-01-1947
1C/CW	B-109	9.9	40	0.65	0.28	3-18-1947
1C/CW	C-112	9.9	12	12	4.4	3-18-1947
2C	B-111	6.9	7.2E-02	2.0E-03	3.0E-03	7-1-1947
2C	B-112	6.8	4.32E?? [3]	1.5E-03	3.0E-03	7-1-1947
Waste Type	**Tank**	**pH**	**Pu µGm/liter**	**Gross Beta Counts/minute/cc**	**Gross Gamma Counts/minute/cc**	**Date Sampled**
2C	T-110	Not reported [4]	15	4.9E+04	30	7-13-1945
2C	T-110	9.8[4]	19	6.9E+04	55	7-25-1945
2C	B-110	9.6[4]	8.5	7.0E+04	55	7-25-1945

Notes:

[1] See HW-10728 and HW-3-3220.

[2] Solids formed in each of wastes, settling to the bottom of each tanks. These sample analyses are for the supernatant only and are not representative of the sludges.

[3] The reported Pu sample analyses for tank B-112 seems to be in error and lacking an exponent in HW-10728.

[4] Prior to October 1945, the 2C waste was neutralized to a pH of approximately 10. The waste collected in tanks 241-T-110, 241-T-111, and 241-T-112 were neutralized to about pH 7 after October 1945 to precipitate bismuth and plutonium (HW-3-3220, page 13).

[5] Reduction in the gross gamma and beta analyses for the metal waste in tank T-101 from sampling in 12-12-1946 to 07-01-1947 is due to decay of short-lived fission products.

Table 3 Radionuclide Analyses of Metal Waste and First Decontamination Cycle Waste

Tank	Date Filled	Pu µgm/cc	Gross Beta µCi/cc	Gross Gamma µCi/cc	Sr µCi/cc	Cs µCi/cc	Ru µCi/cc	Rare Earths + Y – Ce µCi/cc	Ce µCi/cc	Nb µCi/cc	Zr µCi/cc	Te µCi/cc
Analyses of Metal Waste Supernatant Following Uranium Extraction [1]												
C-106	Not specified				0.44	54.2						
BX-108	Not specified				0.26	132.4						
BX-109	Not specified				1.08	56.3						
C-112	Not specified				1.20	25.8						
C-109	Not specified				0.46	40.7						
C-111	Not specified				0.10	34.5						
Average Concentrations for Metal Waste					**0.59**	**57.3**						
Analyses of First Decontamination Cycle Waste Mixed with Coating Removal Waste Supernatant [2]												
B-107	8-1945	1.7E-02	0.135	0.055	0.011	0.10						
T-107	9-1945	1.5E-03	0.170	0.093	0.0013	0.20						
B-108	12-1945	2.0E-02	0.183	0.044	0.022	0.12						
T-108 (Top)	12-1945	2.0E-02	0.25	0.073	0.012	0.17	0.0066	0.047	0.007	0.0018	0	1.2E-05
T-108 (Bottom)	12-1945	2.0E-02	0.25	0.070	0.012		0.0065	0.029	0.0066	0.0024	0	3E-05
T-109	3-1946	2.6E-03	0.14	0.082	0.00038	0.15						
B-109	4-1946	1.8E-02	0.16	0.051	0.01	0.11						
T-104 (Top)	7-1946	3E-03	0.51	0.130	0.00013	0.13	0.058	0.004	0.051	0.028	0.010	2.4E-05
T-104 (Bottom)	7-1946	3E-03	0.52	0.160	0.00037		0.059	0.003	0.050	0.028	0.015	3.6E-05
C-110	8-1946	2E-03	0.14	0.0067	0.00026	0.11						
C-111	11-1946	4.2E-03	0.16	0.069	0.01	0.13						
C-112	4-1947	3.1E-03	0.14	0.064	0.005	0.13						
U-110	4-1947	2.1E-04	0.13	0.069	0.00011	0.17						
U-111	10-1947	3.4E-04	0.12	0.060	0.00023	0.14						
TX-109 [3]	9-1949	2.7E-05	2.8	2.2	0.00087	0.27	0.34	0.0085	0.0035	0.34	1.2	8E-05
Average Concentrations for 1C / CW		**7.67E-03**	**0.39**	**0.22**	**0.0058**	**0.15**						

Notes:

[1] HW-36717, Decontamination of Uranium Recovery Process Stored Wastes Interim Report, May 16, 1955, W. W. Schulz, General Electric Company, Richland Washington.

[2] HW-20195, Radioactive Content of Stored Bismuth Phosphate First Cycle Waste Supernatants, February 5, 1951, General Electric Company, Richland Washington.

[3] Tank TX-109 exhibits higher gross beta and gross gamma radioactivity since this tank was sampled shortly after filling and the short-lived fission products (e.g., Ru, Nb, and Zr) had not decayed appreciably.

2.1.1 224-B and 224-T Concentration Buildings

The process steps executed in the 224 Concentration buildings were as follows (HW-10475-C, chapter VII and HW-23043, pages 34 to 55):

- The starting batch size received from the 221 Plant was 330 gallons.
- Plutonium solution from the 221 Plant was oxidized with sodium bismuthate to convert the plutonium to the +6 valence state.
- Phosphoric acid was added to produce a bismuth phosphate ($BiPO_4$) precipitate, with the plutonium still in solution. At this point, operators wanted to get rid of all the $BiPO_4$.
- The solution and precipitate were separated by centrifugation.
- Nitric acid was added to dissolve the $BiPO_4$ precipitate, with this solution removed as waste.
- Potassium permanganate ($KMnO_4$) was added to the plutonium solution to ensure all the plutonium was in the +6 valence state.
- Hydrogen fluoride and lanthanum salts were added to the plutonium solution producing a lanthanum fluoride precipitate. Fission products were carried with the lanthanum. This precipitate contained all the lanthanides (cerium, lanthanum, etc.) and residual ruthenium, samarium, europium, americium, and curium that the $BiPO_4$ could not carry out of the stream.
- The lanthanum fluoride precipitate was dissolved in nitric acid, neutralized with sodium hydroxide, and sent to waste storage tanks.
- Oxalic acid was added to the plutonium solution collected from the lanthanum fluoride precipitation step to reduce the plutonium to the +4 valence-state.
- Hydrogen fluoride and lanthanum salts were added to the plutonium solution producing a lanthanum fluoride and plutonium fluoride precipitate. The precipitate was centrifuged to collect the solids.
- Potassium hydroxide was added to convert the plutonium fluoride / lanthanum fluoride precipitate into lanthanum hydroxide and plutonium hydroxide solids.
- After centrifuging to separate the lanthanum hydroxide and plutonium hydroxide solids, these solids are reacted with nitric acid solution to dissolve the lanthanum and plutonium. The plutonium nitrate / lanthanum nitrate solution product was now ready for transfer to the 231-Z building or 234-5 building.

By this time, each original 330-gallon batch of plutonium-bearing solution that had entered the 224 buildings was concentrated down to eight gallons. The liquid waste (designated as "224") from the lanthanum fluoride and barium sulfate precipitation process was neutralized and transferred to the single-shell tanks. Table 1 provides the estimated compositions of the neutralized 224 waste solutions based on the October 1, 1951 flowsheet (HW-23043).

3.0 ORIGINS OF WASTE IN TANKS 241-B-201 THROUGH 241-B-204 AND 241-T-201 THROUGH 241-T-204

This section provides a brief description of tanks 241-B-201 through 241-B-204 and 241-T-201 through 241-T-204, and a summary of the documented waste transfers into these tanks. In order to determine the origins of the wastes presently stored in these tanks, declassified historical reports for the Hanford Site were reviewed. Documents reviewed included the Hanford site contractors' monthly reports (1945 through 1975), Army Corp of Engineers monthly reports (December 1944 through December 1946), U. S. Atomic Energy Commission monthly reports (1947 through 1954), waste disposal reports (1948 through 1975), tank farm waste status summary reports, and miscellaneous letters and technical reports. While no records were located that identify individual transfers of waste, the above cited reports do provide a compendium of information that supports the discussion of historical waste types transferred into the B-200 and T-200 series tanks.

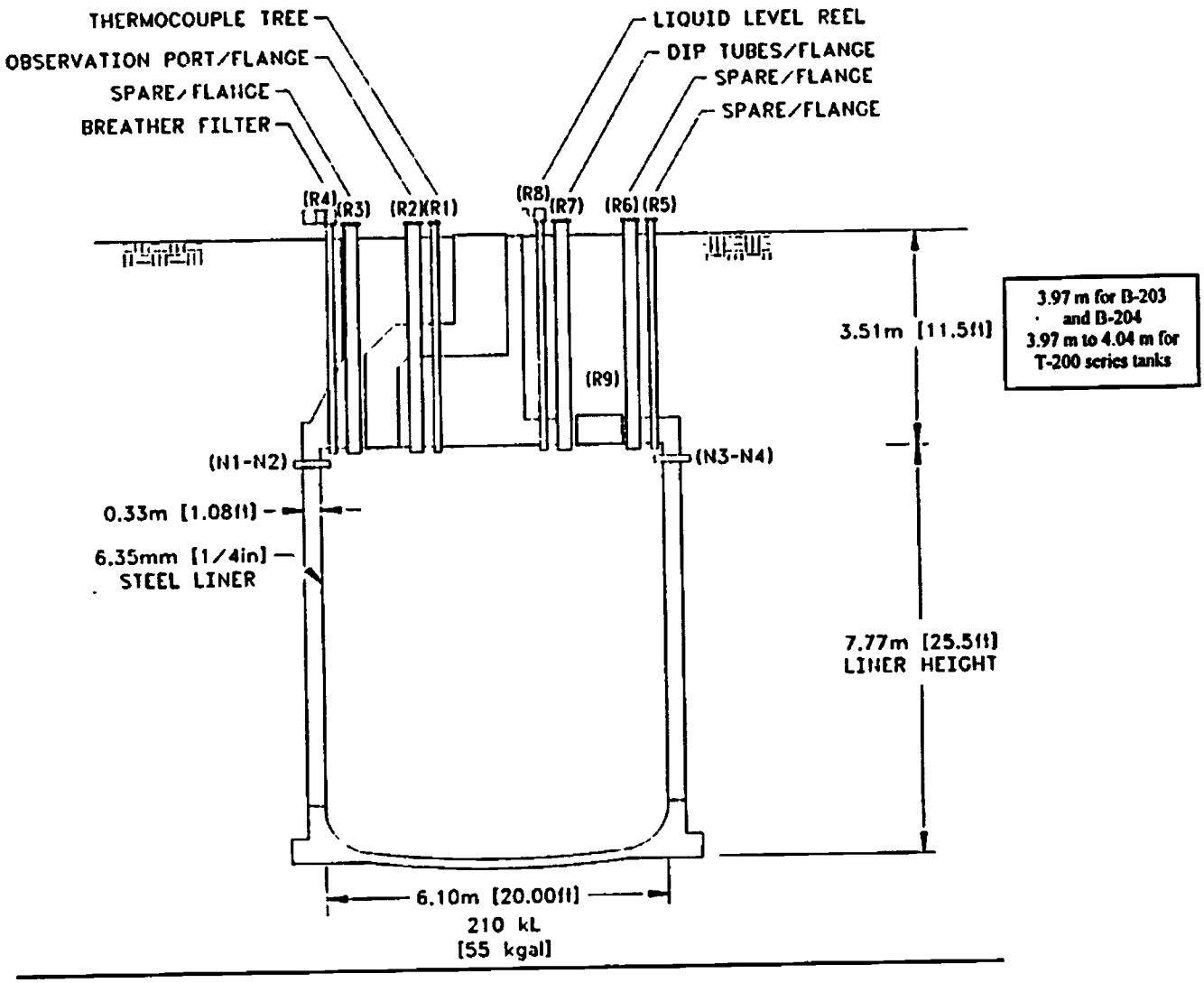
The Hanford site contractors' monthly reports for January 1945 through July 1951 list the volume of waste stored in the single-shell tanks, with the exception of the B-200 and T-200 series single-shell tanks. No records were located that provided the volume of wastes stored in the single-shell tanks from August 1951 through February 1952. Beginning in March 1952, waste transfers and the volume of waste stored in each single-shell tank were reported for each tank in a waste status summary report. Evidence of the waste types transferred to the B-200 and T-200 series single-shell tanks is provided in the Hanford site contractors' monthly reports, waste disposal reports, and miscellaneous letters and technical reports cited in the following sections.

With the exception of the waste status summary reports, all reports cited in this section are available electronically from the Hanford Declassified Document Retrieval System at http://www2.hanford.gov/declass/. Full-text copies of the waste status summary reports cited in this section are provided in Appendix A. The results of the present review of historical records are compared with a previous review of historical report that was conducted in 1980 as part of WHC-MR-0132, *A History of the 200 Area Tank Farms*.

3.1 DESCRIPTION OF TANKS 241-B-201 THROUGH 241-B-204 AND 241-T-201 THROUGH 241-T-204

Single-shell tanks 241-B-201 through 241-B-204 (B-200 series) and tanks 241-T-201 through 2410T-204 (T-200 series) were originally constructed in 1944 as part of the Manhattan Project (HW-10475-C, chapter IX). The B-200 and T-200 series tanks are twenty-foot diameter underground tanks made of reinforced concrete with a steel liner on the bottom and sides, as depicted in Figure 2. Each tank has a design capacity of 55,000 gallons at a liquid depth of twenty-four feet. The 200 series tanks are grouped together with twelve larger capacity single-shell tanks (100 series) to comprise a tank farm.

Figure 2 Cross Section of 200 Series Single-Shell Tank.



3.2 WASTE TRANSFERS INTO TANKS 241-B-201 THROUGH 241-B-204

This section discusses the date and source of wastes that were transferred into tanks 241-B-201 through 241-B-204. Tanks 241-B-201 through 241-B-204 did not receive any high-level wastes. These tanks received transuranic waste from operations conducted at the 224-B plutonium concentration building and equipment decontamination waste. According to the *Hanford Technical Manual Section C* for the bismuth phosphate process (HW-10475-C, pages 909 - 911), the metal waste solution from the bismuth phosphate processing plant (B-Plant) was originally planned to be decontaminated to separate fission products from the uranium using scavenger precipitation processes. This decontamination process was to be conducted in B-Plant with the precipitates being transferred to the 241-B-201 through 241-B-204 tanks. However, the metal waste decontamination process was never implemented and metal waste solution was *not* transferred into these tanks. Tanks 241-B-201 through 241-B-204 were unused until October 1, 1946.

Beginning in October 1946, tanks 241-B-201 through 241-B-204 were used as settling tanks for the solids that were contained in the 224-B Concentration building waste, with the liquid waste discharged to the 241-B-1 and 241-B-2 cribs. Prior to October 1946, the waste from the 224-B Concentration building was transferred to the 361-B settling tank and the liquid portion discharged to the 241-B-361, reverse-well. By September 1946, solids had accumulated in the 361-B settling tank to a point where the tank had reached its storage capacity, causing shutdown of 221-B and 224-B building operations, as reported in the Army Corp of Engineers monthly report for September 1946 (HAN-45800, page 77). A project was initiated in August 1946 to divert the 224-B Concentration building waste to tank 241-B-201 (HW-7-4640). The Army Corp of Engineers monthly report for October 1946 reports this project was completed on October 1, 1946, at which time a connection was made from the 224-B building waste transfer line to tank 241-B-201 (HAN-45800, page 87). A similar connection was also completed on October 14, 1946 from the 224-T Concentration building waste transfer line to tank 241-T-201. The *Hanford Engineering Works Monthly Report for October 1946* (HW-7-5362-DEL, pages 27 and 28) confirms that the 224-B building waste was routed to tank 241-B-201 in October 1946.

Tank 241-B-201 received waste from the 224-B Concentration building from October 2, 1946 through October 1948, after which the tank was considered filled with solids and the 224-B Concentration building waste was diverted to tank 241-B-204 (HW-11499, page 34). Tank 241-B-204 was connected in a cascade with tanks 241-B-203 and 241-B-202 (HW-10714-DEL, page 31). Liquid was gravity discharged from the last tank in the cascade, 241-B-202 to the 241-B-1 and 241-B-2 cribs. Solids contained in the 224-B building waste were allowed to settle in tanks 241-B-204 through 241-B-202. The cascade of tanks 241-B-204, 241-B-203, and 241-B-202 continued to receive 224-B Concentration building wastes until September 1952. The discharge of 224-B Concentration building waste from the B-202 tank to the 241-B-1 and 241-B-2 cribs is documented in HW-20583, *Process Waste Disposal Summary – 200 Areas September 1949 through December 1950*, HW-25301, *Process Waste Disposal Summary – 200 Areas January 1952 through June 1952*, HW-28121, *Release of Radioactive Wastes to Ground*, and HW-33591, *Summary of Liquid Radioactive Wastes Discharged to the Ground – 200 Areas July 1952 through June 1954*.

In addition to waste from the 224-B Concentration building, tanks 241-B-202 through 241-B-204 also received low-activity waste from tank 5-6 in 221-B Plant from October 3, 1947 through August 12, 1948 (HW-17088, page 31 and HW-38562, page 9). Tank 5-6 received low activity cell drainage as well as scrubber solution from the dissolvers in 221-B Plant (HW-10728, page 2). Tanks 241-B-201 through 241-B-204 were reported to have received a total of 22,300,000 liters of waste containing 2180 grams of plutonium and 4000 curies of fission products from May 1947 through January 1, 1950 (HW-17088, page 57). Approximately 7,400,000 liters of the waste transferred to tank 241-B-201 was low-activity waste from tank 5-6 in 221-B Plant (HW-17088, page 57). The low concentration of fission products in the 224 building and tank 5-6 waste, ~180 micro-curies per liter supports that no high-level waste was transferred along with the tank 5-6 waste to tanks 241-B-201 through 241-B-204.

In July 1952, B-Plant and the 224-B Concentration building were shut down because their processing capability was no longer needed and had been replaced by the 202-S REDOX facility. Beginning in July 1952, cleanout of B-Plant and the 224-B Concentration building was initiated, with the spent nuclear fuel dissolver heels removed from equipment in the 221-B building (HW-25227-DEL, pages Ed-1 and Ed-6). The dissolvers, metal waste equipment and other process equipment in the 221-B Plant were flushed with nitric acid solution from July 1952 through September 1952 to remove fission products and plutonium. The recovered plutonium solutions were processed through the normal bismuth phosphate flowsheet and wastes transferred to their normal disposal pathways (HW-25227-DEL page Ed-1 and Ed-6, HW-25533-DEL, pages Ed-1 and Ed-6, HW-25781-DEL, page Ed-1, and HW-26047-DEL, pages Ed-1 and Ed-5). Plutonium solutions derived from equipment cleanout activities in the 221-B Plant were processed in the 224-B Concentration building to recover the plutonium, with waste from the 224-B Concentration building transferred to the cascade of tanks 241-B-204, 241-B-203, and 241-B-202.

The waste solutions generated from nitric acid flushing of the 221-B Plant equipment were transferred to their normal disposal pathways. The B-200 series single-shell tanks only received waste from the 224-B Concentration building during the nitric acid flushing of the 221-B Plant equipment. Monthly reports for the 200 Area tank farms for April 1952 through September 1952 (HW-27838 and HW-27839) substantiate that only 224-B Concentration building waste was discharged to the cascade of tanks 241-B-204, 241-B-203, and 241-B-202 during the nitric acid flushing of 221-B Plant equipment.

High-level waste was removed from affected 221-B Plant equipment as a result of removing the heels from the dissolvers and nitric acid flushing of the equipment. Additional cleaning of the internal surfaces of piping and equipment in 221-B Plant and 224-B building was conducted using various chemical solutions and water, as described in HW-27774. This cleaning occurred from October 1952 through March 1953.

Flushes of metal waste, first decontamination cycle, and second decontamination cycle equipment were transferred to the cascade of tanks 241-B-110, 241-B-111, and 241-B-112, as documented in waste status summary reports for the 200 Area tanks farms for this period (HW-27840, HW-27841, HW-27842, and HW-27775). In November 1952, the cascade of tanks 241-B-204, 241-B-203, and 241-B-202 received flushes of 224-B building equipment and metal waste lines (HW-27840, page 20). In December 1952, they received flushes of 224-B building equipment and 221-B Plant section 9 metal waste tanks (HW-27840, page 28). In January, February and March 1953 they received flushes of 224-B building equipment and 221-B Plant sections 7 and 8 extraction equipment (HW-27841, page 9, HW-27842, page 9, HW-27775, page 9). As previously discussed, the dissolvers, metal waste equipment and other equipment in the 221-B Plant had been flushed with nitric acid from July through September 1952 and removed the high level waste from affected equipment. Therefore, the 221-B Plant equipment flushing conducted from October 1952 through March 1953 did not generated high-level waste.

Flushing of the B-Plant cells and wetting of process equipment with water was conducted in April 1953 through June 1, 1953 (HW-27932-DEL, page Ed-5; HW-28267-DEL, page Ed-5; and HW-28576-DEL, page Ed-5). These flush solutions were transferred to the cascade of tanks 241-B-110, 241-B-111, and 241-B-112, as documented in waste status summary reports for the 200 Area tanks farms for this period (HW-28043, HW-28377, and HW-28712). Additional decontamination of equipment in the 224-B Concentration building was also conducted in May through July 1953 with the flush solutions processed through T-Plant to recover plutonium (HW-28267-DEL, page Ed-5, HW-28576-DEL, page Ed-5, and HW-28906-DEL, page Ed-5).

In October 1954, approximately 50,000-gallons of water were transferred from the 221-B Plant through the cascade of tanks 241-B-201 through 241-B-204 (HW-33544, page 4 and HW-38562, page 9). In December 1954, tank 5-6 (low activity cell drainage in 221-B Plant) was reported as being routed to the cascade of tanks 241-B-204, 241-B-203, and 241-B-202, but no volume of waste was reported as being discharged to these tanks in the tank farm monthly waste status summary report (HW-34412, page 4). However, the June 1955 report for discharge of wastes to the ground (HW-38562, page 9) indicates approximately 750,000 liters (~198,000 gallons) of low-activity waste were discharged from 221-B Plant tank 5-6 from December 1954 through June 1955 to tanks 241-B-202 through 241-B-204 to the 241-B-1 and 241-B-2 cribs.

In July 1955, 224-B Concentration building flush water was reported as being routed to the cascade of tanks 241-B-204, 241-B-203, and 241-B-202, but no volume of waste was reported as being discharged to these tanks in the tank farm monthly waste status summary report (HW-38401, page 4). However, the June 1956 report for discharge of wastes to the ground (HW-44784, page 27) indicates approximately 653,000 liters (~172,500 gallons) of low-activity waste were discharged from 221-B Plant tank 5-6 from July 1955 through September 1955 to tanks 241-B-202 through 241-B-204 to the 241-B-1 and 241-B-2 cribs. Beginning in October 1955, the

low activity waste from 221-B Plant tank 5-6 was routed to the cascade of tanks 241-B-110, 241-B-111 and 241-B-112 and then to the 241-B-1 and 241-B-2 cribs (HW-44784, page 27).

During the period of 1954 through 1955, the 221-B Plant and 224-B Concentration building were being modified for restart as part of the so-called "4X Program" (HW-33903). The 4X Program was a program to operate all four separation facilities (221-B, 221-T, 202-S REDOX and 202-A PUREX Plants) simultaneously. The modifications conducted in the 221-B Plant and 224-B Concentration building resulted in the transfer of low-activity waste to tanks 241-B-202 through 241-B-204. However, the 4X Program was cancelled in March 1957 and the 221-B Separations Plant and 224-B Concentration building were placed in lay-away status (DDTS-Generated-491, "Lay-Away of the Bismuth Phosphate – TBP Plants and the Metal Waste Removal Facilities").

From 1957 through 1963, the 221-B Plant was converted for separating fission products of cesium-137 and strontium-90 from PUREX plant wastes. A flush of 7,500-gallons was transferred from the 221-B Plant to the cascade of tanks 241-B-204, 241-B-203, and 241-B-202 sometime January 1, 1962 through June 30, 1962 (HW-74647, page 4). This is the last transfer of any waste solutions into tanks 241-B-201 through 241-B-204. The 221-B Plant did not receive any waste for fission product separation until August 2, 1963 (HW-78817, page 5) and did not discharge fission product waste to tanks 241-B-201 through 241-B-204.

Tanks 241-B-201 through 241-B-204 did not receive any liquid wastes originating from the operation of the first cycle solvent extraction system, or equivalent, or the concentrated wastes from subsequent extraction cycles, or equivalent, in a spent fuel reprocessing facility. Rather, the wastes received into tanks 241-B-201 through 241-B-204 were from a *plutonium concentration* process (not a subsequent *extraction* process) performed in a *separate* facility and wastes from equipment decontamination activities conducted in the 221-B Bismuth Phosphate Plant and 224-B Concentration building.

3.3 WASTE TRANSFERS INTO TANKS 241-T-201 THROUGH 241-T-204

This section discusses the date and source of wastes that were transferred into tanks 241-T-201 through 241-T204. These tanks did not receive any high-level waste but did receive transuranic waste from operations conducted at the 224-T plutonium concentration building. According to the *Hanford Technical Manual Section C* for the bismuth phosphate process (HW-10475-C, chapter X, pages 909 - 911) the metal waste solution from T-Plant was originally planned to be decontaminated to separate fission products from the uranium using scavenger precipitation processes. This decontamination process was to be conducted in T-Plant with the precipitates being transferred to the 241-T-201 through 241-T-204 tanks. However, the metal waste decontamination process was never implemented and metal waste solution was *not* transferred into these tanks. Tanks 241-T-201 through 241-T-204 were unused until November 4, 1946.

Beginning on November 4, 1946, tank 241-T-201 was used as a settling tank for the solids that were contained in the 224-T Concentration building waste, with the liquid discharged to the 241-T-1 and 241-T-2 cribs (HW-33591, page 4). The waste from the 224-T Concentration building had been previously transferred to the 361-T settling tank and the liquid portion

discharged to the 241-T-361, reverse-well. By July 1946, solids had accumulated in the 361-T, settling tank to a point where the tank had reached its storage capacity (HAN-45800, page 67). A project was initiated in August 1946 to divert the 224-T Concentration building waste to tank 241-T-201 (HW-7-4640). The Army Corp of Engineers monthly report for October 1946 reports this project was completed on October 14, 1946, at which time a connection was made from the 224-T building waste transfer line to tank 241-T-201 (HAN-45800, page 87). The Hanford Engineering Works monthly report for October 1946 (HW-7-5362-DEL, page 27 to 28) confirms that a route was established for transfer of the 224-T building waste to tank 241-T-201 in October 1946, with waste transfer initiated on November 4, 1946.

Tank 241-T-201 received waste from the 224-T Concentration building from November 4, 1946 through May 24, 1949, after which the tank was considered filled with solids and the 224-T Concentration building waste was routed to tank 241-T-204 (HW-13561-DEL, page 41). The solids depth in tank 241-T-201 was reported as "twenty feet of rather compact sludge and approximately three feet of a light sludge" (HW-13561-DEL, page 41).

Tank 241-T-204 was connected in a cascade with tanks 241-T-203 and 241-T-202, (HW-10714-DEL, page 31). Liquid was gravity discharged from the last tank in the cascade, tank 241-T-202, to the 241-T-1 and 241-T-2 cribs. Solids contained in the 224-T Concentration building waste were allowed to settle in tanks 241-T-204 through 241-T-202.

The tanks 241-T-204, 241-T-203, and 241-T-202 cascade continued to receive 224-T Concentration building wastes until May 29, 1952, after which this waste was transferred to the cascade of single-shell tanks 241-T-110, 241-T-111, and 241-T-112 (HW-27838, page 17). Tanks 241-T-201 through 241-T-204 were considered filled with solids and taken out of service effect on May 29, 1952 (HW-27838, page 12).

Tanks 241-T-201 through 241-T-204 did not receive any liquid wastes originating from the operation of the first cycle solvent extraction system, or equivalent, or the concentrated wastes from subsequent extraction cycles, or equivalent, in a spent fuel reprocessing facility. Rather, the wastes are either from a *plutonium concentration* process (not a subsequent *extraction* process) performed in a *separate* facility (224-T Concentration building).

3.4 CURRENT REVIEW OF WASTE TRANSFER RECORDS COMPARED WITH OTHER REVIEWS

Historical records of waste transfers into, from and among the 200 Area tank farms were compiled and reported in WHC-MR-0132, LA-UR-96-3860, and LA-UR-97-311. Additional waste transfer records have been summarized for the B-200 series tanks in WHC-SD-WM-ER-310. These documents were reviewed and compared with the current analysis documented in this report to determine if significant discrepancies exist.

3.4.1 B-200 Series Tanks

These previous reviews to determine the tank contents for tanks 241-B-201 through 241-B-204 generally refer to WHC-MR-0132 and provide no new references regarding waste transfers into these tanks. Therefore, the current review of waste transfer records for tanks 241-B-201 through 241-B-204 was compared to that of WHC-MR-0132. Appendix B provides copies of the tabulated waste transfer records for tanks 241-B-201 through 241-B-204 from WHC-MR-0132.

In general, the waste transfer records summarized in WHC-MR-0132 are consistent with the information present in this document. However, there are three significant discrepancies that are discussed in the following sections.

3.4.1.1 Date Tanks Used to Receive Waste

The waste transfer records summarized in WHC-MR-0132 for tanks 241-B-201 through 241-B-204 do not indicate the presence of any waste in tanks 241-B-201 through 241-B-204 until the first quarter of 1952. This is inconsistent with historical documents discussed in this document, which indicates that these tanks received waste from the 224-B Concentration building beginning in October 1946. The Hanford site contractors' monthly reports for January 1945 through July 1951 list the volume of waste stored in the single-shell tanks, with the exception of the B-200 and T-200 series single-shell tanks. Evidence of the waste types transferred to the B-200 and T-200 series single-shell tanks is provided in the Hanford site contractors' monthly reports, waste disposal reports, and miscellaneous letters and technical reports cited in the following sections. These documents were classified until the early 1990's, which would have limited their availability. It is likely that these documents were unavailable to the authors of WHC-MR-0132 and LA-UR-97-311.

3.4.1.2 Cascade Operation of Tanks

Beginning in the first quarter of 1952, WHC-MR-0132 indicates that 224-B Concentration building waste (designated as "224") was transferred into tanks 241-B-201 through 241-B-204, which were operated as a cascade to a crib. However, this contradicts information published in HW-33591(*Summary of Liquid Radioactive Wastes Discharged to the Ground – 200 Areas July 1952 through June 1954*), which states that tank 241-B-201 received waste from the 224-B Concentration building only from October 2, 1946 through October 1948, after which the tank was considered filled with solids and the 224-B Concentration building waste was diverted to tank 241-B-204.

Tank 241-B-204 was connected in a cascade with tanks 241-B-203 and 241-B-202. Liquid was gravity discharged from the last tank in the cascade, tank 241-B-202, to the 241-B-1 and 241-B-2 cribs. Furthermore, tank farm waste status summary records for April through June 1952 (HW-27838) and July through September 1952 (HW-27839) indicate that only tanks 241-B-204

through 241-B-202 were active in a cascade with discharge to the crib. Again, this inconsistency in records does not affect the classification of the wastes in tanks 241-B-201 through 241-B-204.

3.4.1.3 Metal Waste Not Transferred to Tanks

WHC-MR-0132 identifies that metal waste (designated as "MW") was transferred into tanks 241-B-201 through 241-B-204 in the fourth quarter of 1952. WHC-MR-0132 indicates that metal waste was present in tanks 241-B-201 through 241-B-204 through the third quarter of 1953, after which time WHC-MR-0132 indicates that only "224" waste is present in these tanks. There is no explanation provided in WHC-MR-0132 to indicate that metal waste was removed from these tanks or that the earlier designation of metal waste being present in these tanks was incorrect.

It is highly unlikely that metal waste was transferred into tanks 241-B-201 through 241-B-204, since these tanks were active as a cascade that overflowed to the ground via a crib. Metal waste was not discharged to the ground because of the concentration of fission products and the economic value of the uranium. Because of the economic value of uranium, metal waste was kept segregated from other wastes. Document HW-33591 (*Summary of Liquid Radioactive Wastes Discharged to the Ground – 200 Areas July 1952 through June 1954*) does not indicate the disposal of any metal waste to these tanks or the ground (i.e. cribs).

Process records for waste transfers to the 200 Area tank farms indicate that metal waste generated from spent nuclear fuel reprocessing at 221-B Plant was transferred to tank 241-BY-112 in BY Tank Farm for the period of April 1952 through September 1952 (HW-27838, pages 9, 21, and 32 and HW-27839, pages 10, 21, 32). These same historical records indicate that only flushes of the metal waste lines and 221-B and 224-B building equipment were transferred to the cascade of tanks 241-B-204 through 241-B-202 during October 1952 through March 1953. Based on this information, WHC-MR-0132 incorrectly stated the presence of metal waste in tanks 241-B-201 through 241-B-204.

Further evidence that metal waste was not transferred into tanks 241-B-201 through 241-B-204 is provided by the analyzed composition of the sludges presently stored in these tanks, as reported in the Tank Waste Information Network (http://twins.pnl.gov/twins.htm). Key analytes present in the wastes stored in tanks 241-B-201 through 241-B-204 are summarized in Tables 4.

The inventory of key analytes (e.g., Pu-239, Cl, Fe, Na, NO_3, PO_4, SO_4, CO_3, and U) in the sludge phase of tanks 241-B-201 through 241-B-204 has been divided by the mass of the sludge in each tank and reported in the upper half of Table 4. The composition of metal waste that was contained in single-shell tanks 241-T-101, 241-U-101 and 241-U-102 is provided in the lower half of Table 4. It is evident from the analyses in Table 4 that the concentrations of Pu-239, Cl, and Fe in the sludges present in tanks 241-B-201 through 241-B-204 are one order of magnitude higher than the metal waste sludges. Also, the concentration of uranium in the sludges present in tanks 241-B-201 through 241-B-204 is three orders of magnitude lower than the metal waste sludges. This comparison clearly shows that metal waste sludge contained a higher uranium concentration and a lower plutonium concentration than the sludges present in tanks 241-B-201

to 241-B-204. The sludges present in tanks 241-B-201 to 241-B-204 do not have the characteristics of metal waste sludge. Furthermore, the concentrations of cesium-137 and strontium-90 sludge present in tanks 241-B-201 through 241-B204 are less than 2E-04 Ci/l and 4E-03 Ci/l, respectively. Metal waste or other high-level waste would have cesium-137 and strontium-90 concentration several orders of magnitude higher, as reported in Table 3.

3.4.2 T-200 Series Tanks

In general, the waste transfer records summarized in WHC-MR-0132 are consistent with the information present in this document. The waste transfer records summarized in WHC-MR-0132 (see Appendix B) and the Waste Status and Transaction Record Summary (LA-UR-97-311) report for tanks 241-T-201 through 241-T-204 do not indicate the presence of any waste in these tanks until the first quarter of 1952. This is inconsistent with historical documents discussed in the previous section, which indicate that these tanks received waste from the 224-T Concentration building beginning in November 1946. The Hanford site contractors' monthly reports for January 1945 through July 1951 list the volume of waste stored in the single-shell tanks, with the exception of the B-200 and T-200 series single-shell tanks. Evidence of the waste types transferred to the B-200 and T-200 series single-shell tanks is provided in the Hanford site contractors' monthly reports, waste disposal reports, and miscellaneous letters and technical reports cited in the following sections. These documents were classified until the early 1990's, which would have limited their availability. It is likely that these documents were unavailable to the authors of WHC-MR-0132 and LA-UR-97-311.

WHC-MR-0132 and LA-UR-97-311 both indicate that only 224-T building waste was received in these tanks and that these four tanks were removed from service in May 29, 1952. This is consistent with the current review of waste transfer records for these tanks.

Table 4. Comparison of Metal Waste and Tanks 241-B-201 to 241-B-204 Sludges.

	Pu-239	Cl	Fe	Na	NO_3	PO_4	SO_4	CO_3	U Total	Sample Event Description	Reference
	µCi/g	µg/g	µg/g	µg/g	µg/g	µg/g	µg/g	µg/g	µg/g		3
241-B-201	7.51E-01	1.68E+03	1.15E+04	3.42E+04	5.05E+04	1.45E+04	3.48E+02	1.61E+04	1.56E+02	Composite analysis of core sample	3
241-B-202	1.28E-01	8.64E+02	1.19E+04	3.93E+04	6.15E+04	1.12E+04	9.81E+03	9.81E+03	3.23E+02	Composite analysis of core sample	3
241-B-203	1.94E-01	8.39E+02	3.30E+03	2.89E+04	6.22E+04	6.65E+03	2.67E+02	3.34E+03	1.78E+02	Composite analysis of core sample	3
241-B-204	2.39E-01	6.46E+02	3.72E+03	2.63E+04	4.94E+04	7.06E+03	2.81E+02	6.73E+03	1.61E+02	Composite analysis of core sample	3
Metal Waste Sample Analyses											
U-101 (S1)	5.75E-02	5.00E+02	3.80E+02	1.18E+05		5.30E+04	1.10E+03	1.57E+05	2.88E+05	Near tank inlet, near top of sludge	1
U-101 (S2)	2.91E-02	7.00E+01	1.00E+02			3.30E+04	4.10E+03	2.08E+05	3.63E+05	Near tank outlet, 1-ft from bottom	1
T-101 (a)				1.16E+05	5.10E+04	1.11E+05	2.40E+04	3.00E+03	1.12E+05	6/1948, Near tank inlet, depth unknown	2
T-101 (b)				8.50E+04	1.60E+04	1.34E+05	2.20E+04	1.00E+03	1.34E+05	8/1948, Near tank inlet, depth unknown	2
T-101 (2)				1.04E+05		1.28E+05	1.90E+04	1.58E+04	1.62E+05	11/1948, Near tank inlet, 3-ft from bottom	2
T-101 (3)				1.16E+05		1.02E+05	1.20E+04	2.56E+04	2.04E+05	11/1948, Near tank inlet, 2-ft from bottom	2
T-101 (4)				1.37E+05		4.80E+04	8.00E+03	1.15E+05	3.63E+05	11/1948, Near tank inlet, 1-ft from bottom	2
T-101 (5)				1.51E+05		1.60E+04	8.00E+03	2.55E+05	3.46E+05	11/1948, Near tank outlet, 1-ft from bottom	2
T-101 (6)				1.46E+05		1.50E+04	6.00E+03	2.63E+05	3.65E+05	11/1948, Near tank outlet, just off bottom	2
U-101 (13)	2.70E-02			1.27E+05	2.00E+03	6.10E+04	2.80E+03	1.81E+05	3.29E+05	2/1949, Near tank inlet, 4-ft from bottom	2
U-101 (14)	1.29E-02			9.40E+04	3.00E+03	4.90E+04	2.05E+03	1.66E+05	2.63E+05	2/1949, Near tank inlet, 3-ft from bottom	2
U-101 (15)	2.11E-02			1.23E+05	3.50E+03	5.30E+04	2.54E+03	1.62E+05	2.73E+05	2/1949, Near tank inlet, 2-ft, 7-inches from bottom	2
U-101 (16)	2.59E-02			1.08E+05	2.00E+03	5.20E+04	3.03E+03	4.10E+04	2.66E+05	2/1949, Near tank outlet, 3-ft from bottom	2
U-102 (17)	1.83E-02			1.09E+05	3.00E+03	1.36E+05	5.08E+03	6.90E+04	1.06E+05	2/1949, Near tank inlet, 1-inch from bottom	2
U-102 (18)	6.61E-03			8.50E+04	2.00E+03	1.05E+05	9.26E+03	9.00E+04	1.52E+05	2/1949, Near tank outlet, 1-inch from bottom	2

Notes:

Ref. 1: HW-18492, *Settling and Dissolution Characteristics and Composition of Hanford Waste Metal Sludge.*
Ref. 2: Letter HW-14157, "Compilation of Data on Composition of Bismuth Phosphate Process Metal Wastes."
Ref. 3: Best Basis Inventory obtained from the Tank Waste Information System on October 7, 2002. Sechttp://twins.pnl.gov/twins.htm

4.0 TRANSURANIC ANALYSES OF WASTES

The Hanford Site prepares a Best Basis Inventory (BBI) estimate of the composition of the wastes stored in all 177 Hanford Site underground storage tanks. The BBI effort involves developing and maintaining waste tank inventories comprising 25 chemical and 46 radionuclide components in the 177 Hanford Site underground storage tanks. Waste sample analyses, process knowledge, and waste templates are used to create the BBIs. These BBIs provide waste composition data necessary as part of the River Protection Project (RPP) process flowsheet modeling work, safety analyses, risk assessments, and system design for retrieval, treatment, and disposal operations. Development and maintenance of the BBI is an on-going effort, with the current BBIs available electronically through TWINS, http://twins.pnl.gov/data/datamenu.htm.

The BBIs for the wastes contained in tanks 241-B-201 through 241-B-204 and 241-T-201 through 241-T-204 are based on analyses of core samples and templates. Template values were used for constituents below the detection limits for sample data or constituents not measured from the sampling event. Templates are based on sampling data from tanks that contain the same waste type, supplemented with Revision 5 of the HDW model data (RPP-19822). Table 5 provides the best basis inventory concentration estimate for Np^{237}, Pu^{238}, Pu^{239}, Pu^{240}, and Am^{241} in the sludges stored in these tanks. These five radionuclides comprise the majority of the transuranic elements with half-lives greater than 20-years present in these wastes. In general, the concentrations of Np^{237}, Pu^{238}, Pu^{239} and Pu^{240}, in the sludges stored in tanks 241-B-203, 241-B-204 and 241-T-201 through 241-T-204 are calculated from the analyzed total alpha concentrations for these wastes using an alpha isotope distribution template.

Core samples of the wastes in tanks 241-B-201 and 241-B-202 were obtained in 1991. Core samples of the wastes in tanks 241-B-203 and 241-B-204 were obtained in 1995. Core samples of the wastes in tanks 241-T-201 through 241-T-204 were obtained in 1997. The sludges collected in these core samples were analyzed to determine the composition of these wastes as well as the concentration of alpha emitting radionuclides (gross alpha analysis).

The analyzed, mean gross alpha analyses, 95% lower confidence limit and 95% upper confidence limit for the wastes in tanks 241-B-201 through 241-B-204 and tanks 241-T-201 through 241-T-204 are provided in Table 6 (Wilmarth 2002). Uranium-238, which is not a transuranic element, would be included in the gross alpha analysis. The gross alpha analysis would tend to over estimate the sum of the concentrations of alpha-emitting transuranic isotopes with half-life greater than 20 years. This is substantiated by the analyses of the core samples from tank 241-B-201 and 241-B-202, which were also analyzed to determine the concentrations of Pu^{238}, Pu^{239}, Pu^{240}, and Am^{241} in these sludges (see Table 5). The sums of the concentrations of alpha-emitting transuranic isotopes with half-life greater than 20 years are ~829ηCi/g and ~218ηCi/g, respectively for tanks 241-B-201 and 241-B-202.

The analyzed gross alpha analyses for the waste in each tank are in excess of 100ηCi/g. The sum of the concentrations of Np^{237}, Pu^{238}, Pu^{239}, Pu^{240}, and Am^{241} for the sludges in tanks 241-B-201 and 241-B-202 also indicate that the concentration of transuranic elements with half-life greater than 20-years is also in excess of 100ηCi/g.

Table 5. Transuranic Element Analytical Results for Sludges

Tank Name	Analyte	Basis	Concentration, µCi/g
241-B-201	237Np	TE	1.45E-07
241-B-201	238Pu	S	6.29E-03
241-B-201	239Pu	S	7.51E-01
241-B-201	240Pu	S	4.32E-02
241-B-201	241Am	S	2.84E-02
241-B-202	237Np	TE	2.26E-07
241-B-202	238Pu	S	2.03E-03
241-B-202	239Pu	S	1.28E-01
241-B-202	240Pu	S	2.17E-02
241-B-202	241Am	S	6.67E-02
241-B-203	237Np	S	8.17E-07
241-B-203	238Pu	C	2.02E-03
241-B-203	239Pu	C	2.34E-01
241-B-203	240Pu	C	2.94E-02
241-B-203	241Am	S	3.46E-02
241-B-204	237Np	TE	2.08E-07
241-B-204	238Pu	C	1.72E-03
241-B-204	239Pu	C	1.99E-01
241-B-204	240Pu	C	2.51E-02
241-B-204	241Am	C	3.84E-02
241-T-201	237Np	TE	1.37E-07
241-T-201	238Pu	C	2.26E-03
241-T-201	239Pu	C	6.69E-01
241-T-201	240Pu	C	4.51E-02
241-T-201	241Am	C	3.96E-02
241-T-202	237Np	TE	2.20E-07
241-T-202	238Pu	C	1.45E-03
241-T-202	239Pu	C	1.67E-01
241-T-202	240Pu	C	2.11E-02
241-T-202	241Am	C	3.23E-02
241-T-203	237Np	S	6.20E-07
241-T-203	238Pu	C	1.73E-03
241-T-203	239Pu	C	2.00E-01
241-T-203	240Pu	C	2.53E-02
241-T-203	241Am	S	3.36E-02
241-T-204	237Np	S	5.35E-07
241-T-204	238Pu	C	1.46E-03
241-T-204	239Pu	C	1.68E-01
241-T-204	240Pu	C	2.12E-02
241-T-204	241Am	S	2.01E-02

Notes: Radionuclides are decay corrected to January 1, 2004
S – Sample based
C – Calculated
TE – Based on a Hanford Defined Waste model or engineering based waste template

Table 6. Gross Alpha Analyses for Sludges.				
Tank	Mean (ηCi/g)	Relative Standard Deviation	95% Low Confidence Limit	95% Upper Confidence Limit
B-201	1,310	13%	1,030	1,590
B-202	398	9%	338	457
B-203	215	9%	184	245
B-204	265	9%	226	303
T-201	757	21%	490	1,024
T-202	223	12%	180	265
T-203	196	12%	157	234
T-204	144	10%	120	169

5.0 SUMMARY

Tanks 241-B-201 through 241-B-204 received waste from the plutonium concentration activities conducted from October 1946 through June 1952 in the 224-B Concentration building. Following cessation of spent nuclear fuel processing activities in the 221-B Bismuth Phosphate Plant and cleanout of the plant inventory, tanks 241-B-201 through 241-B-204 received flush solutions from equipment cleanout in the 221-B and 224-B buildings and metal waste transfer lines.

Tanks 241-T-201 received waste from plutonium concentration activities conducted from November 4, 1946 through May 24, 1949 in the 224-T Concentration building. Tanks 241-T-202 through 241-T-204 received wastes from plutonium concentration activities conducted from May 24, 1949 through May 29, 1952 in the 224-T Concentration building.

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APPENDIX A

WASTE STATUS SUMMARY REPORTS

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[redacted] Security Information

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Page 1

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WASTE STATUS SUMMARY

Period: April, May and June, 1952

Classification Cancelled and Changed To
Declassified
By Authority of DOC 1973
By A.E. Barber
Verified By J.D. Deroun

SPECIAL RE-REVIEW
FINAL DETERMINATION
DECLASSIFICATION CONFIRMED
BY R. Hammer DATE Aug 16, 1995
BY J.D. Berger DATE 8/17/95
Pat Lerman 3-15-96
Jim Rice 3-22-96

APPROVED FOR PUBLIC RELEASE 3/15/96

A.C. Morgenthaler
Planning & Scheduling Group
Waste Control
Manufacturing Department

INSPECTED BY
R.M. Allen 7-29-02
NAME DATE
PNNL NSAT

[redacted]

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WASTE STATUS SUMMARY
SEPARATIONS-OPERATIONS

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Month of April, 1952

	B Plant	T Plant
Runs of Metal Waste to waste farm during the month	7	58
Gals. increase in Metal Waste volume	22,623	165,000
Gals./Run average Metal Waste volume	2,917	2,797
Reserve Gals. available for Metal Waste on 4/30/52	1,693	1,936
Runs of First Cycle Waste sent to farm during the month	7	66
Gals. increase in First Cycle Waste volume	22,000	160,000
Gals./Run average First Cycle Waste volume	3,142	2,424
Reserve Gals. available for First Cycle Waste on 4/30/52	1,131	2,444

Remarks: * Averages computed after correcting line #2 for 2 [illegible] runs and 1 Bicarbonate flush (1244 + 957)

	S Plant
Batches equivalent to 6-3 MS product content contributing to make-up of waste	115.26
Gallons increase in fission product waste storage*	324,500
Tons of Uranium (as-charged) processed to contribute to make-up of waste	83.14
Gallons/batch equivalent to 6-3 MS	2,315
Gallons per ton of Uranium processed	3,900
Reserve Gallons available for Redox waste on 4/30/52	8,272

Remarks: * During the month of February a 21% discrepancy between amount of waste sent versus amount of waste received in storage existed. The variation this month between these two figures was less than 1%.

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WASTE STORAGE STATUS

As of 4/30/52

METAL WASTE

FARM	Gallons x 10³ In Storage Begg Mon	Metal Waste Received	In Storage End Mon	Reserve Capacity In Batches
EAST AREA				
B	1579		1579	
C	3374		3374	
BX	3117		3117	23
BY	4389	23	4412	604
TOTAL	12459	23	12482	627
WEST AREA				
T	1579		1579	
U	4737	(1579)	3158	
TX	5489	165	5654	132
TY				558**
TOTAL	11805	165	10391	790

REMARKS: *Reserve capacity at 2700* Gallons per batch

** The present plan is to allocate 101-102TX to Redox recovery and give equivalent space in U farm to T plant for metal waste storage. This would eliminate the necessity of completing the removal facilities in TX farm. (Removal facilities are not available in U farm). This plan requires that a cascade become available in U farm before 108TX, the present T plant metal waste tank, is filled.

( ) Metal waste in 101-102-103 U slurrying for TXP feed.

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WASTE STORAGE STATUS

As of 1/30/[illegible]

URANIUM CONTENT
METAL WASTE

PLANT	TONS			
	In Storage Beg. Mos	Received	To TSP	In Storage End Mos
EAST AREA				
B	355			355
C	[illegible]			[illegible]
[illegible]	[illegible]			[illegible]
[illegible]	[illegible]			[illegible]
TOTAL	[illegible]			[illegible]
WEST AREA				
T	175			175
U	1,277		[illegible]	772
[illegible]	1,260	[illegible]		[illegible]
[illegible]				
TOTAL	[illegible]	[illegible]		[illegible]

* Tons of uranium transferred as metal waste to the Waste Control Group for slurrying

REMARKS: April [illegible] based on [illegible] is based on 600 [illegible] average.

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WASTE STORAGE STATUS

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As of 4/30/52

FIRST CYCLE WASTE

FARM	Gallons x 10^3				
	In Storage Beg. Mo.	1st Cycle Waste Rec'd	Feed To Evaporator	In Storage End Mo.	* Reserve Cap. In Batches
EAST AREA					
B	3,060			3,060	
Evaporator Feed Tank = 106 B	233		54	187	123
C	3,039		496	2,543	224
BX	3,175			3,175	
BY	2,088	22		2,108	58
TOTAL	9,493	22	642	9,073	405
WEST AREA					
T	3,910			3,910	
U	3,585		687	898	
TX	3,176	160		3,336	374
Evaporator Feed Tank = 118 TX	69		280	149	316
TY					
TOTAL	4,760	160	303	4,493	1,020

* Reserve Capacity at 2,800 gallons per batch.
( ) Not included in totals.

REMARKS:

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WASTE STORAGE STATUS

As of 5/30/52

SECOND CYCLE WASTES

	Cascade In Use	Gallons x 10³		Estimated Reserve Capacity In Batches
		Cribbed	Sludge	
EAST AREA	110-111-112-[illegible]	128	401 **	3,065
WEST AREA	110-111-112-[illegible]	24	666	3,140
TOTAL		152	1,067	6,205

REMARKS: * Reserve calculated on basis of [illegible] sludgeyard combined 5-6 to 2nd cycle only.

** Intbated sludge on 5-1-52.

224 BUILDING WASTES

	Cascade In Use	Gallons x 10³		Estimated Reserve Capacity In Batches
		Cribbed	Sludge	
EAST AREA	204-203-202-[illegible]	[illegible]	166	512 **
WEST AREA	203-202-[illegible]	173	187	255 runs*
TOTAL		201	348	767

REMARKS: * Reserve capacity = 0.4 x sludge/run = based on sludge reading 5/4/52. 145 reserve runs in 200, 203, 202 and [illegible] 110 reserve runs in 201-Tg

** Reserve capacity = 0.4 x sludge/run = based on 1/2-2 readings = 232 runs in tanks 204, 203, 202 and 220 = [illegible]

*** Basis = 190 gal/inch of sludge

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WASTE STORAGE STATUS

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As of 4/30/52

TBP WASTE

FARP	TBP Gallons x 10^3 In Storage Begin Mon	Total Waste Received	In Storage End Mon	Reserve Capacity
EAST AREA				
B				
C				
BX				
BY				
TOTAL				
WEST AREA				
T				2,263
U				216
TX				
TY				3,110
TOTAL				4,589

- Supernate tanks 209 BY and 115 TX not included in the above.

Gallons x 10^3 of condensate to gally _____

Ratios * Feed to Waste

During Month _____

Cumulative to date _____

* Feed adjusted to metal waste equivalent

- REMARKS: 216,000 gals in 202-U series allocated to TBP wastes

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[redacted]STE STORAGE STATUS

DECLASSIFIED As of 4/30/52

WASTE EVAPORATOR

FARM	Gallons x 10^3 Feed	Bottoms	Condensate To Cribs	Reserve Bottoms Space
EAST AREA				
B		122		654
C	442			
BX				
BY				
TOTAL	442	122	320	654
WEST AREA				
T				
U	407			
TX		312		466
TY				
TOTAL	407	312	295	466

REMARKS:

REDOX WASTE

FARM	Gallons x 10^3 In Storage Beg. Mo.	Waste Received	In Storage End Mo.	** Reserve Capacity In Batches
S Farm	356	325	681	2,970
*U Farm				
TOTAL	356	325	681	2,970

. Gallons x 10^3 of condensate to crib 390 ?

* Will be considered as Redox reserve capacity when empty.

** Reserve Capacity at 2,815 gallons per 6-3 equivalent batch based on current month's performance.

REMARKS:

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STATUS OF WASTE TANKS

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	* Type of Waste	Gallons x 10³ Capacity	Gallons x 10³ Stored	Reserve Cap. Gallons x 10³	Reserve Cap. In Batches	Remarks
B Farm						
101	[redacted]	530	530			
102	[redacted]	530	530			
103	[redacted]	530	529			
104	1C	530	530			
105	1C	530	530			
106	1C	530	187	343	123	1st Cycle Evaporator & Feed Tank
107	[redacted]	530	220	310		
108	[redacted]	530	501	29		
109	[redacted]	530	10	515		Butt-o tank - not filling
110	2C	530	530			
111	2C	530	530			Active Cascade B Farm
112	2C	542	542			
201	224	54.5	54.5			Cascading to crib
202	224	54.5	54.5			
203	224	54.5	54.5			Active Cascade - 224-B
204	224	54.5	54.5			Cascading 204, 203, 202 to crib
C Farm						Idle
101	[redacted]	530	530			
102	[redacted]	530	530			
103	[redacted]	530	529			
104	[redacted]	530	530			
105	[redacted]	530	530			
106	[redacted]	530	529			
107	1C	530	300	133	47	
108	1C	530	34	496	177	
109	1C	530	525			Finished pumping 4-25-52
110	1C	530	530			
111	1C	530	530			
112	1C	530	525			
201	[redacted]	54.5	54.5			
202	[redacted]	54.5	54.5			
203	[redacted]	54.5	54.5			
204	[redacted]	54.5	52.5			

* [redacted] - Metal Waste
1C - First Cycle Waste
2C - Second Cycle Waste
R - Redox Waste

224 - 224 Bldg. Waste
TBP - TBP Waste
EB - Evaporator Bottoms

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STATUS OF WASTE FARMS

	Type of Waste*	Gallons x 10^3 Capacity	Gallons x 10^3 Stored	Reserve Capacity Gallons x 10^3	Reserve Capacity In Batches	Remarks
BX Farm						
101	[illegible]	530	530			
102	[illegible]	530	467	63	23	
103	[illegible]	530	530			
104	[illegible]	530	530			
105	[illegible]	530	530			
106	[illegible]	530	530			
107	1C	530	530			
108	1C	530	530			
109	[illegible]	530	530			
110	1C	530	530			
111	1C	530	[illegible]			
112	1C	530	530			
BY Farm						
101	[illegible]	758	758			
102	[illegible]	758	758			
103	[illegible]	758	661	83	31	
104	[illegible]	758	758			
105	[illegible]	758	491	267	99	
106	[illegible]	758	[illegible]	747	277	
107	2C	758	758			
108	2C	758	758			
109	TBP	758	[illegible]			Supernate tank
110	1C	758	597	161	59	Tank now filling @ U Plant
111	[illegible]	758	758			
112	[illegible]	758	225	531	197	W4 tank now filling @ S Plant
[illegible] Farm						
101	[illegible]	530	530			
102	[illegible]	530	530			
103	[illegible]	530	518			
104	1C	530	530			
105	1C	530	530			
106	2C	530	526			
107	1C	530	245	285		Reserved for TBP
108	1C	530	73	457		
109	1C	530	[illegible]	521		

* MW - Metal Waste
1C - First Cycle Waste
2C - Second Cycle Waste
S - Sludge Waste
[illegible] - [illegible]-52

224 = 224 Bldg. Waste
TBP = TBP Waste
EB = Evaporator Bottoms

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STATUS OF WASTE FARMS

0 10

	* Type of Waste	Gallons x 10³ Capacity	Gallons x 10³ Stored	Reserve Capacity Gallons x 10³	Reserve Capacity In Batches	Remarks
T Farm						
110	2C	530	530			
111	2C	530	530			Active cascade @ T Plant
112	2C	589	569			Cascading to crib
201	224	54.5	54.5			
202	224	54.5	54.5			
203	224	54.5	54.5			
204	224	54.5	54.5			Cascading to crib
						Idle
U Farm						
101	MW	530	530			
102	MW	530	530			
103	MW	530	519			Starting for feed to TBP
104	MW	530	530			
105	MW	530	530			
106	MW	530	519			
107	MW	530	530			
108	MW	530	530			
109	MW	530	519			
110	1C	530	126	194		Down to sludge 4/24/52
111	1C	530	530			Pump now installed here
112	1C	530	32	498		Stopped pumping 4/24/52
201	TBP	54.5		54.5		
202	TBP	54.5		54.5		Plan over-ground filling with TBP waste
203	TBP	54.5		54.5		" "
204	TBP	54.5		54.5		" "
X Farm						
101	MW	758	758			
102	MW	758	758			
103	MW	758	758			
104	MW	758	750			
105	MW	758	758			
106	MW	758	758			
107	MW	758	758			
108	MW	758	758			
109	MW	758	356	391	132	MW tank now filling - T Plant
110	1C	758	574	184	66	1-C tank now filling - T Plant
111	1C	758	9	749	268	
112	1C	758		758	272	
				752	269	

* MW - Metal Waste
* 1C - First Cycle Waste
2C - Second Cycle
R - Redox Waste
T - TBP Waste 4-52

224 - 224 Bldg. Waste
TBP - TBP Waste
EB - Evaporator Bottoms

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STATUS OF WASTE TANKS

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	Type of Waste	Gallons x 10^3 Capacity	Gallons x 10^3 Stored	Reserve Capacity* Gallons x 10^3	Reserve Capacity* In Batches	Remarks
TX Farm (cont'd)						
113	[illegible]	758	[illegible]	146		
114	[illegible]	758	[illegible]			
115	[illegible]	[illegible]				Active [illegible]
116	[illegible]	758	[illegible]			
117	[illegible]	758	[illegible]			
118	[illegible]	758	[illegible]	[illegible]	[illegible]	
TY Farm						
101		758	[illegible]	[illegible]	[illegible]	
102		[illegible]	[illegible]	[illegible]	[illegible]	
103		758	[illegible]	[illegible]		
104		758	[illegible]	[illegible]		
105		758	[illegible]	[illegible]		
106		758	[illegible]	[illegible]		
TY Farm						
S Farm						
101		758	[illegible]	[illegible]	[illegible]	
102		758	[illegible]	[illegible]	[illegible]	
103		758	[illegible]	[illegible]	[illegible]	
104		758	[illegible]	[illegible]	[illegible]	
105		758	[illegible]	[illegible]	[illegible]	
106		758	[illegible]	[illegible]	[illegible]	
107		758	[illegible]	[illegible]	[illegible]	
108		758	[illegible]	[illegible]	[illegible]	
109		758	[illegible]	[illegible]	[illegible]	
110		758	[illegible]	[illegible]	[illegible]	
111		758	[illegible]	[illegible]	[illegible]	
112		758	[illegible]	[illegible]	[illegible]	

* MW = Metal Waste
IC = First Cycle Waste
2C = Second Cycle Waste
R = Redox Waste
224 = 224 Bismuth Waste
BPT = TBP Waste
SP = Supernatant Solution

** Peak reserve capacity based on current month's operating average

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WASTE STATUS SUMMARY

Month of May, 1952

	B Plant	T Plant
Runs of Metal Waste to waste farm during the month	6	21
Gals. increase in Metal Waste volume	13,063	55,000
Gals./Run average Metal Waste volume	2,177	2,619
Reserve Gals. available for Metal Waste on 5-30-52	1,669,000	1,873,000
Runs of First Cycle Waste sent to farm during the month	6	18
Gals. increase in First Cycle Waste volume	22,000	43,250
Gals./Run average First Cycle Waste volume	3,667	2,403
Reserve Gals. available for First Cycle Waste on 5-30-52	1,487,000	2,625,000

Remarks: * After correction for 2 BX runs sent to storage during this time, the average volume per run is 2,221 gallons.

	U Plant
Bismuth Phosphate Batch Equivalents	27.56
Gallons increase in fission product waste storage	342,530
Tons of Uranium, (as charged), processed, to contribute to make-up of waste	28.73
Gallons/batch equivalent to 6-3 MS	2,742
Gallons per ton of Uranium processed	4,351
Reserve Gallons available for Redox waste on 6-1-52	8,045,000

Remarks: * Last month this figure was reported at 3,999 gal/ton, on 5-19-52 an error was found in the calculated amount of uranium charged to extraction, which gave a corrected figure of 4,687 gal/ton. This month's figure of 4,351 gal/ton is based on preliminary uranium inventory figures.

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WASTE STORAGE STATUS

As of 5-31-52

METAL WASTE

TANK	Gallons x 10³ In Storage Beg. Mo.	Metal Waste Received	In Storage End Mo.	Reserve Capacity In Batches*
EAST AREA				
B	1,579		1,579	
C	3,374		3,374	
UR	3,337		3,337	23
TW	4,472	33	4,425	595
TOTAL	12,762	33	12,695	618
WEST AREA				
T	1,579		1,579	
U	4,737	(1,579)	4,737	
TX	5,654	55	5,709	128
TY	[illegible]		[illegible]	558
TOTAL	11,970	55	12,025	682

REMARKS: *Reserve capacity at 2,700 Gallons per batch

( ) Metal waste in 101-102-103-U slurrying for TBP feed.

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WASTE STORAGE STATUS

As of 5-31-52

URANIUM CONTENT
METAL WASTE

FARM	TONS PURE URANIUM In Storage Beg. Mo.	Received	* to TBP	In Storage End Mo.
EAST AREA				
B	385			385
C	843			843
BX	762			762
BY	1,059	5		1,064
TOTAL	3,847	5		3,852
WEST AREA				
T	375			375
U	772			772
TX	1,297	11		1,308
TY				
TOTAL	2,444	11		2,455

* Tons of uranium transferred as metal waste to the Waste Removal Group for slurrying.

REMARKS: ** Metal in tank 101-102-103 U equal to 405 tons has been credited to TBP. This does not show as uranium present in totals.

May increase based on 0.622 tons of uranium per run. This is based on 600 MWD/ton average.

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WASTE [illegible]

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As of 5-21-52

FIRST CYCLE WASTE

TANK	Gallons x 10³ In Storage Beta Flow	1st Cycle Waste Recd	Feed To Evaporator	In Storage Gal Free	Reserve Capacity In Batches
EAST AREA					
B **	1,060			1,060	
Evaporator Feed Tank - 106 B	187		38	225	320
C	2,543		425	2,118	376
UX	3,175			3,175	
UY	2,108	22		2,130	88
TOTAL	9,073	22	388	8,707	584
WEST AREA					
T	1,910			1,910	
U	898		516	382	
TX **	1,336	41		1,377	859
Evaporator Feed Tank - 118 TX	349		187	536	79
TY					
TOTAL	4,493	41	329	4,205	938

Reserve Capacity at 2,800 gallons per batch

( ) Not included in totals

REMARKS: ** Excluding 106-B and 118-TX evaporator feed tanks.

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WASTE STORAGE STATUS

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As of 5-31-52

SECOND CYCLE WASTES

	Cascade In Use	Gallons x 10³		Estimated Reserve Capacity In Batches
		Cribbed	Sludge	
EAST AREA	110-111-112 B	21	103	3,059
WEST AREA	110-111-112 T	36	872	2,454***
TOTAL		57	1,074	

REMARKS: ** Reserve calculations based on 225 gal/run combined 5-6 and 2nd cycle only, or 275 gal/run and 75 gallons sludge per run from 224 Bldg.

*** Assuming 224 wastes with 2nd cycle and 5-6 waste to give a total sludge volume of 350 gal/run.

224 BUILDING WASTES

	Cascade In Use	Gallons x 10³		Estimated Reserve Capacity In Batches
		Cribbed	Sludge	
EAST AREA	204-203-202 B	26	166	506
WEST AREA 5-22	203-202 T 110-111-112 T	215	187	Combined with 2nd cycle above
TOTAL		241	353	506

REMARKS: On 5-29-52, 224 waste were tied into 5-6 stream feeding to 110-111-112 T at diversion box 241-152-T. Thus in 200 West Area 5-6, 2nd cycle, and 224 wastes are all combined in these tanks.

H-2902-05-X 4-52

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[redacted] STORAGE STATUS

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As of 5-31-52

TBP WASTE

FARM	Gallons x 10^3 In Storage Beg. Mo.	TBP Received	In Storage End Mo.	Reserve Capacity
EAST AREA				
B				
C				
BX				
BY				
TOTAL				
WEST AREA				
T				1,263
U		8		216
TX				
TY				3,110
TOTAL				4,589

Supernate tanks, 109 BY and 115 TX not included in the above.

Gallons x 10^3 of condensate to crib _____

Ratio: * Feed to Waste.

During Month _____

Cumulative to date _____

* Feed adjusted to metal waste equivalent.

REMARKS: Present plan is to store cold-start up wastes of 10 g/liter and under in 200-W tanks; if over 10 g/liter to send it to 115-TX supernatant tank for reworking.

For hot TBP wastes: if 10 g/l or less to discard to current TBP waste storage tanks; if between 10-32 g/l (up to 25% of metal content in feed) to be discarded into T Plant current NI cascade.

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As of 5-31-52

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WASTE EVAPORATOR

FARM	Gallons x 10^3 Feed	Bottoms	Condensate To Crib	Reserve Bottoms Space
EAST AREA				
B		93		761
C	380			
BX				
BY				
TOTAL	380	93	295	761
108-B filled with bottoms 5-14-52. 109-B into service 5-15-52.				
WEST AREA				
T				
U	329			
TX		96		370
TY				
TOTAL	329	96	233	370

REMARKS: 110,111,112-U tanks are not emptied to sludge; tanks remaining to evaporate in 200 West area are 114-TX and cascade 104,105,106-T which filled 3-31-52.

REDOX WASTE

FARM	Gallons x 10^3 In Storage Beg. Mo.	Waste Received	In Storage End Mo.	** Reserve Capacity In Batches
S Farm	681	343	1,024	2,905
SY Farm				
TOTAL	681	343	1,024	2,905

Gallons x 10^3 of condensate to crib 387

** Will be considered as Redox reserve capacity when empty.

** Reserve Capacity at 2,744 gallons per 6-3 equivalent batch

REMARKS: 110-S tank cascaded to 111-S on 5-9-52.

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STATUS OF WASTE TANKS

	Type of Waste	Gallons x 10^3 Capacity	Gallons x 10^3 Stored	Reserve Cap. Gallons x 10^3	Reserve Cap. In Batches	Remarks
B Farm						
101	MW	530	530			
102	MW	530	530			
103	MW	530	519			
104	1C	530	530			
105	1C	530	530			
106	1C	530	225	300	120	1st Cycle Evaporator - Feed Tank
107	EB	530	220	310		
108	EB	530	530			
109	EB	530	74	451		Bottoms tank - now filling
110	2C	530	530			Active Cascade @ B Plant
111	2C	530	530			
112	2C	542	542			Cascading to crib
201	224	54.5	54.5			Active Cascade @ 224-B
202	224	54.5	54.5			
203	224	54.5	54.5			Cascading 204,201,202 to crib
204	224	54.5	54.5			Idle
C Farm						
101	MW	530	530			
102	MW	530	530			
103	MW	530	519			
104	MW	530	530			
105	MW	530	530			
106	MW	530	519			
107	1C	530	399	131	47	
108	1C	530	34	496	177	
109	1C	530	525			
110	1C	530	530			
111	1C	530	530			
112	1C	530	99	426	152	Tank @ last current
201	MW	54.5	54.5			
202	MW	54.5	54.5			
203	MW	54.5	54.5			
204	MW	54.5	52.5			

MW - Metal Waste
1C - First Cycle Waste
2C - Second Cycle Waste
R - Redox Waste
224 - 224 Bldg. Waste
TBP - TBP Waste
EB - Evaporator Bottoms

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STATUS OF WASTE [redacted]

0 20

	Type of Waste	Gallons x 10^3 Capacity	Gallons x 10^3 Stored	Reserve Capacity Gallons x 10^3	Reserve Capacity In Batches	Remarks
BX Farm						
101	MW	530	530			
102	MW	530	467	63	23	
103	MW	530	530			
104	MW	530	530			
105	MW	530	530			
106	MW	530	530			
107	1C	530	530			
108	1C	530	530			
109	1C	530	530			
110	1C	530	530			
111	1C	530	525			
112	1C	530	530			
BY Farm						
101	MW	758	758			
102	MW	758	758			
103	MW	758	664	83	31	
104	MW	758	758			
105	MW	758	491	267	99	
106	MW	758		747	277	
107	1C	758	758			
108	1C	758	753			
109	TBP	758				Supernate tank
110	1C	758	619	224	19	[illegible] tank now filling at B Plant
111	MW	758	758			
112	MW	758	238	509	188	MW tank now filling at B Plant.
T Farm						
101	MW	530	530			
102	MW	530	530			
103	MW	530	519			
104	1C	530	530			
105	1C	530	530			
106	1C	530	528			
107	1C	530	245	285		Reserved for TBP
108	1C	530	73	457		
109	1C	530	4	521		

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* MW - Metal Waste
1C - First Cycle Waste
2C - Second Cycle Waste
R - Redox Waste

224 - 224 Bldg. Waste
TBP - TBP Waste
ES - Evaporator Bottoms

[redacted]

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	* Type of Waste	Gallons x 10³ Capacity	Gallons x 10³ Stored	Reserve Capacity Gallons x 10³	Reserve Capacity In Batches	Remarks
Farm						
110	2C	530	530			Active cascade - T Plant
111	2C	530	530			
112	2C	569	569			Feeding to tank
201	22L	54.5	54.5			These 4 tanks out of service 5-29-5
202	22L	54.5	54.5			
203	22L	54.5	54.5			
204	22L	54.5	54.5			
Farm						
101	MW	530	530			
102	MW	[illegible]	530			Siphoning for feed to TBP
103	MW	530	519			
104	MW	530	530			
105	MW	530	530			
106	MW	530	519			
107	MW	530	530			
108	MW	530	530			
109	MW	530	519			
110	1C	530	336	194		
111	1C	530	14	516		
112	1C	530	32	498		
201	TBP	54.5		54.5		Plan eventually filling with TBP waste
202	TBP	54.5		54.5		" " "
203	TBP	54.5		54.5		" " "
204	TBP	54.5		54.5		" " "
TX Farm						
101	MW	758	758			
102	MW	758	758			
103	MW	758	758			
104	MW	758	758			
105	MW	758	758			
106	MW	758	758			
107	MW	758	758			
108	MW	758	413	[illegible]	[illegible]	[illegible] - T Plant
109	2C	758	625	[illegible]	[illegible]	[illegible] - T Plant
110	2C	758	[illegible]	[illegible]	[illegible]	
111	2C	758	[illegible]	[illegible]	[illegible]	
112	2C	758	[illegible]	[illegible]	[illegible]	

* MW - Metal waste
1C - First Cycle Waste
2C - Second Cycle
R - Redox waste
TBP - TBP waste
[illegible] - [illegible]

11-2902.10-X 1-52

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STATUS OF WASTE TANKS

	Type of Waste	Gallons x 10³ Capacity	Gallons x 10³ Stored	Reserve Capacity Gallons x 10³	Reserve Capacity In Batches	Remarks
TX Farm (cont'd)						
213	EB	758	388	370	-	
214	IC	758	752	-		
215	TBP					Active - TBP supernate
216	EB	758	758			
217	EB	758	756			
218	IC	758	536	222	79	Evaporator feed tank
SY Farm						
201	MW	758		758	281	
202	MW	758		747	272	
203	TBP	758		758		
204	TBP	758		747		
205	TBP	758		758		
206	TBP	758		747		
S Farm						
101	R	758		758	277	
102	R	758		758	277	
103	R	758		747	273	
104	R	758		758	277	
105	R	758		758	277	
106	R	758		747	273	
107	R	758		758	277	
108	R	758		758	277	
109	R	758		747	273	
110	R	758	774		-	
111	R	758	249	509	186	Active tank
112	R	758		747	273	

- MW = Metal Waste
- IC = First Cycle Waste
- SC = Second Cycle Waste
- R = Redox Waste
- 224 = 224 Ridge Waste
- TBP = TBP Waste
- EB = Evaporator Bottoms

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Month of June, 1952

[redacted]	B Plant	T Plant
Runs of Metal Waste to waste farm during the month	5	16
Gals. increase in Metal Waste volume	13,750	49,500
Gals./Run average Metal Waste volume	2,292	3,094
Reserve Gals. available for Metal Waste on 7-1-52	1,655,000	1,791,000
Runs of First Cycle Waste sent to farm during the month	7	17
Gals. increase in First Cycle Waste volume	19,250	57,750
Gals./Run average First Cycle Waste volume	2,750	3,357
Reserve Gals. available for First Cycle Waste on 7-1-52	1,719,000	2,889,000

Remarks: Higher average volume per run on 1st cycle and MW for T Plant, in part due to increased volumes for processing T.P. runs.

	S Plant
Bismuth Phosphate Batch Equivalent	90.51
Gallons increase in fission product waste storage	264,000
Tons of Uranium, (as charged), processed, to contribute to [illegible] of waste	54.84
Gallons/batch equivalent to 6-3 MS	* 2,917
Gallons per ton of Uranium processed	* 4,814
Reserve Gallons available for Redox waste on 7-1-52	7,781,000

Remarks: * The increase in waste volumes for the month of June was principally the result of abnormal uranium rework.

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H-2902.01-X 3-52

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HW-27[illegible]

[redacted]

WASTE STORAGE STATUS

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METAL WASTE

FARM	Gallons x 10^3 In Storage Beg. Mo.	Metal Waste Received	In Storage End Mo.	Reserve Capacity In Batches
EAST AREA				
B	1,579		1,579	
C	3,374		3,374	
BX	3,117		3,117	23
BY	4,465	14	4,439	590
TOTAL	12,495	14	12,509	613
WEST AREA				
T	1,579		1,579	
U	4,737	(2,579)	4,737	
TX	5,709	50	5,759	106
TY	MT	-	MT	558
TOTAL	12,025	50	12,075	664

REMARKS: *Reserve capacity at 2,700 Gallons per batch.

1) Metal waste in 101,102,103-U slurrying for TBP feed.

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WASTE STORAGE STATUS

[redacted] as of 6-30-52

URANIUM CONTENT
METAL WASTE

FARM	TONS Uranium			
	In Storage Beg. Mo.	Received	* To TBP	In Storage End Mo.
EAST AREA				
B	385			385
C	841			841
BX	762			762
BY	1,070	6		1,070
TOTAL	3,058	6		3,058
WEST AREA				
T	375			375
U	772		**	772
TX	1,308	13 & 5***		1,326
TY	-		-	-
TOTAL	2,455	13		2,473

* Tons of uranium transferred as metal waste to the Waste Removal Group for slurrying.

REMARKS: ** Metal in tanks 101-102-103 U equal to 405 tons of uranium has been crushed to TBP. This does not show as uranium present in totals.

June increase is for all runs having June serial numbers not necessarily in storage at month end.

*** Cold uranium sent from TBP Building to 115 TX (see TB2 waste).

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[redacted] of 6-30-52

FACILITY	Gallons x 10^3				*
	In Storage Beg. Mo.	1st Cycle Waste Rec'd	Feed To Evaporator	In Storage End Mo.	Reserve Capacity In Batches*
EAST AREA					
B **	1,060	-	-	1,060	-
Evaporator Feed Tank - 106 B	225	-	32	193	120
C	2,117	-	214	1,903	452
TX	3,175	-	-	3,175	-
UX	2,130	19	-	2,149	41
TOTAL	8,707	19	246	8,480	613
WEST AREA					
T	1,910	-	-	1,910	-
U	382	-	-	382	-
TX **	1,377	58	195	1,240	838
Evaporator Feed Tank - 118 TX	536	-	331	205	198
UX	-	-	-	-	-
TOTAL	4,205	58	526	3,737	1,036

* Reserve Capacity at 2,800 gallons per batch

( ) Not included in totals.

Remarks: ** Excluding 106-B and 118-TX evaporator feed tanks. Tank 113-TX containing 753,000 gal. 1st cycle waste will be designated as Evaporator Bottoms Storage Tank when emptied.

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WASTE STORAGE STATUS

[redacted] of 6-30-52

[redacted]

	Cascade In Use	Gallons x 10^3		Estimated Reserve Capacity In Batches
		Cribbed	Sludge	
EAST AREA	110-111-112-B	15	407	3,044 **
WEST AREA	110-111-112-T	39	685	2,415 ***
TOTAL		54		

REMARKS: ** Reserve calculations based on storage of combined 5-6 and 2nd cycle only at 275 gallons per run.

*** Reserve calculation based on storage of combined 5-6, 2nd cycle, and 224 wastes at 350 gallons per run.

224 BUILDING WASTES

	Cascade In Use	Gallons x 10^3		Estimated Reserve Capacity In Batches
		Cribbed	Sludge	
EAST AREA	204-203-202-B	40	167	500
WEST AREA	204-201-T 110-111-112-T	Inactive Cascade 86	187 + Sludge for 110-111-112-T shown above	
TOTAL		126	354	500

REMARKS:

[redacted]

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WASTE STORAGE STATUS

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[redacted] As of 6-30-52

[redacted]

FARM	Gallons x 10^3 In Storage Beg. Mo.	TBP Received	In Storage End Mo.	Reserve Capacity
EAST AREA				
B				
C				
BY				
BX				
TOTAL				
WEST AREA				
T				1,263
U				216
TX				
TY				3,110
TOTAL				4,589

Supernate tanks, 109 BY and 115 TX not included in the above.

Gallons x 10^3 of condensate to crib (216-W) - This calculation is not complete - will be available for next month's report.

Feed Adjusted*

During Month --

Cumulative to date --

* Feed adjusted to metal waste equivalent

REMARKS: 10,991# cold uranium sent to 115-TX tank equal to 193,992 gallons received in 115-TX.

28,746 gallons of waste to ditch equivalent to 149.8 # cold uranium.

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[redacted] 6-30-52

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WASTE EVAPORATOR

FARM	Gallons x 10^3 Feed	Bottoms	Condensate To Cribs	Reserve Bottoms Space
EAST AREA				
B		98	148	663
C	246			
BX				
BY				
TOTAL	246	98	148	663
WEST AREA				
T				
U				
TX	526	144	382	421
TY				
TOTAL	526	144	382	421*

REMARKS: * 144-TX now pumping; reclaimed space designated as Evap. bottoms reserve space.
109-C now pumping in East Area.

REDOX WASTE

FARM	Gallons x 10^3 In Storage Beg. Mo.	Waste Received	In Storage End Mo.	Reserve Capacity In Batches
S Farm	1,024	264	1,288	2,668
WU Farm	-	-	-	
TOTAL	1,024	264	1,288	2,668

Gallons x 10^3 of condensate to crib 292.

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* WU Farm considered as Redox reserve capacity when empty.

** Reserve Capacity at 2,917 gallons per 6-3 equivalent batch

REMARKS:

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[redacted]

	Type of Waste	Gallons x 10^3 Capacity	Gallons x 10^3 Stored	Reserve tank Gallons x 10^3	Reserve tank In Batches	Remarks
B Farm						
101	MW	530	530			
102	MW	530	530			
103	MW	530	519			
104	1 C	530	530			
105	1 C	530	530			
106	1 C	530	193	337	120	1st Cycle evaporator - Feed tank.
107	EB	530	220	310	-	
108	EB	530	530	-	-	
109	EB	530	172	353	-	Bottom tank - now filling.
110	2 C	530	530			Active cascade - B Plant.
111	2 C	530	530			
112	2 C	542	542			Cascading to crib.
201	224	54.5	54.5			Active cascade - 224-B.
202	224	54.5	54.5			
203	224	54.5	54.5			Cascading 204, 203, 202 to crib.
204	224	54.5	54.5			Idle
C Farm						
101	MW	530	530			
102	MW	530	530			
103	MW	530	519			
104	MW	530	530			
105	MW	530	530			
106	MW	530	519			
107	-	530	399	131	47	
108	1 C	530	34	496	377	
109	1 C	530	311	214	76	Tank - now pumping to 106-B.
110	1 C	530	530			To be reserved for TBP supernate.
111	1 C	530	530			
112	1 C	530	99	425	152	Partially pumped to be finished at a later date.
[illegible]	MW	54.5	54.5			
[illegible]	MW	54.5	54.5			
[illegible]	MW	54.5	54.5			
[illegible]	MW	54.5	54.5			

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MW - Metal Waste
1 C - First Cycle Waste
2 C - Second Cycle Waste
EB - Redox Waste

224 - 224 Bldg. Waste

[redacted]

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[redacted]

HW-27838

STATUS OF WASTE FARMS

[redacted]

0-32

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	Type of Waste	Gallons x 10³ Capacity	Gallons x 10³ Stored	Reserve Capacity Gallons x 10³	Reserve Capacity In Stored	Remarks
BX Farm						
101	MW	530	530			
102	MW	530	467	63	23	
103	MW	530	530			
104	MW	530	530			
105	MW	530	530			
106	MW	530	530			
107	1 C	530	530			
108	1 C	530	530			
109	1 C	530	530			
110	1 C	530	530			
111	1 C	530	525			
112	1 C	530	530			
BY Farm						
101	MW	758	758			
102	MW	758	758			
103	MW	758	664	83	31	
104	MW	758	758			
105	MW	758	491	267	99	
106	MW	758	-	747	277	
107	1 C	758	758			
108	1 C	758	753			
109	TBP	758				Supernate tank.
110	1 C	758	638	115	41	1-C tank now filling - B Plant.
111	MW	758	758			
112	MW	758	252	495	183	MW tank now filling - B Plant.
T Farm						
101	MW	530	530			
102	MW	530	530			
103	MW	530	519			
104	1 C	530	530			Cascade filled 3-31-52. Next and last cascade of 1st cycle waste to evaporate in West area. To take place after sufficient allowance for aging. TBP - waste - active cascade.
105	1 C	530	530			
106	1 C	530	528			
107	1 C	530	245			
108	1 C	530	73			
109	1 C	530	4			

MW - Metal Waste
1C - First Cycle Waste
2C - Second Cycle Waste
R - Redox Waste

224 - 224 Bldg. Waste

[redacted] Evaporator Bottoms

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STATUS OF WASTE FARMS

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	Type of Waste	Gallons x 10^3 Capacity	Gallons x 10^3 Stored	Reserve Capacity Gallons x 10^3	Reserve Capacity In Batches	Remarks
T Farm						
110	224 and 2 C	530	530			Active cascade - T Plant.
111	224 and 2 C	530	530			
112	224 and 2 C	569	569			Cascading to crib.
201	224	54.5	54.5			
202	224	54.5	54.5			
203	224	54.5	54.5			
204	224	54.5	54.5			
U Farm						
101	MW	530	530			Cascading - now slurrying for feed to TBP plant.
102	MW	530	530			
103	MW	530	519			
104	MW	530	530			
105	MW	530	530			
106	MW	530	519			
107	MW	530	530			
108	MW	530	530			
[illegible]	MW	530	519			
110	1 C	530	336	194		Cascade being held as Redox reserve space.
111	1 C	530	14	516		
112	1 C	530	32	498		
201	TBP	54.5		52.5		Plan overhead filling with TBP waste.
202	TBP	54.5		54.5		
203	TBP	54.5		54.5		
204	TBP	54.5		54.5		
TX Farm						
101	MW	[illegible]	758			
102	MW	758	758			
103	MW	758	758			
104	MW	758	750			
105	MW	758	758			Cascade set up to receive high TBP wastes in addition to MW from T plant.
106	MW	758	758			
107	MW	758	758			
108	MW	758	461	206	105	MW tank now filling via 107 TX - T plant.
109	1 C	758	673	85	30	1-C tank now filling - T plant.
110	1 C	758	9	749	268	
[illegible]	1 C	758	[illegible]	758	271	
[illegible]	1 C	758	[illegible]	[illegible]	[illegible]	

* MW - Metal Waste.
* 1C - First Cycle Waste
* 2C - Second Cycle
* R - Redox Waste
[illegible] - TBP Waste
[illegible] - Evaporator Bottoms

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[redacted] SUMMARY OF WASTE TANKS

[redacted]

	Type of Waste	Gallons x 10^3 Capacity	Gallons x 10^3 Stored	Reserve Capacity Gallons x 10^3	Reserve Capacity In Batches	Remarks
TX Farm (cont'd)						
113	EB	758	532	226	-	Active bottoms tank - West area.
114	1 C	758	558	195	-	Tank now pumping - reclaimed space to
115	TBP					active TBP supernate; to be designated
116	EB	758	758	-		as EB.
117	EB	758	756	-		
118	1 C	758	205	553	198	Evaporator feed tank.
TX Farm						
101	MW	758		750	201	
102	MW	758		747	277	
103	TBP	758		750	-	
104	TBP	758		747	-	
105	TBP	758		750	-	
106	TBP	758		747	-	
S Farm						
101	R	758	-	758	260	
102	R	758	-	758	260	
103	R	758	-	747	256	
104	R	758		758	260	
105	R	758	-	758	260	
106	R	758	-	747	256	
107		758	-	758	260	
108	R	758	-	758	260	
109	R	758	-	747	256	
110	R	758	774	-	-	
111	R	758	513	245	84	Active tank
112	R	758	-	747	256	

MW - Metal Waste
1C - First Cycle Waste
2C - Second Cycle Waste
R - Redox Waste
224 - 224 Bldg. Waste
TBP - TBP Waste
EB - Evaporator Bottoms

Reserve figures based on current months average number of gallons per batch equivalent 2,917 gal/batch.

H-2902.11-X 4-52

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WASTE STATUS SUMMARY

Period: JULY, AUGUST AND SEPTEMBER 1952

Classification Cancelled and Changed To

DECLASSIFIED
By Authority of DOE 1973
By H.E. Roller 5-10-82
Verified By W.P. DEPAIN

A.C. Morganthaler
Planning & Scheduling Group
Waste Control
Manufacturing Department
SEPARATIONS SECTION

SPECIAL RE-REVIEW
FINAL DETERMINATION
DECLASSIFICATION CONFIRMED
BY Buzz Hanson DATE Aug 19, 1995
BY J.D. Beggs DATE 8/17/95
Pat Simew 3-15-96
LK Rice 3-15-96

3-15-96
Buzz Hanson
APPROVED FOR
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Ron Zten 7-29-02
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Month of July, 1952

	B Plant	T Plant
Runs of Metal Waste to waste farm during the month	8	38
Gals. Increase in Metal Waste volume	18,250	(1) 101,500
Gals./Run average Metal Waste volume	2,406	(2) 2,705
Reserve Gals. available for Metal Waste on 8-1-52	1,636,000	1,687,000
Runs of First Cycle Waste sent to farm during the month	8	36
Gals. increase in First Cycle Waste volume	15,125	122,000
Gals./Run average First Cycle Waste volume	1,891	(3) 3,388
Reserve Gals. available for First Cycle Waste on 8-1-52	(4) 243,000	3,487,000

Remarks: (1) Includes 1720 gallons of uranium waste from Bldg. 321 - 300 Area. See (uranium waste).
(2) From T Plant process only.
(3) High average volume per run due in part to increased volumes resulting from processing L.P. runs.
(4) Drop in 1st cycle reserve capacity for 200-E Area due to reallocation of space in tank from 241-C to TBP waste recovery system.

	S Plant
Bismuth Phosphate Batch Equivalent	128.42
Gallons increase in fission product waste storage	245,280
Tons of Uranium (as charged), processed, to cor rib-but to make-up of waste	77.2
Gallons/batch equivalent to 6-3 MS	8,688
Gallons per ton of Uranium processed	4,473
Reserve Gallons available for Redox waste on 8-1-52	3,422,000

Remarks: Includes only space available in tank from 241-C.

[redacted]

[redacted]

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[redacted] WASTE STORAGE STATUS

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As of 7-31-52

METAL WASTE

FROM	Gallons x 10^3 In Storage Beg. Mo.	Metal Waste Received	In Storage End Mo.	Reserve Capacity In Batches
EAST AREA				
B	1,579		1,579	
C	3,374		3,374	
BX	3,117		3,117	23
BY	4,439	19	4,453	[illegible]
TOTAL*	12,508	19	12,521	[illegible]
WEST AREA				
T	1,579		1,579	
U	4,737	(1,579)	4,737	
TX	5,759	105	5,864	67
TY	[illegible]		[illegible]	[illegible]
TOTAL	12,075	105	12,180	625

REMARKS: *Reserve capacity at 2,700 Gallons per batch.

( ) [illegible] in cascade 2-1-4-1-10-1-12-13. [illegible] for [illegible] good.

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WASTE STORAGE STATUS

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As of 7-31-52

URANIUM CONTENT
METAL WASTE

FARM	TONS DEPLETED URANIUM			
	In Storage Beg. Mo.	Received	* To TBP	In Storage End Mo.
EAST AREA				
B	383			383
C	837			837
BX	758			758
BY	1,064.93	3.50	(1) -10.67	1,057.76
TOTAL (5)	3,042.93	3.50	-10.67	3,035.76
WEST AREA				
T	374			374
U	770			770
TX	1,322.08	24.97 (2)(3)		1,347.05
TY				
TOTAL	2,466.08	24.97		2,491.05 (4)

* Tons of uranium transferred as metal waste to the Waste Removal Group for slurrying.

REMARKS: (1) Adjustment for loss of 10.67 tons uranium via overflow of 102 BX in Feb., 1951.
(2) Includes 0.41 tons of unreacted metal received on 7-2-52 into 102-TX tank from Bldg. 321 - 300 Area.
(3) Includes 1.77 tons of depleted and decontaminated metal into 115-TX tank from TBP.
(4) Total does not include metal in tank 101-102-103-U now sluicing for feed to TBP Plant.
(5) All uranium storage figures have been adjusted to equal those kept by S.F. Accountability group.

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WASTE STORAGE STATUS

As of 7-31-52

FIRST CYCLE WASTE
AND COATING WASTE
TANK FARMS

FARM	Gallons x 10^3				
	In Storage Beg Mos	1st Cycle Waste Rec'd	Feed To Evaporator	In Storage End Mos	* Reserve Cap In Batches
EAST AREA					
B **	1,060			1,060	-
Evaporator Feed Tank - 105 B	193		(-) 191	372	49
C	1,903		(-) 845	1,058	To THP reserve
BX	3,175			3,175	
BY	2,149	35		2,184	38
TOTAL	8,480	35	846	7,849	87
WEST AREA					
T	1,310			1,310	
U	382			382	
TX **	1,240	122	555	807	1,063
Evaporator Feed Tank - 105 TX	205		(-) 33	244	181
TY					
TOTAL	3,737	122	316	3,343	1,247

* Reserve Capacity at 1,100 gallons per batch
( ) Not included in total

REMARKS: ** Evaporator feed tanks

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WASTE STORAGE STATUS

[redacted] 7-31-52

SECOND CYCLE WASTES

	Cascade In Use	Gallons x 10^3		Estimated Reserve Capacity In Batches
		Cribbed	Sludge	
EAST AREA	110-111-112-U	22	409	3,036 **
WEST AREA	110-111-112-T	92	698	2,377 ***
TOTAL		114	1,107	5,413

REMARKS: ** Reserve calculations based on storage of combined 5-6 and 2nd cycle only at 275 gallons/run.

*** Reserved calculations based on storage of combined 5-6, 2nd cycle, and 224 wastes at 350 gallons/run.

224 BUILDING WASTES

	Cascade In Use	Gallons x 10^3		Estimated Reserve Capacity In Batches
		Cribbed	Sludge	
EAST AREA	201-203-202-U	24	168	402
WEST AREA	201-201-T 110-111-112-T	In active cascade 176	187* Sludge & volume shown with 2nd cycle.	*
TOTAL		140	355	402

REMARKS:

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WASTE STORAGE STATUS

As of 7-31-52

[redacted]

TBP WASTE

FARM	Gallons x 10^3 In Storage* Beg. Mo.	TBP Waste Received	In Storage End Mo.	Reserve* Capacity
EAST AREA				
B				
C				(3) 2,100
BX				
BY				
TOTAL				2,100
WEST AREA				
T				1,263
U				216
TX		(1) 177		
TY				3,110
TOTAL				4,589

Supernate tanks, 109 BY and 115 TX not included in the above.

* Gallons x 10^3 of condensate to crib 606 (216-W)

Ratio: * Feed to Waste

During Month _____

Cumulative to date _____

* Feed adjusted to metal waste equivalent.

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REMARKS: (1) Waste to 115-TX = 177 x 10^3 gallons equivalent to 1.77 tons of decontaminated and depleted uranium.

(2) Waste to Ditch 52 x 10^3 gallons = 1.06 tons of decontaminated and depleted uranium.

(3) Space released by East Area evaporator Cross-connected Bldg. C 107,8,9, and 115,11,12 [redacted]

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[redacted]

[redacted]

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As of 7-31-[redacted]

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FARM	Gallons x 10^3 Feed	Bottoms	Condensate To Cribs	Reserve Bottoms Space
EAST AREA				
B		223	425	442
C	616			
BX				
SX				
TOTAL	616	223	425	442
WEST AREA				
T				
U				
TX	516	143	373	268
TY				
TOTAL	516	143	373	268

[redacted]

REDOX WASTE

FARM	Gallons x 10^3 In Storage Beg. Mo.	Waste Received	In Storage End Mo.	Reserve Capacity In Batches
S Farm	1,287	345	1,632	2,766
W Farm				
TOTAL	1,287	345	1,632	2,766

Gallons x 10^3 of condensate to crib 369

Will be considered as Redox reserve capacity when empty.

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Reserve Capacity at 2,688 gallons [redacted]

REMARKS: Additional storage space equal to 1,200,000 gallons is available for Redox waste in tanks 110-111 [redacted]

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[illegible]	530			
[illegible]	530			
[illegible]	519			
[illegible]	530			
[illegible]	530			
[illegible]	572	130	4	(after dumping batch E-1 8-1-52) Evap. feed tank.
[illegible]	220	310		
[illegible]	530			
[illegible]	573	137		Active bottom tank - Feed from evap.
[illegible]	530			Active cascade - B. Flush
[illegible]	530			
[illegible]	502			Tank 112-B cascade to crib.
[illegible]	54.5			Active cascade - 241-B
[illegible]	54.5			
[illegible]	54.5			Tank 202-B flush to crib.
[illegible]	54.5			Tank 241-B to [illegible]
[illegible]	530			
[illegible]	530			
[illegible]	519			
[illegible]	530			
[illegible]	530			
[illegible]	519			
[illegible]	399	131		Space allocated to TBP waste receiver
[illegible]	34	166		"
[illegible]	17	502		" finished pumping 7-25-52. finished pump.
[illegible]	231	299		Space allocated to TBP, inc 7-22-52.
[illegible]	237	293		Tank pumping at south end; to be held
[illegible]	140	379		Space allocated to TBP. for TBP.
[illegible]	54.5			
[illegible]	54.5			
[illegible]	54.5			
[illegible]	[redacted]			

[illegible] Waste
[illegible] Waste
[illegible] Waste
[illegible] Waste

22.4 - [illegible] Hdg. Waste

[redacted]

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[redacted]

STATUS [redacted]

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[redacted]	Type of Waste	Gallons [redacted] Capacity				Remarks
		Capacity	Stored	Gallons x 10^3	In Batches	
B Farm						
101	MW	530	530			
102	MW	530	467	63	23	
103	MW	530	530			
104	MW	530	530			
105	MW	530	530			
106	MW	530	530			
107	1C	530	530			
108	1C	530	530			
109	1C	530	530			
110	1C	530	530			
111	1C	530	525			
112	1C	530	530			
H Farm						
101	MW	758	758			
102	MW	758	758			
[redacted]	MW	758	664	63	30	
104	MW	758	758			
105	MW	758	491	267	99	
106	MW	758	-	747	277	
107	1C	758	758			
108	1C	758	753			
109	TBP	758				TBP supernate tank - 200 East Area
110	2C	758	653	105	38	1-C tank now filling - B Plant
111	MW	758	758			
112	MW	758	271	476	176	MW tank now filling - B Plant
I Farm						
101	MW	530	530			
102	MW	530	530			
103	MW	530	519			
104	1C	530	530			Content of cascade will be aged 1
105	1C	530	530			years 3-31-53
106	1C	530	528			
107	1C	530	245	235	-	Space allocated to TBP waste
[redacted]	1C	530	73	457	-	" " "
[redacted]	1C	530	4	[redacted]		" "

[redacted]

MW - Metal Waste
1C - First Cycle Waste
2C - Second Cycle Waste
F - Feed Waste

224 - 224 Bldg. Waste
TBP - TBP Waste

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[redacted]

STATUS OF WASTE FARMS

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	* Type of Waste	Gallons x 10³ Capacity	Stored	Gallons x 10³	In Patches	Remarks
T Farm						
110	224-C	530	530			Active cascade - T Plant
111	224-C	530	530			
112	224-C	569	569			112-C cascade to grib
201	221	54.5	54.5			
202	221	54.5	54.5			
203	221	54.5	54.5			
204	221	54.5	54.5			
U Farm						
101	1U	530	530			Cascade now plumbing for food to TBP Plant.
102	1U	530	530			
103	1U	519	519			
104	1U	530	530			
105	1U	530	530			
106	1U	530	519			
107	1U	530	530			
[redacted]	1U	530	530			
109	1U	530	519			
110	1C	530	336	194		Cascade being held at Tolex waste.
111	2C	530	14	516		
112	2C	530	32	498		
201	TBP	54.5	-	52.5		Plan overload filling with TBP waste.
202	TBP	54.5	-	54.5		
203	TBP	54.5	-	54.5		
204	TBP	54.5	-	54.5		
TX Farm						
101	1C	758	758			
102	1C	758	758			
103	1C	758	758			
104	1C	758	758			
105	1C	758	758			
106	1C	758	758			Cascade now receiving high TBP waste in addition to T Plant metal waste.
107	1C	758	758			
108	1C	758	556	181	67	Active MW tank - T Plant
109	1C	758	758			Tank filled on Run 7-12-C7-1Reel 7-25-5
[redacted]	1C	758	45	713	255	
111	1C	758	[redacted]			
112	1C	758	[redacted]			

* MW - Metal Waste
* 1C - First Cycle Waste
2C - Second Cycle
224 - 224 Bldg. Waste

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STATUS OF WASTE FARMS

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	Type of Waste*	Gallons x 10^3 Capacity	Gallons x 10^3 Stored	Reserve Capacity Gallons x 10^3	Reserve Capacity In Batches	Remarks
TX Farm (cont'd)						
113	EB	758	675	83	•	Active bottoms tank - West Area.
114	1C	758	4	749	268	pumping stopped 7-11-52
115	TBP					active TBP supernate
116	EB	758	758	•	•	
117	EB	758	756			
118	1C	758	244	514	184	Evaporator feed tank
TY Farm						
101	MW	758		758	261	
102	MW	758		747	277	
103	TBP	758		758	•	
104	TBP	758		747	•	
105	TBP	758		758	•	
106	TBP	758		747	•	
S Farm						
101	R	758		758	282 **	
102	R	758		758	282	
103	R	758		747	278	
104	R	758		758	282	
105	R	758		758	282	
106	R	758		747	278	
107	R	758		758	282	
108	R	758		758	282	
109	R	758		747	278	
110	R	758	754	•	•	
111	R	758	755	•	•	Tank capacded to 112% 7-25-52
112	R	758	103	644	240	

* MW = Metal Waste
1C = First Cycle Waste
2C = Second Cycle Waste
R = Redox Waste
224 = 224 Bldg. Waste
TBP = TBP Waste
EB = Evaporator Bottoms

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** Reserve figures for storage in tank [redacted] on Redox current [redacted] 2,688 gallons/batch.

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WASTE STATUS REPORT

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[redacted]

Month of August 1952

	B Plant	T Plant
Runs of Metal Waste to waste farm during the month	1 run - 4 AW	46
Gals. increase in Metal Waste volume	20,625	132,000
Gals./Run average Metal Waste volume	--	2,870
Reserve Gals. available for Metal Waste on 9-1-52	1,615,000	784,000
Runs of First Cycle Waste sent to farm during the month	1 run - 5½ AW	49
Gals. increase in First Cycle Waste volume	26,125	110,000
Gals./Run average First Cycle Waste volume	--	2,245
Reserve Gals. available for First Cycle Waste on 9-1-52	202,000	2,791,000

Remarks: (1) Tank 241-TX-414 added to T plant MW reserve.

(2) Averages not calculated for B plant since they no longer have production significance.

	S Plant
Bismuth Phosphate Batch Equivalent	166.76
Gallons increase in fission product waste storage	405,780
Tons of Uranium, (as charged), processed, to contribute to make-up of waste	109.4
Gallons/batch equivalent to 6-3 MS	(1) 2433
Gallons per ton of Uranium processed	3709
Reserve Gallons available for Redox waste on 9-1-52	(2) 7,027,000

Remarks: (1) This figure represents a 12% variation from average plant performance which cannot be entirely accounted for by August process changes.

(2) Includes reserve in 5 Farmington disposal lines are available at present to allocated reserves in U and TX farms.

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[redacted] As of 8-31-52

METAL WASTE

FARM	Gallons x 10^3 In Storage Beg. Mo.	Metal Waste Received	In Storage End Mo.	Reserve Capacity In Batches
EAST AREA				
B	1572		1579	
C	3374		3374	
[illegible]	3417		3417	23
BX	4458	21	4479	575
TOTAL	12820		12849	598
WEST AREA				
T	1579		1572	
U	4737 (2)	(2)	4737 (1)	
TX	5863	741	6605	290 (3)
TY	MT		MT	None (4)
TOTAL	12180		12321	290

REMARKS: Reserve capacity at 2700 gallons per batch.

(1) MW in cascade 101-102-103-U slurrying for TBP feed.

(2) Includes 9000 gallons received from TBP plant.

(3) 241-TX-106 tank pumping overground [illegible] month end to tank 11TX. Metal waste reserve increase due to addition of 11TX to metal waste account.

(4) Reserve space in tanks 241-TY-101 and 2 removed from Metal waste account and transferred to Redox reserves because of incomplete [illegible] facilities in these tanks.

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WASTE STORAGE STATUS

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As of 8-31-52

[redacted]

URANIUM CONTENT
METAL WASTE

FARM	TONS In Storage Beg. Mo.	Received	* To TBP	In Storage End. Mo.
EAST AREA				
B	383			383
C	837			837
BX	758			758
BY	1057.76	--	--	1057.76
TOTAL	3035.76			3035.76
WEST AREA				
T	374			374
U	770			770
TX	1347.05	29.66 (1)		1376.71
TY				
TOTAL	2491.05	29.66		2520.71 (2)

* Tons of uranium transferred as metal waste to the Waste Removal Group for slurrying.

REMARKS: (1) Includes 1.51 tons from TBP (decontaminated and depleted).

(2) Total does not include metal in tanks 241-U-101-102-103 now sluicing for feed to TBP plant (405 tons)

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WASTE STORAGE STATUS

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As of 8-31-52

[redacted]

URANIUM CONTENT
METAL WASTE

FARM	TONS			
	In Storage Beg. Mo.	Received	* To TBP	In Storage End Mo.
EAST AREA				
B	383			383
C	837			837
HX	758			758
BY	1057.76	--	--	1057.76
TOTAL	3035.76			3035.76
WEST AREA				
T	374			374
U	770			770
TX	1347.05	29.66 (1)		1376.71
TY	--			
TOTAL	2491.05	29.66		2520.71 (2)

* Tons of uranium transferred as metal waste to the Waste Removal Group for slurrying.

REMARKS: (1) Includes 1.51 tons from TBP (decontaminated and depleted)

(2) Total does not include metal in tanks 241-U-101-102-103 now sluicing for feed to TBP plant (405 tons)

[redacted]

[redacted]

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p. 16
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[redacted] STATUS

[redacted] 8-31-52

[redacted]

FIRST CYCLE WASTE
AND COATING WASTE
T AND B PLANTS

FAR[redacted]	Gallons x 10^3				
	In Storage Beg. Mo.	1st Cycle Waste Rec'd	Feed To Evaporator	In Storage End Mo.	Reserve Cap. In Batches*
EAST AREA					
B **	1060		-309	751	--
Evaporator Feed Tank - 106 B	392		10	402	46
C	1058		31	727	--
TX	3175		[redacted]	[redacted]	--
TY	2164	26		2190	26
TOTAL	7849	26	-630	7245	72
WEST AREA					
T	1910			1910	
U	382			382	
TX **	807	110		917	755 (1)
Evaporator Feed Tank - 118 TX	244		-154	90	242
TY	--			--	
TOTAL	3343	110	-154	3299	997

* Reserve Capacity at 2800 gallons per batch
( ) Not included in totals.

REMARKS: ** Excluding evaporator feed tanks.

(1) Tank 241-TX-114 has been converted to metal waste storage account causing a loss of 258 batches to 1st cycle waste reserve (see Metal waste storage).

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WASTE STORAGE STATUS

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[redacted]

SECOND CYCLE WASTES

	Cascade In Use	Gallons x 10^3		Estimated Reserve Capacity In Batches
		Cribbed	Sludge	
EAST AREA	110-111-112-B	21	411	3030 **
WEST AREA	110-111-112-T	99	715	2328 ***
TOTAL		120	1126	5358

REMARKS: ** Reserve calculations based on storage of combined 5-6 and 2nd cycle only at 275 gallons of sludge per run.

*** Reserve calculation based on storage of combined 5-6, 2nd cycle, and 224 wastes at 350 gallons of sludge per run.

224 BUILDING WASTES

	Cascade In Use	Gallons x 10^3		Estimated Reserve Capacity In Batches
		Cribbed	Sludge	
EAST AREA	204-203-202-B	29	169	486
WEST AREA	204-201-T 110-111-112-T	inactive cascade 155	187 sludge and reserve	-- shown with 2nd cycle
TOTAL		184	356	486

REMARKS:

[redacted]

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[redacted]

WASTE STORAGE STATUS [redacted]

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As of 8-31-52

[redacted]

TBP WASTE

FARM	Gallons x10³ In Storage Beg. Mo.	TBP Waste Received	In Storage End Mo.	Reserve Capacity
EAST AREA				
B				
C				2443 (4)
BX				
BY				
TOTAL				2443
WEST AREA				
T				1263
U				216
TX		9 (3)		
TY				3110
TOTAL				4589

Supernate tanks, 209 BY and 115 TX not included in the above.

Gallons x 10³ of condensate to crib 565 (216 W) (1) (2)

Ratio: * Feed to Waste

During Month _____

Cumulative to date _____

* Feed adjusted to metal waste equivalent

REMARKS: (1) Includes 0.79 tons of depleted and decontaminated uranium.

(2) In addition to the amount cribbed, 242,000 gallons containing 0.79 tons of decontaminated and depleted uranium were ditched.

(3) 9000 gallons of waste were sent [redacted] 105 active metal waste cascade. This waste contained 1.51 tons of decontaminated and depleted Uranium.

(4) Reserve space has increased during m 1st cycle evaporation.

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[redacted]

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WASTE SPACE STATUS

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As of 3-31-52

[redacted]

FARM	[redacted] Gallons x 10^3 Feed	Bottoms	Condensate To Crib	Reserve Bottoms Space
EAST AREA				
B	209	203	427	548 (1)
C	331			
BX				
BY				
TOTAL	640	203	427	
WEST AREA				
T				
U				
TX	154	45	102	38 (2)
TY				
TOTAL	154	45	102	

REMARKS: (1) Bottoms reserve has increased due to pumping of 105-B, a future bottoms tank.
(2) Re-evaporation of bottoms tanks 116-TX and 113 TX to begin in near future to obtain additional bottoms reserve space.

REDOX WASTE

FARM	In Storage Beg. Mo.	Gallons x 10^3 Waste Received	In Storage End Mo.	Reserve Capacity In Batches
S Farm	1632	406	2038	2558 (1)
U Farm				
TOTAL	1632			2558

Gallons x 10^3 of condensate to trib 381

[redacted] will be considered as Redox reserve [redacted]

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Reserve Capacity at 2750 (2) gallons per 6-3 equivalent batch

REMARKS: (1) Additional Redox [redacted] in tanks 241-110, 111, 112 and 241-TY-101-102 [redacted] 208,000 and 1,505,000 gallons respectively.
(2) Based on average of [redacted]

[redacted]

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STATUS OF WASTE TANKS

[redacted]

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	Type of Waste	Gallons x 10^3 Capacity	Gallons x 10^3 Stored	[redacted] x 10^3	[redacted] Batches	Remarks
B Farm						
101	MW	530	530			
102	MW	530	530			
103	MW	530	519			
104	1C	530	530			
105	1C	530	221	309	E.B.	Tank now being pumped to 106-B
106	1C	530	402	128	46	Evap. feed tank
107	EB	530	298	232		Active bottoms tank-East Area Evap.
108	EB	530	530			
109	EB	530	518	7	[illegible]	Aug. 21, 1952 - switched to 107-B
110	2C	530	530			
111	2C	530	530			Active cascade - B plant
112	2C	542	542			
						Tank 112-B cascades to crib
201	224	54.5	54.5			
202	224	54.5	54.5			Active cascade - 224-B
203	224	54.5	54.5			
204	224	54.5	54.5			202-B flows to crib
						204-B is idle
C Farm						
101	MW	530	530			
102	MW	530	530			
103	MW	530	519			
104	MW	530	530			
105	MW	530	530			
106	MW	530	519			
107	1C	530	399	131		All space in tanks 107-112C
108	1C	530	34	496		allocated to TBP waste reserve
109	1C	530	10	515		
110	1C	530	231	299		
111	1C	530	36	494		Finished pumping to 106-B 8-2-52
112	1C	530	17	508		Finished pumping to 106-B 8-15-52
201	MW	54.5	54.5			
202	MW	54.5	54.5			
203	MW	54.5	54.5			
204	MW	54.5	54.5			

[redacted]

MW - Metal Waste
1C - First Cycle Waste
2C - Second Cycle Waste
RX - Redox Waste

224 - 224 Bldg. Waste
TBP - TBP Waste
EB - Evaporator Bottoms

[redacted]

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[redacted]

[redacted]

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	Type of Waste	Gallons x 10^3 Capacity	Gallons x 10^3 Stored	Res[redacted] Capacity Gallons x 10^3	Res[redacted] Capacity In	Remarks
BX Farm						
101	MW	530	530			
102	MW	530	467	63	23	
103	MW	530	530			
104	MW	530	530			
105	MW	530	530			
106	MW	530	530			
107	1C	530	530			
108	1C	530	530			
109	1C	530	530			
110	1C	530	520			
111	1C	530	525			
112	1C	530	530			
BY Farm						
101	MW	758	758			
102	MW	758	758			
103	MW	758	664	83	31	
104	MW	758	758			
105	MW	758	491	267	99	
106	MW	758	--	747	277	
107	1C	758	758			
108	1C	758	753			
109	TBP	758		758		TBP supernate tank 200 East Area
110	1C	758	670	70	26	
111	MW	758	758			
112	MW	758	292	455	168	
T Farm						
101	MW	530	530			
102	MW	530	530			
103	MW	530	519			
104	1C	530	530			
105	1C	530	530			contents of cascade will be aged [redacted] 3-31-53, after which time [redacted]oration will be started
106	1C	530	528	[redacted]		
107	1C	530	245	285		Space allocated to TBP waste
108	1C	530	73	457		
109	1C	530	4	515	[redacted]	

* MW - Metal Waste
1C - First Cycle Waste
2C - Second Cycle Waste
R - Redox Waste
224 - 224 Bldg. Waste
TBP - TBP Waste
EB - Evaporator Bottoms

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[redacted]

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STATUS OF WASTE TANKS [redacted]

	Type of Waste*	Gallons x 10^3 Capacity	Gallons x 10^3 Stored	Reserve Capacity Gallons x 10^3	Reserve Capacity In Batches	Remarks
T Farm						
110	224 & 20	530	530			Active cascade at T Plant
111	224 & 20	530	530			
112	224 & 20	569	569			112-T cascades to crib
201	224	54.5	54.5			
202	224	54.5	54.5			
203	224	54.5	54.5			
204	224	54.5	54.5			
U Farm						
101	MW	530	530			Cascade now slurrying for feed to TBP Plant
102	MW	530	530			
103	MW	530	519			
104	MW	530	530			
105	MW	530	530			
106	MW	530	519			
107	MW	530	530			
108	MW	530	530			
109	MW	530	519			
110	1C	530	376	194	71**	Cascade being held as Redox waste reserve
111	1C	530	14	516	187	
112	1C	530	32	498	181	
201	TBP	54.5	--	52.5		Plan overhead filling with TBP waste
202	TBP	54.5	--	54.5		
203	TBP	54.5	--	54.5		
204	TBP	54.5	--	54.5		
TX Farm						
101	MW	758	758			
102	MW	758	758			
103	MW	758	758			
104	MW	758	750			
105	MW	758	758			
106	MW	758	758			
107	MW	758	758			[redacted] 114 TK on 5-29-52
108	MW	758	607	50	18	
109	1C	758	758	--	--	
110	1C	758	1[illegible]	602	215	Tank [redacted] filling T plant 1st cycle
111	1C	758	--	758	[redacted]	
112	1C	758	--	[illegible]	[illegible]	

* MW - Metal Waste
* 1C - First Cycle Waste
20 - Second Cycle
R - Redox Waste
224 - 224 Indg. Waste
TBP - TBP Waste
ER - [redacted]

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[redacted]

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STATUS OF WASTE FARMS

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[redacted]

	Type of Waste*	Gallons x 10^3 Capacity	Gallons x 10^3 Stored	Reserve Capacity Gallons x 10^3	Reserve Capacity In Batches	Remarks
TX Farm (cont'd)						
113	EB	758	720	38	--	
114	1C & MW	758	13	734	272	started filling 8-29-52 from 106 TX [illegible]
115	TBP					
116	EB	758	758			
117	EB	758	756			
118	1C	758	90	5[illegible]	242	Evaporator
SY Farm						
201	R	758		758	276**	Space reserve transferred to Redox
202	R	758		747	272	account - Tank 201 and 102
203	TBP	758		758		
204	TBP	758		747		
205	TBP	758		758		
[redacted]	TBP	758		747		
S Farm						
101	R	758		758	276**	
102	R	758		758	276	
103	R	758		747	272	
104	R	758		758	276	
105	R	758		758	276	
106	R	758		747	272	
107	R	758	67	691	251	tank started filling 8-25-52
108	R	758		758	276	
109	R	758		747	272	
110	R	758	774	--	--	
111	R	758	755	--	--	
112	R	758	442	305	111	cascade abandoned on 8-25-52 because of boiling in tank 110-S

* MW = Metal Waste
1C = First Cycle Waste
2C = Second Cycle Waste
R = Redox Waste

224 [redacted]
TBP - TBP Waste
EB - Evaporator Bottoms

** Reserve fl[redacted]e in tank farm 241-S and tanks 101[redacted] on average plant performance of 2750 gallons per batch.

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WASTE STATUS SUMMARY

[redacted]

[redacted] of September 1952

	B Plant	T Plant
Runs of Metal Waste to waste farm during the month	1 water flush	8
Gals. increase in Metal Waste volume	2060	20600
Gals./Run average Metal Waste volume	- (1)	2575
Reserve Gals. available for Metal Waste on 10/1/52	1,613,000	773,000
Runs of First Cycle Waste sent to farm during the month	10-1/2 AW	5 & 1 AW
Gals. increase in First Cycle Waste volume	43,300	22,000
Gals./Run average First Cycle Waste volume	- (1)	3550 (2)
Reserve Gals. available for First Cycle Waste on 10/1/52	113,000	2,114,000

Remarks: (1) Averages not calculated for B Plant since runs are not of normal size.

(2) T Plant first cycle waste average calculated after correcting for volume of acid wash.

	S Plant
Bismuth Phosphate Batch Equivalent	156.41
Gallons increase in fission product waste storage	390,500
Tons of Uranium, (as charged), processed to contribute to make-up of waste	96.72
Gallons/batch equivalent to 6-3 [illegible]	2497
Gallons per ton of Uranium processed	4037
Reserve Gallons available for Redox waste on 10/1/52 (3)	6,636,000

Remarks: (3) Immediately available on S Farm only: 2,713,000 gallons of reserve space are immediately available on other [illegible] if a tie line is made between Redox system and remainder of waste system.

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[redacted]

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WASTE STORAGE STATUS

As of 9/30/52

METAL WASTE

FARM	Gallons x 10^3 In Storage Beg Mo	Metal Waste Received	In Storage End Mo	Reserve Capacity In Batches
EAST AREA				
B	1579		1579	
C	3374		3374	
BX	3117		3117	23
BY	4479	2	4481	574
TOTAL	12549	2	12551	597
WEST AREA				
T	1579		1579	
U	4737 (1)		4737	
TX	6005	21 (-7) (2)	6019	287
TY	MT		MT	None
TOTAL	12321	14	12335	287

REMARKS: *Reserve capacity at 2700 Gallons per Batch.

(1) Metal waste in cascade 241-U-101-102-103 slurrying for TBP feed.

(2) By transferring metal waste from 241-TX-106 to 241-TX-114 an apparent volume loss of 7,000 gallons occurred. This can be accounted for by the increase of density resulting from cooling liquid in the 106-TX tank prior to pumping to the 114-TX tank.

H-2000.02-X 4-52 [redacted]

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WASTE STORAGE STATUS

as of 9/30/52

URANIUM CONTENT
METAL WASTE

FARM	Tons			
	In Storage Beg Mo.	Received	* To TBP	In Storage End Mo.
EAST AREA				
B	383			383
C	837			837
BX	758			758
BY	1057.76			1057.76
TOTAL	3035.76			3035.76
WEST AREA				
T	374			374
U	770			770
TX	1376.71	4.92		1381.63
TY				
TOTAL	2520.71	4.92		2525.63(1)

* Tons of uranium transferred as metal waste to the Waste Removal Group for slurrying.

REMARKS: (1) 405 tons of Uranium in cascade 241-U-101-102-103 now slurrying for feed to TBP Plant not included in this total.

[redacted]

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[redacted]D

WASTE STORAGE STATUS

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As of 9/30/52

FIRST CYCLE WASTE AND COATING WASTE
T AND B PLANTS

FARM	Gallons x 10⁻³ In Storage Beg. Mo.	1st Cycle Waste Rec'd	Feed To Evaporator	In Storage End Mon.	* Reserve Cap. In Batches
EAST AREA					
B	751		-169	582	
Evaporator Feed Tank - 106 B	402		+46	448	29
C	427			727	
BY	3175			3175	
BY	2190	43	-414	1819	11
TOTAL	7245	43	-537	6751	40
WEST AREA					
T	1910			1910	
U	382			382	
TX	917	22	3	936	747
Evaporator Feed Tank - 118 TX	90	(708)[1]	63	735	8
TY	-			-	
TOTAL	3299	730	66	3963	755

* Reserve Capacity at 2800 gallons per batch.
( ) Not included in totals. **Excludes evaporator feed tanks 106-B and 118-TX.

NOTES: (1) Adjusted to include 712,000 gallons of bottoms supernate received from 110-TX bottoms tank to 118-TX, and loss of 4,000 gallon heel in 114-TX tank during waste storage.

[redacted]

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[redacted]

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[redacted] WASTE STORAGE STATUS

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As of 9-30-52

SECOND CYCLE WASTES - SECTION 5 WASTES

	Cascade In Use	Gallons x 10^3		Estimated Reserve Capacity In Batches
		Cribbed	Sludge	
EAST AREA	110-111-112-B	89	414	3020**
WEST AREA	110-111-112-T	85	717	2352
TOTAL		174	1131	5372

REMARKS: 61,000 gallons to Sec. 5 - 200-E, and 68,000 to Sect. 5- 200 W, included in crib figures.

**Reserve calculations based on storage of combined 5-6 & 2nd cycle only at 275 gallons of sludge per run.

**Reserve calculations based on storage of combined 5-6, 2nd cycle, and 224 wastes at 350 gallons of sludge per run.

224 BUILDING WASTES

	Cascade In Use	Gallons x 10^3		Estimated Reserve Capacity In Batches
		Cribbed	Sludge	
EAST AREA	204-203-202-B	42	170	476
WEST AREA	204-201-T 110-111-112-T	Inactive cascade 60	187 Sludge of reserve	- shown with 2nd cycle.
TOTAL		102	357	476

REMARKS:

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[redacted]

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WASTE [redacted] STATUS

[redacted]

As of 9-30-52

TBP WASTE

FARM	Gallons x 10^3			
	In Storage Beg. Mo.	TBP Waste Received	In Storage End Mo.	Reserve Capacity
EAST AREA				
B				
C				2,443
BX				
BY				414 (1)
TOTAL		None		2,857
WEST AREA				
T				1,263
U				216
TX	380	---	380	
TY				3,110
TOTAL	380	None	380 (4)	4,589

Supernate tanks, 109 BY and 115 TX not included in the above.

Gallons x 10^3 of condensate to crib 840 (2) (3).

Ratio, * Feed to Waste

During Month ---

Cumulative to date ---

* Feed adjusted to metal waste equiva[redacted]

REMARKS: 103-C to pump overground to 109-C (1st cycle tank) instead of 109-BY during October to permit slurrying of 101-102-103-C cascade.

(1) Space released in 107-BY by first cycle evaporation.

(2) Includes 0.48 tons at decontaminated and depleted uranium.

(3) In addition to the amount cribbed, 336,000 gallons containing 2.97 tons of decontaminated and depleted uranium were ditched.

(4) 371,000 gallons of this was [redacted]

[redacted]

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[redacted]

WASTE STORAGE STATUS

[redacted] As of 2-31-52

[redacted]

WASTE EVAPORATOR

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FARM	Gallons x 10^3			
	Feed	Bottoms	Condensate To Cribs	Reserve Bottoms Space
EAST AREA				
U	123	162	375	554
C				
BX				
BY	414			
TOTAL	537	162	375	[illegible] (1)
WEST AREA				
T				
U				
TY	66	30	36	720
TX				
TOTAL	66	30	36	720 (2)

REMARKS: (1) Bottoms reserve has increased due to pumping 105-B and part of 104-B to evaporator feed tank. (2) Temporary increase due to contents of 116 TX bottoms tank being pumped to 116 TX feed tank feed tank for re-evaporation.

REDOX WASTE

FARM	Gallons x 10^3			% Reserve Capacity In Patches
	In Storage Beg. Mo.	Waste Received	In Storage End Mo.	
S Farm	2,038	391	2,429	[illegible] (1)
FU Farm				
TOTAL	2,038	391	2,429	[illegible]

Gallons x 10^3 of condensate to crib 342

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% Will be considered as Redox reserve capacity when empty.

** Reserve Capacity at [redacted] gallons per U-3 equivalent [redacted].

REMARKS: (1) Additional Redox reserve space is now available in tanks 241-S-110-111-112 and 241-TY-101-[illegible] 000 and 1,505,000 [illegible], respectively.
(2) Based on average [illegible]

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[redacted]

[redacted]

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STATUS OF WASTE FARMS

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	Type of Waste	Gallons x 10^3 Capacity	Gallons x 10^3 Stored	Reserve Cap. Gallons x 10^3	Reserve Cap. In Batches	Remarks
B Farm						
101	MW	530	530			
102	MW	530	530			
103	MW	530	519			
104	1C	530	410	120	2B	Partially pumped to 102-B. Not down to sludge.
105	EB	530	172	358		Completed pumping - [illegible]/52.
106	1C	530	448	82	2B	Strap. Feed Tank.
107	EB	530	461	69	2B	Active bottom tk.-East Area evap.
108	EB	530	530			
109	EB	530	528	7	2B	
110	2C	530	530			Active cascade-B plant 2nd cycle &
111	2C	530	530			Section 5.
112	2C	542	542			Tank 112-B, changed to crit.
201	224	54.5	54.5			Active cascade - [illegible]
202	224	54.5	54.5			
203	224	54.5	54.5			
204	224	54.5	54.5			
C Farm						
101	MW	530	530			
102	MW	530	530			
103	MW	530	519			Supernate to pump to 102-C.
104	MW	530	530			
105	MW	530	530			
106	MW	530	519			
107	1C	530	399	131	TBP	
108	1C	530	34	496	TBP	
109	1C	530	10	515	TBP	To receive TBP supernate from 103-C.
110	1C	530	231	299	TBP	
111	1C	530	36	494	TBP	
112	1C	530	17	506	TBP	
201	MW	54.5	54.5			
202	MW	54.5	54.5			
203	MW	54.5	54.5			
204	MW	54.5	54.5			

MW - Metal Waste
1C - First Cycle Waste
2C - Second Cycle Waste
R - Redox Waste

224 - 224 Oligo Waste
TBP - TBP Waste
EB - Evaporator Bottoms

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[redacted]

[redacted]

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D-27

STATUS OF WASTE FARMS

[redacted]

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	Type of Waste	Gallons x 10^3 Capacity	Gallons x 10^3 Stored	Reserve Capacity Gallons x 10^3	Reserve Capacity In Inches	Remarks
BX Farm						
101	MW	530	530			
102	MW	530	467	63	23	
103	MW	530	530			
104	MW	530	530			
105	MW	530	530			
106	MW	530	530			
107	1C	530	530			
108	1C	530	530			
109	1C	530	530			
110	1C	530	530			
111	1C	530	525			
112	1C	530	530			
BY Farm						
101	MW	758	758			
102	MW	758	758			
103	MW	758	664	83	31	
104	MW	758	758			
105	MW	758	491	267	99	
106	MW	758	---	747	277	
107	1C	758	344	414	TBP	Partially pumped 9-25 to 9-28.
108	1C	758	753			
109	TBP	758	---	758		TBP supernate tank-200 East Area.
110	1C	758	722	31	11	Active-1st cycle tank-221-B.
111	MW	758	758			
112	MW	758	294	453	168	Active - MW tank - 221-B.
[illegible] Farm						
101	MW	530	530			
102	MW	530	530			
103	MW	530	519			
104	1C	530	530			Contents of cascade will be aged 1 year - 3/1/53, after which evaporation may be started.
105	1C	530	530			
106	1C	530	528			
107	1C	530	245	285	TBP	
108	1C	530	73	457	TBP	
109	1C	530	4	515	TBP	

MW - Metal Waste
1C - First Cycle Waste
2C - Second Cycle Waste
R - Redox Waste
[redacted] Bridge Waste
[redacted]

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[redacted]

STATUS OF WASTE TANKS

[redacted]

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	* Type of Waste	Gallons x 10^3 Capacity	Gallons x 10^3 Stored	Reserve Capacity Gallons x 10^3	Reserve Capacity In Batches	Remarks
T Farm						
110	224 & 2C	530	530			Active cascade - T plant - 2nd
111	224 & 2C	530	530			cycle, 224 and Sect. 5 Wastes.
112	224 & 2C	569	569			112-T cascades to crib.
201	224	54.5	54.5			
202	224	54.5	54.5			
203	224	54.5	54.5			
204	224	54.5	54.5			
U Farm						
101	MW	530	530			Cascade now slurrying for feed to TBP Plant.
102	MW	530	530			
103	MW	530	529			
104	MW	530	530			
105	MW	530	530			
106	MW	530	519			
107	MW	530	530			
108	MW	530	530			
109	MW	530	519			
110	1C	530	336	194	71 **	Cascade being held as Redox
111	1C	530	14	516	187	waste reserve.
112	1C	530	32	498	181	
201	TBP	54.5	---	52.5	TBP	
202	TBP	54.5	---	54.5	TBP	
203	TBP	54.5	---	54.5	TBP	
204	TBP	54.5	---	54.5	TBP	
TX Farm						
101	MW	758	758			
102	MW	758	758	8		
103	MW	758	758			
104	MW	758	750			
105	MW	758	758			
106	MW	758	95	663	246	Pumped to 1:4 TX on 9/6/52 over-
107	MW	758	758			ground.
108	MW	758	718	29	11	Active tank - 221-T - metal waste.
109	1C	758	758	---	---	Active cascade - 221-T - first
110	1C	758	178	580	207	cycle.
111	1C	758	---	758	271	
112	1C	758	---	753	269	

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* MW - Metal Waste
* 1C - First Cycle Was[redacted]
2C - Second Cycle [redacted]
R - Redox Waste
H-2902.10-X 4-52 [redacted]

224 - 224 Bldg. Waste
[redacted]P - TBP Waste
[redacted]B - Evaporator Bottoms

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STATUS OF WASTE FARMS

[redacted]

	* Type of Waste	Gallons x 10^3 Capacity	Gallons x 10^3 Stored	Reserve Capacity Gallons x 10^3	Reserve Capacity In Batches	Remarks
TX Farm (cont'd)						
113	EB	758	750	8	---	
114	MW	758	666	81	30	Received from 106-TX, 9/6/52.
115	TBP	758	758	---	---	TBP supernate tank-200West Area
116	EB	758	46	712		Pumped to 118 TX for starting re-evaporation.
117	EB	758	756	---	---	
118	1C	758	735	23	8	Evaporator feed tank.
TY Farm						
101	R	758		758	276**	
102	R	758		747	272	
103	TBP	758		758	276	
104	TBP	758		747	272	
105	TBP	758		758	276	
106	TBP	758		747	272	
S Farm						
101	R	758		758	276	
102	R	758		758	276	
103	R	758		747	272	
104	R	758		758	276	
105	R	758		758	276	
106	R	758		747	272	
107	R	758	458	300	109	Active tank - Redox wastes.
108	R	758	---	758	276	
109	R	758	---	747	272	
110	R	758	774	---	---	
111	R	758	755	---	---	
112	R	758	442	305	111	

* MW - Metal Waste
1C - First Cycle Waste
2C - Second Cycle Waste
R - Redox Waste

224 - 224 Bldg. Waste
TBP - TBP Waste
EB - Evaporator Bottoms

** - Reserve figures for storage in tank farm 241-S and tanks 241-U-110-112; 241-TY-101-102. Based on average plant performance of 2,750 gallons per batch.

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WASTE STATUS SUMMARY Separations Section

Period: OCTOBER, NOVEMBER AND DECEMBER, 1952

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HW-27845

Ground

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WASTE STATUS SUMMARY

Month of October 1952

	B Plant	T Plant
Runs of Metal Waste to waste farm during the month	2 Bicarb. flushes	
Gals. increase in Metal Waste volume	2,000	58,9[illegible]
Gals./Run average Metal Waste volume	- (1)	2,[illegible]
Reserve Gals. available for Metal Waste on 11-1-52	1,556,000 (2)	708,0[illegible]
Runs of First Cycle Waste sent to farm during the month	2 AW	[illegible]
Gals. increase in First Cycle Waste volume	9,600	55,0[illegible]
Gals./Run average First Cycle Waste volume	- (1)	2,[illegible]
Reserve Gals. available for First Cycle Waste on 11-1-52	304,000 (2)	2,076,0[illegible]

Remarks: (1) Since B-Plant batches have been of abnormal sizes, no averages have been calculated. (2) In November 5-6, 2nd cycle, 1st cycle, and stack drainage will be cribbed after passing through 110-111-112 B cascade. Metal waste flushes will be cribbed after passing through 200-B tank cascade. Because of these changes, B-Plant no longer requires first cycle and metal waste reserves. (3) Underground line connecting 105 and 105-TX (T-Plant active metal waste cascade) was plugged at month's end. This has resulted in an unusually high liquid level in the 105-TX tank. Metal waste averages shown above are based on the assumption that none of this material has been lost to the ground.

	S Plant
Bismuth Phosphate Batch Equivalent	121.[illegible]
Gallons increase in fission product waste storage	323,0[illegible]
Tons of Uranium, (as charged), processed to contribute to make-up of waste	73.[illegible]
Gallons/batch equivalent to 6-3 MS	2,6[illegible]
Gallons per ton of Uranium processed (1)	4,3[illegible]
Reserve Gallons available for Redox waste on 10-31-52 (2)	5,319,0[illegible]

Remarks: (1) This average shows an 8.5% increase per ton over September. This was due to increased waste volumes resulting from equipment changes in the third uranium cycle. The theoretical effect of these changes is 8.7%. (2) These reserves are those in tank farm 241-S only.

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(3)

WASTE STORAGE STATUS

As of 10-31-52

METAL WASTE

FARM	Gallons x 10^3 In Storage Beg. Mo.	Metal Waste Received	In Storage End Mo.	Reserve Capacity In Batches
EAST AREA				
B	1,579		1,579	
C	3,374		3,374 (1)	
BX	3,117		3,117	23
BY	4,481	57 (2)	4,538	553
TOTAL	12,551	57	12,608	576
WEST AREA				
T	1,579		1,579	
U	4,737		4,737 (1)	
TX	6,019	59	6,078	265
TY	---		---	---
TOTAL	12,335	59	12,394	265

REMARKS: Reserve capacity at 2,700 Gallons per batch.

(1) Cascades 101-103 C and 101-103 U slurrying for TBP feed.

(2) Includes 2,000 gallons from B-Plant and 55,000 gallons from TBP-Plant.

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WASTE STORAGE STATUS

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of 10-31-52

URANIUM CONTENT
METAL WASTE

FARM	TONS OF DEPLETED URANIUM			
	In Storage Beg. Mo.	Received	* To TBP	In Storage End Mo.
EAST AREA				
B	383			383
C	837	1.32 (1)	392 (4)	446.32
BK	758			758
BY	1,057.76	0.61 (2)		1,058.37
TOTALS	3,035.76	1.93		2,645.69
WEST AREA				
T	374			374
U	770	0.45 (3)		770.45
TX	1,381.63	13.62		1,395.25
TY				
TOTAL	2,525.63	14.07		2,539.70 (5)

* Tons of uranium transferred as metal waste to the Waste Removal Group for slurrying.

REMARKS: (1) Uranium in recovered nitric acid sent to C Farm in September and October.

(2) 55,000 gallons from TBP-Plant to 111-112 BY.

(3) Uranium in recovered nitric acid sent to U-Farm in September and October.

(4) 392 tons of uranium in cascade 101-103 C transferred to TBP account.

(5) 405 tons of uranium in cascade 101-103 C not included in this total.

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WASTE STORAGE ST

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As of 10-31-52

FIRST CYCLE WASTE AND COATING WASTES

T AND B PLANTS

TANK	Gallons x 10^3				
	In Storage Beg. Mo.	1st Cycle Waste Rec'd	Feed To Evaporator	In Storage End Mo.	Reserve In Batch
EAST AREA					
B	582			582	
Evaporator Feed Tank - 106 B	448		201	247	101
C	727			727	
BX	3,175			3,175	
BY	1,819	10		1,829	8
TOTAL	6,751	10	201	6,560	109
WEST AREA					
T	1,910			1,910	
U	382			382	
TX	936	55		991	727
Evaporator Feed Tank - 118 TX	335		17	318	24
TY	---				
TOTAL	3,963	55	17	4,001	741

Reserve Capacity at 2,800 gallons per batch

( ) Not included in totals.

REMARKS:

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WASTE STORAGE STATUS

As of 10-31-52

SECOND CYCLE WASTES

	Cascade In Use	Gallons x 10^3 Cribbed	Gallons x 10^3 Sludge	Estimated Reserve Capacity In Batches
EAST AREA	110-111-112-B	82	414	3,020 **
WEST AREA	110-111-112-T	162	725	2,344 ***
TOTAL		244	1,139	5,364

REMARKS: 58,000 gallons from Section 5, 221-B and 114,000 gallons from Section 5, 221-T included in cribbed figures.

** Reserve calculations based on storage of combined 5-6 and second cycle only at 275 gallons of sludge per run.

*** Reserve calculations based on storage of combined 5-6, second cycle and 224-T wastes at 350 gallons of sludge per run.

224 BUILDING WASTES

	Cascade In Use	Gallons x 10^3 Cribbed	Gallons x 10^3 Sludge	Estimated Reserve Capacity In Batches
EAST AREA	204-201-202-B	12	170	476
WEST AREA	204-201-T. 110-111-112-T	Inactive Cascade 98	187 Included with 2nd cycle figures	---
TOTAL		110	357	476

REMARKS:

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WASTE STORAGE STATUS

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as of 10-31-52

TBP WASTE

Tank	Gallons x 10^3			
	In Storage Beginning	TBP Waste Received	In Storage Ending	Remaining Capacity
1X5P SERIES				
[illegible]				2,443
[illegible]				
[illegible]		(55) (1)		414
TOTAL				2,857
1X5T SERIES				
[illegible]				1,263
[illegible]				216
[illegible]	380		380	
TOTAL	380		380	3,110
TOTAL	380		380	4,589

Supernate tanks, 109 BY and 115 TX not included in the above.

Gallons x 10^3 of condensate to crib 854 (2) (3)

Ratio = Feed to Waste

During Month ---

Cumulative to date ---

Feed adjusted to metal waste equivalent

REMARKS: (1) Stored in unprocessed metal waste tanks 111 & 112 BY; this material will be re-worked. Shown as metal waste figures; includes 0.61 tons of depleted uranium.

(2) Includes amount cribbed to 216-W and 316-W crib - contained 0.84 tons of depleted uranium.

(3) In addition to this figure, 405,000 gallons of solution containing 2.40 tons of depleted uranium were ditched.

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WASTE EVAPORATOR

Week	Gallons x 10^3			
	Feed	Bottoms	Condensate To Crib	Average Bottoms Sp. Gr.
1st Qtr.				
1	201	64	137	490
2				
3				
4				
TOTAL	201	64	137	490
2nd Qtr.				
1				
2				
3	17	46 (1)	-29 (1)	674
4				
TOTAL	17	46	-29	674

(1) Bottoms figures exceeded feed because of evaporator flushes, hence recovered space or condensate is negative.

REMARKS

REDOX WASTE

Week	Gallons x 10^3			Reserve Capacity in Gallons
	In Storage Beg. Qtr.	Waste Received	In Storage End Qtr.	
1st Qtr.	2,429	323	2,752	2,300
2nd Qtr.				
TOTAL	2,429	323	2,752	

Gallons x 10^3 of condensate to crib 300

Gallons to consider as usable reserve capacity when storage

Reserve Capacity of 2,750 gallons per 6-9 equivalent batch

REMARKS: A total of 2,713,000 gallons of storage space immediately available 241-TY and 241-TX

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STATUS OF WASTE FARMS

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	Type of Waste	Gallons x 10^3 Capacity	Gallons x 10^3 Stored	Reserve Cap. Gallons x 10^3	Reserve Cap. In Batches	Remarks
B Farm						
101	MW	530	530			
102	MW	530	530			
103	MW	530	519			
104	1C	530	410	120	EB	
105	EB	530	172	358	EB	
106	1C	530	247	283	[illegible]	Evaporator feed tank
107	EB	530	525	5	EB	Active bottoms tank-East Area [illegible]
108	EB	530	530	—	—	
109	EB	530	518	7	EB	
110	2C	530	530			2nd cycle and 5-6 waste, B Fla[illegible] active cascade
111	2C	530	530			
112	2C	562	562			112-B cascades to crib
201	224	54.5	54.5			Active cascade, 224-B
202	224	54.5	54.5			
203	224	54.5	54.5			
204	224	54.5	54.5			
C Farm						
101	[illegible]	530	530			Cascade now slurrying for TBP f[illegible]
102	[illegible]	530	[illegible]			
103	[illegible]	530	519			
104	[illegible]	530	530			
105	[illegible]	530	530			
106	[illegible]	530	519			
107	1[illegible]	530	399	131	TBP	
108	1[illegible]	530	[illegible]	[illegible]	TBP	
109	1[illegible]	530	10	515	TBP	Temporary supernate tank for [illegible] operations
110	1[illegible]	530	231	299	TBP	Active cascade TBP operations
111	[illegible]	530	36	494	[illegible]	
112	[illegible]	530	17	506	TBP	
201	MW	54.5	52.5			
202	MW	54.5	54.5			
203	MW	54.5	54.5			
204	MW	54.5	54.5			

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- MW - Metal Waste
- 1C - First Cycle Waste
- 2C - Second Cycle Waste
- R - Redox Waste
- 224 - 224 Bldg. Waste
- TBP - TBP Waste
- EB - Evaporator Bottoms

[redacted]

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	Type of Waste	Gallons x 10^3 Capacity	Gallons x 10^3 Stored	Reserve Capacity Gallons x 10^3	Reserve Capacity In Batches	Remarks
BX Farm						
101	MW	530	530			
102	MW	530	467	63	23	
103	MW	530	530			
104	MW	530	530			
105	MW	530	530			
106	MW	530	530			
107	1C	530	530			
108	1C	530	530			
109	1C	530	530			
110	1C	530	530			
111	1C	530	525			
112	1C	530	530			
BY Farm						
101	MW	758	758			
102	MW	758	758			
103	MW	758	664	83	11	
104	MW	758	758			
105	MW	758	491	267	99	
106	MW	758	[illegible]	147	277	
107	1C	758	[illegible]	[illegible]	[illegible]	Pumping to 100-B not complete
108	1C	758	[illegible]			
109	TBP	758	[illegible]	750		TBP supernate tank - 20C B Area
110	1C	758	732	21	6	Abandoned as 1st cycle cascade
111	[illegible]	758	[illegible]	[illegible]	[illegible]	
112	[illegible]	758	[illegible]	[illegible]	[illegible]	Abandoned by Department as metal waste cascade. Waste will be cribbed.
T Farm						
101	MW	530	[illegible]			
102	MW	530	[illegible]			
103	MW	530	519			
104	1C	530	530			1 year decay complete 3/31/53
105	1C	530	530			Evaporation scheduled to
106	1C	530	528			start 4/1/53
107	1C	530	245	285	[illegible]	
108	1C	530	73	457	TBP	
109	1C	530	4	515	TBP	

* MW - Metal Waste
1C - First Cycle Waste
2C - Second Cycle Waste
R - Redox Waste
224 - 224 Bldg. Waste
TBP - TBP Waste
EB - Evaporator Bottoms

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STATUS OF WASTE TANKS

	Type of Waste	Gallons x 10^3 Capacity	Gallons x 10^3 Stored	Reserve Capacity Gallons x 10^3	Reserve Capacity In Batches	Remarks
T Farm						
110	224 & 2C	530	530			Active cascade-T Plant; 2nd
111	224 & 2C	530	530			cycle, 224 & Sect. 5 wastes
112	224 & 2C	569	569			Tank 112-T cascades to crib
201	224	54.5	54.5			
202	224	54.5	54.5			
203	224	54.5	54.5			
204	224	54.5	54.5			
U Farm						
101	MW	530	530			Cascade now slurrying for fe
102	MW	530	530			to TBP
103	MW	530	519			
104	MW	530	530			
105	MW	530	530			
106	MW	530	519			
107	MW	530	530			
108	MW	530	530			
109	MW	530	519			
110	1C	530	[illegible]	[illegible]	[illegible]	Cascade being held as Redox
111	1C	530	14	516	[illegible]	waste reserve
112	1C	530	[illegible]	[illegible]	[illegible]	
201	TBP	54.5		[illegible]	TBP	
202	TBP	54.5		[illegible]	TBP	
203	TBP	54.5		[illegible]	TBP	
204	TBP	54.5		[illegible]	TBP	
TX Farm						
101	[illegible]	758	758			
102	[illegible]	758	758			
103	[illegible]	758	[illegible]			
104	[illegible]	758	[illegible]			
105	MW	758	[illegible]	[illegible]	[illegible]	Overflow to 100-TX plugged
106	MW	758	102	[illegible]	[illegible]	month end
107	MW	758	718			Supernate temp. [illegible]
108	MW	758	732			10-31-52
109	1C	758	758	---	---	Active cascade, 221-T, 1st
110	1C	758	233	525	188	
111	1C	758	---	52	271	
112	1C	758	---	753	269	

* MW - Metal Waste
* 1C - First Cycle Waste
2C - Second Cycle Waste
R - Redox Waste

224 - 224 Bldg. Waste
TBP - TBP Waste

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STATUS OF WASTE FARMS

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	* Type of Waste	Gallons x 10^3 Capacity	Gallons x 10^3 Stored	Reserve Capacity Gallons x 10^3	Reserve Capacity In Batches	Remarks
TX Farm (cont'd)						
111	EB	758	750	8	28	
114	MW	758	666	61	30	
115	TBP	758	758			TBP supernate tank, 2-West Area
116	EB	758	92	666	28	Active bottoms tank, 2-West Area
117	EB	758	756			
118	1C	758	718	40	14	Evap. feed tank, 2-West Area
TY Farm						
101	R	758	---	758	276 **	
102	R	758	---	747	272	
103	TBP	758	---	758	---	
104	TBP	758	---	747	---	
105	TBP	758	---	758	---	
106	TBP	758	---	747	---	
S Farm						
101	R	758	---	758	276 **	
102	R	758	---	756	276	
103	R	758	---	747	272	
104	R	758	---	758	276	
105	R	758	---	756	276	
106	R	758	---	747	272	
107	R	758	763	---	---	Failed 10-30-52
108	R	758	17	741	[illegible]	Lower tank, Redox waste
109	R	758	---	747	[illegible]	
110	R	758	774	---	---	
111	R	758	755			
112	R	758	[illegible]	[illegible]	[illegible]	

* MW - Metal Waste
1C - First Cycle Waste
2C - Second Cycle Waste
R - Redox Waste

224 - 224 Bldg. Waste
TBP - TBP Waste
EB - Evaporator Bottoms

** - Reserve figures for storage in tank farm 241-S-101-109 and tanks 241-U-110-112; 241-TY-101-102 based on average plant performance of 2,750 gallons per batch.

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WASTE STATUS SUMMARY

[redacted]

Month of November 1952

	B Plant	T Plant
Tons of Total Waste to waste farm during the month	[redacted]	[redacted]
Gallons Increase in Total Waste [redacted]	[redacted]	82,250
Gallons/Run average Total [redacted]	[redacted]	3,570
Reserve Gallons available for Total Waste on 11-30-52	1,556,000 (1)	652,000
Tons of First Cycle Waste sent to farm during the month	[redacted]	[redacted]
Gallons Increase in First Cycle Waste Volume	[redacted]	61,250
Gallons/Run average First Cycle Waste Volume	[redacted]	2,520
Reserve Gallons available for First Cycle Waste on 11-30-52	386,000 (1)	2,013,000

Remarks (1) Reserve space no longer required for B-Plant since all waste from [redacted] buildings are being cribbed.

[redacted]

	S Plant
Bismuth Phosphate Batch Equivalent	182.73
Gallons Increase in Bismuth product waste storage	473,000
Tons of Uranium (as charged) processed to certain batch or make-up of waste	114.10
Gallons/batch equivalent to 6-3 TS	2,589
Gallons per Ton of Uranium processed	4,145
Reserve Gallons available for Redox waste on 11-30-52	(1) 5,846,000

Remarks (1) These reserves are those in tank farm 241-S only.

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Waste storage status

[redacted] as of 11-30-52

[redacted]

[redacted]

FARM	In Storage [redacted]	Total Waste Received	In Storage [redacted]	Waste Generated in Batches
EAST AREA				
B	1,579		1,579	
[redacted]	3,374		3,374 (1)	
BX	3,117		3,117	23
BY	4,538	---	4,538	553
TOTAL	12,608	---	12,608	576
WEST AREA				
T	1,579		1,579	
U	4,737		4,737 (1)	
TX	6,078	82	6,160	241
TY	---		---	
TOTAL	12,394	82	12,476	241

REMARKS: Reserve capacity of 2,700 Gallons per batch

(1) Cascades 101-103 C and 101-103 U are now serving as feed tanks to IBI Plant. These cascades will be indicated as full until the entire cascade has been released.

[redacted]

[redacted]

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HW-27[illegible]

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[redacted] 11-30-52

[redacted]

[redacted]

Item	In Storage Beg Mo	Received	To TBP	In Storage End Mo
[redacted]				
[redacted]	383			383
[redacted]	446.32 (2)	3.40 (1)		449.72
[redacted]	758			758
[redacted]	1,058.37			1,058.37
TOTAL	2,645.09	3.40		2649.09
[redacted]				
[redacted]	374			374
[redacted]	770.45 (2)	2.88 (1)		773.33
[redacted]	1,395.25	16.27		1,411.52
TT	---			---
TOTAL	2,539.70	19.27		2558.97

* Tons of uranium transferred as metal cake to the waste disposal group for slurrying

** REMARKS (1) 6.30 tons addition to farm at blend tanks in form of recovered nitric acid. This uranium will be fed back through the TBP Plant.

*(2) 392 tons in cascade 101-103 C and [illegible] tons in cascade 101-103 U are now being fed to TBP Plant. These quantities are not included in the above figures.

[redacted]

[redacted]

[redacted]

[redacted]

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T6

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11-30-

[redacted] AND COATING WASTES
T AND B PLANTS

[redacted]	[redacted]				
	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]					
[redacted]	582			582	
Evaporator Feed Tank [redacted]	247		82	165	130
[redacted]	727			727	
[redacted]	3,175			3,175	
[redacted]	1,829	---		1,829	8
TOTAL	6,560	---	82	6,478	138
[redacted]					
[redacted]	1,910			1,910	
[redacted]	362			382	
[redacted]	991	63		1,054	705
Evaporator Feed Tank [redacted]	718		---	718	14
[redacted]	---			---	
TOTAL	4,001	63	---	4,064	719

[redacted] 2,000 [redacted]

[redacted]

[redacted]

[redacted]

[redacted]

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WASTE STORAGE STATUS

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As of 11-30-52

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SECOND CYCLE WASTES

	Cascade or Tank	Cribbed	Sludge	Estimated Reserve Capacity in Gallons
EAST AREA	110-111-112 B	131 (1)	414	3,020 **
WEST AREA	110-111-112 T	178	733	2,321 ***
TOTAL		309	1,147	5,341

REMARKS: (1) Includes metal waste, first cycle, section five, and second cycle wastes resulting from cleanouts.

** Reserve calculations based on storage of combined 5-6 and second cycle only at 275 gallons of sludge per run.

*** Reserve calculations based on storage of combined 5-6, 2nd cycle and 224-T waste at 350 gallons of sludge per run.

[illegible]

	Cascade or Tank	Cribbed	Sludge	Estimated Reserve Capacity in Gallons
EAST AREA	204-203-202 B	24	170	476
WEST AREA	204-201-T 110-[illegible]-112 T	79 Inactive cascade	187 Incl. with 2nd cycle figures	---
TOTAL		103	357	476

REMARKS:

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WASTE STORAGE STATUS

As of 11-30-52

[redacted]

PARM	Gallons x 10^3 In Storage Beg. Mon.	[redacted]	In Storage	Reserve Capacity
EAST AREA				
B				
C		362	362	1,580 (3)
BX				
BY	55 (1)		55	414
TOTAL	55	362	417	1,994
WEST AREA				
T		426	426	831
U				
TX	380 (2)		380	
TY				3,010
TOTAL	380	426	806	3,841

Supernate tanks, 109 BY and 115 TX not included in the above.

Gallons x 10^3 of condensate to crib 2,055

Ratio: ~~Feed to waste~~ WASTE TO FEED

During Month 0.95*

Cumulative to date 1.65 (4)

* Feed adjusted to metal waste equivalent

REMARKS: (1) High waste in metal waste cascade 111-112 BY is reworkable.

(2) High waste [redacted]

(3) Tank 109 C not included as reserve space since this space is not immediately available.

(4) Includes high waste [redacted]

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WASTE STORAGE STATUS

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As of 11-30-52

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WASTE EVAPORATOR

FARM	Gallons x 10^3 Feed	Bottoms	Condensate To Cribs	Reserve Bottoms Space
EAST AREA		[redacted]		
B	82.5	20	62.5	489
C				
BX				
BY				
TOTAL	82.5	20	62.5	489
WEST AREA				
T				
U				
TX	0	0	0	676 (1)
TY				
TOTAL	0	0	0	676 (1)

REMARKS: (1) 2,000 gallon reserve increase in 113 TX because of volume contraction of liquid following cooling below boiling point toward atmospheric temperature.

REDOX WASTE

FARM	Gallons x 10^3 In Storage Beg. Mo.	Waste Received	In Storage End Mon.	** Reserve Capacity In Batches
S Farm	2,751	473	3,224	2,245
SU Farm				
TOTAL	2,751	[redacted]		2,245

Gallons x 10^3 of Condensate to cribs 406

[redacted]

[redacted] Capacity of 2,600 gallons [redacted] batch

REMARKS: A total of 2,713,000 gallons of storage space is available in 241-TY and 241-U tank farms.

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STATUS OF WASTE FARMS

Tank	* Type of Waste	Gallons x 10^3 Capacity	Storage	Reserve Cap.		Remarks
B Farm						
101	MW	530	530			
102	MW	530	530			
103	MW	530	519			
104	1C	530	410	120	EB	
105	EB	530	172	358	EB	
106	1C	530	165	365	130	Evaporator feed tank
107	EB	530	531	---		Cascaded to 108-B, 11-25-52
108	EB	530	528	---		Cascaded to 109-B, 11-30-52 *
109	EB	530	514	11	EB	
110	1C - 2C-5-6	530	530			Active cascade, B Plant receives
111	1C - 2C-5-6	530	530			flushes of Sec. 5, 1st cycle &
112	1C - 2C-5-6	542	542			2nd cycle lines
201	MW	224	54.5	54.5		Active cascade, B Plant receives
202	MW	224	54.5	54.5		flushes of 224-B Bldg. & MW lines
203	MW	224	54.5	54.5		
204	MW	224	54.5	54.5		
C Farm						
101	MW	530				Cascade now serving as feed to
102	MW	530	779			TBP Plant
103	MW	530				
104	MW	530	530			
105	MW	530	530			
106	MW	530	519			
107	1C	530	399-0	131	TBP	
108	1C	530	34-0	496	TBP	
109	1C-TBP	530	10-486	23	TBP	Temporary supernate tank for
110	1C-TBP	530	231-259	40	TBP	C-Farm MW removal operations
111	1C-TBP	530	36-103	391	TBP	200-E active receiver of TBP
112	1C-TBP	530	17-0	502	TBP	wastes. Overflow 110-C to 111-C
						plugged on 11-15-52
201	MW	54.5	52.5			
202	MW	54.5	54.5			
203	MW	54.5	54.5			
204	MW	54.5	54.5			

* MW = Metal Waste
1C - First Cycle Waste
2C = Second Cycle Waste
R = Redox Waste

224 Bldg. Waste
TBP - TBP Waste
EB - Evaporator Bottoms

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* Tanks 108 and 109-B were previously in service for storage of evaporator bottoms in May and August respectively. Since those bottoms solutions have cooled, causing a density increase. This has resulted in 19,000 gallons of additional storage space, which was utilized by cascading wastes from 107-B to 108-B to 109-B in November.

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STATUS OF WASTE FARM

	Type of Waste	Gallons x 10^3 Capacity	Gallons x 10^3 Stored	Radioactivity x 10^3	Radioactivity in Batches	Remarks
BX Farm						
101	MW	530	530			
102	MW	530	467	63	23	
103	MW	530	530			
104	MW	530	530			
105	MW	530	530			
106	MW	530	530			
107	1C	530	530			
108	1C	530	530			
109	1C	530	530			
110	1C	530	530			
111	1C	530	525			
112	1C	530	530			
BY Farm						
101	MW	758	758			
102	MW	758	758			
103	MW	758	604	83	31	
104	MW	758	758			
105	MW	758	491	267	99	
106	MW	758	---	747	277	
107	1C	758	344	414	TBP	No supernate pumped to 106-B in November
108	1C	758	753			
109	TBP	758	---	758		TBP supernate tank, 200 E Area
110	1C	758	732	21	8	
111	MW	758	758	---		
112	MW	758	351	396	147	
[illegible] Farm						
101	MW	530	530			
102	MW	530	530			
103	MW	530	519			
104	1C	530	530			1 year decay complete 3/31/53
105	1C	530	[illegible]			Evaporation scheduled to start
106	1C	530	[illegible]			4-1-53
107	1C-TBP	530	245-285	---	TBP	Full 11-26-52. Started filling with TBP, 11-17-52, because of
108	1C-TBP	530	73-141	316	TBP	plug in 110-111-112 C cascade
109	1C-TBP	530	[illegible]		TBP	

* MW - Metal Waste
1C - First Cycle Waste
2C - Second Cycle Waste
R - Redox Waste

224 - 224 Bldg. Waste
TBP - TBP Waste
EB - Evaporator Bottoms

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STATUS OF WASTE FARMS

	Type of Waste	Gallons x 10^3 Capacity	Gallons x 10^3 Stored	Reserve Capacity Gallons x 10^3	Reserve Capacity In Batches	Remarks
T Farm						
110	224&2C	530	530	[redacted]		2nd cycle, Sec. 5, and 224 Bldg.
111	224&2C	530	530*			Active cascade, T Plant
112	224&2C	569	569			Tank 112, T cascades to crib
201	224	54.5	54.5			
202	224	54.5	54.5			
203	224	54.5	54.5			
204	224	54.5	[redacted]			
U Farm						
101	MW	530				Cascade now serving as feed to
102	MW	530	586			TBP Plant
103	MW	530				
104	MW	530	530			
105	MW	530	530			
106	MW	530	519			
107	MW	530	530			
108	MW	530	530			
109	MW	530	530			
110	1C	530	336	194	75 **	Cascade being held as Redox waste
111	1C	530	14	516	198	reserve
112	1C	530	32	498	192	
201	TBP	54.5		52.5	TBP	
202	TBP	54.5		54.5	TBP	
203	TBP	54.5		54.5	TBP	
204	TBP	54.5		54.5	TBP	
X Farm						
101	MW	758	758			
102	MW	758	758			
103	MW	758	758			
104	MW	758	750			
105	MW	758	766	---	---	Plug removed 11-8-52
106	MW	758	187	571	211	
107	MW	758	766	---	---	
108	MW	758	751	---	---	
109	1C	758	758	[redacted]		Active cascade, 221-T, 1st cycle
110	1C	758	296	[redacted]		
111	1C	758	---	[redacted]		
112	1C	758	---	753	269	

* MW - Metal Waste
* 1C - First Cycle Waste
2C - Second Cycle
R - Redox Waste
224 - 224 Bldg. Waste
TBP - TBP Waste
EB - Evaporator Bottoms
** See bottom of page H-2902.11-X

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STATUS OF WASTE FARMS

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	* Type of Waste	Gallons @ 10^3		Remaining		Remarks
		Capacity	Stored	Gallons x 10^3	In Batches	
U Farm (cont'd)						
113	EB	758	748	10	EB	
114	MW	758	666	[redacted]		
115	TBP	758	7[redacted]	[redacted]		TBP supernate tank, 200-W Area
116	EB	758	92	666	EB	Active bottoms tank, 200-W Evap.
117	EB	758	756			
118	1C	758	718	40	14	Evap. feed tank, 200-W Area
Y Farm						
101	R	758	---	758	291 **	
102	R	758	---	747	287	
103	TBP	758	---	758	TBP	
104	TBP	758	---	747	TBP	
105	TBP	758	---	758	TBP	
106	TBP	758	---	747	TBP	
Farm						
101	R	758	---	758	291 **	
102	R	758	---	758	291	
103	R	758	---	747	287	
104	R	758	---	758	291	
105	R	758	---	758	291	
106	R	758	---	747	287	
107	R	758	763		---	
108	R	758	490	268	103	Active tank, Redox wastes
109	R	758	---	747	287	
110	R	758	774			
111	R	758	755			
112	R	758	442	306	117	

MW = Metal Waste
1C = First Cycle Waste
2C = Second Cycle Waste
R - Redox Waste

224 = 224 Bismuth Waste
TBP = TBP Waste
EB = Evaporator Bottoms

** Performance of 2,600 gallons per batch (average of Oct.-Nov. 1952)

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HW-27824

WASTE STATUS SUMMARY

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Month of December, 1952

	B Plant	T Plant
Runs of Metal Waste to waste farm during the month	—	41
Gals. increase in Metal Waste volume	(1)	104,500
Gals./Run average Metal Waste volume	—	2,549
Reserve Gals. available for Metal Waste on 12-31-52	1,545,000 (2)	547,000
Runs of First Cycle Waste sent to farm during the month	—	39
Gals. increase in First Cycle Waste volume	(1)	101,750
Gals./Run average First Cycle Waste volume	—	2,609
Reserve Gals. available for First Cycle Waste on 12-31-52	(3) 136,000	(3) 1,911,000

Remarks: (1) All wastes from B Plant are cribbed after passing through either the 200-B series tanks, or 110-112-B cascade. (See 2nd cycle and 224 wastes) below previous month figure. (2) Decreased 11,000 gallons because of addition of temporary TBP waste to 111-112-BX tanks. (3) Includes twenty acres in first cycle evaporator feed tanks.

	S Plant
Bismuth Phosphate Batch Equivalent	140.69
Gallons increase in Fission product waste storage	373,000
Tons of Uranium (as charged) processed to contribute to make-up of waste	91.00
Gallons/batch equivalent to 6e3 PS	2,650
Gallons per ton of Uranium processed	(1) 4,096
Reserve Gallons available for Redox waste on 12-31-52	(2) 5,475,000

Remarks: (1) Minor process changes were made which tend toward reducing waste volume per ton of uranium feed by a small percentage. (2) These reserves are those in tank farm 241-S only.

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WASTE STORAGE STATUS

As of 12-31-52

METAL WASTE

FARM	Gallons x 10^3 In Storage Beg. Mon.	Metal Waste Received	In Storage End Mo.	Reserve Capacity In Batches
EAST AREA				
B	1,579		1,579	
C	3,374 (1)		3,374	
BX	3,117		3,117	23
BY	4,538	11 (2)	4,549	550
TOTAL	12,608	11	12,619	573
WEST AREA				
T	1,579		1,579	
U	4,737 (1)		4,737	
TX	6,160	105	6,265	203
TY				
TOTAL	12,476	105	12,581	203

REMARKS: Reserve capacity of 2,700 Gallons or better

(1) Cascades 101-109-C and 101-109-U are now serving as FWSI tanks to TBP Plant. These cascades will be indicated as full until the entire cascade has been released.

(2) High waste from TBP Plant return to metal waste storage.

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WASTE STORAGE STATUS

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as of [redacted]-31-52

URANIUM CONTENT
METAL WASTE

FARM	Tons of Depleted Uranium			
	In Storage Prev. Mon.	Received	* In TBP	In Storage End Mo.
EAST AREA				
T	383			383
U	(2) 449.72	1.35 (3)		451.07
HT	758			758
HU	1,058.37	0.67 (1)		1,059.04
TOTAL	2,649.09	2.02		2,651.11
WEST AREA				
T	374			374
U	(2) 774.35	1.37 (3)		776.72
TX	1,411.52	24.58		1,436.10
TY				
TOTAL	2,558.87	25.95		2,584.82

* Tons of uranium transferred as metal waste to the Waste Removal Group for storage.

REMARKS: (1) 0.67 tons of high TBP waste sent to cascade 111-112-HY

(2) 392 tons in cascade 101-103-C and 405 tons in cascade 101-103-U are now being fed to TBP Plant. These quantities are not included in the above total.

(3) 2.72 tons of uranium returned to tank farm blend tanks in form of recovered nitric acid.

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WASTE STORAGE STATUS

As of 12-31-52

FIRST CYCLE WASTE AND COATING WASTE
T AND B PLANTS

FARM	Gallons x 10^3				*
	In Storage Beg. Mo.	1st Cycle Waste Recd	Feed To Evaporator	In Storage End Mo.	Reserve Cap. In Months
EAST AREA					
B (1)	2,155	(197)		2,352	
Evaporator Feed Tank - 106 B	165		(250)	415	41
C (2)	727			727	
BX	3,175		(23) (3) 579	2,573	
BY	1,829		343	1,486	8
TOTAL	8,051	(197)	672(123)	7,553	49
WEST AREA					
T	1,910			1,910	
U (2)	382			382	
TX	3,316	102		3,418	669
Evaporator (1) Feed Tank @ 118 TX	718			718	14
TY					
TOTAL	6,326	102		6,428	683

* Reserve Capacity of 2,800 gallons per bench
( ) Not included in totals

REMARKS: All figures have been revised to include first cycle waste in storage as evaporator bottoms. (1) Figures represent bottoms storage only. (2) First cycle waste as non-evaporable sludge only. (3) 21,000 gallons of first cycle waste lost to ground during pumping of 108 BX supernatant liquid to 106-B evaporator feed tank on 12-16-52.

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WASTE STORAGE STATUS

As of 12-31-52

SECOND CYCLE WASTES

	Cascade Is Into	Gallons x 10^3		Estimated Reserve Capacity In Batches
		Cribbed	Sludge	
EAST AREA	110-111-112-3	97 (1)	414	3,020
WEST AREA	110-111-112-T	218	734	2,28
TOTAL		315	1,148	5,302

REMARKS: (1) Includes metal waste first cycle, section five, and second cycle wastes resulting from cleanouts. * Reserve calculations based on storage of combined section five and second cycle wastes only at 275 gal. of sludge per run. ** Reserve calculations based on storage of combined section five, second cycle, and 224-T building waste at 350 gal. of sludge per run.

224 BUILDING WASTES

	Cascade Is Into	Gallons x 10^3		Estimated Reserve Capacity In Batches
		Cribbed	Sludge	
EAST AREA	204-203-202-B	13 (2)	170	476
	204-201-T	Inactive Cascade	187	
WEST AREA	110-111-112-T	132	Included with 2nd cycle figures	
TOTAL		145	357	476

REMARKS: Flushes of B plant are cribbed as follows: (1) 2nd cycle, 1st cycle, stack drainage, and section 5 crib via 110-111-112-B tanks. (2) 224-B and Section 9 metal waste tanks crib via 200-B tanks.

[redacted]

[redacted]

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WASTE STORAGE STATUS

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As of 12-31-52

TBP WASTE

PERMANENT AND TEMPORARY WASTE

TANK	Gallons x 10^3 In Storage Beg Mth		TBP Received		In Storage End Mth		Reserve Capacity	
	Perm.	Temp.	Perm.	Temp.	Perm.	Temp.	Perm.	Temp.
BRSF AREA								
[redacted]		(1)		(1)		(1)		(1)
[redacted]	362		198		560		1,362 (4)	
BK							602	
BF		55		11		66	757	
TOTAL	362	55	198		560	66	2,721	
BEST AREA								
[redacted]	426		774				57	
[redacted]							216	
BF		9 (1) 371 (2)				9 (1) 371 (2)		
TX							3,010	
TOTAL	426	380	774	0	1,200	380	3,283	

Supernate tanks, 209 BF and 115 TX not included in the above.

Gallons x 10^3 of condensate to crib 3,909 (3)

Volumetric Ratios:

	Waste to Feed (Permanent only)	(Combined Perm. and Temp.)
During Month	1.90	1.93
Cumulative to date	1.17	1.47

* Feed adjusted to metal waste equivalent

REMARKS: (1) Temporary wastes and reserve capacities are shown with metal waste inventories. (2) Temporary waste stored in 115 TX supernate tank. (3) Cribbed waste contained 1.62 tons of depleted and decontaminated uranium. (4) Tank 109-C is not included in reserve figure since this space is not immediately available.

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WASTE STORAGE STATUS

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As of 12-31-52

WASTE EVAPORATOR

FARM	Gallons x 10^3 Feed	Bottoms	Condensate To Crib	Reserve Bottoms Space
[redacted]				
[redacted]		197	475	303
[redacted]				
[redacted]	329			
[redacted]	343			
TOTAL	672	197	475	(1) 303

On the basis of present bottoms reserve figures, it is estimated that a re-evaporation of [redacted] evaporator bottoms tanks will be required near the middle of February, 1953 before further space recovery can be made.

[redacted]				
[redacted]				
TX				676
[redacted]				
TOTAL				676

REMARKS:

REDOX WASTE

FARM	Gallons x 10^3 In Storage Beg. No.	Waste Received	In Storage End No.	** Reserve Capacity In Batches
S Farm	3,224	373	3,597	2,103
[redacted] Farm				
TOTAL	3,224	373	3,597	2,103

Gallons x 10^3 of condensate to crib 278.

** Will be considered as Redox reserve capacity when empty.

[redacted]

** Reserve Capacity at 2,600 gallons per 6-3 equivalent batch

REMARKS: A total of 2,713,000 gallons of storage space is available in 241-TY and 241-[redacted] tank farms.

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STATUS OF WASTE TANKS

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	Type of Waste*	Gallons @ 10^3 Capacity	Gallons @ 10^3 Stored	Reserve Cap. Gallons @ 10^3	Reserve Cap. In Batches	Remarks
B Farm						
101	MW	530	530			
102	MW	530	530			
103	MW	530	519			
104	RB	530	531			Started filling 12-4-52:
105	RB	530	227	303	RB	
106	IC	530	415	115	42	Evaporator Feed Tank
107	RB	530	531			
108	RB	530	528			
109	RB	530	531			Completed filling 12-4-52
110 IC-2C	5-6	530	530			Active Cascade - B Plant
111 IC-2C	5-6	530	530			
112 IC-2C	5-6	542	542			
201 MW	224	54.5	54.5			Active Cascade - B Plant
202 MW	224	54.5	54.5			
203 MW	224	54.5	54.5			
204 MW	224	54.5	54.5			
C Farm						
101	MW	530				Cascade now processing for feed
102	MW	530	984	595		to TBP Plant
103	MW	530				
104	MW	530	530			
105	MW	530	530			
106	MW	530	519			
107	IC-TBP	530	399-148	(-16)		Overflow line to 108 C plugged
108	IC-TBP	530	34-51	445	TBP	/12-18-52
109	IC-TBP	530	10-486	23	Supernate	Temp. supernate tank for C-farm
						MW removal operations
110	IC-TBP	530	231-259	40	TBP	Overline still plugged 12-31-52
111	IC-TBP	530	36-103	391	TBP	
112	IC-TBP	530	17-0	502	TBP	
201	MW	54.5	52.5			
202	MW	54.5	54.5			
203	MW	54.5	54.5			
204	MW	54.5	54.5			

* MW - Metal Waste
IC - First Cycle Waste
2C - Second Cycle Waste
R - Redox Waste
224 - 224 Bldg. Waste
TBP - TBP Waste
RB - Evaporator Bottoms

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W-2902.08-X 4-52 [redacted]

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HW-27

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STATUS OF WASTE FARMS

	Type of Waste	Gallons x 10^3 Capacity	Gallons x 10^3 Stored	Reserve Capacity Gallons x 10^3	Reserve Capacity In Batches	Remarks
BK Farm						
101	MW	530	530			
102	MW	530	467	63	23	
103	MW	530	530			
104	MW	530	530			
105	MW	530	530			
106	MW	530	530			
107	1C-TBP	530	437-0	93	TBP	Finished pumping 12-18-52; dump
108	1C-TBP	530	21-0	509	TBP	sludge. Finished pumping to liq
109	1C-TBP	530	530			heel, 1-1-52. 23,000 gallons of
110	1C	530	530			1st cycle supernate was lost to
111	1C	530	525			open ground from 108 BK pumping
112	1C	530	530			operation on 12-16-52.
BP Farm						
101	MW	758	758			
102	MW	758	758			
103	MW	758	664	83	31	
104	MW	758	758			
105	MW	758	491	267	99	
106	MW	758		747	277	
107	1C-TBP	758	1	757	TBP	Pumped to liquid heel - 12-6-52
108	1C	758	753			
109	TBP	758		758	Supernate	TBP supernate tank - 200-E Area
110	1C	758	732	21	[illegible]	
111	1C	758	758			Receives high TBP wastes for temp
112	MW	758	362	385	143	erary storage.
						(Received 11,000 gallons in Dec.)
S Farm						
101	MW	530	530			
102	MW	530	530			
103	MW	530	519			
104	1C	530	530			1 yr. decay complete 3-31-53
105	1C	530	530			Evaporation to start after 4-1-53
106	1C	530	529			
107	1C-TBP	530	245-285			
108	1C-TBP	530	73-157			Tank filled 12-11-52
109	1C-TBP	530	4-458	57	TBP	Tank now filling with TBP waste

MW - Metal Waste
1C - First Cycle Waste
2C - Second Cycle Waste
R - Redox Waste
22h - 22h Bldg. Waste
TBP - TBP Waste
EB - Evaporator Bottoms

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A-102

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STATUS OF WASTE TANKS

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HW-27

	Type of Waste	Gallons x 10^3 Capacity	Gallons x 10^3 Stored	Reserve Capacity Gallons x 10^3	Reserve Capacity In Batches	Remarks
T Farm						
110 5-6	22/A2C	530	530			Active cascade - T Plant
111 5-6	22/A2C	530	530			
112 5-6	22/A2C	569	569			112-T Cascades to [illegible]
201	224	54.5	54.5			
202	224	54.5	54.5			
203	224	54.5	54.5			
204	224	54.5	54.5			
U Farm						
101	MW	530				Cascade now serving as feed to TBP
102	MW	530	797	782		Plant.
103	MW	530				
104	MW	530	296	234		Supernate from 104-U pumped to
105	MW	530	530			Cascade 101-103U
106	MW	530	519			
107	MW	530	530			
108	MW	530	530			
109	MW	530	519			
110	1C	530	336	194	75**	Cascade being held as Redox waste
111	1C	530	14	516	198	reserve.
112	1C	530	32	498	192	
201	TBP	54.5		52.5	TBP	
202	TBP	54.5		54.5	TBP	
203	TBP	54.5		54.5	TBP	
204	TBP	54.5		654.5	TBP	
SX Farm						
101	MW	758	758			
102	MW	758	758			
103	MW	758	758			
104	MW	758	750			
105	MW	758	766			
106	MW	758	292	466	173	Active cascade 221-T Metal Waste
107	MW	758	766			
108	MW	758	751			
109	1C	758	758			Active cascade 221-T - 1st Cycle
110	1C	758	398	360	129	
111	1C	758		758	271	
112	1C	758		753	269	Tank to be held for Recomplex waste

* MW - Metal waste
1C - First Cycle Waste
2C - Second Cycle
R - Redox Waste
224 - 224 Bldg. Waste
TBP - TBP Waste
EB - Evaporator Bottoms
* See bottom of page H-2902.11-I

H-2902.10-X 4-52

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HW-27

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STATUS OF WASTE FARMS

	Type of Waste	Gallons x 10^3 Capacity	Gallons x 10^3 Stored	Reserve Capacity Gallons x 10^3	Reserve Capacity In Batches	Remarks
TX Farm (cont'd)						
113	EB	758	718	10	EB	
114	MW	758	666	81	30	
115	TBP	758	759			TBP supernate tank, 200-W Area
116	EB	758	92	666	EB	Active bottoms tank, 200-W Area
117	EB	758	756			
118	1C	758	718	40	14	Evap. feed tank, 200-W Area
TY Farm						
101	R	758		758	291 **	
102	R	758		747	287	
103	TBP	758		758	TBP	
104	TBP	758		747	TBP	
105	TBP	758		758	TBP	
106	TBP	758		747	TBP	
S Farm						
101	R	758		758	291 **	
102	R	758		758	291	
103	R	758		747	287	
104	R	758		758	291	
105	R	758		758	291	
106	R	758		747	287	
107	R	758	763			
108	R	758	760			
109	R	758	103	644	248	Filled 12-24-52; cascaded to 109-S. Active tank, Redox Wastes
110	R	758	774			
111	R	758	755			
112	R	758	442	305	117	

* MW - Metal Waste
1C - First Cycle Waste
2C - Second Cycle Waste
R - Redox Waste

224 & 224 Bldg. Waste
TBP - TBP Waste
EB - Evaporator Bottoms
** Based on Plant performance of 2,600 gallons per batch - (average - Oct, Nov., 1952)

H-2902.11-X 4-52 [redacted]

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APPENDIX B

WHC-MR-0132, A HISTORY OF THE 200 AREA TANK FARMS

TANKS 241-B-201 THROUGH 241-B-204

AND

TANKS 241-T-201 THROUGH 241-T-204

201-B-1 WHC-MR-0132

Waste Status Summary of 201-B Tank-Capacity 55,000 Gallons

Qtr.-Year	Type Waste	Total Vol.	Liquid In Storage	Solids In Storage	Remarks
1-1944					
2					
3					
4					
1-1945					
2					
3					
4					
1-1946					
2					
3					
4					
1-1947					
2					
3					
4					
1-1948					
2					
3					
4					
1-1949					
2					
3					
4					
1-1950					
2					
3					
4					
1-1951					
2					
3					
4					
1-1952	224	54.5	---	---	Active cascade to crib
2	224	54.5	---	---	Active cascade to crib
3	224	54.5	---	---	Active cascade to crib
4	224-MW	54.5	---	---	Active cascade to crib

201-B-2 WHC-MR-0132

Waste Status Summary of 201-B Tank-Capacity 55,000 Gallons

Qtr.-Year	Type Waste	Total Vol.	Liquid In Storage	Solids In Storage	Remarks
1-1953	224-MW	54.5	---	---	Receives B plant flushes
2	224-MW	54.5	0	54.5	
3	224-MW	54.5	0	54.5	
4	224	54.5	0	54.5	
1-1954	224	54.5	0	54.5	
2	224	54.5	0	54.5	
3	224	54.5	0	54.5	
4	224	54.5	0	54.5	
1-1955	224	54.5	0	54.5	
2	224	54.5	0	54.5	
3	224	54.5	0	54.5	
4	224	54.5	0	54.5	
1-1956	224	54.5	0	54.5	
2	224	54.5	0	54.5	
3	224	54.5	0	54.5	
4	224	54.5	0	54.5	
1-1957	224	53	0	54.5	Latest electrode reading
2	224	53	0	54.5	
3	224	53	24.5	28.5	
4	224	53	24.5	28.5	
1-1958	224	53	24.5	28.5	
2	224	53	24.5	28.5	
3	224	53	29.5	23.5	
4	224	51	22.5	28.5	Latest electrode reading
1-1959	224	51	22.5	28.5	
2	224	51	22.5	28.5	New electrode
3	224	51	22.5	28.5	
4	224	52	0	54.5	
1-1960	224	52	0	54.5	
2	224	52	0	54.5	
3	224	52	0	54.5	
4	224	52	0	54.5	
1-1961	224	---	0	54.5	
2	224	50	0	54.5	
3	224	50	0	54.5	
4	224	50	0	54.5	

201-B-3 WHC-MR-0132

Waste Status Summary of 201-B Tank-Capacity 55,000 Gallons

Qtr.-Year	Type Waste	Total Vol.	Liquid In Storage	Solids In Storage	Remarks
1-1962	224	50	0	54.5	
2	224	50	0	54.5	
3	224	---	---	---	
4	224	51	1	50	
1-1963	224	51	1	50	
2	224	51	1	50	
3	224	---	---	50	
4	224	53	3	50	Latest electrode reading
1-1964	224	53	3	50	
2	224	53	3	50	
3	224	53	3	50	
4	224	53	3	50	
1-1965	---	---	---	50	
2	224	56	6	50	
3	224	56	6	50	
4	224	56	6	50	
1-1966	224	56	6	50	
2	224	56	6	50	
3	224	56	6	50	
4	224	56	6	50	
1-1967	224	56	6	50	
2	224	56	6	50	
3	224	56	6	50	
4	224	56	6	50	
1-1968	224	55	5	50	
2	224	55	5	50	
3	224	55	5	50	
4	224	55	5	50	
1-1969	224	55	5	50	
2	224	55	5	50	
3	224	55	5	50	
4	224	55	5	50	
1-1970	224	55	25	30	
2	224	55	25	30	
3	224	55	25	30	
4	224	54	24	30	

201-B-4 WHC-MR-0132

Waste Status Summary of 201-B Tank-Capacity 55,000 Gallons

Qtr.-Year	Type Waste	Total Vol.	Liquid In Storage	Solids In Storage	Remarks
1-1971	224	54	24	30	
2	224	33	3	30	22 to 106-B
3	224	33	3	30	
4	224	33	3	30	
1-1972	224	33	7	26	
2	224	33	7	26	
3	224	33	7	26	
4	224	33	7	26	
1-1973	224	33	7	26	Suspect leaker
2	224	33	7	26	Suspect leaker
3	224	33	7	26	Suspect leaker
4	224	33	7	26	Suspect leaker
1-1974	224	32	6	26	Suspect leaker, 1 to 109-B
2	224	31	5	26	Suspect leaker, 2 to 109-B
3	224	29	3	26	Suspect leaker, 4 to 109-B
4	---	29	0	29	Suspect leaker, 4 water, 6 to 109-B
1-1975	---	29	0	29	Suspect leaker, 2 to 102-B.
2	---	29	0	29	Removed from service, 1 to 109-B
3	---	29	0	29	" " "
4	---	29	0	29	" " "
1-1976	---	29	0	29	" " "
2	---	29	0	29	
3	---	29	0	29	
4	---	29	0	29	Salt Well Comp.
1-1977	---	29	0	29	Questionable Integrity
2	---	29	0	29	
3	---	29	0	29	Inactive-Stabilized
4	---	29	0	29	Inactive Current-Stabilized Phase I

201-B-5 WHC-MR-0132

Waste Status Summary of 201-B Tank-Capacity 530,000 Gallons

Qtr.-Year	Type Waste	Total Vol.	Liquid in Storage	Solids in Storage	Remarks
1-1978	-	29	0	29	Inactive - Primary Stabilized
2-	-	29	0	29	
3-	-	29	0	29	P-10 Pmp. Removed
4-	-	29	0	29	
1-1979	-	28	1	27	New Solids Level 1/29/79
2-	-	28	1	27	Questionable Integrity
3-	-	28	1	27	
4-	-	28	1	27	
1-1980	-	28	1	27	New Photo 2/4/80
2-	-	28	1	27	
3-	-	29	1	28	
4-	-	29	1	28	

202-B-1 WHC-MR-0132

Waste Status Summary of 202-B Tank-Capacity 55,000 Gallons

Qtr.-Year	Type Waste	Total Vol.	Liquid In Storage	Solids In Storage	Remarks
1-1944					
2					
3					
4					
1-1945					
2					
3					
4					
1-1946					
2					
3					
4					
1-1947					
2					
3					
4					
1-1948					
2					
3					
4					
1-1949					
2					
3					
4					
1-1950					
2					
3					
4					
1-1951					
2					
3					
4					
1-1952	224	54.5	---	---	Active cascade to crib
2	224	54.5	---	---	Active cascade to crib
3	224	54-5	---	---	Active cascade to crib
4	224-MW	54.5	---	---	Active cascade to crib

202-B-2 WHC-MR-0132

Waste Status Summary of 202-B Tank-Capacity 55,000 Gallons

Qtr.-Year	Type Waste	Total Vol.	Liquid In Storage	Solids In Storage	Remarks
1-1953	224-MW	54.5	---	---	Receives B plant flushes
2	224-MW	54.5	---	54.5	
3	224-MW	54.5	29.5	25.0	
4	224	54.5	29.5	25.0	
1-1954	224	54.5	29.5	25.0	
2	224	54.5	29.5	25.0	
3	224	54.5	29.5	25.0	Cascades to crib
4	224	54.5	29.5	25.0	Rec'd 5-6 water. Cascades to crib
1-1955	224	54.5	29.5	25.0	
2	224	54.5	29.5	25.0	Cascades to crib
3	224	54.5	29.5	25.0	Rec'd 224-B flush water. Cascades tc crib
4	224	54.5	29.5	25.0	
1-1956	224	54.5	29.5	25.0	
2	224	54.5	29.5	25.0	
3	224	54.5	29.5	25.0	
4	224	54.5	29.5	25.0	
1-1957	224	56	31	25.0	Latest electrode reading
2	224	56	31	25.0	
3	224	56	31	25.0	
4	224	56	31	25.0	
1-1958	224	56	31	25	
2	224	56	31	25	
3	224	56	31	25	
4	224	54	29	25	Latest electrode reading
1-1959	224	54	29	25	
2	224	54	29	25	New electrode
3	224	54	29	25	
4	224	54	29	25	
1-1960	224	54	29	25	
2	224	54	29	25	
3	224	51	26	25	
4	224	51	26	25	
1-1961	224	51	26	25	
2	224	51	26	25	
3	224	51	26	25	
4	224	51	26	25	

202-B-3 WHC-MR-0132

Waste Status Summary of 202-B Tank-Capacity 55,000 Gallons

Qtr.-Year	Type Waste	Total Vol.	Liquid In Storage	Solids In Storage	Remarks
1-1962	224	---	---	25	
2	224	54.5	29.5	25	7.5 from 221-B
3	224	---	---	25	
4	224	55	30	25	
1-1963	224	55	30	25	
2	224	55	30	25	
3	224	---	---	25	
4	224	54	29	25	Latest electrode reading
1-1964	224	54	29	25	
2	224	54	29	25	
3	224	54	29	25	
4	224	54	29	25	
1-1965	---	---	---	25	
2	224	58	33	25	
3	224	56	31	25	
4	224	56	31	25	
1-1966	224	56	31	25	
2	224	56	31	25	
3	224	56	31	25	
4	224	56	31	25	
1-1967	224	56	31	25	
2	224	56	31	25	
3	224	56	31	25	
4	224	56	31	25	
1-1968	224	56	31	25	
2	224	56	31	25	
3	224	56	31	25	
4	224	56	31	25	
1-1969	224	56	31	25	
2	224	56	31	25	
3	224	56	31	25	
4	224	56	31	25	
1-1970	224	56	27	29	
2	224	56	27	29	
3	224	56	27	29	
4	224	56	27	29	

202-B-4 WHC-MR-0132

Waste Status Summary of 202-B Tank-Capacity 55,000 Gallons

Qtr.-Year	Type Waste	Total Vol.	Liquid In Storage	Solids In Storage	Remarks
1-1971	224	56	27	29	
2	224	56	27	29	
3	224	56	27	29	
4	224	56	27	29	
1-1972	224	56	29	27	
2	224	56	29	27	
3	224	56	29	27	
4	224	56	29	27	
1-1973	224	56	29	27	
2	224	56	29	27	
3	224	56	29	27	
4	224	56	29	27	
1-1974	224	53	26	27	3 to 109-B
2	224	53	26	27	
3	224	53	26	27	
4	224	53	26	27	
1-1975	224	53	26	27	
2	224	53	26	27	
3	224	53	26	27	
4	224	53	26	27	
1-1976	224	53	26	27	
2	224	53	26	27	
3	---	53	26	27	Restricted
4	---	53	26	27	"
1-1977	---	53	26	27	Restricted
2	---	30	3	27	"
3	---	27	0	27	Inactive Current
4	---	27	0	27	" "

202-B-5 WHC-MR-0132

Waste Status Summary of 202-B Tank-Capacity 530,000 Gallons

Qtr.-Year	Type Waste	Total Vol.	Liquid in Storage	Solids in Storage	Remarks
1-1978	-	27	0	27	Inactive
2-	-	27	0	27	
3-	-	27	0	27	
4-	-	27	0	27	
1-1979	-	27	0	27	
2-	-	27	0	27	
3-	-	27	0	27	
4-	-	27	0	27	
1-1980	-	27	0	27	New Photo 2/4/80
2-	-	27	0	27	
3-	-	28	0	28	
4-	-	28	0	28	

203-B-1 WHC-MR-0132

Waste Status Summary of 203-B Tank-Capacity 55,000 Gallons

Qtr.-Year	Type Waste	Total Vol.	Liquid In Storage	Solids In Storage	Remarks
1-1944					
2					
3					
4					
1-1945					
2					
3					
4					
1-1946					
2					
3					
4					
1-1947					
2					
3					
4					
1-1948					
2					
3					
4					
1-1949					
2					
3					
4					
1-1950					
2					
3					
4					
1-1951					
2					
3					
4					
1-1952	224	54.5	---	---	Active cascade to crib
2	224	54.5	---	---	Active cascade to crib
3	224	54.5	---	---	Active cascade to crib
4	224-MW	54.5	---	---	Active cascade to crib

203-B-2 WHC-MR-0132

Waste Status Summary of 203-B Tank-Capacity 55,000 Gallons

Qtr.-Year	Type Waste	Total Vol.	Liquid In Storage	Solids In Storage	Remarks
1-1953	224-MW	54.5	---	---	Receives B plant flushes
2	224-MW	54.5	0	54.5	
3	224-MW	54.5	0	54.5	
4	224	54.5	0	54.5	
1-1954	224	54.5	0	54.5	
2	224	54.5	0	54.5	
3	224	54.5	0	54.5	
4	224	54.5	0	54.5	
1-1955	224	54.5	0	54.5	
2	224	54.5	0	54.5	
3	224	54.5	0	54.5	
4	224	54.5	0	54.5	
1-1956	224	54.5	0	54.5	
2	224	54.5	0	54.5	
3	224	54.5	0	54.5	
4	224	54.5	0	54.5	
1-1957	224	56	1.5	54.5	Latest electrode reading
2	224	56	1.5	54.5	
3	224	56	1.5	54.5	
4	224	56	1.5	54.5	
1-1958	224	56	1.5	54.5	
2	224	56	1.5	54.5	
3	224	56	1.5	54.5	
4	224	55	0.5	54.5	Latest electrode reading
1-1959	224	55	0.5	54.5	
2	224	55	0.5	54.5	
3	224	55	0.5	54.5	
4	224	55	0.5	54.5	
1-1960	224	55	0.5	54.5	
2	224	55	0.5	54.5	
3	224	55	0.5	54.5	
4	224	55	0.5	54.5	
1-1961	224	---	---	54.5	
2	224	54	0	54.5	
3	224	54	0	54.5	
4	224	54	0	54.5	

203-B-3 WHC-MR-0132

Waste Status Summary of 203-B Tank-Capacity 55,000 Gallons

Qtr.-Year	Type Waste	Total Vol.	Liquid In Storage	Solids In Storage	Remarks
1-1962	224	---	---	54.5	
2	224	56	1.5	54.5	
3	224	56	---	---	
4	224	56	2	54	
1-1963	224	56	2	54	
2	224	56	2	54	
3	224	56	2	54	
4	224	56	2	54	Latest electrode reading
1-1964	224	---	---	54	
2	224	55	1	54	New electrode
3	224	55	1	54	
4	224	55	1	54	
1-1965	---	---	---	54	
2	224	58	4	54	
3	224	56	2	54	
4	224	56	2	54	
1-1966	224	56	2	54	
2	224	56	2	54	
3	224	56	2	54	
4	224	56	2	54	
1-1967	224	56	2	54	
2	224	56	2	54	
3	224	56	2	54	
4	224	56	2	54	
1-1968	224	56	2	54	
2	224	56	2	54	
3	224	56	2	54	
4	224	56	2	54	
1-1969	224	56	2	54	
2	224	56	2	54	
3	224	56	2	54	
4	224	56	2	54	
1-1970	224	56	7	49	
2	224	56	7	49	
3	224	56	7	49	
4	224	56	7	49	

203-B-4 WHC-MR-0132

Waste Status Summary of 203-B Tank-Capacity 55,000 Gallons

Qtr.-Year	Type Waste	Total Vol.	Liquid In Storage	Solids In Storage	Remarks
1-1971	224	56	7	49	
2	224	56	7	49	
3	224	56	7	49	
4	224	56	7	49	
1-1972	224	56	12	44	
2	224	56	12	44	
3	224	56	12	44	
4	224	56	12	44	
1-1973	224	56	12	44	
2	224	56	12	44	
3	224	56	12	44	
4	224	56	12	44	
1-1974	224	50	6	44	6 to 109-B
2	224	50	6	44	
3	224	50	6	44	
4	224	50	6	44	
1-1975	224	50	6	44	
2	224	50	6	44	
3	224	50	6	44	
4	224	50	6	44	
1-1976	224	50	6	44	
2	224	50	6	44	
3	---	50	5	45	Restricted
4	---	50	5	45	"
1-1977	---	50	5	45	Restricted
2	---	50	5	45	"
3	---	50	3	47	Inactive Current-Solid Level Adj.
4	---	50	3	47	" " " " "

203-B-5 WHC-MR-0132

Waste Status Summary of 203-B Tank-Capacity 530,000 Gallons

Qtr.-Year	Type Waste	Total Vol.	Liquid in Storage	Solids in Storage	Remarks
1-1978	-	50	3	47	Inactive
2-	NCPLX	50	3	47	
3-	NCPLX	50	3	47	
4-	NCPLX	50	3	47	
1-1979	NCPLX	50	3	47	New Photo's 3/1/79
2-	NCPLX	50	3	47	
3-	NCPLX	50	3	47	
4-	NCPLX	50	3	47	
1-1980	NCPLX	50	3	47	New Photo 2/6/80
2-	NCPLX	50	3	47	
3-	NCPLX	50	2	48	
4-	NCPLX	50	2	48	

204-B-1 WHC-MR-0132

Waste Status Summary of 204-B Tank-Capacity 55,000 Gallons

Qtr.-Year	Type Waste	Total Vol.	Liquid In Storage	Solids In Storage	Remarks
1-1944					
2					
3					
4					
1-1945					
2					
3					
4					
1-1946					
2					
3					
4					
1-1947					
2					
3					
4					
1-1948					
2					
3					
4					
1-1949					
2					
3					
4					
1-1950					
2					
3					
4					
1-1951					
2					
3					
4					
1-1952	224	54.5	---	---	Active cascade to crib
2	224	54.5	---	---	Active cascade to crib
3	224	54.5	---	---	Active cascade to crib
4	224-MW	54.5	---	---	Active cascade to crib

204-B-2 WHC-MR-0132

Waste Status Summary of 204-B Tank-Capacity 55,000 Gallons

Qtr.-Year	Type Waste	Total Vol.	Liquid In Storage	Solids In Storage	Remarks
1-1953	224-MW	54.5	---	---	Active cascade to crib
2	224-MW	54.5	0	54.5	
3	224-MW	54.5	0	54.5	
4	224	54.5	0	54.5	
1-1954	224	54.5	0	54.5	
2	224	54.5	0	54.5	
3	224	54.5	0	54.5	
4	224	54.5	0	54.5	
1-1955	224	54.5	0	54.5	
2	224	54.5	0	54.5	
3	224	54.5	0	54.5	
4	224	54.5	0	54.5	
1-1956	224	54.5	0	54.5	
2	224	54.5	0	54.5	
3	224	54.5	0	54.5	
4	224	54.5	0	54.5	
1-1957	224	56	1.5	54.5	Latest electrode reading
2	224	56	1.5	54.5	
3	224	56	1.5	54.5	
4	224	56	1.5	54.5	
1-1958	224	56	1.5	54.5	
2	224	56	1.5	54.5	
3	224	56	1.5	54.5	
4	224	55	0.5	54.5	Latest electrode readings
1-1959	224	56	1.5	54.5	Latest electrode reading
2	224	56	1.5	54.5	New electrode
3	224	56	1.5	54.5	
4	224	54	0	54	Latest electrode reading
1-1960	224	54	0	54	New electrode installed
2	224	54	0	54	
3	224	54	0	54	
4	224	54	0	54	
1-1961	224	54	0	54	
2	224	54	0	54	
3	224	54	0	54	
4	224	54	0	54	

Waste Status Summary of 204-B Tank-Capacity 55,000 Gallons

Qtr.-Year	Type Waste	Total Vol.	Liquid In Storage	Solids In Storage	Remarks
1-1962	224	---	---	54.5	
2	224	56	1.5	54.5	
3	224	56	---	54	
4	224	56	2	54	
1-1963	224	56	2	54	
2	224	56	2	54	
3	224	56	2	54	
4	224	56	2	54	Latest electrode reading
1-1964	224	---	---	54	
2	224	55	1	54	New electrode
3	224	55		54	
4	224	55		54	
1-1965	---	---	---	54	
2	224	58	4	54	
3	224	56	2	54	
4	224	56	2	54	
1-1966	224	56	2	54	
2	224	56	2	54	
3	224	56	2	54	
4	224	56	2	54	
1-1967	224	56	2	54	
2	224	56	2	54	
3	224	56	2	54	
4	224	56	2	54	
1-1968	224	56	2	54	
2	224	56	2	54	
3	224	56	2	54	
4	224	56	2	54	
1-1969	224	56	2	54	
2	224	56	2	54	
3	224	56	2	54	
4		56	2	54	
1-1970	224	56	8	48	
2	224	56	8	48	
3	224	56	8	48	
4	224	56	8	48	

204-B-4 WHC-MR-0132

Waste Status Summary of 204-B Tank-Capacity 55,000 Gallons

Qtr.-Year	Type Waste	Total Vol.	Liquid In Storage	Solids In Storage	Remarks
1-1971	224	56	8	48	
2	224	56	8	48	
3	224	56	8	48	
4	224	56	8	48	
1-1972	224	56	10	46	
2	224	56	10	46	
3	224	56	10	46	
4	224	56	10	46	
1-1973	224	56	10	46	
2	224	56	10	46	
3	224	56	10	46	
4	224	56	10	46	
1-1974	224	49	3	46	6 to 109-B
2	224	49	3	46	
3	224	49	3	46	
4	224	49	3	46	
1-1975	224	49	3	46	
2	224	49	3	46	
3	224	49	3	46	
4	224	49	3	46	
1-1976	224	49	3	46	Removed from Service
2	224	49	3	46	
3	---	49	3	46	Restricted
4	---	49	3	46	"
1-1977	---	49	3	46	Restricted
2	---	49	3	46	"
3	---	49	3	46	Inactive Current
4	---	49	3	46	" "

204-B-5 WHC-MR-0132

Waste Status Summary of 204-B Tank-Capacity 530,000 Gallons

Qtr.-Year	Type Waste	Total Vol.	Liquid in Storage	Solids in Storage	Remarks
1-1978	-	49	3	46	Inactive
2-	NCPLX	49	3	46	
3-	NCPLX	49	3	46	
4-	NCPLX	49	3	46	
1-1979	NCPLX	49	3	46	
2-	NCPLX	49	3	46	
3-	NCPLX	49	3	46	
4-	NCPLX	49	3	46	New Photo 10/16/79
1-1980	NCPLX	49	3	46	
2-	NCPLX	49	3	46	
3-	NCPLX	50	3	47	
4-	NCPLX	50	3	47	

201-T-1 WHC-MR-0132

Waste Status Summary of 201-T Tank-Capacity 55,000 Gallons.

Qtr.-Year	Type Waste	Total Vol.	Liquid In Storage	Solids In Storage	Remarks
1-1952	---	---	---	---	
2	224	54.5	---	---	These 4 tanks out of service 5/29/52.
3	224	54.5	---	---	
4	224	54.5	---	---	
1-1953	---	54.5	---	54.5	
2	---	54.5	0	54.5	
3	---	54.5	0	54.5	
4	---	54.5	0	54.5	
1-1954	---	54.5	0	54.5	
2	---	54.5	0	54.5	
3	---	54.5	0	54.5	
4	---	54.5	0	54.5	
1-1955	---	54.5	0	54.5	
2	---	54.5	0	54.5	
3	---	54.5	0	54.5	
4	---	54.5	0	54.5	
1-1956	---	54.5	0	54.5	
2	---	54.5	0	54.5	
3	---	54.5	0	54.5	
4	---	54.5	0	54.5	
1-1957	---	54.5	0	54.5	Estimated reading.
2	---	54.5	0	54.5	New electrode reading.
3	---	54		54.5	
4	---	54		54.5	
1-1958	224	54	.5	54.5	
2	224	54	.5	54.5	
3	224	54	.5	54.5	
4	224	54	.5	54.5	
1-1959	224	54	.5	54.5	
2	224	54	.5	54.5	
3	224	54	.5	54.5	
4	224	54	.5	54.5	

201-T-2 WHC-MR-0132

Waste Status Summary of 201-T Tank-Capacity 55,0000 Gallons

Qtr.-Year	Type Waste	Total Vol.	Liquid In Storage	Solids In Storage	Remarks
1-1960	224	54	.5	54.5	
2	224	54	5	54.5	
3	224	54	.5	54.5	
4	224	54	.5	54.5	
1-1961	---	---	---	---	6 Month Report
2	224	54	.5	54.5	
3	---	---	---	---	
4	224	54	.5	54.5	6 Month Report
1-1962	---	---	---	---	6 Month Report
2	224	53	---	53	
3	---	---	---	---	
4	224	52	2	50	Latest electrode readings.
1-1963	---	---	---	---	6 Month Report
2	224	54	4	50	New electrode reading.
3	---	---	---	---	
4	224	54	4	50	6 Month Report
1-1964	---	---	---	---	6 Month Report
2	224	54	4	50	
3	---	---	---	---	
4	224	54	4	50	6 Month Report
1-1965	---	---	---	---	6 Month Report
2	224	53	20	33	
3	224	53	20	33	
4	224	53	20	33	
1-1966	224	53	20	33	
2	224	53	20	33	
3	224	53	20	33	
4	224	53	20	33	
1-1967	224	53	20	33	
2	224	53	20	33	
3	224	53	20	33	
4	224	53	20	33	
1-1968	224	48	15	33	
2	224	48	15	33	
3	224	48	15	33	
4	224	49	16	33	

201-T-3 WHC-MR-0132

Waste Status Summary of 201-T Tank-Capacity 55,000 Gallons

Qtr.-Year	Type Waste	Total Vol.	Liquid In Storage	Solids In Storage	Remarks
1-1969	224	53	20	33	
2	224	54	21	33	
3	224	54	21	33	
4	224	54	21	33	
1-1970	224	54	21	33	
2	224	54	21	33	
3	224	54	21	33	
4	224	54	23	31	
1-1971	224	54	23	31	
2	224	54	23	31	
3	224	54	23	31	
4	224	54	23	31	
1-1972	224	54	23	31	
2	224	54	23	31	
3	224	54	23	31	
4	224	54	23	31	
1-1973	224	54	23	31	
2	224	54	23	31	
3	224	54	23	31	
4	224	54	23	31	
1-1974	224	54	23	31	
2	224	54	23	31	
3	224	54	23	31	
4	224	54	23	31	
1-1975	224	54	23	31	
2	224	54	23	31	
3	224	54	23	31	
4	224	54	23	31	
1-1976	224	34	3	31	Removed from service 21 to 101-T
2	224	33	2	31	" " " 1 to 101-T.
3	Evap.	31	0	31	Inactive salt well pumping.
4	---	31	0	31	
1-1977	---	31	0	31	Salt Well, Pump
2	---	31	0	31	Salt Well, Pump
3	---	31	0	31	Inactive Current
4	---	31	0	31	" " " Salt Well installed

201-T-4 WHC-MR-0132

Waste Status Summary of 201-T Tank-Capacity 55,000 Gallons

Qtr.-Year	Type Waste	Total Vol.	Liquid in Storage	Solids in Storage	Remarks
1-1978	-	28	0	28	Photo taken 2-27-78 Prim. Stabilized
2-	-	27	0	27	New Solids Level Adj. 5-31-78
4-	-	27	0	27	
1-1979	-	27	0	27	
2-	-	27	0	27	
3-	-	27	0	27	
4-	-	27	0	27	
1-1980	-	27	0	27	New Photo 3-10-80
2-	-	27	0	27	
3-	-	28	0	28	
4-	-	28	0	28	

202-T-1 WHC-MR-0132

Waste Status Summary of 202-T Tank-Capacity 55,000 Gallons

Qtr.-Year	Type Waste	Total Vol.	Liquid In Storage	Solids In Storage	Remarks
1-1952	---	---	---	---	
2	224	54.5	---	---	
3	224	54.5	---	---	
4	224	54.5	---	---	
1-1953	---	54.5	---	54.5	
2	---	54.5	0	54.5	
3	---	54.5	0	54.5	
4	---	54.5	0	54.5	
1-1954	---	54.5	0	54.5	
2	---	54.5	0	54.5	
3	---	54.5	0	54.5	
4	---	54.5	0	54.5	
1-1955	---	54.5	0	54.5	
2	---	54.5	0	54.5	
3	---	54.5	0	54.5	
4	---	54.5	0	54.5	
1-1956	---	54.5	0	54.5	
2	---	54.5	0	54.5	
3	---	54.5	0	54.5	
4	---	54.5	0	54.5	
1-1957	---	54.5	0	54.5	Estimated reading.
2	---	54.5	0	54.5	New electrode reading.
3	224	55	.5	54.5	Latest electrode reading.
4	224	55	.5	54.5	
1-1958	224	55	.5	54.5	
2	224	55	.5	54.5	
3	224	55	.5	54.5	
4	224	55	.5	54.5	
1-1959	224	56	1.5	54.5	
2	224	55	.5	54.5	
3	224	55	.5	54.5	
4	224	55	.5	54.5	

202-T-2 WHC-MR-0132

Waste Status Summary of 202-T Tank-Capacity 55,000 Gallons

Qtr.-Year	Type Waste	Total Vol.	Liquid In Storage	Solids In Storage	Remarks
1-1960	224	55	.5	54.5	
2	224	55	.5	54.5	
3	224	55	.5	54.5	
4	224	55	.5	54.5	
1-1961	---	---	---	---	
2	224	55	.5	54.5	6 Month Report
3	---	---	---	---	" " "
4	224	55	.5	54.5	
1-1962	---	---	---	---	" " "
2	224	54	---	54	
3	---	---	---	---	
4	224	53	3	50	Latest electrode readings.
1-1963	---	---	---	---	
2	224	53	3	50	New electrode reading.
3	---	---	---	---	6 Month Report
4	224	53	3	50	
1-1964	---	---	---	---	" " " "
2	224	53	3	50	
3	---	---	---	---	" " " "
4	224	53	3	50	
					" " " "
1-1965	---	---	---	---	
2	224	52	22	30	
3	224	52	22	30	
4	224	52	22	30	
1-1966	224	52	22	30	
2	224	52	22	30	
3	224	52	22	30	
4	224	52	22	30	
1-1967	224	52	22	30	
2	224	52	22	30	
3	224	52	22	30	
4	224	52	22	30	
1-1968	224	51	21	30	
2	224	51	21	30	
3	224	51	21	30	
4	224	51	21	30	

202-T-3 WHC-MR-0132

Waste Status Summary of 202-T Tank-Capacity 55,000 Gallons

Qtr.-Year	Type Waste	Total Vol.	Liquid In Storage	Solids In Storage	Remarks
1-1969	224	51	21	30	
2	224	51	21	30	
3	224	51	21	30	
4	224	51	21	30	
1-1970	224	51	21	30	
2	224	51	21	30	
3	224	51	21	30	
4	224	51	21	30	
1-1971	224	51	21	30	
2	224	51	21	30	
3	224	51	21	30	
4	224	51	21	30	
1-1972	224	51	21	30	
2	224	51	21	30	
3	224	51	21	30	
4	224	51	21	30	
1-1973	224	51	21	30	
2	224	51	21	30	
3	224	51	21	30	
4	224	51	21	30	
1-1974	224	51	21	30	
2	224	51	21	30	
3	224	51	21	30	
4	224	51	21	30	
1-1975	224	51	21	30	
2	224	51	21	30	
3	224	51	21	30	
4	224	51	21	30	
1-1976	---	25	0	25	Removed from service 27 to 101-T
2	---	25	0	25	" " " 1 to 101-T.
3	---	25	0	25	Inactive salt well pumping.
4	---	25	0	25	
1-1977	---	25	0	25	Salt Well, Pump
2	---	25	0	25	Inactive, current
3	---	25	0	25	" " "
4	---	25	0	25	" " " Salt Well Installed

202-T-4 WHC-MR-0132

Waste Status Summary of 202-T Tank-Capacity 50,000 Gallons

Qtr.-Year	Type Waste	Total Vol.	Liquid in Storage	Solids in Storage	Remarks
1-1978	-	20	0	20	Prim. Stabl., Photo taken 2-27-78
2-	-	20	0	20	Solids Level taken 1-31-
3-	-	20	0	20	
4-	-	20	0	20	
1-1979	-	20	0	20	
2-	-	20	0	20	
3-	-	20	0	20	
4-	-	20	0	20	New Photo 10-12-79
1-1980	-	20	0	20	
2-	-	20	0	20	
3-	-	21	0	21	
4-	-	21	0	21	

203-T-1 WHC-MR-0132

Waste Status Summary of 203-T Tank-Capacity 55,000 Gallons

Qtr.-Year	Type Waste	Total Vol.	Liquid In Storage	Solids In Storage	Remarks
1-1952	---	---	---	---	
2	224	54.5	---	---	
3	224	54.5	---	---	
4	224	54.5	---	---	
1-1953	---	54.5	---	54.5	
2	---	54.5	0	54.5	
3	---	54.5	0	54.5	
4	---	54.5	0	54.5	
1-1954	---	54.5	0	54.5	
2	---	54.5	0	54.5	
3	---	54.5	0	54.5	
4	---	54.5	0	54.5	
1-1955	---	54.5	0	54.5	
2	---	54.5	0	54.5	
3	---	54.5	0	54.5	
4	---	54.5	0	54.5	
1-1956	---	54.5	0	54.5	
2	---	54.5	0	54.5	
3	---	54.5	0	54.5	
4	---	54.5	0	54.5	
1-1957	---	54.5	0	54.5	Estimated reading.
2	---	54.5	0	54.5	New electrode reading.
3	224	55	.5	54.5	Latest electrode reading.
4	224	55	.5	54.5	
1-1958	224	55	.5	54.5	
2	224	55	.5	54.5	
3	224	55	0	55	
4	224	55	.5	54.5	
1-1959	224	55	.5	54.5	
2	224	55	.5	54.5	
3	224	55	.5	54.5	
4	224	55	.5	54.5	

203-T-2 WHC-MR-0132

Waste Status Summary of 203-T Tank-Capacity 55,000 Gallons

Qtr.-Year	Type Waste	Total Vol.	Liquid In Storage	Solids In Storage	Remarks
1-1960	224	55	.5	54.5	
2	224	55	.5	54.5	
3	224	55	.5	54.5	
4	224	55	.5	54.5	
1-1961	---	---	---	---	
2	224	55	.5	54.5	6 Month Report
3	---	---	---	---	" " " "
4	224	55	.5	54.5	
1-1962	---	---	---	---	" " " "
2	224	54	---	54	
3	---	---	---	---	" " " "
4	224	53	3	50	Latest electrode reading.
1-1963	---	---	---	---	
2	224	53	3	50	New electrode reading.
3	---	---	---	---	
4	224	53	3	50	6 Month Report
1-1964	---	---	---	---	" " " "
2	224	53	3	50	
3	---	---	---	---	" " " "
4	224	53	3	50	
1-1965	---	---	---	---	" " " "
2	224	52	17	35	
3	224	52	17	35	
4	224	52	17	35	
1-1966	224	52	17	35	
2	224	52	17	35	
3	224	52	17	35	
4	224	52	17	35	
1-1967	224	52	17	35	
2	224	52	17	35	
3	224	52	17	35	
4	224	51	16	35	
1-1968	224	47	12	35	
2	224	51	16	35	
3	224	51	16	35	
4	224	51	16	35	

203-T-3 WHC-MR-0132

Waste Status Summary of 203-T Tank-Capacity 55,000 Gallons

Qtr.-Year	Type Waste	Total Vol.	Liquid In Storage	Solids In Storage	Remarks
1-1969	224	51	16	35	
2	224	51	16	35	
3	224	51	16	35	
4	224	51	16	35	
1-1970	224	51	16	35	
2	224	51	16	35	
3	224	51	16	35	
4	224	51	16	35	
1-1971	224	51	16	35	
2	224	51	16	35	
3	224	51	16	35	
4	224	51	16	35	
1-1972	224	51	16	35	
2	224	51	16	35	
3	224	51	16	35	
4	224	51	16	35	
1-1973	224	51	16	35	
2	224	51	16	35	
3	224	51	16	35	
4	224	51	16	35	
1-1974	224	51	16	35	
2	224	51	16	35	
3	224	51	16	35	
4	224	51	16	35	
1-1975	224	51	17	35	
2	224	51	17	35	
3	224	51	17	35	
4	224	51	17	35	
1-1976	224	50	15	35	Removed from service 1 to 101-T.
2	224	42	7	35	" " " 1 to 101-T.
3	Evap.	41	6	35	Inactive salt well pumping.
4	Evap.	40	5	35	
1-1977	Evap.	39	4	35	Salt Well, Pumping
2	Evap.	38	3	35	" " " "
3	Evap.	36	3	35	" " " "
4	Evap.	36	1	35	Salt Well Installed

203-T-4 WHC-MR-0132

Waste Status Summary of 203-T Tank-Capacity 55,000 Gallons

Qtr.-Year	Type Waste	Total Vol.	Liquid in Storage	Solids in Storage	Remarks
1-1978	-	37	0	37	Salt Well Installed New Solids Level 1-31-78
2-	-	36	0	36	
3-	-	36	0	36	
4-	-	36	0	36	
1-1979	-	36	0	36	Inactive Primary Stab.
2-	-	36	0	36	
3-	-	36	0	36	
4-	-	36	0	36	
1-1980	-	36	0	36	New Photo 3-18-80
2-	-	36	0	36	
3-	-	37	0	37	
4-	-	37	0	37	

204-T-1 WHC-MR-0132

Waste Status Summary of 204-T Tank-Capacity 55,000 Gallons

Qtr.-Year	Type Waste	Total Vol.	Liquid In Storage	Solids In Storage	Remarks
1-1952	---	---	---	---	
2	224	54.5	---	---	
3	224	54.5	---	---	
4	224	54.5	---	---	
1-1953	---	54.5	0	54.5	
2	---	54.5	0	54.5	
3	---	54.5	0	54.5	
4	---	54.5	0	54.5	
1-1954	---	54.5	0	54.5	
2	---	54.5	0	54.5	
3	---	54.5	0	54.5	
4	---	54.5	0	54.5	
1-1955	---	54.5	0	54.5	
2	---	54.5	0	54.5	
3	---	54.5	0	54.5	
4	---	54.5	0	54.5	
1-1956	---	54.5	0	54.5	
2	---	54.5	0	54.5	
3	---	54.5	0	54.5	
4	---	54.5	0	54.5	
1-1957	---	54.5	0	54.5	Estimated reading.
2	---	54.5	0	54.5	New electrode reading.
3	224	56	1.5	54.5	Latest electrode reading.
4	224	56	1.5	54.5	
1-1958	224	56	1.5	54.5	
2	224	56	1.5	54.5	
3	224	56	1.5	54.5	
4	224	56	1.5	54.5	
1-1959	224	56	1.5	545	
2	224	55	.5	54.5	
3	224	55	.5	54.5	
4	224	55	.5	54.5	

204-T-2 WHC-MR-0132

Waste Status Summary of 204-T Tank-Capacity 55,000 Gallons

Qtr.-Year	Type Waste	Total Vol.	Liquid In Storage	Solids In Storage	Remarks
1-1960	224	54	.5	54.5	
2	224	54	.5	54.5	
3	224	54	.5	54.5	
4	224	54	.5	54.5	
1-1961	---	---	---	---	
2	224	52	2.5	54.5	6 Month Report
3	---	---	---	---	
4	224	52	2.5	54.5	6 Month Report
1-1962	---	---	---	---	
2	224	54	---	54	6 Month Report
3	---	---	---	---	
4	224	52	2	50	6 Month Report Latest electrode reading.
1-1963	---	---	---	---	
2	224	52	2	50	6 Month Report New electrode reading.
3	---	---	---	---	
4	224	52	2	50	6 Month Report
1-1964	---	---	---	---	
2	224	52	2	50	6 Month Report
3	---	---	---	---	
4	224	52	2	50	6 Month Report
1-1965	---	---	---	---	
2	224	52	8	44	6 Month Report
3	224	52	8	44	
4	224	52	8	44	
1-1966	224	52	8	44	
2	224	52	8	44	
3	224	52	8	44	
4	224	52	8	44	
1-1967	224	52	8	44	
2	224	52	8	44	
3	224	52	8	44	
4	224	52	8	44	
1-1968	224	52	8	44	
2	224	51	7	44	
3	224	51	7	44	
4	224	51	7	44	
1-1969	224	51	7	44	
2	224	51	7	44	
3	224	51	7	44	
4	224	51	7	44	

204-T-3 WHC-MR-0132

Waste Status Summary of 204-T Tank-Capacity 55,000 Gallons

Qtr.-Year	Type Waste	Total Vol.	Liquid In Storage	Solids In Storage	Remarks
1-1970	224	51	7	44	
2	224	51	7	44	
3	224	51	7	44	
4	224	51	7	44	
1-1971	224	51	7	44	
2	224	51	7	44	
3	224	51	7	44	
4	224	51	7	44	
1-1972	224	51	7	44	
2	224	51	7	44	
3	224	51	7	44	
4	224	51	7	44	
1-1973	224	51	7	44	
2	224	50	6	44	
3	224	50	6	44	
4	224	50	6	44	
1-1974	224	50	6	44	
2	224	50	6	44	
3	224	50	6	44	
4	224	50	6	44	
1-1975	224	50	6	44	
2	224	50	6	44	
3	224	50	6	44	
4	224	50	6	44	
1-1976	224	49	5	44	Removed from service 1 to 101-T.
2	---	44	0	44	Removed from service 5 to 101-T.
3	---	44	0	44	Inactive salt well pumping.
4	---	44	0	44	
1-1977	---	44	0	44	Salt well, pump
2	---	44	0	44	
3	---	44	0	44	Inactive current
4	---	44	0	44	Inactive current

204-T-4 WHC-MR-0132

Waste Status Summary of 204-T Tank-Capacity 55,000 Gallons

Qtr.-Year	Type Waste	Total Vol.	Liquid in Storage	Solids in Storage	Remarks
1-1978	-	37	0	37	Prim. Stab. New Solids Level 1-31-78
2-	-	37	0	37	
3-	-	37	0	37	
4-	-	37	0	37	
1-1979	-	37	0	37	
2-	-	37	0	37	
3-	-	37	0	37	
4-	-	37	0	37	
1-1980	-	37	0	37	New Photo 3-18-80
2-	-	37	0	37	
3-	-	38	0	38	
4-	-	38	0	38	

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ORIGIN OF WASTES IN SINGLE-SHELL TANKS 241-T-110, 241-T-111 and 241-T-112

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Abstract: A review of waste transfer documentation was conducted to determine the origin of wastes transferred into single-shell tanks 241-T-110, 241-T-111 and 241-T-112. This review was conducted to support decisions concerning disposition of the waste present in this tank.

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(2) Title
Origin of Wastes in Single-Shell Tanks 241-T-110, 241-T-111 and 241-T-112

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RS1	Add - Title page: Included tank T-112 in title. Document already discussed tank T-112 waste history. Add - Executive Summary: Included summary of tank T-112 waste history and sum of transuranic elements concentrations. Included discussion on origin of equipment decontamination and coating removal waste. Replace - Executive Summary: Replaced discussion on gross alpha concentrations measurements for tanks waste samples with sum of the transuranic elements with half-lives greater than 20-years. Add - Section 2: Expanded discussion on types of records reviewed and information available in each of these records. Add - Sections 2.2.1: Included discussion on prior waste types stored in tanks 241-T-105 and 241-T-106. Add - Section 2.2.3: Discussed variation in sludge volume reported for tank 241-T-110 in historical records. Included discussion on saltwell pumping in 1978 and interim stabilization of tank 241-T-110 in 2000. Add - Section 2.2.4: Indicated that analyses of the equipment decontamination waste solutions were not located during review of available records. Included discussion on saltwell pumping 1976-78 and interim stabilization of tank 241-T-111 in 1995. Add - Section 2.2.5: New section added to expand discussion on cesium ion exchange process waste that was added to tank T-112 in 1973. Included discussion on prior waste types stored in tanks 241-T-105 and 241-T-106 Add - Section 2.2.6: Discussed that WHC-MR-0132 does support waste history described in RPP-13873 for tanks T-111	Michael E Johnson 11/4/04 Michael E. Johnson	S Mackay 11/15/04. STEWART MACKAY

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	and T-112. Add - Section 3.1: Added discussion that plutonium precipitate separated from uranium and fission products was washed three times and the wash water combined with the uranium and fission product solution. Add - Section 3.1: Spent nuclear fuel reprocessing completed in the 221 BiPO4 process when plutonium was separated from the metal waste. Add - Section 3.1: Discussed that after October 20, 1954, the CW from 221-T Plant was transferred as a separate waste stream to underground storage tanks. The 1C waste was treated in 221-T Plant to separate fission products using ferrocyanide precipitation and sent to tanks separate from the CW stream. Change - Table 3: Sr concentrations reported for samples from tanks T-108 (top), T-108 (bottom), C-112 and average for 1C/CW were incorrectly transcribed from the reference document. Error was corrected. Add - Section 3.1.1: Included discussion on off-gas scrubbers and silver chemical reactors that were installed in the 221 BiPO4 Plants. Add - Section 3.3: Included new section discussing processing activities conducted in the 221-B Plant from 1961 through 1985 that generated cesium ion exchange process waste solution, as well as other wastes. Add - Section 4.0: Indicated analyses of core samples and waste templates are the basis for the gross alpha and transuranic elements concentrations reported. Add - Section 5.0: Included summary of tank T-112 waste history and sum of transuranic elements concentrations.		

RPP-13873
Revision 1

ORIGIN OF WASTES IN SINGLE-SHELL TANKS 241-T-110, 241-T-111 AND 241-T-112

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EXECUTIVE SUMMARY

A review of waste transfer documentation was conducted to determine the origin of waste transferred into single-shell tanks 241-T-110, 241-T-111 and 241-T-112. This review was conducted to support decisions concerning disposition of the waste present in these tanks.

Tank 241-T-110 received second decontamination cycle (2C) waste from processing plutonium solutions at the 221-T Bismuth Phosphate plant from January 1945 through December 1954, 221-T Plant low activity cell drainage waste from June 1951 through December 1954, and 224-T Concentration building wastes from May 1952 through December 1954. Tanks 241-T-111 and 241-T-112 received 2C waste from the 221-T Plant from January 1945 through October 1956, 221-T Plant low activity cell drainage waste from June 1951 through October 1956, 224-T Concentration building wastes from May 1952 through October 1956, and 221-T Plant equipment decontamination waste from December 1959 through June 1967. Tank 241-T-112 continued to receive 221-T Plant equipment decontamination waste until June 1973. Tank 241-T-112 also received a mixture of coating removal waste 221-B Plant cesium ion exchange process waste from tank 241-T-106 in March 1973.

The second decontamination cycle and 224-T building wastes originated from purification of plutonium solutions. The second decontamination cycle and 224-T building wastes are not waste originating from separating fission products from the uranium fraction of irradiated reactor fuel. Equipment decontamination wastes originated from removing residual radionuclides from failed process equipment to enable this equipment to be repaired and returned to service. Coating removal waste originated from dissolution of the aluminum coating present on irradiated fuel elements, prior to the dissolution of the fuel elements. Cesium ion exchange process waste originated from processing waste solutions at the 221-B Plant to separate cesium from these wastes.

The concentrations of the transuranic elements with half-lives greater than 20-years (i.e. sum of neptunium-237, plutonium-238, plutonium-240, plutonium-240 and americium-241) in the waste stored in tanks 241-T-110, 241-T-111 and 241-T-112 (sludge fraction only) are approximately 83.3ηCi/g, 186.5ηCi/g and 255.2ηCi/g, as reported on October 11, 2004 from the TWINS database.

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LIST OF TERMS

1C	first cycle of the decontamination process
2C	second decontamination cycle
CW	Coating waste
DOE	U.S. Department of Energy
lbs	pounds
MW	Metal waste
REDOX	Reduction-Oxidation
ηCi/g	nanocuries per gram
μCi/cc	microcuries per cubic centimeters
μCi/g	microcuries per gram
μg/cc	micrograms per cubic centimeters

1.0 INTRODUCTION

The origin of the wastes in tanks 241-T-110, 241-T-111 and 241-T-112 is important in determining the disposition of these wastes and the waste storage tanks. Section 2.0 discusses the origin of waste transferred into and removed from single-shell tanks 241-T-110, 241-T-111 and 241-T-112. Section 3.0 provides a description of the different types of wastes that were generated at the Hanford Site chemical processing plants and transferred to these underground storage tanks. Section 4.0 provides a discussion on the transuranic radionuclide analyses of the wastes in these tanks. The concentration of transuranic radionuclides present in these wastes is important to determining the disposition of these wastes. Section 5 summarizes the waste types that were transferred into tanks 241-T-110, 241-T-111 and 241-T-112.

2.0 WASTE TRANSFER INTO AND WASTE REMOVAL FROM TANKS 241-T-110, 241-T-111 AND 241-T-112

This section provides a brief description of tanks 241-T-110, 241-T-111 and 241-T-112 and summarizes waste transfers into and waste removal from these tanks. In order to determine the origins of the wastes presently stored in tanks 241-T-110, 241-T-111 and 241-T-112, publicly available reports for the Hanford Site were reviewed.

Documents reviewed included the Hanford site contractors' monthly reports (1945 through 1975), Army Corp of Engineers monthly reports (December 1944 through December 1946), U. S. Atomic Energy Commission monthly reports (1947 through 1954), waste disposal reports (1948 through 1975), tank farm waste status summary reports, and miscellaneous letters and technical reports.

The Hanford site contractors' monthly reports for January 1945 through July 1951 list the volume of waste stored in the single-shell tanks, with the exception of the B-200 and T-200 series single-shell tanks. No records were located that provided the volume of wastes stored in the single-shell tanks from August 1951 through February 1952. Beginning in March 1952, waste transfers and the volume of waste stored in each single-shell tank were reported for each tank in a waste status summary report.

With the exception of the waste status summary reports, all reports cited in this section are available electronically from the Hanford Declassified Document Retrieval System at http://www2.hanford.gov/declass/ or the U.S. Department of Energy (DOE) Information Bridge at http://www.osti.gov/bridge/. The waste status summary reports are available only as photocopies from Hanford Site Records Information Management Services organization.

2.1 DESCRIPTION OF TANKS 241-T-110, 241-T-111 AND 241-T-112

Single-shell tanks 241-T-110, 241-T-111 and 241-T-112 were originally constructed in 1944 as part of the Manhattan Project (HW-10475-C, chapter IX) and are three of the twelve, 100-series tanks in 241-T Tank Farm. The 100-series tanks are seventy-five-foot diameter underground

tanks made of reinforced concrete with a steel liner on the bottom and sides. Each tank has a design capacity of 530,000 gallons at a liquid depth of sixteen-feet. The overflow pipe for tanks 241-T-110 and 241-T-111 is at an elevation that results in seventeen-feet of waste (~540,530 gallons) being retained in each tank. The overflow pipeline from tank 241-T-112 is at an elevation that results in eighteen-feet of waste (~573,530 gallons) being retained in this tank (HW-27035).

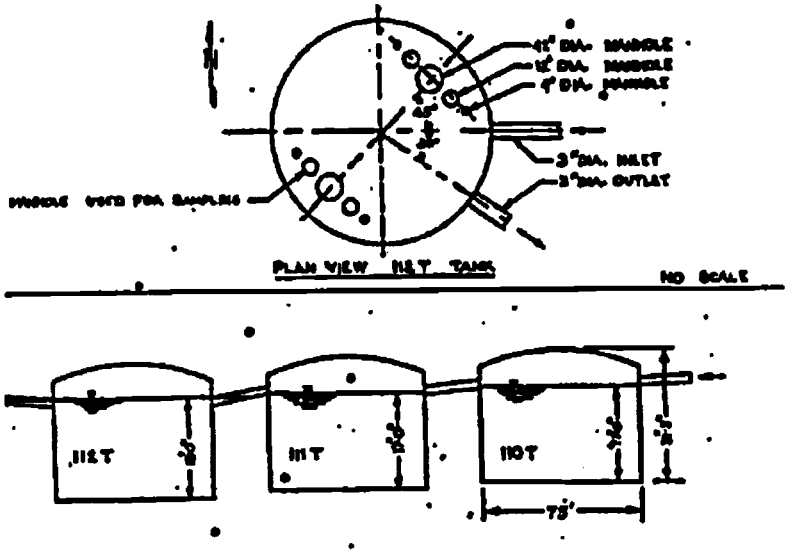
Tanks 241-T-110 and 241-T-111, along with tank 241-T-112, were connected together via underground piping to allow solution to cascade from the lead tank into the subsequent two tanks. Solids settled in each tank, with the supernatant discharged from tank 241-T-112 through an underground pipeline to a crib. In addition to the overflow piping, each tank is equipped with four, 3-inch diameter stainless steel inlet pipes. Originally, only the inlet pipes from tank 241-T-110 were connected to diversion box 241-T-153, with the inlet pipes for the other tanks blanked off close to each tank (HW-10475-C, page 907 –908).

2.2 WASTE TRANSFERS

This section describes waste transfers into and waste removal from tanks 241-T-110, 241-T-111 and 241-T-112. These tanks were operated for a number of years as a three-tank cascade. This section includes a discussion of waste discharge to underground cribs. The design of the tank cascade system is shown in Figure 1 and resulted in tanks 241-T-110 and 241-T-111 being filled with waste that then cascaded into tank 241-T-112. Figure 1 does not represent the current configuration of piping for these tanks. From 1947 through 1951, a jet was used to transfer waste from tank 241-T-112 to the crib. After modifying the disposal system in May 1951, waste was allowed to gravity overflow from tank 241-T-112 to the crib.

The volume and radioactive (plutonium, gross beta, and uranium) content of waste discharged from these tanks to underground cribs is summarized in references HW-17088, HW-20583, HW-25301, HW-28121, HW-33591, HW-38562, HW-44784, HW-72956, ISO-98, and ARH-1608. Appendix A provides a tabular listing of the volume of solids and total waste present in tanks 241-T-110, 241-T-111, and 241-T-112 for January 1945 through December 1975, after which these tanks were no longer used to receive wastes.

Figure 1. Tanks 241-T-110, 241T-111, 241-T-112 Waste Tank Cascade System



2.2.1 Second Decontamination Cycle (2C) Waste

The 241-T Tank Farm was originally constructed to receive waste from the 221-T Bismuth Phosphate plant (see Section 3.0). Tanks 241-T-110, 241-T-111, and 241-T-112 were operated as a cascade. Chemical tracer runs (non-radioactive) were initiated in the 221-T Plant in December 19444, with the second decontamination cycle (designated as 2C) waste from these runs received into tank 241-T-110 (HAN-45800-DEL, page 1). According to the Army Corps of Engineers report for January 1945 (HAN-45800-DEL, page 4), the first radioactive waste was received into tank 241-T-110 from the processing of six charges of material from 100-B reactor in the 221-T Plant to separate plutonium.

Tanks 241-T-110, 241-T-111, and 241-T-112 continued to receive 2C waste through July 22, 1946, at which time these tanks were reported as being filled and 2C waste was diverted to tanks 241-T-105 and 241-T-106 (HAN-45800-DEL, page 64 and HW-7-4542-DEL, page 21). Tanks 241-T-105 and 241-T-106 were originally designated as a spare set of tanks for receipt of 2C waste from the 221-T Plant. In order to allow the collection of 2C waste in tanks 241-T-105 and 241-T-106, a separate transfer pipeline was established to the inlet of tank 241-T-105 on July 17, 1946 (H-2-578 and HAN-45762, pages 27 and 32).

While tanks 241-T-110, 241-T-111, and 241-T-112 remained filled with 2C waste, tanks 241-T-105 and 241-T-106 continued to receive 2C waste from the 221-T Plant. Measurements of the solids depth in tanks 241-T-110, 241-T-111, and 241-T-112 were conducted in October 1946 using an ionization chamber indicated that only tank 241-T-110 contain solids, evenly distributed at a depth of approximately 38 inches, corresponding to ~84,030 gallons (H-7-5362-DEL, page 27).

Plans were initiated in October 1946 to dispose of the 2C supernatant contained in these tanks to an underground crib (HW-7-5362-DEL, page 27). A new underground crib (designated as 241-T-3) was constructed in 1947. Tank 241-T-110 would be used to settle solids that formed in the 2C waste, with the supernatant cascading by gravity flow into tank 241-T-111 and then into tank 241-T-112. The clarified 2C supernatant would be jetted from tank 241-T-112 to the underground crib. Crib disposal of the clarified 2C supernatant was authorized on an experimental basis (HW-10321). The 2C waste contained in tank 241-T-111 was jetted to this underground crib in September 1947 (HW-7795-DEL, page 26).

As part of the planned disposal of the 2C supernatant to the underground crib, separate waste transfer lines were routed to tanks 241-T-111 and 241-T-112 (see drawing H-2-578). This would enable filling these tanks directly with 2C waste when tank 241-T-110 filled with solids and was no longer suitable as a settling tank. Approximately 20,000-gallons of 2C supernatant were jetted from tank 241-T-112 to the underground crib in November 1947 to enable a waste transfer line tie-in from diversion box 241-T-153 to tanks 241-T-111 and 241-T-112 (HW-8267-DEL, page 27). Crib disposal of additional 2C supernatant was delayed until a means to sample the soil in dry wells that surround the crib area was developed.

A tool for sampling the soil in dry wells surrounding the 2C disposal crib area was designed, constructed, and tested in February 1948 (HW-9191-DEL, page 28), but this tool proved unsuccessful in obtaining soil samples when used in March 1948 (HW-9595-DEL, page 30). However, approval was given to resume limited crib disposal of 2C supernatant in April 1948, since tanks 241-T-105 and 241-T-106 were nearly filled with 2C waste and additional storage space in the single-shell tanks was not available. Crib disposal of approximately 360,000 gallons of 2C waste from tank 241-T-105 was conducted in April 1948 (HW-9922-DEL, page 31).

Following extensive sampling of the soil surrounding the 2C waste disposal crib (HW-10166-DEL, page 31), crib disposal of 2C waste contained in tank 241-T-106 was conducted in July 1948 (HW-10714-DEL, page 32) and August 1948 (HW-10993-DEL, page 32). Crib disposal of approximately 450,000 gallons of the 2C waste in tank 241-T-112 was initiated on August 4, 1948 (HW-10993-DEL, page 35) and stopped in September 1948 (HW-11226-DEL, page 32) to allow installation of an experimental sand filter on the jet discharge from tank 241-T-112 to the crib. The experimental sand filter was installed to determine the feasibility of removing additional activity from the 2C supernatant being disposed to the crib. Crib disposal of the remainder of the 2C waste in tank 241-T-112 was completed in October 1948 (HW-11499, page 33).

With the emptying of tank 241-T-112 in August through October 1948, 2C waste was again routed from the 221-T Plant into the cascade of tanks 241-T-110, 241-T-111, and 241-T-112 beginning in August 1948. Tank 241-T-110 was used to settle solids that formed in the 2C waste, with the supernatant cascading by gravity flow into tank 241-T-111 and then into tank 241-T-112. The clarified 2C supernatant was periodically jetted from tank 241-T-112 to the crib (HW-33591, pages 4 and 26) from August 1948 through May 1951. In May 1951, modifications were conducted that allowed the 2C supernatant waste to gravity overflow from tank 241-T-112 into the crib (HW-21260-DEL, page 57).

2.2.2 2C Waste Combined with Cell Drainage Waste

Beginning in June 1951, the neutralized, cell drainage waste from the 221-T Plant (designated as 5-6 waste) was combined with the 2C waste in the cascade of tanks 241-T-110, 241-T-111, and 241-T-112 (HW-21506-DEL, page 56 and H-2-1988). Tank 5-6 in the 221-T Plant was used to collect low activity drainage from the process cells. The generation of cell drainage waste was intermittent and dependent on the frequency of leaks that developed in the 221-T Plant process equipment. High-activity cell drainage waste was collected in tank 5-9 and either reworked or transferred to single-shell tank 241-T-107 (see Section 3.1.1).

The low activity cell drainage was transferred to the cascade of tanks 241-T-110, 241-T-111, and 241-T-112 so "... that the major portion of the suspended plutonium carrying solids will settle out while the waste solution combines and cascades concurrently with the second decontamination cycle waste prior to underground cribbing by constant overflow" (HW-21506-DEL, page 56). The combined 2C waste and cell drainage waste from tank 5-6 were transferred to the cascade of tanks 241-T-110, 241-T-111, and 241-T-112. All three tanks were essentially filled with waste to the overflow pipeline. Solids gravity settled and supernatant gravity overflow from tank 241-T-112 into the crib.

2.2.3 2C, Cell Drainage, and 224-T Concentration Building Waste

Beginning on May 29, 1952, the waste from the 224-T Concentration building (designated as 224 waste) was discharged to the cascade of tanks 241-T-110, 241-T-111, and 241-T-112 along with the cell drainage waste collected in tank 5-6 and the 2C waste from the 221-T Plant (HW-27838, page 17). Section 3.1 provides a description of the plutonium concentration process conducted in the 224-T Concentration building. These three waste streams (2C / 224 / 5-6) continued to be collected in the cascade of tanks 241-T-110, 241-T-111, and 241-T-112. All three tanks were essentially filled with waste to the overflow pipeline. Solids gravity settled and supernatant gravity overflow from tank 241-T-112 into the crib.

In December 1954, tank 241-T-110 was reported as filled with sludge (530,000 gallons) and only tanks 241-T-111 and 241-T-112 were receiving the 2C / 224 / 5-6 waste streams (HW-34412, page 6 and H-2-2398). A review of Hanford Site monthly reports and waste status summary reports from 1955 to the present indicate that no additional waste was transferred into tank 241-T-110. This review also observed that the documented, volume of solids contained in this tank was recorded generally as 530,000 gallons through July 1957and then reported as 46,000 gallons from August 1957 through June 1966. The tank 241-T-110 sludge volume was reported typically as 508,000 gallons from July 1966 through September 1969, then 293,000 gallons through September 1974, and 466,000 gallons from October 1974 through March 1982. Following completion of salt well pumping in 1978 (RMIS TFIC # D196235596), the tank 241-T-110 sludge level was reported at 370,000 gallons in April 1982 to the present. Supernatant and interstitial liquids were removed from tank 241-T-110 in 2000 as part of interim stabilization of the single-shell tanks (HNF-SD-RE-TI-178, pages 218-222).

The reason for the variations in the measured solids volume in tank 241-T-110 was not reported in the waste status summary reports, but could be due to inaccurate measurements. Sludge depth measurements were obtained by lowering a weight through a riser in the single-shell tank and attempting to determine the sludge interface with the supernatant. The distance from the riser bench-mark to the sludge interface was determined and the sludge depth was then calculated. The date when sludge measurements were actually obtained was not located in the available documentation. An erroneous measurement or calculation may have been recorded in August 1957 and the sludge depth not measured again until July 1967. Sludge removal from tank 241-T-110 has not been conducted as of June 2004 and is not the source for the variation in measured sludge volume.

Tanks 241-T-111 and 241-T-112 continued receiving the 2C / 224 / 5-6 waste streams and by March 1955, were reported as containing approximately 487,000-gallons and 33,000 gallons of sludge, respectively (HW-36001, page 6). This prompted the transfer in April 1955 of 115,000 to 133,000-gallons of sludge from tank 241-T-111 to tank 241-T-112 (HW-36553, page 6). Tank 241-T-111 was reported as containing approximately 362,000 gallons of solids after this transfer. Tank 241-T-112 was reported as having 33,000 gallons of solids before this transfer (HW-36001, page 6) and approximately 170,000 gallons of solids after this transfer (HW-37143, page 6). The solids were transferred from tank 241-T-111 into tank 241-T-112 to provide sufficient space in tank 241-T-111 for gravity settling of solids present in the 2C / 224 / 5-6

wastes before the clarified supernatant was overflowed to tank 241-T-112 and to the 241-T-3 crib (after 1958 referred to as the 216-T-7 crib).

The 241-T-3 crib continued to receive the supernatant overflowed from tank 241-T-112 until November 30, 1955, after which the 241-TX-153 crib (after 1958 referred to as the 216-T-19 crib) was used (HW-44784, pages 43 and 44). Additionally, approximately 700,000 gallons of waste was discharged from tank 241-T-112 to the 241-T trench number 5 on May 5, 1955, to empty this tank (HW-38562, page 28). Trench 241-T number 5 is also referred to as trench number 216-T-5 (HW-48518, page 42).

The 2C / 224 / 5-6 wastes continued to be transferred into the cascade of tanks 241-T-111 and 241-T-112 through March 20, 1956, when the final processing of irradiated fuels for plutonium recovery was completed in the 221-T Plant (HW-42219-DEL, page ED-5). Process equipment flushes using nitric acid and peroxide – caustic were conducted in the 221-T Plant from March 1956 (HW-42219-DEL, page ED-5) through September 1956 (HW-45707-DEL, page D-5) to recover plutonium and remove fission products from the equipment. The acid flushes were processed through the normal flowsheet, generating additional 2C and 224 wastes that were transferred to the cascade of tanks 241-T-111 and 241-T-112. The 221-T Plant was placed in standby status whereas the 224-T building was placed in lay-away status in October 1956 (HW-46432-DEL, page D-5). The volume of solids and liquid report in tanks 241-T-111 were 510,000 gallons and 20,000 gallons as of September 30, 1956 (HW-45738, page 6). The volume of solids and liquid report in tanks 241-T-112 were 170,000 gallons and 259,000 gallons as of September 30, 1956 (HW-45738, page 6).

Water transfers through the equipment in the 221-T Plant were conducted once per week beginning in October 1956 following chemical flushing to keep the gaskets installed in piping wetted (HW-46432-DEL, page D-5). If the gaskets dried out, leaks could develop if the equipment were restarted. Water transfers through the 221-T Plant equipment were continued through January 1957 (HW-48132-DEL, page D-6) and were terminated when the 221-T Plant was transitioned to final lay-away status in June 1957 (HW-51211-DEL, page D-6).

The disposition of the water transferred through process equipment in the 221-T Plant is not specified in the Hanford Site monthly reports or waste status summary reports. Reports that document radioactive liquid discharges to the ground for 1956 through 1959 do not indicate the discharge of any waste from tank 241-T-112 to the crib (number 241-TX-153 also known as the 216-T-19 crib) after August 1956 (HW-48518, page 35, HW-59359, page 7, and HW-63646, page 7). Tank 241-T-111 was filled to the overflow pipeline and the total waste volume in tank 241-T-112 fluctuated from 429,000 gallons (HW-45738, page 6) to 417,000 gallons (HW-50127, page 6) during this period, without any cause noted for the volume changes. Therefore, it cannot be determine with certainty whether the water used to wet equipment in 221-T Plant was discharged to tank 241-T-111 and 241-T-112.

2.2.4 Equipment Decontamination Waste

The 221-U Plant was being used to decontaminate equipment from the Reduction-Oxidation (REDOX) plant, which processed spent nuclear fuels to recover uranium and plutonium. In October 1958, plans were developed to convert the 221-T Plant for use as decontamination facility for equipment from the REDOX plant (HW-58051-DEL, page D-5) and use the 221-U Plant for another purpose. Work was conducted from February 1959 (HW-59434-DEL, page D-4) through June 1960 (HW-65935-DEL, page C-2) to convert the 221-T Plant to an equipment decontamination facility. Equipment decontamination activities were initiated at the 221-T Plant in July 1960, with the receipt of a failed multipurpose dissolver from the REDOX plant (HW-66271-DEL, page C-2).

The Hanford Site monthly reports and waste status summary reports indicate that no waste was transferred into or out of tanks 241-T-110, 241-T-111 and 241-T-112 from August 1956 through November 1959 during modifications to the 221-T Plant. In December 1959, 2,750 gallons of waste were transferred from 221-T Plant into tank 241-T-111 (HW-83906-C-RD, page 92), presumably resulting from the equipment modifications conducted at 221-T Plant. The composition or specific source of the equipment modification waste was not found during review of available documentation. However, all 221-T Plant equipment had been flushed using nitric acid and peroxide – caustic solution during 1956 to recover plutonium and remove fission products (see section 2.2.3). Therefore, the waste transferred from 221-T Plant to tanks 241-T-111 and 241-T-112 would have contained only residual levels of fission products.

As part of readying 221-T Plant for this new mission, a route was established in November 1959 from the 221-T Plant to crib number 241-TY (later referred to as 216-TY-3 or 216-T-28) for disposal of low activity waste (HW-62864, page D-4). Low activity waste was transferred from 221-T Plant into the cascade of tanks 241-T-111 and 241-T-112 and then pumped from tank 241-T-112 to the underground crib. The waste status summary reports for the underground storage tanks at the Hanford Site indicate tank 241-T-112 received 3,000 gallons of waste from 221-T Plant in March 1960 (HW-64810, page 6 and HW-83906-C-RD, page 119) and 16,000 gallons in May 1960, with 44,000 gallons of waste pumped to the 241-TY-3 crib (HW-65643, page 6 and HW-83906-D-RD, page 131). Additional decontamination waste continued to be received periodically into the cascade of tanks 241-T-111 and 241-T-112 and was pumped to the underground crib (216-T-28; then 216-T-36 after May 1967) through June 1967 (HW-83906-D-RD, HW-83906-E-RD, ISO-538, and ISO-674).

After July 1967, equipment decontamination waste from 221-T Plant was transferred directly into tank 241-T-112, with the supernatant discharged to crib number 216-T-36 (ARH-95). Tank 241-T-111 no longer was used to receive waste. Supernatant and interstitial liquids were removed from tank 241-T-111 between 1976 and 1978 (RMIS TFIC #D196235379) and 1995 as part of isolation and interim stabilization of the single-shell tanks (HNF-SD-RE-TI-178, pages 223-225).

From July 1967 through June 1972, equipment decontamination waste was transferred from 221-T Plant into directly into tank 241-T-112. Waste was transferred from tank 241-T-112 to the

REDOX plant for evaporation, with the concentrated waste transferred to other single-shell tanks (ARH-1200 C, ARH-1200 D, ARH-1666 A, B, C, D, ARH-2074 A, B, C, D, and ARH--2456 A, B). From July 1972 through June 1973, equipment decontamination waste was transferred from 221-T Plant into tank 241-T-112, and then to single-shell tank 241-U-107 (ARH-2456 C, D, and ARH-2794 A, B). After June 1973, tank 241-T-112 was no longer used to receive 221-T Plant decontamination waste. The equipment decontamination waste was transferred from 221-T Plant into tank 241-U-107 beginning in October 1973 (ARH-2794 D).

2.2.5 Cesium Ion Exchange Process Waste

Tank 241-T-112 received 350,000 gallons of a mixture of coating removal waste, B-Plant cesium ion exchange waste, and laboratory waste from tank 241-T-106 and 20,000 gallons of waste from diversion box catch tank 241-T-301 in January through March 1973 (ARH-2794A). No other waste was transferred into tank 241-T-112 after March 1973. Supernatant and interstitial liquids were removed from tank 241-T-112 in 1974, 1976 and 1981 as part of isolation and interim stabilization of the single-shell tanks (HNF-SD-RE-TI-178, page 6).

Prior to 1973, tank 241-T-106 was used to stored 2C waste, first decontamination cycle (1C) and coating removal waste (CW) from the 221-T Plant and coating removal waste from the REDOX Plant. As discussed in section 2.2.1, tanks 241-T-105 and 241-T-106 were spare single-shell tanks that were placed in service to receive and stored 2C waste from the 221-T Plant beginning in July 1946. The 2C waste was received into tank 241-T-105 from July 23, 1946 (HW-7-4542-DEL, page 22) through April 1948, after which the 2C supernatant waste was discharged to a crib (HW-9922-DEL, page 31). Tank 241-T-106 began to receive 2C waste through the overflow line from tank 241-T-105 in June 1947 (HW-7-7454-DEL, page 26) and was filled in March 1948 (HW-9595-DEL, page 32). The 2C supernatant waste contained in tank 241-T-106 was discharged to a crib from July 1948 (HW-10714-DEL, page 32) through August 3, 1948 (HW-10993-DEL, page 35).

After emptying the 2C supernatant waste from tanks 241-T-105 and 241-T-106, the combined 1C/CW waste was transferred from 221-T Plant to tank 241-T-105 beginning in May 1948 (HAN-45807-DEL, page 55). Waste began to cascade from tank 241-T-105 into tank 241-T-106 in August 1948. Tank 241-T-105 continued to receive 1C/CW waste and cascade waste into tank 241-T-106 through January 1949, at which tanks 241-T-105 and 241-T-106 were filled with 1C/CW waste (HW-12391-DEL, page 38). The 1C/CW supernatant contained in tank 241-T-106 (along with other tanks in 241-T farm) was processed through the 242-T Evaporator from in 1951 with the concentrated 1C/CW supernatant waste (i.e., evaporator bottoms) stored in tanks 241-TX-116 and 241-TX-117. The evaporator bottoms in tanks 241-TX-116 and 241-TX-117 were eventually processed again through the 242-T Evaporator to further concentrate these wastes for storage in tanks 241-TX-110 and 241-TX-111 (RPP-16129, section 2.2.2). Tank 241-T-106 again was used as part of the cascade of tanks 241-T-104 and 241-T-105 to store 1C/CW waste from the 221-T Plant from August 1951 through September 1954, with some of the 1C/CW supernatant discharged from these tanks to a trench in early 1954 (RPP-16129, sections 2.2.3 and 2.2.4). All of the 1C/CW supernatant was transferred from tank 241-T-106 to 241-TX-

118 in January 1955 for processing in the 242-T Evaporator, leaving approximately 10,000 gallons of 2C and 1C/CW sludge in this tank (HW-35022, page 5).

Tank 241-T-106 then received ~221,000 gallons of REDOX Plant coating removal waste supernatant in May 1956 from tank 241-U-110 (HW-43490, page 5). Tank 241-T-106 next received 221,000 gallons of REDOX Plant coating removal waste supernatant from tank 241-S-107 via the cascade overflow line from tank 241-T-105 in June 1965 (HW-83906-E-RD, page 62c) and an additional 90,000 gallons of this same waste type in 1966 (ISO-226, page 5). The REDOX Plant coating removal waste was transferred from tank 241-T-106 to tank 241-TY-101 in the third quarter of 1969, leaving approximately 26,000 gallons of sludge and 42,000 gallons of supernatant in this tank (ARH-1200 C, page 7).

In January through March 1973, tank 241-T-106 received a mixture of supernatant wastes (~455,000 gallons) from tank 241-T-105 consisting of B-Plant cesium ion exchange waste and laboratory waste (ARH-2794A). Approximately 350,000 gallons of supernatant were then transferred from tank 241-T-106 to tank 241-T-112 in June 1973.

2.2.6 Comparison with Other Reports

Waste transfers into and waste removals from tanks 241-T-110, 241-T-111 and 241-T-112 were summarized in *A History of the 200 Area Tank Farms* (WHC-MR-0132), *Waste Status and Transaction Record Summary for the Northwest Quadrant of the Hanford 200W Area* (WHC-SD-WM-TI-669, Rev. 1), *Historical Tank Waste Content Estimate for the Northwest Quadrant of the Hanford 200 West Area* (HNF-SD-WM-ER-351, Rev. 1), and *Waste Status and Transaction Record Summary (WSTRS) Rev. 4* (LA-UR-97-311). In general, the information cited in Sections 2.2.1 through 2.2.4 is in agreement with these previous reports.

These previous reports accurately state the volume of waste transferred into and removed from tanks 241-T-110, 241-T-111 and 241-T-112, as well as the volume of solids and total waste stored in each tank. Specifically, these previous reports do indicate the waste transferred to this tank cascade from was 2C waste from January 1945 through May 1951, combined 2C / 5-6 waste from June 1951 (WHC-MR-0132, page 4) through 1st quarter 1952 and 2C / 224 / 5-6 waste from 2nd quarter 1952 through 1st quarter 1957. These previous reports do indicate that the source of waste transferred into tank 241-T-111 from December 1959 (4th quarter 1959) through June 1967 was from 221-T Plant, but do not describe these wastes as originating from equipment decontamination conducted in the 221-T Plant (see Section 2.2.4). These previous reports also accurately reflect the waste transfer history associated with tank 241-T-112, as described in this report.

3.0 TYPES OF TANK WASTE GENERATED AT THE HANFORD SITE CHEMICAL PROCESSING PLANTS

There were numerous spent nuclear fuel reprocessing, research and development, plutonium processing and waste management activities conducted at the Hanford Site starting in 1944. These spent nuclear fuel reprocessing, research and development, plutonium processing and waste management activities conducted in the processing plants are discussed further in the DOE/RL-97-02, *National Register of Historic Places Multiple Property Document Form - Historic, Archaeological and Traditional Cultural Properties of the Hanford Site, Washington February 1997.*

It has been established in Section 2.0 that second decontamination cycle (2C) wastes and tank 5-6 cell drainage wastes from the 221-T Bismuth Phosphate plant and 224-T building wastes were transferred into tanks 241-T-110, 241-T-111, and 241-T-112. Additionally, tanks 241-T-111 and 241-T-112 received equipment decontamination waste and tank 241-T-112 received coating removal waste and 221-B Plant cesium ion exchange process waste. The following sections provide a discussion of the wastes originating from operation of the 221-T Bismuth Phosphate plant, 224-T Concentration building and 221-B Plant cesium ion exchange process waste. Equipment decontamination waste from the 221-T Plant was previously discussed in Section 2.2.4.

3.1 B AND T BISMUTH PHOSPHATE PROCESS PLANTS

B- and T-Plants were constructed in 1944 through 1945 to separate plutonium from spent nuclear fuel using the bismuth phosphate process. Figure 2 shows a summary of the 221-B/T Plant bismuth phosphate process, which is referred to throughout this discussion.

In the bismuth phosphate process, the aluminum cladding of spent nuclear fuel elements was dissolved in boiling sodium nitrate solution, to which sodium hydroxide was slowly added (HW-10475-C, page 403). The cladding removal waste, sometimes referred to as coating waste (CW), was transferred to single-shell underground storage tanks (see item [1] in Figure 2).

Reprocessing of the spent nuclear fuel commenced with the dissolution of the uranium fuel elements. The uranium fuel elements (see item [2] in Figure 2) were then dissolved in nitric acid (HW-10475-C, chapter IV, page 405). Water and sulfuric acid were added to the dissolved uranium metal solution and the mixture was then transferred to the plutonium extraction section. The sulfuric acid formed a uranyl sulfate complex that prevented uranium precipitation as a phosphate in the subsequent plutonium extraction step (HW-10475-C, page 418).

Plutonium was extracted from the acid solution by addition of bismuth nitrate and phosphoric acid to form a bismuth phosphate carrier precipitate (HW-10475-C, page 503). The plutonium and bismuth phosphate carrier precipitate was centrifuged and washed three times with water to separate the acidic supernatant from the plutonium precipitate (see item [3] in Figure 2). The acidic solution remaining after the plutonium precipitation contained about 99 percent of the uranium, about 90 percent of the fission products. This separation process also removed and

reduced the gamma radiation activity level in the plutonium precipitate by a factor of 10. However, zirconium is phosphate insoluble and zirconium-95 (10 percent of the activity) stayed with the plutonium product. The acidic uranium solution was then neutralized and transferred to the underground single-shell tanks as metal waste (MW). Recent laboratory testing of the bismuth phosphate flowsheet confirms this partitioning of radionuclides (internal letter 7G300-02-NWK-024, "Bismuth Phosphate Process Radionuclide Partition Factors for the Hanford Defined Waste Model"). The laboratory tests indicate the percentage of cecium-137 and strontium-90 partitioned to the metal waste may have been as high as 100 percent and 89 percent, respectively.

After separating and washing the plutonium precipitate from the metal waste, reprocessing of spent nuclear fuel was completed in the 221 Plant Bismuth Phosphate process. Plutonium decontamination was conducted in the remainder of the 221 Plant Bismuth Phosphate process. The plutonium bearing cake was dissolved in nitric acid and further decontamination of the plutonium to separate fission products was conducted (HW-10475-C, chapter VI). Sodium bismuthate, sodium dichromate, or potassium permanganate was added to oxidize the plutonium to the +6 valence-state. This step caused the bismuth phosphate to precipitate phosphate insoluble fission products ("by-product precipitation"), leaving the plutonium in solution. The precipitate was separated from the plutonium-bearing solution using centrifuges and washed to remove soluble plutonium. The plutonium was reduced to the +4 valence state to form a precipitate that could be separated from the remaining soluble fission products by centrifugation.

The fission products separated from the plutonium product during this first cycle of the decontamination process (designated as 1C) were transferred to single-shell tanks. The 1C waste (see item [4] in Figure 2), contained approximately 10 percent of all fission products and approximately 1.4 percent of the plutonium present in the original fuel charged to the plant (HW-23043, pages 20 and 22). After 1951, the Bismuth Phosphate process flowsheet was modified to include cerium and zirconium scavenger precipitation in the 1C by-product step to remove lanthanide and zirconium radionuclides from the plutonium product (HW-23043, page 16). During operation of 221-B Plant, the 1C waste was combined with the coating removal waste and transferred to the same single-shell tank. This same practice was conducted in 221-T Plant from December 1944 through October 19, 1954. Beginning on October 20, 1954, nickel ferrocyanide scavenging of the 1C waste was conducted in T-Plant (but not in B-Plant) to precipitate cesium-137 and strontium-90 (HW-33585-DEL, page Ed-8, and HW-33184). The precipitated 1C waste slurry was transferred separate from the coating removal waste to different single-shell tanks for settling of the precipitate and discharge of the scavenged (i.e., cesium and strontium depleted) supernatant to a crib.

The plutonium solids were again dissolved in nitric acid. A second decontamination cycle (see item [5] in Figure 2) was conducted to reduced the gamma activity level by a factor of 10,000 from that in the previous dissolved metal solution, giving an overall process decontamination factor of 100,000 below that of the original solution (HW-10475-C, page 627). The second decontamination step essentially repeated the steps previously described for the first cycle decontamination. The second decontamination cycle wastes (designated as 2C) were also transferred to the single-shell tanks. The 2C waste contained less than 0.1 percent of the uranium and fission products and about 0.4 percent of the plutonium present in the original fuel charged

to the plant (HW-23043, pages 26 and 28). The plutonium product from the bismuth phosphate process was subsequently concentrated in the 224-T and 224-B buildings using a lanthanum fluoride precipitation process.

Table 1 provides the flowsheet estimated compositions of the neutralized CW, MW, 1C, and 2C waste solutions generated from the bismuth phosphate plants based on the October 1, 1951 flowsheet (HW-23043). Additional analyses of the supernatant fraction of MW, 1C, and 2C that was stored in single-shell tanks are provided in Tables 2 and 3. The CW was combined with the 1C waste in the same tanks in the Bismuth Phosphate process. Note that the coating waste batch size shown in Table 1 is based on 6,600-lbs uranium, but that the metal waste dissolution batch size is based on 2,200-lbs uranium. These sample analyses support that the 2C waste contained less than 0.1 percent of the fission products. Analyses of the combined 2C / 224 building / tank 5-6 waste supernatant stored in tank 241-T-112 conducted on August 6, 1952 and September 24, 1952 indicate that the total beta emitters was comprised of 35 to 50 percent ruthenium, 35 to 50 percent cesium, 4 to 8 percent cerium, yttrium, and other rare earths, and 6 to 11 percent undetermined (HW-27035, page 8).

Figure 2. Bismuth Phosphate Process Diagram

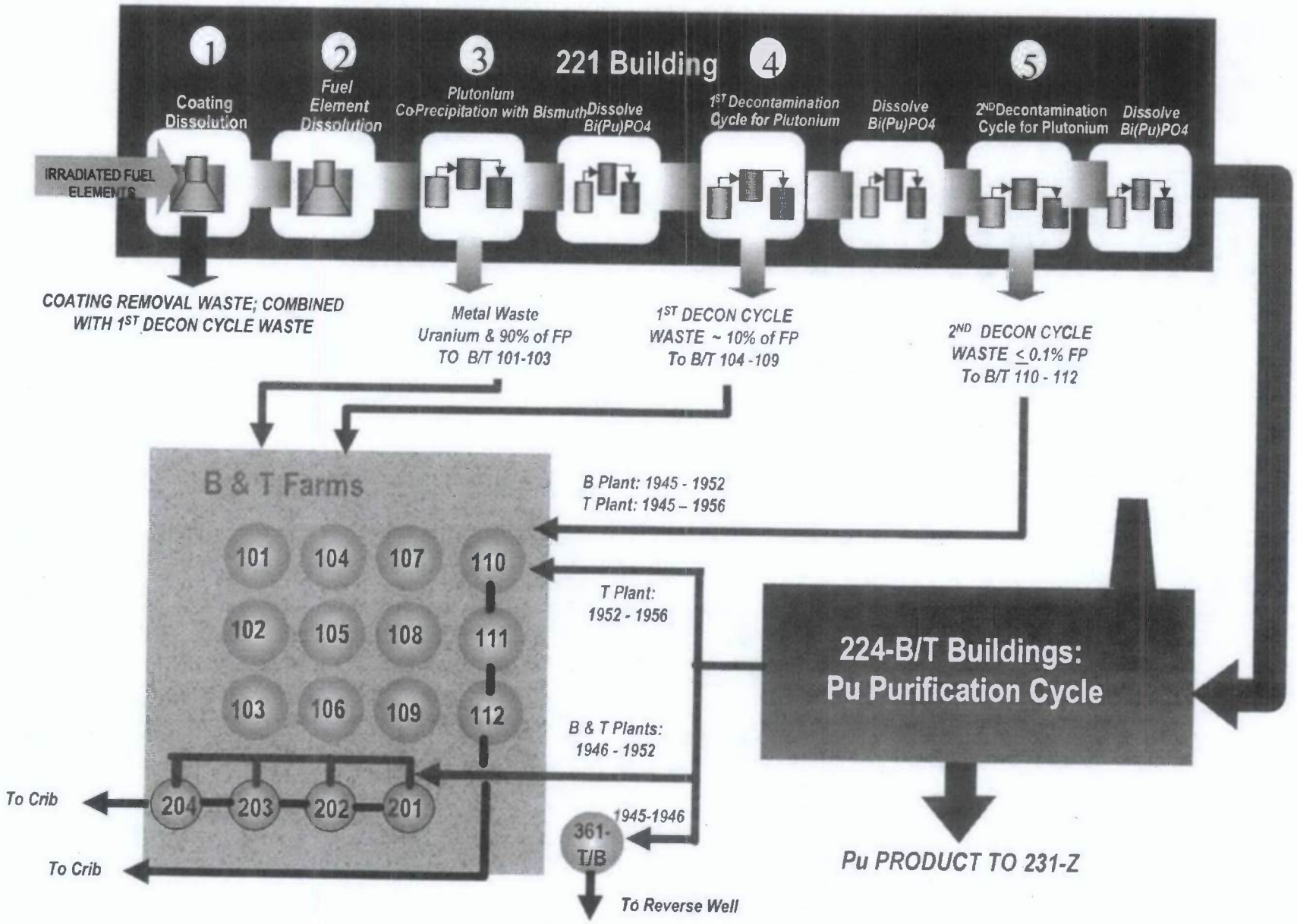


Table 1. Estimated Composition of Bismuth Phosphate Plant Wastes From October 1, 1951 Flowsheet [1]

Analyte [2]	Coating Removal Waste	Metal Waste	First Decontamination Cycle (1C) Waste	Second Decontamination Cycle (2C) Waste	224 Building Waste
Plutonium	3.3E-04	2.0E-04	6.0E-07 [4]	1.6E-07 [5]	1.68E-04 [6]
Uranium	0.15		0.235 [4]	Not reported	2.04E-05
Gamma	6.6E+04	1.3E+07	2.3E+06 [4]	1.13E+04 [5]	1.13E+02 [6]
Sodium Aluminate ($NaAlO_2$)	95.1				
Sodium Hydroxide (NaOH)	43.6				
Sodium Nitrate ($NaNO_3$)	61.8				
Sodium Nitrite ($NaNO_2$)	56.0				
Sodium Silicate ($NaSiO_3$)	4.3				
Uranyl nitrate (UHN) [3]		132			
Fluorine (F)					5.6
Nitrate (NO_3)		9.7	93.1	61.3	42.4
Sulfate (SO_4)		24.4	4.73	3.61	0.35
Phosphate (PO_4)		25.2	26.2	23.0	3.05
Sodium (Na)		83.2	47.3	36.7	36.8
Bismuth (Bi)			2.59	1.31	1.18
Cerium (Ce)			0.030		
Lanthanum (La)					0.49
Manganese (Mn)					0.33
Zirconium (Zr)			0.030		
Iron (Fe)			1.37	1.82	
Chrome (Cr)			0.16	0.06	0.17
Ammonia (NH_4)			1.98	1.71	0.12
Silicon Hexa-Fluoride (SiF_6)			4.35	3.67	
Volume per Batch (gallons)	795	2,380	2,040	2,090	2,200

Notes:

[1] See HW-23043

[2] Analyses are reported in grams per liter, except for gamma activity, which is counts/minute/mL.

[3] HW-23043, page 31, notes that uranium is not actually present in this form, but is probably as $NaUO_2PO_4$ and $Na_4(UO_2)_2CO_3$.

[4] Pu and Gamma concentrations were calculated from the compositions of tanks 13-4 and 14-3 (HW-23043, pages 20 and 22).

[5] Pu and Gamma concentrations were calculated from the compositions of tanks 18-4 and 19-3 (HW-23043, pages 26 and 28).

[6] Pu and Gamma concentrations were calculated from the compositions of tanks A-4, D-4, B-3, and F-8 (HW-23043, pages 39, 44, 48, and 54).

Note that the coating waste batch size shown in Table 1 is based on 6,600-lbs uranium, but that the metal waste dissolution batch size is based on 2,200-lbs uranium. These sample analyses support that the 2C waste contained less than 0.1 percent of the fission products.

3.1.1 221-B and 221-T Cell Drainage Waste

During the operation of the 221-B and 221-T Bismuth Phosphate plants, failure of process equipment, cooling jackets on process vessels, and piping occurred periodically, resulting in the discharge of cooling water, chemical solutions, and process solutions (e.g., MW, 1C, 2C wastes and plutonium product solutions) to the process cells. Each of the 40 process cells in the 221-B and 221-T Plants contained a sump that was equipped with a conductivity probe beginning in August 1946 to detect a liquid leak in the process cell (HW-7-4739-DEL, page 21). The sumps gravity drained to a 24-inch diameter vitrified clay pipe that traversed under each cell and discharged to a deep, open top, stainless steel tank, number 5-7 in section 5 (cell 10) (HW-10475-C, page 914).

Cell drainage collected in tank 5-7 was jetted to tank 5-6 or tank 5-9, which were used for sampling and chemical treatment of the cell drainage solution. Waste in tanks 5-6 and 5-9 could be jetted between these two tanks. High activity waste collected in 221-T Plant and 221-B Plant tanks 5-9 could be jetted to single-shell tank 241-T-107 and 241-B-107, respectively (HW-10475-C, page 918). Alternatively, the waste could be transferred to process vessels with the 221-T (or 221-B) Plant and processed to recover plutonium. An example of this practice is cited in the January 1948 monthly report for the Hanford Works (HW-8931-Del, page 28).

The T-Plant stack drainage waste was also collected as part of the cell drainage until May 28, 1951, after which the stack drainage was routed to the cascade of single-shell tank 241-TX-113, 241-TX-114, and 241-TX-115 (HW-21260-DEL, page 58). Also, the dissolvers located in 221-B and 221-T Plant cells 5, 6 and 7 were equipped with off-gas scrubber towers in May 1948 (HAN-45807, pages 57). The dissolver off-gas scrubbers used water to adsorb iodine and remove particulates from the dissolver off-gases. The spent scrubber solution was combined with the low-activity cell drainage waste collected in tank 5-6 (HW-10728). The dissolver off-gas scrubbers were replaced with silver chemical reactors, thus eliminating the spent scrubber solution. The first silver reactor was installed in the 221-B Plant in October 24, 1950 (HW-19898 and HW-19325, page 52) and the remaining silver chemical reactors were installed in the 221-B and 221-T Plants by January 1951 (HW-20161, page 52 and HW-21826).

Waste collected in tank 5-6 was transferred to reverse well number 216-T-3 from January 1945 through August 1946. Crib number 216-T-6 was used to dispose of the cell drainage waste from August 1946 through June 1951. After June 1951, cell drainage waste was transferred to the cascade of tanks 241-T-110, 241-T-111, and 241-T-112 (HW-55176, part V). The quantity and composition of the cell drainage solutions discharged from tank 5-6 varied (see HW-20583, page 4 and HW-33591, page 25). Table 4 provides analyses of cell drainage waste that was collected in tank 5-6 and transferred to either crib 216-T-6 or to the cascade of tanks 241-T-110, 241-T-111, and 241-T-112. As evident from the analyses provided in Table 4, the neutralized, low activity cell drainage waste contained soluble beta emitting radionuclides and plutonium.

3.2 224-B AND 224-T CONCENTRATION BUILDINGS

The process steps executed in the 224 buildings were as follows:

- The starting batch size received from the 221 buildings was 330 gallons.
- Plutonium solution from the 221 buildings was oxidized with sodium bismuthate to convert the plutonium to the +6 valence state.
- Phosphoric acid was added to produce a bismuth phosphate ($BiPO_4$) precipitate, with the plutonium still in solution. At this point, operators wanted to get rid of all the $BiPO_4$.
- The solution and precipitate were separated by centrifugation.
- Nitric acid was added to dissolve the $BiPO_4$ precipitate, with this solution removed as waste.
- Potassium permanganate ($KMnO_4$) was added to the plutonium solution to ensure all the plutonium was in the +6 valence state.
- Hydrogen fluoride and lanthanum salts were added to the plutonium solution producing a lanthanum fluoride precipitate. Fission products were carried with the lanthanum. This precipitate contained all the lanthanides (cerium, lanthanum, etc.) and residual ruthenium, samarium, europium, americium, and curium that the $BiPO_4$ could not carry out of the stream.
- The lanthanum fluoride precipitate was dissolved in nitric acid, neutralized with sodium hydroxide, and sent to waste storage tanks.
- Oxalic acid was added to the plutonium solution collected from the lanthanum fluoride precipitation step to reduce the plutonium to the +4 valence-state.
- Hydrogen fluoride and lanthanum salts were added to the plutonium solution producing a lanthanum fluoride and plutonium fluoride precipitate. The precipitate was centrifuged to collect the solids.
- Potassium hydroxide was added to convert the plutonium fluoride / lanthanum fluoride precipitate into lanthanum hydroxide and plutonium hydroxide solids.
- After centrifuging to separate the lanthanum hydroxide and plutonium hydroxide solids, these solids are reacted with nitric acid solution to dissolve the lanthanum and plutonium. The plutonium nitrate / lanthanum nitrate solution product was now ready for transfer to the 231-Z building or 234-5 building.

By this time, each original 330-gallon batch of plutonium-bearing solution that had entered the 224 Buildings was concentrated down to eight gallons. The liquid waste (designated as 224) from the lanthanum fluoride precipitation process was neutralized and transferred to the single-shell underground storage tanks. The resulting purified plutonium material was transferred to the 231-Z building and subsequently to the 234-5 building (Z Plant) beginning in 1949 for further processing.

Table 2. Analyses of Bismuth Phosphate Process Supernatants Stored [1,2]

Waste Type	Tank	pH	Pu µg/liter	Gross Beta millicuries/liter	Gross Gamma millicuries/liter	Date Sampled
Metal Waste	T-101	10.1	70	200[5]	70[5]	12-12-1946
Metal Waste	T-101	10	35	110[5]	25[5]	7-01-1947
Metal Waste	T-102	9.9	60	120	20	7-01-1947
Metal Waste	T-103	9.8	60	150	20	7-01-1947
1C/CW	B-109	9.9	40	0.65	0.28	3-18-1947
1C/CW	C-112	9.9	12	12	4.4	3-18-1947
2C	B-111	6.9	7.2E-02	2.0E-03	3.0E-03	7-1-1947
2C	B-112	6.8	4.32E?? [3]	1.5E-03	3.0E-03	7-1-1947
Waste Type	**Tank**	**pH**	**Pu µg/liter**	**Gross Beta Counts / minute/ cc**	**Gross Gamma Counts / minute/ cc**	**Date Sampled**
2C	T-110	Not reported [4]	15	4.9E+04	30	7-13-1945
2C	T-110	9.8[4]	19	6.9E+04	55	7-25-1945
2C	B-110	9.6[4]	8.5	7.0E+04	55	7-25-1945

Notes:

[1] See HW-10728 and HW-3-3220.

[2] Solids formed in each of wastes, settling to the bottom of each tanks. These sample analyses are for the supernatant only and are not representative of the sludges.

[3] The reported Pu sample analyses for tank B-112 seems to be in error and lacking an exponent in HW-10728.

[4] Prior to October 1945, the 2C waste was neutralized to a pH of approximately 10. The waste collected in tanks 241-T-110, 241-T-111, and 241-T-112 were neutralized to about pH 7 after October 1945 to precipitate bismuth and plutonium (HW-3-3220, page 13).

[5] Decreases in gross beta and gross gamma concentrations shown for the T-101 waste samples are due to decay of fission products with short half-lives.

Table 3. Analyses of Metal Waste and First Decontamination Cycle / Coating Waste Supernatant

Tank	Date Filled	Pu µg/cc	Gross Beta µCi/cc	Gross Gamma µCi/cc	Sr µCi/cc	Cs µCi/cc	Ru µCi/cc	Rare Earths + Y – Ce µCi/cc	Ce µCi/cc	Nb µCi/cc	Zr µCi/cc	Te µCi/cc
Analyses of Metal Waste Supernatant Following Uranium Extraction [1]												
C-106	Not specified				0.44	54.2						
BX-108	Not specified				0.26	132.4						
BX-109	Not specified				1.08	56.3						
C-112	Not specified				1.20	25.8						
C-109	Not specified				0.46	40.7						
C-111	Not specified				0.10	34.5						
Average Concentrations for Metal Waste					**0.59**	**57.3**						
Analyses of First Decontamination Cycle (1C) Waste Mixed with Coating Removal Waste (CW) [2]												
B-107	8-1945	1.7E-02	0.135	0.055	0.011	0.10						
T-107	9-1945	1.5E-03	0.170	0.093	0.0013	0.20						
B-108	12-1945	2.0E-02	0.183	0.044	0.022	0.12						
T-108 (Top)	12-1945	2.0E-02	0.25	0.073	0.012	0.17	0.0066	0.047	0.007	0.0018	0	1.2E-05
T-108 (Bottom)	12-1945	2.0E-02	0.25	0.070	0.012	Not reported	0.0065	0.029	0.0066	0.0024	0	3E-05
T-109	3-1946	2.6E-03	0.14	0.082	0.00038	0.15						
B-109	4-1946	1.8E-02	0.16	0.051	0.01	0.11						
T-104 (Top)	7-1946	3E-03	0.51	0.130	0.00013	0.13	0.058	0.004	0.051	0.028	0.010	2.4E-05
T-104 (Bottom)	7-1946	3E-03	0.52	0.160	0.00037	Not reported	0.059	0.003	0.050	0.028	0.015	3.6E-05
C-110	8-1946	2E-03	0.14	0.0067	0.00026	0.11						
C-111	11-1946	4.2E-03	0.16	0.069	0.01	0.13						
C-112	4-1947	3.1E-03	0.14	0.064	0.006	0.13						
U-110	4-1947	2.1E-04	0.13	0.069	0.00011	0.17						
U-111	10-1947	3.4E-04	0.12	0.060	0.00023	0.14						
TX-109 [3]	9-1949	2.7E-05	2.8	2.2	0.00087	0.27	0.34	0.0085	0.0035	0.34	1.2	8E-05
Average Concentrations for 1C / CW		**7.67E-03**	**0.39**	**0.22**	**0.0058**	**0.15**						

Notes:

[1] HW-36717, *Decontamination of Uranium Recovery Process Stored Wastes Interim Report*, May 16, 1955, W. W. Schulz, General Electric Company, Richland, Washington.

[2] HW-20195, *Radioactive Content of Stored Bismuth Phosphate First Cycle Waste Supernatants*, February 5, 1951, General Electric Company, Richland, Washington.

[3] Tank TX-109 exhibits higher gross beta and gross gamma radioactivity since this tank was sampled shortly after filling and the short-lived fission products (e.g., Ru, Nb, and Zr) had not decayed appreciably.

Table 4. Composition of Tank 5-6 Cell Drainage Waste from 221-T Plant

Year	Month	Liters	Pu Grams	Total Beta Activity Curies	Comment
Tank 5-6 Cell Drainage Transferred to 216-T-6 Crib [1,2]					
1948	January	839,900	49	88	Total beta activity does not include radioactive iodine. Samples were measured for total alpha activity. Calculated Pu mass assumes that all alpha activity measured in samples was Pu. Uranium activity in samples contributed less than 8% of the total alpha activity [1].
	February	724,461	8	73	
	March	586,188	3	789	
	April	842,778	9	461	
	May	918,007	5	72	
	June	971,810	9	295	
	July	1,057,015	6	130	
	August	831,662	4	248	
	September	857,327	5	361	
	October	830,083	4	116	
	November	980,411	6	214	
No records could be located for December 1948 through August 1949.					
1949	September	260,000	32	365	
	October	360,000	41	2800	
	November	340,000	38.2	333	
	December	430,000	48	250	
1950	January	410,000	44	210	
	February	330,000	28.5	No data reported	
	March	370,000	35	No data reported	
	April	450,000	35.6	294	
	May	370,000	33.9	363	
	June	430,000	36.6	2142	
	July	520,000	43.6	600	
	August	590,000	44.9	741	
	September	480,000	42.3	850	
	October	620,000	47.3	858	
	November	540,000	50.9	600	
	December	590,000	42.1	850	
No records could be located for January 1951 through December 1951. Beginning in June 1951, Tank 5-6 cell drainage waste along with 2C waste was routed to the cascade of tanks 241-T-110, 241-T-111, and 241-T-112.					

Table 4. Composition of Tank 5-6 Cell Drainage Waste from 221-T Plant

Year	Month	Liters	Pu Grams	Total Beta Activity Curies	Comment
Tank 5-6 Cell Drainage Waste Discharged to the Cascade of Tanks 241-T-110, 241-T-111, and 241-T-112 [3,4]					
1952	January	595,000	5.2	440	
	February	498,000	6.9	850	
	March	643,000	8.2	920	
	April	623,000	8.8	660	
	May	318,000	1.8	84	
	June	392,000	3.0	97	
	July	600,000	4.1	160	Beginning in July 1952, 224 building waste, along with tank 5-6 cell drainage and 2C wastes were routed to the cascade of tanks 241-T-110, 241-T-111, and 241-T-112. Values reported are for tank 5-6 cell drainage waste only.
	August	670,000	6.5	265	
	September	260,000	1.9	675	
	October	430,000	3.0	310	
	November	490,000	2.7	95	
	December	540,000	3.3	240	
1953	January	490,000	2.4	130	
	February	530,000	3.9	480	
	March	660,000	5.0	245	
	April	390,000	2.0	180	
	May	490,000	1.8	220	
	June	660,000	3.5	590	
	July	280,000	0.9	65	
	August	490,000	2.4	100	
	September	560,000	7.8	195	
	October	560,000	6.8	1,840	
	November	710,000	8.7	1,085	
	December	740,000	8.8	885	
1954	January	830,000	10.4	1,680	
	February	820,000	14.2	16,420	
	March	860,000	18.6	5,305	
	April	540,000	8.4	2,175	
	May	790,000	10.6	1,760	
	June	810,000	9.5	2,390	
	July	1,030,000			Radionuclide content not reported separately for 5-6 Cell drainage waste from July 1954 thru June 1955 (HW-38562, page 26).
	August	1,150,000			
	September	1,090,000			
	October	800,000			
	November	730,000			
	December	1,100,000			
1955	January	1,370,000			
	February	950,000			
	March	1,460,000			
	April	1,380,000			

Table 4. Composition of Tank 5-6 Cell Drainage Waste from 221-T Plant

Year	Month	Liters	Pu Grams	Total Beta Activity Curies	Comment
	May	1,410,000			
	June	1,440,000			
The volume and radionuclide content of tank 5-6 cell drainage waste were not recorded separate from other wastes transferred into the cascade of tanks 241-T-110, 241-T-111, and 241-T-112 after July 1954.					

Notes:

(1) HW-11908
(2) HW-20583
(3) HW-25301
(4) HW-33591
(5) Analyses of the combined 2C / 224 building / tank 5-6 waste supernatant stored in tank 241-T-112 conducted on August 6, 1952 and September 24, 1952 indicate that the total beta emitters was comprised of 35 to 50% ruthenium, 35 to 50% cesium, 4 to 8% cerium, yttrium, and other rare earths, and 6 to 11% undetermined (HW-27035, page 8).

3.3 221-B PLANT FISSION PRODUCTS PROCESSING

From August 1963 through June 1966, B-Plant was used in conjunction with the PUREX facility, 244-CR Vault, and the 201-C Hot Semiworks (renamed Strontium Semiworks in 1963) to separate strontium-90 and rare earths (i.e., cerium-144 and promethium-147) from high-level waste solutions. Then, from July 1966 through December 1967, equipment was replaced within B-Plant to expand the processing capability to include cesium removal from fission high-level waste solutions using ion exchange equipment. The strontium and rare earths processing equipment was also replaced to include only strontium removal using a solvent extraction equipment, followed by precipitation and centrifugation equipment for purifying the strontium. Each of the fission products processing events in the B-Plant is discussed in more detail in the following sections.

3.3.1 STRONTIUM AND RARE EARTHS PROCESSING

On September 18, 1961 (HW-71187-DEL, page F-2), renovation of cells 5 through 12 within B-Plant canyon was initiated to use these cells for separating strontium and rare earths from a mixed fission product solution (HW-69011). Construction activities were completed, and the facility was accepted by operations on January 31, 1963 (HW-76848-DEL, page B-2). Processing of radioactive waste in cells 5 through 12 at the B-Plant commenced on August 2, 1963 (HW-78817-DEL, pages B-2 and G-2).

B-Plant was used in conjunction with the PUREX facility, 244-CR Vault and the 201-C Hot Semiworks to separate strontium-90, cerium-144 and promethium-147 from high-level waste solutions. The PUREX facility generated a first cycle raffinate solution from the solvent extraction reprocessing of irradiated reactor fuel (i.e., high-level waste). The first cycle raffinate solution was highly acidic and contained most of the fission products (e.g., strontium-89/90, cerium-144, promethium-147, and cesium-137) that were separated from the uranium and plutonium during the reprocessing of irradiated reactor fuel. The acidity of the first cycle

raffinate solution was reduced by addition of sugar and digestion at elevated temperature to decompose the nitric acid solution.

In a section of the PUREX facility known as the head-end, first cycle raffinate solution was reacted with sodium sulfate and lead nitrate to precipitate strontium and rare earth (i.e., cerium and promethium) fission products (HW-63051 and HW-69534). Lead co-precipitated with strontium and increased the amount of strontium precipitated from the first cycle raffinate solution. The resulting strontium and rare earth precipitate was centrifuged and washed to separate the supernatant, which contained soluble fission products such as cesium-137, zirconium-niobium-95, and ruthenium-rhodium-106. The supernatant containing the soluble fission products (e.g., cesium-137, zirconium-niobium-95, and ruthenium-rhodium-106) was neutralized and transferred to underground storage tanks. The strontium and rare earth precipitate was metathesized to soluble carbonates by addition of sodium carbonate. The strontium and rare earth carbonate precipitates were then dissolved in nitric acid and transferred to B-Plant via 244-CR Vault for further processing.

In B-Plant, the strontium nitrate / rare earth nitrate solution were processed to form separate solutions containing strontium and rare earths (HW-77016). The strontium nitrate / rare earth nitrate solution was reacted with oxalic acid to precipitate the rare earths along with lead, leaving strontium in solution. The precipitate was centrifuged to separate the strontium solution from the rare earth precipitate. The strontium solution was stored in B-Plant and transferred periodically to the 201-C Hot Semiworks for purification. The rare earth precipitate was dissolved in nitric acid and stored in B-Plant for further processing.

Lead was removed from the rare earth solution by adding sodium hydroxide solution to form soluble plumbite and insoluble rare earth hydroxide precipitates (HW-81373, RL-SEP-197, page G-2, and HAN-90907, page 21). The plumbite was separated from the rare earth hydroxide precipitate by centrifugation and discarded to the single-shell tanks. The rare earth hydroxide precipitate was washed with sodium hydroxide solution to remove soluble lead and the wash solution was also discarded to the single-shell tanks. The rare earth hydroxide precipitate was dissolved in nitric acid, stored in B-Plant, and eventually transferred to the 201-C Hot Semiworks for purification.

Processing of strontium and rare earth solutions within B-Plant continued until June 1966 (HAN-95105-DEL, page 15). Separations of strontium and rare earths from the first cycle raffinate solution continued to be conducted in the head-end section of the PUREX facility through February 8, 1967 (HAN-96805-DEL, page AIII-4). The strontium and rare earth solution was transferred from PUREX to the 244-CR Vault for storage from July 1966 through February 1967, while equipment modifications were conducted at B-Plant.

3.3.2 CESIUM AND STRONTIUM PROCESSING

From July 1966 (HAN-95284-DEL, page 13) through October 1967 (HAN-98918-DEL, page AIII-2), equipment within the 221-B Plant was flushed and replaced with new equipment for separating cesium and strontium from high-level waste. In January 1967 (HAN-96590-DEL, page AIII-4) and in March 1967 (HAN-97066-DEL, page AIII-4), testing was conducted of a new centrifuge and a precipitation-decantation-centrifugation technique for separating iron and aluminum from PUREX sludge waste. Construction activities continued to be conducted in the 221-B Plant throughout 1967.

On December 27, 1967 (HAN-99396-DEL, page AIII-3), alkaline supernatants stored in the single-shell tanks were transferred to B-Plant, and cesium was separated using an ion exchange process. Cesium ion exchange processing continued at B-Plant until October 1983 using at first inorganic and later organic ion exchange materials (RHO-RE-SA-169). Cesium was also precipitated from acidic, PUREX high-level waste (known as CAW) using phosphotungstic acid (PTA), with the cesium precipitate dissolved in sodium hydroxide solution and processed through the ion exchange equipment for cesium recovery (ARH-CD-917). After separation of cesium, the alkaline supernatants were transferred directly to underground storage tanks. The ion exchange process used an ammonium carbonate / ammonium hydroxide solution to separate sodium from cesium on the ion exchange media. The aqueous wastes that contained ammonium were processed in the Cell 23 evaporator to concentrate these wastes and volatilize ammonia before transferred to underground storage tanks.

On January 31, 1968, the solvent extraction equipment installed in B-Plant was operated to purify the inventory of rare earth solutions stored at B-Plant (HAN-99604-DEL, page AIII-3). The semi-purified promethium - cerium solution was stored in B-Plant process tank 6-2 (HAN-100127-DEL, page AIII-3). Separation of strontium from the strontium and rare earths solutions stored in the 244-CR Vault was then conducted in March 1968 using the solvent extraction equipment (HAN-100127-DEL, page AIII-3).

The B-Plant solvent extraction equipment began processing the PUREX first cycle raffinate solution to separate strontium on April 20, 1968 (HAN-100357-DEL, page AIII-3). The processing of PUREX first cycle raffinate solution was completed on August 30, 1968 (PR-REPORT-SEP68-DEL, page AIII-3). The B-Plant solvent extraction equipment was then used to separate strontium from PUREX high-level waste sludges. The PUREX high-level waste sludges were dissolved in nitric acid (known as PAS) in the 244-AR Vault and transferred to B-Plant for centrifugation to separate solids. The clarified solution was process in the solvent extraction equipment to separate strontium (PR-REPORT-SEP-68-DEL, page AIII-4). In addition, the B-Plant solvent extraction equipment was operated periodically to separate strontium from CAW solutions following the PTA processing to separate cesium. Strontium separation from high-level waste solutions using the solvent extraction equipment continued at B-Plant until 1977. The aqueous waste from the solvent extraction process was evaporated in the Cell 23 evaporator and transferred to underground storage tanks.

4.0 TRANSURANIC ANALYSES OF WASTE IN TANKS 241-T-110, 241-T-111 AND 241-T-112

The Hanford Site prepares a Best Basis Inventory (BBI) estimate of the composition of the wastes stored in all 177 Hanford Site underground storage tanks. The BBI effort involves developing and maintaining waste tank inventories comprising 25 chemical and 46 radionuclide components in the 177 Hanford Site underground storage tanks. Waste sample analyses, process knowledge, and waste templates are used to create the BBIs. These BBIs provide waste composition data necessary as part of the River Protection Project (RPP) process flowsheet modeling work, safety analyses, risk assessments, and system design for retrieval, treatment, and disposal operations. Development and maintenance of the BBI is an on-going effort, with the current BBIs available electronically through TWINS, http://twins.pnl.gov/data/datamenu.htm.

The BBI for the tank 241-T-110 waste is based on the analyses of two core samples obtained in 1996. Composites of these core samples were analyzed for non-radioactive components and total alpha concentrations. A re-analysis of a composite sample was conducted in 2003 to determine the concentrations cesium-137, strontium-90 and individual transuranic elements with half-life greater than 20-years (i.e. neptunium-237, plutonium-238, plutonium-239, plutonium-240 and americium-241). The analytical results were reviewed and used along with engineering judgment to determine the best basis inventory for the waste stored in tank 241-T-110. The mean, total alpha analysis for the waste stored in tank 241-T-110 is 53ηCi/g. The uncertainty estimates for the total alpha analyses for the waste stored in tank 241-T-110 were evaluated (RPP-10983). The upper 95% confidence limit for the gross alpha analyses of the waste stored in tank 241-T-110 is 62ηCi/g. The sum of the neptunium-237, plutonium-238, plutonium-239, plutonium-240 and americium-241 concentrations analyzed in the composite core sample is approximately 83.3ηCi/g, as reported on October 11, 2004 from the Tank Waste Information Network (TWINS) database; http://twins.pnl.gov/. These analyses indicate that the concentration of alpha-emitting transuranic isotopes with half-life greater than 20 years is less than 100ηCi/g in the waste stored in tank 241-T-110.

The BBI for the tank 241-T-111 waste is based on two core samples obtained in 1991. Composite of these core samples were analyzed for non-radioactive components, select radionuclides, total alpha and transuranic element concentrations. The analytical results were reviewed and used along with engineering judgment to determine the best basis inventory for the waste stored in tank 241-T-111. The mean total alpha analyses and lower 95% confidence limit for the waste stored in tank 241-T-111 are 371ηCi/g and 289ηCi/g (7G300-02-JGF-009). The total alpha analyses of the waste in tank 241-T-111 are support by analyses of this waste for neptunium-237, plutonium-238, plutonium-240, plutonium-240 and americium-241. The sum of these transuranic elements is approximately 186.5ηCi/g in the waste stored in tank 241-T-111, as reported on October 11, 2004 from the Tank Waste Information Network (TWINS) database; http://twins.pnl.gov/.

The BBI for the tank 241-T-112 waste is based on two core samples obtained in 1997. These two core samples were analyzed to determine gross alpha and non-radioactive constituents in the liquid and solids portions of these samples. Template values were used for constituents below

the detection limits for sample data or constituents not measured from the sampling event. Templates are based on sampling data from tanks that contain the same waste type as tank 241-T-112, supplemented with Revision 5 of the HDW model data (RPP-19822). The mean, total alpha analysis for the sludge fraction of the waste stored in tank 241-T-112 is 255ηCi/g. The template based sum of neptunium-237, plutonium-238, plutonium-240, plutonium-240 and americium-241 concentrations in the sludge fraction of the waste stored in tank 241-T-112 is approximately 255.2ηCi/g.

5.0 SUMMARY

Tanks 241-T-110 received 2C waste from reprocessing of spent nuclear fuel at the 221-T Plant from January 1945 through December 1954, low-activity cell drainage waste from June 1951 through December 1954, and 224 wastes from May 1952 through December 1954. Tank 241-T-111 received 2C waste from the 221-T Plant from January 1945 through October 1956, low-activity cell drainage waste from June 1951 through October 1956, 224 wastes from May 1952 through October 1956, and equipment decontamination waste from December 1959 through June 1967. Tank 241-T-112 continued to receive 221-T Plant equipment decontamination waste until June 1973. Tank 241-T-112 also received a mixture of coating removal waste 221-B Plant cesium ion exchange process waste from tank 241-T-106 in March 1973.

The concentrations of the transuranic elements (i.e. sum of neptunium-237, plutonium-238, plutonium-240, plutonium-240 and americium-241) in the waste stored in tanks 241-T-110, 241-T-111 and 241-T-112 (sludge only) are approximately 83.3ηCi/g, 186.5ηCi/g and 255.2ηCi/g, as reported on October 11, 2004 from the TWINS database.

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APPENDIX A

VOLUME OF SOLIDS AND TOTAL WASTE IN TANKS 241-T-110, 241-T-111, AND 241-T-112

January 1945 through December 1975

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Reference	Year	Period	Cascade of Tanks T-110, T-111, and T-112 Percent Filled						Comments from Reference Document
HW-7-1293-DEL	1945	Jan	Not reported						
HW-7-1388-DEL, page 18		Feb	7.8%						
HW-7-1544-DEL, page 21		March	9.7%						
HW-7-1649-DEL, page 20		April	12.0%						
HW-7-1793-DEL, page 22		May	15.4%						
HW-7-1981-DEL, page 23		June	17.6%						
HW-7-2177-DEL, page 22		July	21.2%						
HW-7-2361-DEL, page 21		August	26.4%						
HW-7-2548-DEL, page 22		September	32.6%						"Technical Department work has demonstrated that the precipitate formed on neutralization will carry more residual product into the sludge at pH of 7 than at the pH of 9 to 10 previously used. Consequently, the second cycle wastes are now being neutralized to a pH of about 7. This may permit disposal of the supernatant solution through dry-wells at some future date ..."
HW-7-2706-DEL, page 21		October	38.7%						"The second decontamination cycle waste in tank (110) in the T Plant waste storage area was filled and began to cascade into the second tank of the series on about October 15."
HW-7-2957-DEL, page 21		November	49.0%						
HW-7-3171-DEL, page 21		December	58.5%						
HW-7-3378-DEL, page 24	1946	Jan	67.1%						
HW-7-3566-DEL, page 21		Feb	74.3%						
HW-7-3751-DEL, page 21		March	78.4%						
HW-7-4004-DEL, page 21		April	86.1%						
HW-7-4193-DEL, page 21		May	91.3%						

Reference	Year	Period	Cascade of Tanks T-110, T-111, and T-112 Percent Filled						Comments from Reference Document
HW-7-4343-DEL, page 23		June	97.5%						
HW-7-4542-DEL, page 21-22		July	100.0%						"The installation of a new underground line from diversion box 153 in the T Waste Area to the second cascade tank in the X104 series permitted the diversion, on 7-22-46, of second cycle waste and stack drainage from T Plant to the remaining two tanks in this series."
HW-7-4739-DEL, page 23		August	100.0%						2C waste transferred from 221-T into T-105, which cascades to T-106.
HW-7-5194-DEL, page 26		September	100.0%						
HW-7-5362-DEL, page 27-28		October	100.0%						"Tanks X-110-T, X-111-T and X-112-T in T Plant were checked by means of ionization chambers and it was determined that while the sludge level in the first tank was evenly distributed on the bottom of the tank to a depth of 38", there was no indication of sludge in the second and third tanks in the series." 38" of sludge corresponds to ~84,030-gallons.
HW-7-5505-DEL, page 28		November	100.0%						
HW-7-5630-DEL, page 25		December	100.0%						
HW-7-5802-DEL, page 26	1947	Jan	100.0%						
HW-7-5944-DEL, page 25		Feb	100.0%						"Excavation for an underground crib system and tile file adjacent to the 241 T Waste Storage Tank Farm in T Plant for the proposed handling of second cycle waste supernatants was started in February."
HW-7-6048-DEL, page 24		March	100.0%						
HW-7-6184-DEL, page 26		April	100.0%						
HW-7-6391-DEL, page 24		May	100.0%						
HW-7-7454-DEL, page 26		June	100.0%						
HEW-7283-DEL, page 26		July	100.0%						
HEW-7504-DEL, page 27		August	100.0%						
HW-7795-DEL, page 26-27		September	71.0%						"In T Plant, one tank, X-111-T, containing second cycle waste was disposed of to the recently installed underground crib system (Project C-120)."

Reference	Year	Period	Cascade of Tanks T-110, T-111, and T-112 Percent Filled						Comments from Reference Document
HW-7997-DEL, page 27		October	67.0%						2C waste transferred from 221-T into T-105, which cascades to T-106.
HW-8267-DEL, page 29		November	67.0%						"In order to safely complete the tie-in of the two lines from the 153-T diversion box to the X-111T and X-112T underground waste storage tanks, 20,000-gallons of second cycle waste were jetted from X-112T tank to the second cycle waste crib in T Plant. No further jetting of second cycle waste will be done until the perforating device mentioned in last month's report is available."
HW-8438-DEL, page 27		December	67.0%						2C waste transferred from 221-T into T-105, which cascades to T-106.
HW-8931-DEL, page 28	1948	Jan	67.0%						2C waste transferred from 221-T into T-105, which cascades to T-106.
HW-9191-DEL, page 30		Feb	67.0%						2C waste transferred from 221-T into T-105, which cascades to T-106.
HW-9595-DEL, page 32		March	70.8%						Tanks T-105 and T-106 are filled with 2C waste. 2C waste transferred from 221-T into cascade of T-110, T-111, and T-112.
HW-9922-DEL, page 31-32		April	75.1%						~360,000-gallons of 2C waste jetted from T-105 to crib.
HW-10166-DEL, page 33		May	79.3%						
HW-10378-DEL, page 30		June	84.1%						
HW-10714-DEL, page 32-33		July	89.0%						2C waste jetted from tank T-106 to crib.
HW-10993-DEL, page 35-36		August	67.5%						"The cribbing of tank X-112-T was started on August 4, 1948 and was nearing completion at month end."
HW-11226-DEL, page 32-33		September	66.0%						"At T Plant the cribbing of the X-112-T tank was discontinued after approximately 450,000 gallons of waste had been jetted to the crib to permit installation of an experimental sand filter for the purpose of determining the feasibility of removing the activity from the waste supernatant by this method prior to discharging it to the ground."
HW-11499-DEL, page 33-34		October	66.8%						"At T Plant, the cribbing of second cycle wastes in tank X-112-T was completed."
HW-11835-DEL, page 36		November	71.0%						
HW-12086-DEL, page 38		December	77.3%						

Reference	Year	Period	Cascade of Tanks T-110, T-111, and T-112 Percent Filled						Comments from Reference Document
HW-12391-DEL, page 39	1949	Jan	84.4%						
HW-12666-DEL, page 35		Feb	89.7%						
HW-12937-DEL, page 40-41		March	87.2%						"The cribbing of second cycle waste supernatant from X-112-T tank was started on March 17, 1949. At month end 151,250-gallons of this material has been jetted to the crib. Average age of material being cribbed is estimated to be nine months. Analysis of a sample of the waste being cribbed is as follows: AT 100 c/m/ml, Beta's 1730 c/m/ml, Gamma's 10 c/m/ml, pH 7.1, suspended solids 0.1%, Uranium nil.
HW-13190-DEL, page 39-40		April	71.0%						"The cribbing of second cycle waste from X-112-T tank which was started on March 17, 1949, was continued with a total of 319,000-gallons being jetted to the crib during this month."
HW-13561-DEL, page 41-41		May	71.9%						"The cribbing of second cycle waste from X-112-T tank, which was started in March, was completed with 55,000-gallons being cribbed during this month."
HW-13793-DEL, page 41		June	87.2%						Reported percent fill may be error.
HW-14043-DEL, page 43		July	77.6%						
HW-14338-DEL, page 44		August	81.9%						
HW-14596-DEL, page 43		September	86.2%						
HW-14916-DEL, page 44		October	92.4%						
HW-15267-DEL, page 43-45		November	82.6%						""In order to provide additional space for the storage and settling of second decontamination cycle wastes in the X-110-T series of tanks in the 241-T area, cribbing of supernatant from X-112-T (final tank in 110-T series) was resumed on November 18 ...". "Cribbing of 215,000-gallons of supernatant was completed during the month."
HW-1550-DEL, page 42-43		December	69 4%						"Cribbing of 578,000-gallons of second cycle waste from X-112-T tank in the 200 West Area was concluded on December 19, for a total of 2,955,000-gallons of this type waste cribbed in the 200 West Area since cribbing of second cycle supernatant was first initiated."
HW-15843-DEL, page 45	1950	Jan	76.2%						
HW-17056-DEL, page 45		Feb	81.8%						
HW-17410-DEL, page 47-49		March	89.9%						"A total of 27,300-gallons of second cycle decontamination waste having its origin from the bismuth phosphate process semi-works, which was formerly operated in the 300 Area, was placed in the X-112-T waste storage tank during this month."

Reference	Year	Period	Cascade of Tanks T-110, T-111, and T-112 Percent Filled						Comments from Reference Document
HW-17660-DEL, page 46-47		April	92.0%						"Cribbing of supernatant from X-112-T second cycle waste storage tank in the 200 West Area was started late in the month when this tank became 85% filled".
HW-17971-DEL, page 44-45		May	71.9%						"In 200 West Area, the cribbing of supernatant from X-112-T second cycle waste storage tank, started late in April, has totaled 462,000-gallons to date".
HW-18221-DEL, page 43-45		June	70 8%						"Approximately 129,000-gallons of second cycle waste supernatant were cribbed during the month from the 112-T tank in 200 West Area".
HW-18473-DEL, page 46		July	79.5%						
HW-18740-DEL, page 50		August	89.4%						
HW-19021-DEL, page 49		September	97.2%						

Reference	Year	Period	Cascade of Tanks T-110, T-111, and T-112 Waste Volume (x 1000 gallons)						Comments from Reference Document
HW-19325-DEL, page 49-50		October	1382						"With the X-112-B and X-112-T tanks each becoming half full during the month, cribbing of the second decontamination cycle waste from each was resumed. A total of 327,250-gallons in T Plant and 507,700 gallons in B Plant had been cribbed by month end without incident."
HW-19622-DEL, page 49		November	1154						"A total of 349,250-gallons of second decontamination cycle waste supernatant was cribbed from X-112-T tank in the 200 West Area during the month."
HW-19842-DEL, page 50-51		December	1073						"Disposal of second decontamination cycle waste to underground cribs was made in December as tabulated below: 200 East Area from tank X-112-B: 249,000-gallons 200 West Area from tank X-112-T: 118,200-gallons
HW-20161-DEL, page 50	1951	Jan	1297						
HW-20438-DEL, page 50		Feb	1448						"Cribbed as necessary."
HW-20671-DEL, page 54		March	1467						"143,000-gallons cribbed from 112-T."
HW-20991-DEL, page 52-53		April	1596						"Cribbed when necessary." "The tie-line from tank 241-T-112 to the 241-T crib was completed during the month on Project C-415, which will allow constant overflow of settled second decontamination cycle waste in conjunction with Section 5 waste." [Section 5 waste is low-activity cell drainage from T Plant tank 5-6]
HW-21250-DEL, page 56-57		May	1629						"185,600-gallons estimated cribbed by cascade." "The settled second cycle decontamination cycle waste started to overflow constantly from the 241-T-112 tank on May 8, 1951 and has continued uneventfully since that time. It is expected that Section 5 waste effluents, originating in the Canyon Buildings, will be combined with second cycle decontamination wastes at both B and T Plants, during June."
HW-21506-DEL, page 55		June	1629						"Cascades to Crib". "... parallel changes were completed in both the 200 East and West Areas, whereby the Section 5 waste effluents, originating in the Canyon Buildings, were combined with the second decontamination cycle waste facilities, rather than being discharged directly to underground cribs."
HW-21802-DEL, page 41		July	1629						"Cascades to Crib".
HW-22075-DEL		August	Not reported						
HW-22304-DEL		September	Not reported						
HW-22610-DEL		October	Not reported						
HW-22875-DEL		November	Not reported						
HW-23140-DEL		December	Not reported						

Reference	Year	Period	T-110	T-110	T-111	T-111	T-112	T-112	Comments from Reference Document
			Waste Volume (x 1000 gallons)						
			Total	Sludge	Total	Sludge	Total	Sludge	
no report	1952	Jan							Hanford Site monthly reports only list percent filled for cascade prior to 1952.
HW-27897		Feb							No information on individual tanks
HW-27898		March	530	Not reported	530	Not reported	569	Not reported	T-110, T-111, T-112 operate as cascade and receive 2C waste. T-112 cascades to crib.
HW-27838		April to June	530	Not reported	530	Not reported	569	Not reported	On 5-29-52, 224-T wastes were tied into 5-6 stream feeding to 110-111-112-T at diversion box 241-T-152.
HW-27839		July to Sept.	530	Not reported	530	Not reported	569	Not reported	5-6, 2C and 224 waste routed to these tanks. T-112 cascades to crib.
HW-27840		Oct. to Dec.	530	Not reported	530	Not reported	569	Not reported	
HW-27841	1953	Jan	530	530	530	191	569	28	
HW-27842		Feb	530	530	530	191	519	28	
HW-27775		March	530	530	530	191	569	29	
HW-28043		April	530	530	530	233	569	34	
HW-28377		May	530	530	539	235	569	35	
HW-28712		June	530	530	530	246	569	45	
HW-29054		July	530	530	530	252	569	50	
HW-29242		August	530	521	530	186	569	2	
HW-29624		September	530	521	530	213	569	2	
HW-29905		October	530	522	530	220	564	5	
HW-30250		November	530	523	530	229	569	6	
HW-30498		December	530	530	530	230	569	7	
HW-30851	1954	Jan	530	530	530	245	569	12	
HW-31126		Feb	530	530	530	277	569	22	
HW-31374		March	530	530	530	299	569	33	
HW-31811		April	530	530	530	299	569	33	
HW-32110		May	530	530	530	299	569	33	
HW-32389		June	530	530	530	312	569	33	
HW-32697		July	530	530	530	345	569	33	
HW-33002		August	530	530	530	355	569	33	
HW-33396		September	Illegible	Illegible	Illegible	Illegible	Illegible	Illegible	
HW-33544		October	530	530	530	377	569	33	
HW-33904		November	530	530	530	417	569	33	
HW-34412		December	530	530	530	439	569	33	T-110 full of sludge. T-111 and T-112 active 2C and 224 waste cascade to crib.
HW-35022	1955	Jan	530	530	530	464	569	33	
HW-35628		Feb	530	530	530	430	569	33	T-111 and T-112 active 2C and 224 waste cascade to crib.

Reference	Year	Period	T-110	T-110	T-111	T-111	T-112	T-112	Comments from Reference Document
			Waste Volume (x 1000 gallons)						
			Total	Sludge	Total	Sludge	Total	Sludge	
HW-36001		March	530	530	530	487	569	33	T-111 and T-112 active 2C and 224 waste cascade to crib.
HW-36553		April	530	530	398	362	322	166	T-111 pumping to T-112 at month end. 833,000-gallons supernatant pumped to open ditch.
HW-37143		May	530	530	530	387	569	170	T-112 cascades to crib.
HW-38000		June	530	530	530	402	569	170	T-112 cascades to crib.
HW-38401		July	530	530	530	408	569	170	
HW-38926		August	530	530	530	417	569	170	
HW-39216		September	530	530	530	430	569	170	
HW-39850		October	530	530	530	440	569	170	
HW-40208		November	530	530	530	465	569	170	
HW-40816		December	530	530	530	465	569	170	T-112 pumps to crib at intervals.
HW-41038	1956	Jan	530	530	530	482	442	170	T-112 pumps to crib at intervals.
HW-41812		Feb	530	530	530	499	472	170	
HW-42394		March	530	530	530	507	439	170	
HW-42993		April	530	530	530	510	441	170	
HW-43490		May	530	530	530	510	435	170	
HW-43895		June	530	530	530	510	429	170	T-111 Receives from T Plant. T-112 pumps to crib at intervals.
HW-44860		July	530	530	530	510	429	170	
HW-45140		August	530	530	530	510	429	170	
HW-45738		September	530	530	530	510	429	170	
HW-46382		October	530	530	530	Not reported	439	Not reported	
HW-47052		November	530	530	530	510	451	170	
HW-47640		December	530	530	530	510	470	170	
HW-48144	1957	Jan	481	530	543	510	475	170	T-112 estimated reading.
HW-48846		Feb	481	530	554	510	475	170	T-112 estimated reading.
HW-49523		March	481	530	560	510	422	170	T-112 latest electrode reading.
HW-50127		April	483	530	560	510	417	170	
HW-50617		May	527	530	560	510		170	HW-50617 not legible. Values from HW-83906-C-RD, page 46. Corrected T-110 reading.
HW-51348		June	527	530	560	510	448	170	
HW-51858		July	527	530	557	510	414	170	
HW-52414		August	527	46	557	510	417	170	
HW-52932		September	527	46	557	510	417	170	
HW-53573		October	527	46	557	510	417	170	
HW-54067		November	527	46	557	510	417	170	

Reference	Year	Period	T-110	T-110	T-111	T-111	T-112	T-112	Comments from Reference Document
			Waste Volume (x 1000 gallons)						
			Total	Sludge	Total	Sludge	Total	Sludge	
HW-54519		December	527	46	557	510	417	170	
HW-54916	1958	Jan	527	46	557	510	417	170	
HW-55264		Feb	527	46	557	510	420	170	
HW-55630		March	527	46	557	510	420	170	
HW-55997		April	527	46	557	510	420	170	
HW-56357		May	527	46	524	510	420	170	Corrected calculation for T-111 waste volume.
HW-56761		June	527	46	524	510	420	170	
HW-57122		July	527	46	524	510	420	170	
HW-57550		August	527	46	524	510	420	170	
HW-57711		September	527	46	527	510	420	170	
HW-58201		October	527	46	527	510	422	170	
HW-58579		November	527	46	527	510	425	170	
HW-58831		December	527	46	527	510	425	170	
HW-59204	1959	Jan	527	46	527	510	425	170	
HW-59586		Feb	527	46	524	510	439	170	
HW-60065		March	524	46	524	510	439	170	
HW-60419		April	524	46	524	510	439	170	
HW-60738		May	524	46	524	510	442	170	
HW-61095		June	524	46	524	510	444	170	
HW-61582		July	524	46	524	510	444	170	
HW-61952		August	524	46	524	510	444	170	
HW-62421		September	524	46	524	510	442	170	
HW-62723		October	524	46	524	510	442	170	
HW-63083		November	524	46	524	510	442	170	
HW-63559		December	524	46	527	510	442	170	T-111 received 2,750-gallons of waste from 221-T (HW-83906-D-RD, page 92).
HW-63896	1960	Jan	524	46	527	510	442	170	
HW-64373		Feb	524	46	527	510	447	170	
HW-64810		March	524	46	527	510	450	170	T-112 received 3,000-gallons 221-T waste.
HW-65272		April	524	46	527	510	450	170	
HW-65643		May	524	46	527	510	422	170	T-112 received 16,000-gallons from 221-T. Pumped out to TY crib 44,000-gallons.
HW-66187		June	524	46	527	510	429	170	T-112 received 7,000-gallons from 221-T.
HW-66557		July	524	46	527	510	461	170	T-112 received 32,000-gallons from 221-T.
HW-66827		August	524	46	527	510	461	170	

Reference	Year	Period	T-110	T-110	T-111	T-111	T-112	T-112	Comments from Reference Document
			Waste Volume (x 1000 gallons)						
			Total	Sludge	Total	Sludge	Total	Sludge	
HW-67696		September	524	46	527	510	461	170	
HW-67705		October	524	46	527	510	461	170	
HW-68291		November	524	46	527	510	461	170	
HW-68292		December	524	46	529	510	403	170	T-112 jetted 58,000-gallons to TY crib.
HW-71610	1961	Jan. to June	524	46	527	510	395	170	T-112 received 221-T waste and pumped to TY crib.
HW-83906-D-RD pg. 197	*1961*	*Jan. to June*	*524*	*530*	*521*	*510*	*396*	*170*	*T-111 cascades to T-112. T-112 receives 221-T crib waste and pumps to TY crib.*
HW-72625	1961	Jul to Dec.	524	46	527	510	395	170	
HW-83906-E-RD pg. 8	*1961*	*Jul to Dec.*	*524*	*530*	*527*	*510*	*395*	*170*	*T-111 receives waste from 221-T. Cascades to T-112, which is pumped to TY crib.*
HW-74647	1962	Jan. to June	524	46	524	510	442	170	221-T waste cascades from T-111 to T-112 and then pumped to cribs.
HW-76223	1962	Jul to Dec.	524	46	524	510	395	170	221-T waste cascades from T-111 to T-112 and then pumped to cribs.
HW-78279	1963	Jan. to June	524	46	524	510	395	170	221-T waste cascades from T-111 to T-112 and then pumped to cribs.
HW-80379	1963	Jul to Dec.	524	46	524	510	430	170	T-111 received wastes from 221-T cascades to T-112, which is pumped to TY crib.
HW-83308	1964	Jan. to June	524	46	524	510	430	170	221-T waste cascades from T-111 to T-112 and then pumped to cribs.
HW-83906-E-RD pg. 58	1964	Jul to Dec.	524	46	524	510	433	170	T-111 received wastes from 221-T cascades to T-112, which is pumped to TY crib.
HW-83906-E-RD pg. 64	1965	Jan. to June	530	46	541	510	442	170	T-111 received wastes from 221-T cascades to T-112, which is pumped to TY crib.
HW-83906-E-RD pg. 70	1965	July to Sept.	530	46	537	510	447	170	T-111 receives waste from 221-T, cascades to T-112, which is pumped to the TY crib.
HW-83906-E-RD pg. 78	1965	Oct. to Dec.	530	46	540	510	408	170	T-111 receives waste from 221-T. T-112 waste pumped to TY crib.
no report	1966	Jan. to March							
HW-83906-E-RD pg. 86	1966	April to June	530	46	539	510	425	170	T-111 receives waste from 221-T. Cascades to 112-T, pumped to TY crib.
ISO-538	1966	July to Sept.	532	508	538	442	392	40	221-T waste cascades from T-111 to T-112, then pumps to cribs.
ISO-674	1966	Oct. to Dec.	532	508	538	442	392	40	221-T waste cascades from T-111 to T-112, then pumps to cribs.
ISO-806	1967	Jan. to March	532	508	538	442	508	40	221-T waste cascades from T-111 to T-112, then pumps to cribs.
ISO-967	1967	April to June	534	508	538	442	362	40	Transferred 146,000-gallons from T-112 to TX-118.
									Beginning in July 1967, waste status summary reports indicate that equipment decontamination waste from 221-T Plant was routed to T-112.
ARH-95	1967	July to Sept.	534	508	538	442	73	40	289,000-gallons transferred from T-112 to TX-118
ARH-326	1967	Oct. to Dec.	534	508	540	442	371	170	T-112 Received 298,000-gallons from 221-T

Reference	Year	Period	T-110	T-110	T-111	T-111	T-112	T-112	Comments from Reference Document
			Waste Volume (x 1000 gallons)						
			Total	Sludge	Total	Sludge	Total	Sludge	
ARH-534	1968	Jan. to March	535	46	538	510	508	170	T-112 Received 141,000-gallons from 221-T
ARH-721	1968	April to June	534	508	538	442	237	40	T-112 Transferred 382,000-gallons to REDOX Evaporator. Received 111,000-gallons from 221-T.
ARH-871	1968	July to Sept.	534	508	538	442	365	40	T-112 Transferred 125,000-gallons to REDOX Evaporator. Received 253,000-gallons from 221-T.
ARH-1061	1968	Oct. to Dec.	534	508	538	447	266	24	T-112 Transferred 354,000-gallons to REDOX Evaporator. Received 255,000-gallons from 221-T.
ARH-1200 A	1969	Jan. to March	534	508	538	447	406	24	T-112 Transferred 86,000-gallons to REDOX Evaporator. Received 226,000-gallons from 221-T.
ARH-1200 B	1969	April to June	534	508	538	447	165	24	T-112 Transferred 20,000-gallons to REDOX Evaporator. Received 227,000-gallons from 221-T. Transferred 448,000 to 103-TY.
ARH-1200 C	1969	July to Sept.	534	508	538	447	354	24	T-112 received 189,000-gallons of decontamination waste from 221-T Plant.
ARH-1200 D	1969	Oct. to Dec.	534	293	537	233	174	33	T-112 received 232,000-gallons of decontamination waste from 221-T Plant. T-112 transferred 413,000-gallons to REDOX evaporators.
ARH-1666 A	1970	Jan. to March	534	293	539	233	290	33	T-112 Transferred 111,000-gallons to REDOX Evaporator. Received 228,000-gallons from 221-T.
ARH-1666 B	1970	April to June	534	293	538	233	343	32	T-112 Transferred 109,000-gallons to REDOX Evaporator. Received 161,000-gallons from 221-T.
ARH-1666 C	1970	July to Sept.	534	293	539	233	351	32	T-112 Transferred 132,000-gallons to REDOX Evaporator. Received 140,000-gallons from 221-T.
ARH-1666 D	1970	Oct. to Dec.	534	293	539	233	370	32	T-112 Transferred 119,000-gallons to REDOX Evaporator. Received 138,000-gallons from 221-T.
ARH-2074 A	1971	Jan. to March	534	293	540	233	395	32	T-112 Transferred 76,000-gallons to REDOX Evaporator. Received 100,000-gallons from 221-T.
ARH-2074 B	1971	April to June	534	293	545	233	298	32	T-112 Transferred 244,000-gallons to REDOX Evaporator. Received 147,000-gallons from 221-T.
ARH-2074 C	1971	July to Sept.	534	293	539	233	342	32	T-112 Transferred 116,000-gallons to REDOX Evaporator. Received 160,000-gallons from 221-T.
ARH-2074 D	1971	Oct. to Dec.	534	293	541	233	399	32	T-112 Transferred 87,000-gallons to REDOX Evaporator. Received 144,000-gallons from 221-T.
ARH-2456 A	1972	Jan. to March	535	293	538	233	378	32	T-112 Transferred 260,000-gallons to REDOX Evaporator. Received 237,000-gallons from 221-T.
ARH-2456 B	1972	April to June	535	293	540	233	404	32	T-112 Transferred 146,000-gallons to REDOX Evaporator. Received 174,000-gallons from 221-T.

Reference	Year	Period	T-110	T-110	T-111	T-111	T-112	T-112	Comments from Reference Document
			Waste Volume (x 1000 gallons)						
			Total	Sludge	Total	Sludge	Total	Sludge	
PPD-493-7-DFL									REDOX Evaporators shutdown 7-5-1972. Waste to be stored in tanks and processed in 242-T or 242-S evaporators.
ARH-2456 C	1972	July to Sept.	535	293	539	233	468	32	T-112 received 136,000-gallons of decontamination waste from 221-T Plant. T-112 transferred 71,000-gallons to U-107.
ARH-2456 D	1972	Oct. to Dec.	535	293	539	233	329	32	T-112 received 148,000-gallons of decontamination waste from 221-T Plant. T-112 transferred 286,000-gallons to U-107.
ARH-2794A	1973	Jan. to March	536	293	536	233	217	32	T-112 Transferred 332,000-gallons to 107-U. T-112 received 199,000-gallons from 221-T and 20,000-gallons from 301-T catch tank
ARH-2794 B	1973	April to June	536	293	536	233	508	32	T-112 Transferred 180,000-gallons to 107-U. T-112 Received 120,000-gallons from 221-T and 350,000-gallons from 106-T.
ARH-2794 C	1973	July to Sept.	531	293	535	233	505	32	
ARH-2794 D	1973	Oct. to Dec.	531	293	534	233	505	32	221-T Decontamination solution routed to U-107
ARH-CD-133A	1974	Jan. to March	531	293	534	233	505	32	
ARH-CD-133B	1974	April to June	475	293	490	233	236	32	Transferred 59,000-gallons from T-110 to S-110, 28,000-gallons from T-111 to S-110, 14,000 from T-111 to T-109, and 273,000 from T-112 to S-110.
ARH-CD-133C	1974	July to Sept.	483	293	485	485	101	32	Transferred 8,000-gallons of water into T-110. Transferred 136,000-gallons from T-112 to S-110.
ARH-CD-133D	1974	Oct. to Dec.	483	466	488	488	101	32	T-111 removed from service.
ARH-CD-336A	1975	Jan. to March	483	466	488	488	101	32	
ARH-CD-336B	1975	April to June	483	466	488	488	101	32	
ARH-CD-336C	1975	July to Sept.	483	466	488	488	101	32	
ARH-CD-336D	1975	Oct. to Dec.	483	466	488	488	101	32	

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