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Accession #: D196040587

Document #: SD-RE-TI-178

Title/Desc:
SST LEAK STABILIZATION RECORD [DIRECT REV] [FY1978 THRU FY1995]

Pages: 230

COMPLETE

ENGINEERING CHANGE NOTICE

Page 1 of 2

1. ECN No 625446

Proj. ECN

2. ECN Category (mark one)	3. Originator's Name, Organization, MSIN, and Telephone No.	3a. USQ Required?	4. Date
Supplemental [] Direct Revision [X] Change ECN [] Temporary [] Standby [] Supersedure [] Cancel/Void []	V.C.Boyles,ISE,R1-49,373-1321	[] Yes [X] No	2/29/96
	5. Project Title/No./Work Order No. Single-shell Tank Stabilization Record	6. Bldg./Sys./Fac. No. N/A	7. Approval Designator N/A
	8. Document Numbers Changed by this ECN (includes sheet no. and rev.) WHC-SD-RE-TI-178, Rev 4	9. Related ECN No(s). N/A	10. Related PO No. N/A

11a. Modification Work	11b. Work Package No.	11c. Modification Work Complete	11d. Restored to Original Condition (Temp. or Standby ECN only)
[] Yes (fill out Blk. 11b) [X] No (NA Blks. 11b, 11c, 11d)	N/A	N/A Cog. Engineer Signature & Date	N/A Cog. Engineer Signature & Date

12. Description of Change

This change adds additional stabilization information including the addition of FY 1994 and FY 1995 tanks 241-BX-106, -BX-111, -BY-102, -C-102, -C-105, -C-107, -C-110, and -T-111.

13a. Justification (mark one)

Criteria Change	[X]	Design Improvement	[]	Environmental	[]	Facility Deactivation	[]
As-Found	[]	Facilitate Const	[]	Const. Error/Omission	[]	Design Error/Omission	[]

13b. Justification Details

Added FY 1994 and FY 1995 Interim Stabilization information on tanks 241-BX-106, -BX-111, -BY-102, -C-102, -C-105, -C-107, -C-110, and -T-111.

14. Distribution (include name, MSIN, and no. of copies)

See attached distribution list

RELEASE STAMP

DATE: MAR 04 1996

STA: 4

ID: 3

A-7900-013-2 (11/94) GEF095

ENGINEERING CHANGE NOTICE	Page 2 of 2	1. ECN (use no. from pg. 1) 625446

15. Design Verification Required	16. Cost Impact				17. Schedule Impact (days)	
	ENGINEERING		CONSTRUCTION			
[] Yes	Additional	[] $N/A	Additional	[] $N/A	Improvement	[] N/A
[X] No	Savings	[] $N/A	Savings	[] $N/A	Delay	[] N/A

18. Change Impact Review: Indicate the related documents (other than the engineering documents identified on Side 1) that will be affected by the change described in Block 12. Enter the affected document number in Block 19.

SDD/DD	[]	Seismic/Stress Analysis	[]	Tank Calibration Manual	[]
Functional Design Criteria	[]	Stress/Design Report	[]	Health Physics Procedure	[]
Operating Specification	[]	Interface Control Drawing	[]	Spares Multiple Unit Listing	[]
Criticality Specification	[]	Calibration Procedure	[]	Test Procedures/Specification	[]
Conceptual Design Report	[]	Installation Procedure	[]	Component Index	[]
Equipment Spec.	[]	Maintenance Procedure	[]	ASME Coded Item	[]
Const. Spec.	[]	Engineering Procedure	[]	Human Factor Consideration	[]
Procurement Spec.	[]	Operating Instruction	[]	Computer Software	[]
Vendor Information	[]	Operating Procedure	[]	Electric Circuit Schedule	[]
OM Manual	[]	Operational Safety Requirement	[]	ICRS Procedure	[]
FSAR/SAR	[]	IEFD Drawing	[]	Process Control Manual/Plan	[]
Safety Equipment List	[]	Cell Arrangement Drawing	[]	Process Flow Chart	[]
Radiation Work Permit	[]	Essential Material Specification	[]	Purchase Requisition	[]
Environmental Impact Statement	[]	Fac. Proc. Samp. Schedule	[]	Tickler File	[]
Environmental Report	[]	Inspection Plan	[]		[]
Environmental Permit	[]	Inventory Adjustment Request	[]	N/A	[X]

19. Other Affected Documents: (NOTE: Documents listed below will not be revised by this ECN.) Signatures below indicate that the signing organization has been notified of other affected documents listed below.

Document Number/Revision	Document Number/Revision	Document Number Revision
N/A		

20. Approvals

Signature	Date	Signature	Date
OPERATIONS AND ENGINEERING		ARCHITECT-ENGINEER	
Cog. Eng. D.A. Bragg per Telecon VC Boyles	2/29/96	PE	
Cog. Mgr. VC Boyles	2/28/96	QA	
QA		Safety	
Safety		Design	
Environ.		Environ.	
Other		Other	
		DEPARTMENT OF ENERGY	
		Signature or a Control Number that tracks the Approval Signature	
		ADDITIONAL	

SINGLE-SHELL TANK LEAK STABILIZATION RECORD

V. C. Boyles
Westinghouse Hanford Company, Richland, WA 99352
U.S. Department of Energy Contract DE-AC06-87RL10930

EDT/ECN: 625446 UC: 2030
Org Code: 77420 Charge Code: N-1918
B&R Code: EW3120071 Total Pages: 225

Key Words: stabilization, interim, single-shell tank, administrative stabilization, supernate pump, jet pump, saltwell

Abstract: This document provides the interim stabilization evaluation history of the single-shell tanks. Data are listed for fiscal years from FY 1978 to FY 1995.

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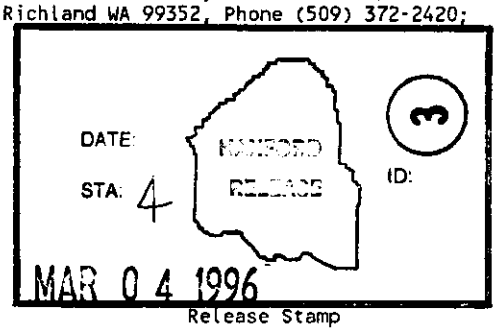

Release Approval — Date: 3/1/96

Release Stamp

Approved for Public Release

RECORD OF REVISION	(1) Document Number WHC-SD-RE-TI-178 Rev. 5 VCB page 1

(2) Title

Single-Shell Tank Stabilization Record

CHANGE CONTROL RECORD

(3) Revision	(4) Description of Change - Replace, Add, and Delete Pages	Authorized for Release		
		(5) Cog. Proj. Engr	(6) Cog. Proj. Mgr	Date
RS 1	(7) Complete revision to document in accordance with ECN 106858.	VC Boyles 1/24/96	R T Allen 4/3/96	
RS 2	Complete revision to document in accordsnce with ECN 106864	VC Boyles 1/29/96	for R T Allen T. Allen	10-25-96
~~RS~~ 3	Complete revision to document in accordance with ECN 171773	S. Sun 7/24/96 A. J. White 7/24/96	Allen T. Allen for V. C. Boyles	
RS 4	Complete revision to document in accordance with ECN 602442.	S. Sun 04/05/96	VC Boyles 4/5/96	
5 RS	Complete revision to document in accordance with ECN # 625446.	VC Boyles 3/4/96	VC Boyles 3/4/96	

SINGLE-SHELL TANK LEAK STABILIZATION RECORD

S. L. Swaney

Single-Shell Tanks

Prepared for the United States Department of Energy
Westinghouse Hanford Company
P.O. Box 1970
Richland, Washington 99352

TABLE OF CONTENTS

1.0 INTRODUCTION

Single-wall underground storage tanks (SWT) now referred to as single-shell tanks (SST) and their supporting waste treatment and transfer facilities, were used for the storage of radioactive wastes produced by Hanford plants for nearly forty years. Active use of the SSTs was phased out completely by November 1980. The first step toward final disposal of the waste in the SSTs is Interim Stabilization.

The stabilization program is intended to reduce the liquid content of wastes to the greatest extent technically and economically feasible in order to minimize the risk associated with loss of tank integrity and exposure of the contents to the general environment. The first SSTs were stabilized in 1978. The first jet pump was started up in BY-107 in 1975.

To be stabilized a tank must contain less than 50,000 gallons of drainable interstitial liquid (DIL) and less than 5,000 gallons of supernate. Stabilization can be achieved by one of three ways. The SST can be jet pumped to remove DIL, supernate pumped or administratively stabilized.

The stabilization record is intended to record the annual progress made in the stabilization process. This document will be updated as necessary.

2.0 STABILIZATION SUMMARY BY FISCAL YEAR

Stabilization Record

The record is summarized by fiscal year and stabilization method: Administrative (AR), Supernatant (SN), and Saltwell (JET).

Summary per Fiscal Year	METHOD OF STABILIZATION			
YEAR (FY) STABILIZED	AR	SN	JET	YEAR TOTAL
78	3	0	0	3
79	15	5	1	21
80	2	0	0	2
81	11	2	0	13
82	4	0	0	4
83	0	0	18	18
84	9	1	2	12
85	6	10	4	20
86	0	0	0	0
87	2	0	0	2
88	0	2	1	3
89	1	2	0	3
90	1	0	3	4
91	0	0	0	0
92	0	0	0	0
93	0	1	0	1
94	0	0	0	0
95	1	1	6	8
TOTALS	55	24	35	114

FY	TANK STABILIZED
78	A-104, BX-101, SX-115
79	A-105, BX-102, BX-108, BY-107, SX-108, SX-110, SX-111, SX-112, SX-113, SX-114, T-108, TX-104, TY-102, TY-106, U-101, U-104, U-112, U-201, U-202, U-203, U-204
80	SX-107, TX-107
81	AX-104, B-101, B-201, BX-105, C-202, SX-109, T-102, T-106, T-112, T-201, T-202, T-203, T-204
82	A-106, C-201, C-203, C-204
83	TX-102, TX-103, TX-105, TX-106, TX-108, TX-109, TX-110, TX-111, TX-112, TX-113, TX-114, TX-115, TX-116, TX-117, TX-118, TY-101, TY-103, TY-105
84	B-203, B-204, BX-103, BY-101, BY-112, C-101, C-108, C-109, C-111, T-103, TX-101, TY-104
85	B-102, B-103, B-104, B-105, B-106, B-107, B-108, B-109, B-110, B-111, B-112, B-202, BX-110, BY-104, BY-108, BY-110, BY-111, S-104, T-109, U-110
86	NONE
87	AX-103, T-105
88	A-103, AX-102, S-105
89	A-102, BX-104, C-104
90	BX-107, BX-109, BX-112, C-112
91	NONE
92	NONE
93	T-101
94	NONE
95	BX-106, BX-111, BY-102, C-102, C-105, C-107, C-110, T-111

3.0 INTERIM STABILIZATION INDEX

TANK NO	PAGE NO	STAB MTHD	DATE STAB	TANK NO	PAGE NO	STAB MTHD	DATE STAB
A-102	6	SN	08/89	BX-109	65	JET	09/90
A-103	8	AR	06/88	BX-110	67	SN	08/85
A-104	12	AR	09/78	BX-111	69	JET	03/95
A-105	13	AR	07/79	BX-112	73	JET	09/90
A-106	14	AR	08/82	BY-101	75	JET	05/84
AX-102	15	SN	09/88	BY-102	77	JET	04/95
AX-103	17	AR	08/87	BY-104	80	JET	01/85
AX-104	19	AR	08/81	BY-107	82	JET	07/79
B-101 (3)	20	SN	03/81 (7/91)	BY-108	83	JET	02/85
B-102	22	SN	08/85	BY-110	85	JET	01/85
B-103	24	SN	02/85	BY-111	87	JET	01/85
B-104(2)	26	SN	06/85	BY-112	89	JET	06/84
B-105(3)	28	AR	12/84	C-101	91	AR	11/83
B-106	30	SN	03/85	C-102	93	JET	09/95
B-107(2)	32	SN	12/84	C-104	99	SN	09/89
B-108	34	SN	05/85	C-105	101	AR	10/95
B-109	36	SN	04/85	C-107	103	JET	08/98
B-110(2)	38	AR	12/84	C-108	110		03/84
B-111(2)	40	SN	06/85	C-109	112	AR	11/83
B-112	42	SN	05/85	C-110	114	JET	05/95
B-201(1)		AR	08/81	C-111	119	SN	03/84
B-202	44	AR	05/85	C-112	120	AR	09/90
B-203	46	AR	06/84	C-201	122	AR	03/82
B-204	48	AR	06/84	C-202	123	AR	08/81
BX-101	12	AR	09/78	C-203	124	AR	03/82
BX-102	50	AR	11/78	C-204	125	AR	09/82
BX-103	52	AR	11/83	S-104	126	AR	12/84
BX-104	55	SN	09/89	S-105(4)	128	JET	09/88 (09/78)
BX-105	57	SN	03/81 (09/86)	SX-107	130	AR	10/79
BX-106	60	SN	08/95	SX-108	131	AR	08/79
BX-107	62	JET	09/90	SX-109(3)	132	AR	05/81 (01/92)
BX-108	64	SN	07/79	SX-110	135	AR	08/79

3.0 INTERIM STABILIZATION INDEX

TANK NO	PAGE NO	STAB MTHD	DATE STAB	TANK NO	PAGE NO	STAB MTHD	DATE STAB
SX-111	136	SN	07/79	TX-108	178	JET	03/83
SX-112	137	AR	07/79	TX-109	180	JET	04/83
SX-113	139	AR	11/78	TX-110	182	JET	04/83
SX-114	141	AR	07/79	TX-111	184	JET	04/83
SX-115	12	AR	09/78	TX-112	186	JET	04/83
T-101	142	SN	04/93	TX-113	188	JET	04/83
T-102(1,2)	7	AR	03/81	TX-114	190	JET	04/83
T-103	145	AR	11/83	TX-115	192	JET	09/83
T-105	148	AR	06/87	TX-116	194	JET	04/83
T-106	151	AR	08/81	TX-117	196	JET	03/83
T-108	152	AR	11/78	TX-118	198	JET	04/83
T-109	154	AR	12/84	TY-101	200	JET	04/83
T-111	156		12/94	TY-102(3)	202	AR	09/79 (04/84)
T-112(1,2)	7	AR	03/81	TY-103	204	JET	02/83
T-201		AR	04/81	TY-104	206	AR	11/83
T-202	159	AR	08/81	TY-105	208	JET	02/83
T-203(3)	160	AR	04/81 (06/91)	TY-106	210	AR	11/78
T-204	162	AR	08/81	U-101	212	AR	09/79
TX-101	163	AR	02/84	U-104	214	AR	10/78
TX-102	165	AR	04/83	U-110(2)	215	AR	12/84
TX-103	167	AR	08/83	U-112(3)	217	AR	09/79 (02/84)
TX-104(3)	169	AR	09/79 (04/84)	U-201	219	AR	08/79
TX-105	171	AR	04/83	U-202	220	SN	08/79
TX-106	173	JET	06/83	U-203	221	AR	08/79
TX-107(3)	175	JET	10/79 (01/84)	U-204	222	SN	08/79

(1) Stabilization evaluation data missing.

(2) Stabilized under old criteria, but have to be re-established to meet new criteria.

(3) Date in parentheses is date that Interim Stabilization documentation was completed.

(4) This tank was originally jet pumped in 1978, but not declared stabilized until 1988.

STABILIZATION EVALUATION
NON-JET PUMPED TANKS

Tank: 241-A-102

Evaluation (See continuation page for calculations and additional comments):

[XX] Photograph review completed - Date of most recent photographs 7-20-89

[XX] Tank history review completed

[XX] Tank temperature profile review completed

Surface Description: Mottled light and dark solids cover surface of waste in a broken pattern. Many pieces of crust are tilted, with angular shapes. Fifteen to twenty percent of tank surface is composed of liquid supernatant pools covering solids. Pump and FIC plummet are visible. Date 7-20-89
Pools are seven to eight inches deep.

Solids Level 15.0 inches * Date 7-27-89 Method Photo of FIC contacting solids

Liquid Level less then 15 in Date 7-27-89 Method Photos (pump is visible)

Solids Volume 36,850 gallons

Drainable Liquid Remaining
~~Estimated Drainable Liquid Volume~~ 6,100 gallons

Average Maximum Tank Temperature, past 6 months 90°F

Estimated Supernatant Volume 4,400 gallons

[ ] Cost/Benefit Analysis attached

Evaluation Performed by D. WIGGINS Date 8/18/89 Checked by [signature] Date 8/21/89

Disposition of Tank:

[XX] Tank Interim Stabilized at 6,100 gallons of drainable liquid

[ ] Tank not Interim Stabilized; stabilization activities resumed

Approved by: Manager, WMPE** [signature] Date 8-24-89

Manager, TFS&O [signature] Date 8-28-89

Program Manager [signature] Date 8-25-89

DISTRIBUTION: WMPE Tank File, Tank Farm Surveillance Analysis, Approval Signatures

*The 15-inch solids level used above is a nominal measurement taken on 7-27-89.
**Due to the reorganization of November 1988, the function of Manager, WMPE has been tranferred to Manager, Single-Shell Tanks (SST).

EVALUATION CALCULATIONS AND COMMENTS

Tank: 241-A-102 **Page** 2 **of** 2

The submersible pump is resting on solid surface at the time the photographs were taken within the tank. Approximately seven to eight inches of submersible pump is not visible, as this part appears under liquid in the in-tank photos. Single-Shell Tank Process Engineering knows that there are pools of liquid in this tank, but at present it is unpumpable.

The quantity of supernatant liquid (using a submersible pump) removed from this tank in July, 1989, totalled 39,500 gallons.

The following results are considered conservative. Tank 241-A-102 is a flat-bottomed tank. One inch of waste in this tank equals 2,750 gallons.

1. Volume Calculations

   A. Supernatant Volume

   (2750 gallons/inch)(8 inches)(20% of tank surface) = 4,400 gallons

   B. Solids Volume = Total Waste - Supernatant

   (15 inches)(2750 gallons/inch) = Total Waste = 41,250 gallons

   41,250 gallons - 4,400 gallons = 36,850 gallons

2. Interstitial Liquids

   Porosity = 45% Capilliary height = 12 inches

   Drainable Interstitial Liquid (DIL) =

   [36,850 - (12 inches)(2750 gallons/inch)] 0.45 = 17~~00~~ 32 gallons D.D.W. 8/24/89

   Drainable Liquid Remaining (DLR) = DIL + Supernatant

   17~~00~~ 32 gallons + 4400 gallons = 61~~00~~ 32 gallons (Rounded down to 6100 gallons on page 1 of 2.) D.D.W.

   Pumpable Liquid Remaining (PLR) = DLR - (amount of liquid contained in 18 inches of solids, expressed in gallons)

This volume figure is not applicable to this tank stabilization due to the fact that less than 18 inches of solids remains in tank 241-A-102.

Calculations made by: Dirk D. Wiggins 8/18/89

Checked by: R.A. Hanson 8/24/89

STABILIZATION EVALUATION
NON-JET PUMPED TANKS

Tank: 241-A-103

Evaluation (See continuation page for calculations and additional comments):

☑ Photograph review completed - Date of most recent photographs 5-24-88

☑ Tank history review completed

☑ Tank temperature profile review completed

Surface Description: THE SURFACE IS SMOOTH LIGHT GRAY SLUDGE WITH POCKETS OF LIQUID. APPROXIMATELY 14% OF THE SURFACE IS LIQUID COVERED. Date 6-3-88

Solids Level 137.50 Date 5-24-88 Method FIC

Liquid Level _____ Date _____ Method _____

Solids Volume 366,000

Estimated Drainable Liquid Volume 12,000

Average Maximum Tank Temperature, past 6 months 122°F

Estimated Supernatant Volume 46,615

☐ Cost/Benefit Analysis attached

Evaluation Performed by _____ Date _____ Checked by _____ Date _____

Disposition of Tank:

☑ Tank Interim Stabilized at 12,000* gallons of drainable liquid

☐ Tank not Interim Stabilized; stabilization activities resumed

Approved by: Manager, ~~WMPE~~ TFPE _____ Date 6/7/88

Manager, TFS&O _____ Date 6/29/88

Program Manager _____ Date 6/22/88

DISTRIBUTION: WMPE Tank File, Tank Farm Surveillance Analysis, Approval Signatures

*FROM CORE SEGMENTS 3-9

EVALUATION CALCULATIONS AND COMMENTS

Tank: 241-A-103

Tank 241-A-103 will be stabilized based on the core sample data taken during April 1986 and on photographs taken May 24, 1988.

Document SD-RE-TI-101 allows the use of core data to determine the remaining interstitial liquid. Two (2) core samples were obtained during April 1986 of the sludge in tank 241-A-103 and the results were published in document SD-RE-TI-198. The liquid content data of each core segment was taken from this document and the tank liquid volume was calculated. The results show very little liquid in the lower 150 inches of the tank with Sample #1 having 14,780 gallons and Sample #2 having 12,410 gallons. The higher value of 14,780 gallons will be used for the final estimated volume of interstitial liquid remaining. This evaluation is conservative because it assumes all the liquid pumped during the recent campaigns was supernatant and came from segments 1 and 2 of the samples. Actually, some of the pumped liquid would be interstitial and would further lower the liquid content of core segments 3 -10. See attached tables showing liquid calculations for segments 3-10 of Samples #1 and #2.

The tank was pumped starting in May 1987 from a measured height of 183.90 inches to 137.5 inches by May 24, 1988 and resulted in removal of 111,000 gallons of liquid. During the last two pumping campaigns four hot water flushes totalling 5,475 gallons were added to clear the salt well screen so pumping could continue. During this additional pumping, only 11,175 gallons of liquid was pumped and this included the flush water addition.

The amount of supernatant liquid remaining in the tank was determined from the May 24, 1988 photographs. A best engineering estimate indicates that 4,615 gallons of supernatant remains (14% of the total tank surface). Pool sizes were determined by comparing individual pools to the overall size of the tank and objects of known dimensions (i.e. salt well screen, piping, etc.) Individual depth was estimated at 3-18 inches and took in to account the ability to see through the liquid to the solids beneath.

Total estimated gallons of liquid remaining in the tank is 14,780 interstitial (based on the core sample data of sample #1) and 4,615 gallons of supernatant (based on the photograph analysis).

Calculations made by: V.C. Boyles

Checked by: Joel A. Tack

EVALUATION CALCULATIONS AND COMMENTS

Tank: 241-A-103 Page 3 of 4

TANK 103-A
CORE SAMPLE #1
RISER R-17

CORE SEGMENT	SAMPLE HEIGHT	CORE LIQUID VOLUME	TOTAL VOLUME	PERCENT LIQUID	TANK LIQUID VOLUME
3	133"-152"	14 cc	244 cc	5.7%	2,980 gal
4	114"-133"	22 cc	244 cc	9.0%	4,700 gal
5	95"-114"	8 cc	244 cc	3.3%	1,725 gal
6	76"-95"	7 cc	244 cc	2.9%	1,515 gal
7	57"-76"	0 cc	244 cc	0.0%	0 gal
8	38"-57"	0 cc	244 cc	0.0%	0 gal
9	19"-38"	6 cc	244 cc	2.5%	1,300 gal
10	0"-19"	12 cc	244 cc	4.9%	2,560 gal
			TANK TOTAL VOLUME		14,780 gal

Calculations made by: V.C. Boyles

Checked by: Joel A. Tack

EVALUATION CALCULATIONS AND COMMENTS

Tank: 241-A-103

Page 4 of 4

TANK 103-A
CORE SAMPLE #2
RISER R-12

CORE SEGMENT	SAMPLE HEIGHT	CORE LIQUID VOLUME	TOTAL VOLUME	PERCENT LIQUID	TANK LIQUID VOLUME
3	131"-150"	23 cc	244 cc	9.4%	4,910 gal
4	112"-131"	7 cc	244 cc	2.9%	1,515 gal
5	93"-112"	6 cc	244 cc	2.5%	1,300 gal
6	74"-93"	0 cc	244 cc	0.0%	0 gal
7	55"-74"	3 cc	244 cc	1.2%	625 gal
8	36"-55"	6 cc	244 cc	2.5%	1,300 gal
9	17"-36"	0 cc	244 cc	0.0%	0 gal
10	0"-17"	13 cc	219 cc	5.9%	2,760 gal
			TANK TOTAL VOLUME		12,410 gal

Calculations made by: V.C. Boyles

Checked by: Joel A. Lockrem

October 2, 1978

Distribution

FROM:
J. W. Bailey
Tank Farm Process Engr'g
2750-E/200-East
Ext. 221

Tank Status Update

Based on a Tank Farms Process Engineering evaluation of tank photographs and/or liquid and solids level data, the following listed tanks have changed status as indicated below. Future operations and reporting should reflect these status changes. The effective date for these changes is September 30, 1978.

TANK	PREVIOUS STATUS	NEW STATUS	EST. SUPERN. LIQ. (GAL.)
241-A-104	Leaker-Primary Stab.	Leaker-Interim Stab.	-0-
241-AX-104	Inactive	Inactive-Primary Stab.	-0-
241-B-102	Active	Inactive	19,000
241-BX-101	Inactive-Primary Stab.	Inactive-Interim Stab.	-0-
241-SX-103	Active	Inactive-Primary Stab.	-0-
241-SX-105	Active	Inactive-Primary Stab.	-0-
241-SX-115	Inactive-Primary Stab.	Inactive-Interim Stab.	-0-
241-TX-107	Inactive	Inactive-Primary Stab.	1,000*
241-TX-114	Inactive	Inactive-Primary Stab.	-0-
241-TX-117	Inactive	Inactive-Primary Stab.	-0-
241-TX-105	Inactive	Inactive-Primary Stab.	-0-
241-U-105	Active	Inactive	23,000
241-U-201	Inactive	Inactive-Primary Stab.	1,000*
241-U-202	Inactive	Inactive-Primary Stab.	1,000*
241-U-203	Inactive	Inactive-Primary Stab.	1,000*
241-U-204	Inactive	Inactive-Primary Stab.	1,000*

241-TX-105

* Liquid is nonpumpable

Documentation of the engineering evaluations supporting these status changes will be maintained on file at TFPE. For further details on these evaluations contact V. D. Maupin, ext. 217.

J. W. Bailey
Tank Farm Process Engr'g

JWB/rfh

Distribution:
C. R. Carter
G. T. Dukelow
J. H. Garnrick
R. B. Langley
C. A. Petersen
R. A. Zinsli

cc:
D. R. Autery
H. A. Anderson
J. W. Bailey
C. A. Mulvey
[redacted]
G. A. Olsen
T. B. Veneziano
LB

INTERIM STABILIZATION EVALUATION

TANK NUMBER: 105-A EFFECTIVE DATE: 7-31-79

LIQUID LEVEL & RISER NO. N/A

SOLIDS LEVEL & RISER NO. 14" R5

EST. SUPERNATE LIQUID VOLUME 0

EST. DRAINABLE INTERSTITIAL LIQUID VOLUME 4,100 gallons

TEMPERATURE: 125°F (In Tank)
221°F (In laterals)

IS THIS TEMPERATURE A PROBLEM?

yes ____ no X* unknown ____

* Tank's temperature is being maintained through the use of a portable exhauster. Air flow rates that have been used were above 550 cfm. No attempts were made to minimize flow rate due to exhauster interlook system limitations.

IS THERE A POTENTIAL DOME LOAD PROBLEM? yes ____ no X

PHOTOGRAPH EVALUATION: (Order #87080, LL 14 inches, Date 6-21-79)

The surface appears dry with the exception of a wet spot trailing away from a circulator The floor is approximately 40% bare metal, 30% a thin layer of sludge and the remaining 30% a heavier sludge primarily around the perimeter of the tank. The liner of the tank is almost free of scale except for a small ridge around the lower perimeter.

COMMENTS:

Tank's temperature is to be maintained below 200°F. Refer to RHO-CD-604, Tank 241-A-105 Stabilization Progress Report (soon to be issued), for further details on the stabilization of this tank. The manual tape touches down on a pile of old tapes and piping causing an erroneous reading.

Prepared By: Barry Carl

Reviewed By: John W Bailey 7-31-79

Interim Stabilization Evaluation

TANK NUMBER: TK-106-A

EFFECTIVE DATE: 8-31-82

LIQUID LEVEL & RISER NO. 45.5" FIC R-6

SOLIDS LEVEL & RISER NO. R-13 = 43" Avg. based on solids level and photos=46"

EST. SUPERNATE LIQUID VOLUME 0

EST. DRAINABLE INTERSTITIAL LIQUID VOLUME < 3500 gallons

TEMPERATURE: maximum 135°

IS HEAT LOAD A PROBLEM? YES X* NO ____ UNKNOWN ____

*The heat load on the tank will not present any problems as long as the tank is ventilated. The maximum temperature after the solids dry and with forced air cooling will be 250°F. Cooling will be via the 702-A Ventilation system or the Tank 241-A-105 exhauster.

Reference: Letter 65430-79-036, G. D. Campbell to J. W. Bailey, "Tank 106-A Transient Heat Transfer Analysis."

IS THERE A POTENTIAL DOME LOAD PROBLEM: YES ____ NO X

PHOTOGRAPH EVALUATION: (Photo Series 101055 4-7-82)

The photos show that the waste substance consists of solids of irregular configuration, but of relatively low profile. No liquid is visible. The tank was lanced on 7-15-82, and the results indicated wet and soft solids with no interior liquid zones.

COMMENTS: With the heat load present in this tank, further evaporation will occur in the months following interim stabilization. No jet pump will be installed in this tank.

Prepared By: [signature] 5-24-82

Reviewed By: [signature] 5-24-82

STABILIZATION EVALUATION
NON-JET PUMPED TANKS

Tank: 102-AX

Evaluation (See continuation page for calculations and additional comments):

[xx] Photograph review completed - Date of most recent photographs 9/1/88

[xx] Tank history review completed

[xx] Tank temperature profile review completed

Surface Description: The surface is smooth gray sludge with one discernable pool of liquid covering approximately 20% of the surface.

Date 9/6/88

Solids Level 14 inches Date 9/5/88 Method Manual Tape

Liquid Level 14 inches Date 9/5/88 Method Manual Tape

Solids Volume 35,750 gallons

Estimated Drainable Liquid Volume 2750 gallons

Average Maximum Tank Temperature, past 6 months 80° F

Estimated Supernatant Volume 2750 gallons

[ ] Cost/Benefit Analysis attached

Evaluation Performed by J Eacker Date 9/6/88 Checked by V Boyle Date 9/6/88

Disposition of Tank:

[xx] Tank Interim Stabilized at 2750 gallons of drainable liquid

[ ] Tank not Interim Stabilized; stabilization activities resumed

Approved by: Manager, TFPE [signature] Date 9/8/88

Manager, TFS&O [signature] Date 9/8/88

Program Manager [signature] Date 9/9/88

DISTRIBUTION: TFPE Tank File, Tank Farm Surveillance Analysis, Approval Signatures

EVALUATION CALCULATIONS AND COMMENTS

Tank: AX-102 Page 2 of 2

The tank was pumped starting in August 1988 using a submersible pump. The pumping campaign produced a total of 13,200 gallons before the pump cavitated. Additional pumping attempts spread over several days failed to produce any liquid.

The amount of interstitial liquid was calculated from the waste volume assuming a porosity of 45%. The waste volume of 38,000 gallons leads to 17,500 gallons of interstitial liquid. The capillary height used for salt cake, however, is 33,000 gallons. Based on this estimate, none of the interstitial liquid is drainable and the total drainable liquid for this tank is the supernatant volume.

The amount of supernatant liquid remaining in the tank was estimated at 2750 gallons from the September 1, 1988 photographs. A best engineering estimate is that 20% of the surface is covered with liquid to a depth of 5 inches. The pool size was determined by comparing the pool to the overall size of the tank and objects of known dimensions. The depth was based on a 6 inch liquid level reading taken in the pool prior to the last day of pumping. This was then corrected to account for the amount of liquid pumped during the final pumping operations.

Calculations made by: JA Eacker
J.A. Eacker, Adv Eng

Checking done by: VC Boyles
V.C. Boyles, Sr Eng

INTERIM STABILIZATION EVALUATION
NON-JET PUMP TANKS

Tank: 103-AX

Evaluation (see continuation page for calculations and additional comments):

☒ Photograph review completed - Date of most recent photographs 8-13-87

☒ Tank History review completed

☒ Tank temperature profile review completed

Surface Description: LIQUID FREE SURFACE, SOLIDS ARE LIGHT BROWN IN COLOR. SURFACE IS EVEN. Date 8-13-87

Solids Level 40.8" Date 8-17-87 Method LASS, FIC

Liquid Level 40.8" Date 8-17-87 Method FIC/PHOTO EVALUATION

Solids Volume 112,000 gal

Estimated Drainable Liquid Volume 35,600 gal

Average Maximum Tank Temperature, past 6 months 100°F*

Estimated Supernatant Volume 0 gal

☐ Cost/Benefit Analysis attached

Evaluation Performed by [illegible] Date 8/17/87 Checked by [illegible] Date 8/17/87

Disposition of Tank:

☒ Tank Interim Stabilized at 35,600 gallons of drainable liquid

☐ Tank not Interim Stabilized; stabilization activities resumed

Approved by: Manager, ~~TF&EPE~~ TFPE [illegible] Date 8/17/87

Manager, TFS&O [illegible] Date 8/18/87

Program Manager [illegible] Date 8/19/87

DISTRIBUTION: TF&EPE Tank File, Tank Farm Surveillance Analysis, Approval Signatures

* TANK TEMPERATURE FROM 12/85 DATA NO RECENT DATA AVAILABLE. TANK TEMPERATURES SHOWED A COOLING TREND CONCURRED. 8/17/87

EVALUATION CALCULATIONS AND COMMENTS

Tank: 103-AX

Page 2 of 2

FLAT BOTTOM TANK

SOLIDS LEVEL = 40.8"

TOTAL SOLIDS VOLUME = 40.8 INCHES (2750 GAL/IN)
= 112.2 kgal

SUPERNATANT VOLUME

FROM PHOTOS: 0 gal

DRAINABLE INTERSTITIAL LIQUID (DIL) REMAINING

DIL = (LIQUID LEVEL − CAPILLARY HEIGHT)(POROSITY)275

POROSITY = 45%

CAPILLARY HEIGHT = 12 INCHES

LL = 40.8 INCHES

DIL = (40.8 − 12)(.45)(2750) = 35,640 gal

Calculations made by: [signature]

Checked by: [signature]

INTERIM STABILIZATION EVALUATION

TANK NUMBER: 241-AX-104 EFFECTIVE DATE: 8-10-81

LIQUID LEVEL & RISER NO. 2.5" R-9E

SOLIDS LEVEL & RISER NO. 1.8" R-1B

EST. SUPERNATE LIQUID VOLUME 0

EST. DRAINABLE INTERSTITIAL LIQUID VOLUME 0

TEMPERATURE: 94 F

IS TANK HEAT LOAD A PROBLEM?

yes X no ___ unknown ___

The tank contains a heat load calculated to be in the range of 20,000 to 25,000 BTU/Hr, and continued tie-in to the 702-A Vessel Ventilation system is required.

IS THERE A POTENTIAL DOME LOAD PROBLEM? yes ___ no X

PHOTOGRAPH EVALUATION: Photo date - May 14,1981

The in-tank photos show a series of corrugation ridges in the tank bottom liner and no discernable liquid pools. There is no definable pattern to this buckling configuration. In addition, areas of mounded dry sludge are seen at random locations about the tank.

COMMENTS:

The discrepancy between the liquid level and sludge level readings is due to the irregularity of the dry bottom surface.

All valve and service pit drain lines to this tank were removed during August 1981.

Prepared By: [signature] 9-22-81

Reviewed By: [signature]

STABILIZATION EVALUATION Page 1 of 2

TANK: 241-B-101

EVALUATION (see continuation page for calculations and additional comments):

[✓] Photograph review completed - Date of most recent photographs: 5/19/93

[✓] Tank history review completed SEE TANK HISTORY FILE

[✓] Tank temperature profile review completed 2-5-90 @ 118°F

Surface Condition & Comments: PHOTOS ARE OCCASIONALLY HAZY. (PHOTOS FROM 9/29/87 ARE VERY HAZY.) A BROWN, MOTTLED, DRY SURFACE OF SLUDGE IS VISIBLE IN 5/19/93 PHOTOS. A RELATIVELY FLAT SURFACE IS VISIBLE IN THE PHOTOS. NO SALTCAKE IS VISIBLE.

FIC IN "INTRUSION MODE" AT 36.7 INCHES BASELINE ON 2/13/84
Solids Level 35.2 INCHES Date 1/3/84 Method FIC
Liquid Level 35.2 INCHES Date 1/3/84 Method FIC
Solids Volume 113,400 GALLONS
Estimated Drainable Insterstitial Liquid Remaining Volume 36,200 GALLONS (DIL)
Estimated Supernatant Volume Remaining ~0
Tank was pumped with a ~~submersible~~ P-10 pump ✓Yes __No; if yes, 3100 gallons pumped.
RECORD #2774 JUNE 1975

[ ] Cost/Benefit Analysis attached

DISPOSITION OF TANK:

[✓] Tank Interim Stabilized at ~0 gallons of supernatant and 36,200 gallons of drainable interstitial liquid

[ ] Tank not Interim Stabilized; continue stabilization activities

Evaluation Performed by D.D. Wiggins DDW 6/27/91 Date 6/25/91 Checked by K.A. White KAW 6/27/91 Date 6/25/91

APPROVED BY:

Manager, Stabilization Engineering V.C. Boyles Date 6/27/91
Manager, Single Shell Tanks R.C. Raymond Date 7-5-91
Manager, Tank Farms Facility Operations [signature] Date 7/9/91

DISTRIBUTION: Tank Farm Surveillance Analysis, SE Tank History File, Nuclear Facility Safety, TPA Integration Control, Managers Approval, Evaluation Performer, and Checker signatures

STABILIZATION EVALUATION
CONTINUATION SHEET

EVALUATION CALCULATIONS AND COMMENTS:

Page 2 of 2

TANK: 241-B-101

1- COMMENTS:

* THIS TANK DECLARED INTERIM STABILIZED IN MARCH, 1981 AND INTERIM ISOLATED IN MAY, 1991. THIS PAPERWORK IS A RESUBMITTAL BECAUSE THE ORIGINAL INTERIM STABILIZATION PAPERWORK IS MISSING.
* SINGLE-SHELL, DISH-BOTTOMED TANK (500,000 GALLON CAPACITY)
* ASSUMED LEAKER
* USE MOST CONSERVATIVE ESTIMATE. 45% POROSITY TO CALCULATED DIL AND 12.5% POROSITY TO DETERMINE PLR

2- TOTAL WASTE: (INCHS X $\frac{\text{VOL}}{\text{IN}}$) + DISH VOLUME

$= (36.7\ \text{IN})(2750\ \frac{\text{GALLONS}}{\text{IN}}) + 12,500$

$= 113,400$ GALLONS

3- DRAINABLE INTERSTITIAL LIQUID (DIL): (TOTAL WASTE - 12 IN CAPILLARY VOL) 0.45 POROSITY

$= (113,400\ \text{GALLONS} - (12)(2750\ \frac{\text{GALLONS}}{\text{IN}}))0.45$

$= 36,200$ GALLONS

4- DRAINABLE LIQUID REMAINING (DLR) = DIL + SUPERNATANT

SUPERNATANT = 0

DLR = 36,200 + 0 = 36,200 GALLONS

5- PUMPABLE LIQUID REMAINING (PLR):

DLR - (18 INCHES OF 12.5% POROSITY)

$= 36,200 - ((18\ \text{IN})(2750\ \frac{\text{GALLONS}}{\text{IN}})(0.125))$

PLR = 30,000 GALLONS

Calculations made by Dirk D. Wiggins Date 6/27/91

Checked by Karen L. White Date 6/27/91

Tank: B-102

Evaluation (see continuation page for calculations and additional comments):

☒ Photograph review completed - Date of most recent photographs 8/21/85

☒ Tank History review completed

☒ Tank temperature profile review completed

Surface Description: Sludge Surface with a supernate pool in the middle. Pool extends to within 6' of tank walls. Several islands in the middle. Estimated avg depth 2" Date 8/22/85

Solids Level 7.1"/5.1" Date 8/21/85 Method Photo Observation

Liquid Level 7.1" Date 8/21/85 Method FIC

Solids Volume 28,000 gal

Estimated Drainable Liquid Volume 0

Average Maximum Tank Temperature, past 6 months N/A

Estimated Supernatant Volume 4000 gallons

☐ Cost/Benefit Analysis attached

Evaluation Performed by K.K. Nudge Date 8/22/85 Checked by S.W. Wert Date 8/22/85

Disposition of Tank:

☒ Tank Interim Stabilized at 4000 gallons of drainable liquid

☐ Tank not Interim Stabilized; stabilization activities resumed

Approved by: Manager, TF&EPE R.A. Van Meter Date 8/22/85

Manager, TFS&O A.T. Pasto Date 8/22/85

Program Manager R.J. Serkowski Date 8/23/85

DISTRIBUTION: TF&EPE Tank File, Tank Farm Surveillance Analysis, Approval Signatures

EVALUATION CALCULATIONS AND COMMENTS

Tank: 102-B

Page 2 of 2

Supernatant Volume

~~Diam.~~ % Coverage = $\frac{(63/2)^2 \pi}{(75/4)^2 \pi} \times 100 = 70.56\%$

Average depth = 2"

(70.56 %)(2750 gal/in)(2 in) = 3,880 gal or ≃ 4000 gallons supernate

For Sludge Drainable Interstitial = 0 - Capillary Height is 2 FEET

Total Pumpable Liquid Remaining = 0

Sludge Volume = 7.1" (2750 gal/in) + 12,500 gal - 3880 gal

= 28,145 gal ≃ 28,000

Calculations made by: K L Madge

Checked by: T W Ross 8/22/85

Tank: B-103

Evaluation (see continuation page for calculations and additional comments):

☒ Photograph review completed - Date of most recent photographs 2-5-85

☒ Tank History review completed

☒ Tank temperature profile review completed

Surface Description: The tank contains a moist, dark colored sludge. The surface is relatively smooth with a small supernate pool with a diameter of approximately 3ft around the saHuwell screen Date 2/25/85

Solids Level 16.8 inches Date 2-25-85 Method EIC

Liquid Level 16.8 inches Date 2-25-85 Method EIC

Solids Volume 58,700 gallons

Estimated Drainable Liquid Volume 0 gallons

Average Maximum Tank Temperature, past 6 months Not Available

Estimated Supernatant Volume 0 gallons

☐ Cost/Benefit Analysis attached

Evaluation Performed by JS Hill Date 2/25/85 Checked by JS Hill Date 2/25/85

Disposition of Tank:

☒ Tank Interim Stabilized at 0 gallons of drainable liquid

☐ Tank not Interim Stabilized; stabilization activities resumed

Approved by: Manager, TF&EPE for RA Van Meter Date 2/25/85

Manager, TFS&O RB Gelman Date 2/25/85

Program Manager RD Wojtasek Date 2/26/85

DISTRIBUTION: TF&EPE Tank File, Tank Farm Surveillance Analysis, Approval Signatures

EVALUATION CALCULATIONS AND COMMENTS

Tank: 103-B

Page 2 of 2

Volume = (inches) 2750 + 12,500

Volume = (16.8) 2750 + 12500 = 58,700 gallons

Drainable Interstitial = 0 gallons (All liquid held within capillary height for sludge.

Calculations made by: J. Allan Hill

Checked by: Terry L. Vail

Tank: 104-B

Evaluation (see continuation page for calculations and additional comments):

☒ Photograph review completed - Date of most recent photographs 6/26/85

☒ Tank History review completed

☒ Tank temperature profile review completed

Surface Description: The surface consists of approximately 70% saltcake with the remainder as a supernate pool with an average depth of approximately 1-inch. Date 6/28/85

Solids Level 130.5 Date 6/27/85 Method Manual Tape

Liquid Level 130.5 Date 6/27/85 Method Manual Tape

Solids Volume 370,000 gallons

Estimated Drainable Liquid Volume 47,000 gallons

Average Maximum Tank Temperature, past 6 months ——

Estimated Supernatant Volume 1,000 gallons

☐ Cost/Benefit Analysis attached

Evaluation Performed by JA Hill Date 6/28/85 Checked by RAU Date 6/28/85

Disposition of Tank:

☒ Tank Interim Stabilized at 47,000 gallons of drainable liquid

☐ Tank not Interim Stabilized; stabilization activities resumed

Approved by: Manager, TF&EPE RAU Date 6-28-85

Manager, TFS&O [signature] Date 6-28-85

Program Manager [signature] Date 6-28-85

DISTRIBUTION: TF&EPE Tank File, Tank Farm Surveillance Analysis, Approval Signatures

EVALUATION CALCULATIONS AND COMMENTS

Tank: 104-B

Page 2 of 2

Supernate Volume = (2750)(1)(.3) = 825 gallons ⇒ 1000 gallons

Solids Volume = 2750(130.5) + 12500 - 1000 = 370,375 gallons

Sludge Volume = 301,000 gallons Saltcake Volume = 69375 gallons

D.I. Sludge = (301,000 - 66,000) .125 = 29375 gallons

D.I. Saltcake = (69375 - 33000) .45 = 16369 gallon

Total Drainable = 29375 + 16369 + 1000 = 46,744 ⇒ 47,000 gallons

Calculations made by: J Stan Hall

Checked by: RG Van Winkle

Tank: 105 B

Evaluation (see continuation page for calculations and additional comments):

☒ Photograph review completed - Date of most recent photographs 12.18.84

☒ Tank History review completed

☒ Tank temperature profile review completed prior to 4/82.

Surface Description: The surface consists of saltcake with a base height of ~40." A shelf with a height of ~12', exists above the base. The shelf extends around the entire tank with a width of approximately 10'. A very small supernate pool is located around the saltwell screen, indicating the base height is saturated saltcake Date 12/20/84

Solids Level 40.25"/90" Date 12/17/84 Method Manual Tape / Photo Observation

Liquid Level 40.25" Date 12/20/84 Method Photo Observation

Solids Volume 306,000 gallons

Estimated Drainable Liquid Volume 22,500 gallons

Average Maximum Tank Temperature, past 6 months Not Available

Estimated Supernatant Volume 0 gallons

☐ Cost/Benefit Analysis attached

Evaluation Performed by _____ Date ____ Checked by ____ Date____

Disposition of Tank:

☒ Tank Interim Stabilized at 22,500 gallons of drainable liquid

☐ Tank not Interim Stabilized; stabilization activities resumed

Approved by: Manager, TF&EPE LaVern Mathes for LHR Date 12/27/84

Manager, TFS&O H. T. Dukelow Date 12-27-84

Program Manager R. D. Izatt Date 12-27-84

DISTRIBUTION: TF&EPE Tank File, Tank Farm Surveillance Analysis, Approval Signatures

EVALUATION CALCULATIONS AND COMMENTS

Tank: 105-B

Page 2 of 2

Solids Volume: Base Volume + Shelf Volume

Base Volume: $(2750)(40.25) + 12500 = 123,188 \Rightarrow 123,000$ gallons

Shelf Volume: $[\pi r_2^2 h - \pi r_1^2 h](7.48\ gal/ft^3)$ where $r_2 = 37.5$ ft $r_1 = 27.5$ ft $h = 12$ ft

$[\pi (37.5)^2(12) - \pi (27.5)^2(12)]\ 7.48 = 183,$ gallons $\Rightarrow 183,000$ gallons

Total Volume = $123,000 + 183,000 = 306,000$ gallons

Drainable Interstitial Liquid:

- 40,000 gallons of sludge at bottom of tank, $\therefore$ 0 gallons DI liquid in sludge.
- Base Volume Containing Saltcake
  $123,000 - 40,000 = 83,000$ gallons
  $(83,000 - 35,000) \cdot .45 = 22,500$ gallons
- Shelf Volume consisting of Saltcake contains no drainable interstitial liquid.

Calculations made by: J Stanfield

Checked by: R A Von Winkle

Tank: B-106

Evaluation (see continuation page for calculations and additional comments):

☒ Photograph review completed - Date of most recent photographs 2-28-85

☒ Tank History review completed

☒ Tank temperature profile review completed

Surface Description: The surface consists of a smooth reddish-brown sludge that contains a few small supernate pools totaling approximately 1000 gallons Date 3/19/85

Solids Level 38.10" Date 3/19/85 Method FIC

Liquid Level 38.10" Date 3/19/85 Method FIC

Solids Volume 116,000 gallons

Estimated Drainable Liquid Volume 7300 gallons

Average Maximum Tank Temperature, past 6 months N/A

Estimated Supernatant Volume 1000 gallons

☐ Cost/Benefit Analysis attached

Evaluation Performed by J Hamilton Date 3/19/85 Checked By TSV Date 3/19/85

Disposition of Tank:

☒ Tank Interim Stabilized at 7300 gallons of drainable liquid

☐ Tank not Interim Stabilized; stabilization activities resumed

Approved by: Manager, TF&EPE RAV JC Fulton Date 3-19-85

Manager, TFS&O SH Trow Date 3-19-85

Program Manager RD Wojtasek Date 3-20-85

DISTRIBUTION: TF&EPE Tank File, Tank Farm Surveillance Analysis, Approval Signatures

EVALUATION CALCULATIONS AND COMMENTS

Tank: B-106 Page 2 of 2

Solids Volume: Volume = (Inches)2750+12500

Volume = (38.1)(2750)+12500 = 117275 gallons

Since this contains ~1000 gallons of supernate, the adjusted solids volume is 116,275 gallons.

Drainable Interstitial Liquid = (116,275 - 66000)(.125) ≈ 6300 gallons

Drainable Liquid Remaining = 6300 gallons + 1000 gallons = 7300 gallons

Calculations made by: J Stan Hill

Checked by: Terry L Veil

Tank: B-107

Evaluation (see continuation page for calculations and additional comments):

☒ Photograph review completed - Date of most recent photographs 2/28/85

☒ Tank History review completed

☒ Tank temperature profile review completed

Surface Description: The surface consists of a relatively smooth, light brown colored sludge with a small supernate pool around the saltwell screen. In addition, there is an area composed of small, interconnecting supernate pools Date 3/19/85

Solids Level 55.5" Date 3/19/85 Method Manual Tape

Liquid Level 65.5" Date 3/19/85 Method Manual Tape

Solids Volume 164,000

Estimated Drainable Liquid Volume 13,300 gallons

Average Maximum Tank Temperature, past 6 months N/A

Estimated Supernatant Volume 1000 gallons

☐ Cost/Benefit Analysis attached

Evaluation Performed by J. Hamilton Date 3/19/85 Checked by I.S. Vail Date 3/19/85

Disposition of Tank:

☒ Tank Interim Stabilized at 13,300 gallons of drainable liquid

☐ Tank not Interim Stabilized; stabilization activities resumed

Approved by: Manager, TF&EPE R.A. Hulstrom Date 3-19-85

Manager, TFS&O [signature] Date 3-19-85

Program Manager R.D. Stevenson Date 3-20-85

DISTRIBUTION: TF&EPE Tank File, Tank Farm Surveillance Analysis, Approval Signatures

EVALUATION CALCULATIONS AND COMMENTS

Tank: B-107

Solids Volume: Volume = (Inches)(2750)+12500

Volume = (55.5)(2750)+12500 = 165,125 gallons

The adjusted Volume reflecting the supernate pool is 164,125 gallons.

Drainable Interstitial Liquid = (164,125 - 66000) .125 ≃ 12300 gallons

Remaining Drainable Liquid = 12,300 gallons + 1000 gallons = 13,300 gallons

Calculations made by: G Ham Hill

Checked by: Terry L Vail

Tank: 108-B

Evaluation (see continuation page for calculations and additional comments):

☒ Photograph review completed - Date of most recent photographs 5/10/85

☒ Tank History review completed

☒ Tank temperature profile review completed

Surface Description: The surface consists of a dry, light gray colored, smooth textured sludge. There are no supernate pools present Date 5/22/85

Solids Level 29.5" Date 5/22/85 Method FIC

Liquid Level 29.5" Date 5/22/85 Method FIC

Solids Volume 94,000 gallons

Estimated Drainable Liquid Volume 3500 gallons

Average Maximum Tank Temperature, past 6 months N/A

Estimated Supernatant Volume 0 gallons

☐ Cost/Benefit Analysis attached

Evaluation Performed by GJ Hill Date 5/22/85 Checked by RAV Date 5/22/85

Disposition of Tank:

☒ Tank Interim Stabilized at 3500 gallons of drainable liquid

☐ Tank not Interim Stabilized; stabilization activities resumed

Approved by: Manager, TF&EPE RAV Date 5/22/85

Manager, TFS&O [signature] Date 5/22/85

Program Manager [signature] Date 5-22-85

DISTRIBUTION: TF&EPE Tank File, Tank Farm Surveillance Analysis, Approval Signatures

EVALUATION CALCULATIONS AND COMMENTS

Tank: 108-B

Page 2 of 2

Volume of Sludge => (29.5)2750 + 12500 = 93,625 gallons

Drainable Interstitial Liquid => (93,625 - 66,000) · 125 = 3453 gallons

Supernate Volume = 0 gallons

Total Drainable = 3453 gallons => 3500 gallons

Calculations made by: JS Hill

Checked by: RA Van Matter

Tank: 109 B

Evaluation (see continuation page for calculations and additional comments):

☒ Photograph review completed - Date of most recent photographs 4-2-85

☒ Tank History review completed

☒ Tank temperature profile review completed

Surface Description: The surface consists of a dry dark sludge. No supernate pools were observed.

Date 4-5-85

Solids Level 41.75" Date 4/5/85 Method Manual Tape

Liquid Level 41.75" Date 4/5/85 Method Manual Tape

Solids Volume 127,000 gallons

Estimated Drainable Liquid Volume 7700 gallons

Average Maximum Tank Temperature, past 6 months N/A

Estimated Supernatant Volume 0 gallons

☐ Cost/Benefit Analysis attached

Evaluation Performed by G.S. Hill Date 4/5/85 Checked by T.J. Vail Date 4/8/85

Disposition of Tank:

☒ Tank Interim Stabilized at 7700 gallons of drainable liquid

☐ Tank not Interim Stabilized; stabilization activities resumed

Approved by: Manager, TF&EPE R.M. J.C. Hall Date 4-8-85

Manager, TFS&O R.E. Lerch for W.H. Hatt Date 4-8-85

Program Manager R.D. Hildebrand Date 4-9-85

DISTRIBUTION: TF&EPE Tank File, Tank Farm Surveillance Analysis, Approval Signatures

EVALUATION CALCULATIONS AND COMMENTS

Tank: 109-B

Page 2 of 2

Solids Volume = (41.75)(2750) + 12500 = 127313 gallons

Drainable Liquid = (127313 - 66000) . 125 = 7700 gallons

Calculations made by: J Stan Hill

Checked by: Terry L. Vail

Tank: 110-B

Evaluation (see continuation page for calculations and additional comments):

☒ Photograph review completed - Date of most recent photographs 12/14/84

☒ Tank History review completed

☒ Tank temperature profile review completed prior to 4/16/82.

Surface Description: The surface consists primarily of cracked damp sludge with a dark reddish-brown appearance. While recent as well as past photographs (1/84) were not very clear, a supernate pool with a diameter of 20 ft could be seen. Date 12/17/84

Solids Level 84.5 inches Date 12/14/84 Method Manual FIC

Liquid Level 84.5 inches Date 12/14/84 Method Manual FIC

Solids Volume 245,000 gallons

Estimated Drainable Liquid Volume 23,400 gallons

Average Maximum Tank Temperature, past 6 months Not Available

Estimated Supernatant Volume 1000 gallons

☐ Cost/Benefit Analysis attached

Evaluation Performed by _____ Date _____ Checked by _____ Date _____

Disposition of Tank:

☒ Tank Interim Stabilized at 23,400 gallons of drainable liquid

☐ Tank not Interim Stabilized; stabilization activities resumed

Approved by: Manager, TF&EPE K. H. [signature] Date 12/17/84

Manager, TFS&O W. T. Dukelow Date 12/19/84

Program Manager K A Zinsli Date 12-20-84

DISTRIBUTION: TF&EPE Tank File, Tank Farm Surveillance Analysis, Approval Signatures

EVALUATION CALCULATIONS AND COMMENTS

Tank: 110-B

Page 2 of 2

Estimated Supernate Volume: 1,000 gallons

Solids Volume: (84.5)(2750) + 12500 = 244875 gallons ⇒ 245,000 gallons

Drainable Interstitial Liquid: (245,000 - 66000) .125 = 22375 gallons ⇒ 22,400 gallons

Total Drainable Liquid: 22,400 + 1,000 = 23,400 gallons.

Pump Liquid: (22400 - 6500) + 1000 = 16,900 gallons.

Calculations made by: G Tom Hill

Checked by: Terry L Vail

Tank: 111-B

Evaluation (see continuation page for calculations and additional comments):

☒ Photograph review completed - Date of most recent photographs 6/26/85

☒ Tank History review completed

☒ Tank temperature profile review completed

Surface Description: Approximately 75% of the surface consists of a dark sludge. The remaining surface area is composed of a supernate pool with an average depth of 1-inch. Date 6/28/85

Solids Level 81.70 Date 5/8/85 Method FIC

Liquid Level 81.70 Date 5/8/85 Method FIC

Solids Volume _____

Estimated Drainable Liquid Volume 22,000 gallons

Average Maximum Tank Temperature, past 6 months —

Estimated Supernatant Volume 1000 gallons

☐ Cost/Benefit Analysis attached

Evaluation Performed by JJH Date 6/28/85 Checked by CAV Date 6/28

Disposition of Tank:

☒ Tank Interim Stabilized at 22,000 gallons of drainable liquid

☐ Tank not Interim Stabilized; stabilization activities resumed

Approved by: Manager, TF&EPE RAW Date 6/28/85

Manager, TFS&O [signature] Date 6/28/85

Program Manager [signature] Date 6/28/85

DISTRIBUTION: TF&EPE Tank File, Tank Farm Surveillance Analysis, Approval Signatures

EVALUATION CALCULATIONS AND COMMENTS

Tank: 111-B

Page 2 of 2

Supernate Volume = .25 (2750) = 688 gallons ⇒ 1000 gallons

Solids Volume = 2750 (81.70) + 12500 - 1000 gallons = 236,175 gallons

Drainable Interstitial = [(236,175) - 66000] .125 = 21,272 gallons ⇒ 21,000

Total Drainable = ~~21,272~~ 21,000 + 1000 = 22,000 gallons

Calculations made by: [signature]

Checked by: [signature]

Tank: 112-B

Evaluation (see continuation page for calculations and additional comments):

☒ Photograph review completed - Date of most recent photographs 5/29/85

☒ Tank History review completed

☒ Tank temperature profile review completed

Surface Description: The surface consists of a dark colored moist sludge with a supernate pool over 90% of the surface. The average supernate pool depth is approximately 1-in Date 5/31/85

Solids Level 7.4/6.4 Date 5/31/85 Method F/C

Liquid Level 7.4 Date 5/31/85 Method F/C

Solids Volume 30,000 gallons

Estimated Drainable Liquid Volume 2,500 gallons

Average Maximum Tank Temperature, past 6 months ——

Estimated Supernatant Volume 2,500 gallons

☐ Cost/Benefit Analysis attached

Evaluation Performed by J. Hom HO Date 5/31/85 Checked by GW Date 5/4/85

Disposition of Tank:

☒ Tank Interim Stabilized at 2500 gallons of drainable liquid

☐ Tank not Interim Stabilized; stabilization activities resumed

Approved by: Manager, TF&EPE [signature] Date 5/31/85

Manager, TFS&O [signature] Date 5/31/85

Program Manager [signature] Date 5/31/85

DISTRIBUTION: TF&EPE Tank File, Tank Farm Surveillance Analysis, Approval Signatures

EVALUATION CALCULATIONS AND COMMENTS

Tank: 112-B

Solids Volume = (Inches) 2750 + 12,500 ⇒ (6.4) 2750 + 12500 + 1 (2750) (.1)

= 30375 gallons

D.I. = (30375 - 66000) .125 = 0

Supernate Volume = .9 (2750)(1) = 2475 gallons

Total Drainable = 2500 gallons

Calculations made by: J. Stanfield

Checked by: EW Eass 5/31/85

P

Tank: 202-B

Evaluation (see continuation page for calculations and additional comments):

☒ Photograph review completed - Date of most recent photographs 5/29/85

☒ Tank History review completed

☒ Tank temperature profile review completed

Surface Description: 60% of the surface consists of a yellow colored sludge with the remaining 40% being a supernate pool with an average depth of approximately 4 inches Date 5/31/85

Solids Level 142.75 Date 5/27/85 Method Manual Tape

Liquid Level 142.75 Date 5/27/85 Method Manual Tape

Solids Volume 27,000 gallons

Estimated Drainable Liquid Volume 3100 gallons

Average Maximum Tank Temperature, past 6 months ——

Estimated Supernatant Volume 300 gallons

☐ Cost/Benefit Analysis attached

Evaluation Performed by [signature] Date 5/31/85 Checked by [signature] Date 5/31/85

Disposition of Tank:

☒ Tank Interim Stabilized at 3100 gallons of drainable liquid

☐ Tank not Interim Stabilized; stabilization activities resumed

Approved by: Manager, TF&EPE [signature] Date 5/31/85

Manager, TFS&O [signature] Date 5/31/85

Program Manager [signature] R.D. WESTASEK Date 5/31/85

DISTRIBUTION: TF&EPE Tank File, Tank Farm Surveillance Analysis, Approval Signatures

EVALUATION CALCULATIONS AND COMMENTS

Tank: 202-B

Page 1 of 1

~~Solids~~ Volume = (Inches - 6) 196 + 590

Solids Volume = (138.75 - 6) 196 + 590 + 4(196)(.6) = 27079 gallons ⇒ 27,000 gal.

Drainable Int. = (27,000 - 5,000) .125 = 2750 gallons

Supernate Volume = (196)(4 inches) .4 = 314 gallons

Total Drainable = 314 + 2750 = 3064 gallons ⇒ 3100 gallons

Calculations made by: GJ Hill

Checked by: EJ Weiss 5/31/95

INTERIM STABILIZATION EVALUATION - NON-JET PUMPED TANKS

Tank: 203-B

Evaluation (see Continuation Page for calculations and additional comments):

[X] Photograph review completed - Date of most recent photographs 7-7-83

[X] Tank history review completed

[X] Tank temperature profile review completed

Surface Description: Surface covered with supernatant estimated to be an average of three inches deep.

Date 7-7-83

Solids Level 257.5" Date 5-29-84 Method Estimation (photo)

Liquid Level 260.5" Date 5-29-84 Method Manual Tape

Solids Volume 50,000 gallons

Estimated Drainable Liquid Volume 6000 gallons

Average Maximum Tank Temperature, past 6 months 60°F. (last reading 4-16-82)

Estimated Supernatant Volume 600 gallons

[X] Cost/Benefit Analysis attached

Evaluation Performed by NE Bell Date 5-29-84 Checked by [illegible] Date 5-30-84

Disposition of Tank:

[X] Tank Interim Stabilized at 6000 gallons of drainable liquid

[ ] Tank not Interim Stabilized; stabilization activities resumed

Approved by:

Manager, TF&EPC	[signature]	Date 5-31-84
Manager, TFS&O	[signature]	Date 5-31-84
Program Manager	[signature]	Date 6-5-84
Director, R&E	[signature]	Date 6-27-84
Director, Prod. Proc.	[signature]	Date 6-28-84
Director, HS&E	[signature]	Date 6/28/84
Director, WHPO	[signature]	Date 6/29/84

INTERIM STABILIZATION EVALUATION - NON-JET PUMPED TANKS

(CONTINUATION PAGE)

Evaluation Calculations and Comments

TANK: 203-B

Liquid Level = 260.5 inches (manual tape)

Solids Level = 257.5 inches (photographic evaluation - average over tank)

Supernatant Volume = 3 inches x 196 gal/in. = 588 gal. (600)

Solids Volume = (257.5 - 6) x 196 + 590 = 49,884 gal. (50,000)

Drainable Liquid = Drainable Interstitial Liquid + Supernatant

Drainable Interstitial = (Solids - Capillary Height ÷ 196) x Porosity

For sludge, capillary height is estimated to be 24" and porosity to be 0.125.

DIL = [49,884 - (24 x 196)] x 0.125 = 5647 gal.

Drainable Liquid = 5647 + 588 = 6236 gallons

If the sludge were to act like salt cake (capillary height of 12" and porosity of 0.45),

DIL = [49,884 - (12 x 196)] x 0.45 = 21,389

Drainable Liquid = 21,977 (22,000 gal)

Calculations by Nancy (Bell Date 5-29-84

Checked by LeVan Mateer Date 5-30-84

INTERIM STABILIZATION EVALUATION - NON-JET PUMPED TANKS

Tank: 204-B

Evaluation (see Continuation Page for calculations and additional comments):

[X] Photograph review completed - Date of most recent photographs 5-19-83

[X] Tank history review completed

[X] Tank temperature profile review completed

Surface Description: 98% of surface covered with supernatant estimated to be an average of 4" deep

Date 5-19-83

Solids Level 252.5" Date 5-29-84 Method Estimation (photo)

Liquid Level 256.5" Date 5-22-84 Method Manual Tape

Solids Volume 49,000 gallons

Estimated Drainable Liquid Volume 6000 gallons

Average Maximum Tank Temperature, past 6 months 57°F. (last reading 4-16-82)

Estimated Supernatant Volume 800 gallons

[X] Cost/Benefit Analysis attached

Evaluation Performed by N E Bell Date 5-29-84 Checked by R V Petersen Date 5-31-84

Disposition of Tank:

[X] Tank Interim Stabilized at 6000 gallons of drainable liquid

[ ] Tank not Interim Stabilized; stabilization activities resumed

Approved by:

Manager, TF&EPC R A Lerch Date 5-31-84

Manager, TFS&O G. T. Dukelow Date 5-31-84

Program Manager R A Zinski Date 6-5-84

Director, R&E J H Rascoe Date 6-27-84

Director, Prod. Proc. K. J. Laidler Date 6-28-84

Director, HS&E B C Hughes Date 6/28/84

Director, WMPO J. W. Patterson Date 6/29/84

INTERIM STABILIZATION EVALUATION - NON-JET PUMPED TANKS

(CONTINUATION PAGE)

Evaluation Calculations and Comments

TANK: 204-B

Liquid Level = 256.5 inches (manual tape)

Solids Level = 252.5 inches (photographic evaluation)

Note: Solids level determination attempted with manual tape; however, results were indecisive. Solids are relatively flat and supernate estimate is considered valid.

Supernatant Volume = 4 inches x 196 gal/in. = 784 gal. (800)

Solids Volume = (252.5 - 6) x 196 + 590 = 48,904

Drainable Liquid = Drainable Interstitial Liquid (DIL) + Supernatant

DIL = (Solids - Capillary Height x 196 gal/in) x Porosity

For sludge, capillary height is estimated to be 24" and porosity to be 0.125.

DIL = [48,904 - (24 x 196)] x 0.125 = 5,525 gal.

Drainable Liquid = 5525 + 784 = 6,309 gal.

If the sludge were to act like saltcake (capillary height of 12" and porosity of 0.45),

DIL = (48,904 - 12 x 196) x 0.45 = 20,948

Drainable Liquid = 20,948 + 784 = 21,732 gal.

Calculations by Nancy C Bell Date 5-29-89

Checked by Robert K. Van Note Date 5-30-89

INTERIM STABILIZATION

TANK: 102-BX EFFECTIVE DATE: NOV. 30, 1978

TEMPERATURE: 68°F TO 70°F

SAMPLE REQUIRED: YES ☐ NO ☒

PHOTO EVALUATION: YES ☒ NO ☐

COMMENTS: This tank is changed from Leaker - Primary Stabilized - Partially Isolated to Leaker - Interim Stabilized - Partially Isolated.

The temperature data is attached to this form. This data covers a time period from April 4, 1975 through July 16, 1978. During this time period the highest temperature recorded was 83°F four inches from the tank bottom on January 11, 1977.

There is 0" of sludge remaining in this tank plus 12,500 gallons in the dish bottom. Diatomaceous Earth has been added to stabilize any liquid remaining on the surface. Photos show a totally dry surface across the entire tank.

There is no sample required to stabilize this tank.

Tank: 102-BX

Photo Date: 11-13-78

Photo I.D: 84031

Liquid Level: 2'6½"

Observation of Surface: The tank surface is 100% dry and cracked. The distoracene salt appears to have stabilized all surface liquid.

Salt Well Status: NO pump or salt well installed

Lollipops? ☐ Yes ☒ No

Other: The marked tape is ~~Floating~~ Touching on a dry surface. There are TWO T.C. Probes visible.

Interpreted by : V.D. Maupin

Date: ~~12~~ 12/4/78

Reviewed by :

Date :

INTERIM STABILIZATION EVALUATION - NON-JET PUMPED TANKS

Tank: 103-BX

Evaluation (see Continuation Page for calculations and additional comments):

[X] Photograph review completed - Date of most recent photographs 7-8-83

[X] Tank history review completed

[X] Tank temperature profile review completed

Surface Description: A shallow liquid pool covers most of the surface.

Date 7-8-83

Solids Level 18.0" Date 4-28-82 Method photo

Liquid Level 18.9" Date 10-30-83 Method FIC

Solids Volume 62,000 gal

Estimated Drainable Liquid Volume 2,500 gal.

Average Maximum Tank Temperature, past 6 months 71°F (1982-most recent data)

Estimated Supernatant Volume 2,500 gal.

[ ] Cost/Benefit Analysis attached

Evaluation Performed by N Bell Date 11/15/83 Checked by TDK Date 11/16/83

Disposition of Tank:

[X] Tank Interim Stabilized at 2,500 gallons of drainable liquid

[ ] Tank not Interim Stabilized; stabilization activities resumed

Approved by: Manager, TF&EPC R.A. Van Meter Date 11/16/83

Manager, TFS&O H.T. Duckett Date 11-28-83

Program Manager R.A. Zinsli Date 11-29-83

DISTRIBUTION: TF&EPC Tank File, Tank Farm Surveillance Analysis, Approval Signatures

INTERIM STABILIZATION EVALUATION - NON-JET PUMPED TANKS

(CONTINUATION PAGE)

Evaluation Calculations and Comments

TANK: 103-BX

The liquid level has been slowly rising since 1977. The baseline was changed from 16.8" to 18.6" in March 1983. The level rose from 18.3" in January to 18.9" in August. Photographs confirm the rise. The increase is believed to be from precipitation. If so, the liquid level should stabilize after isolation (scheduled under Project B-222).

Supernate Liquid = (Liquid Level-Solids Level) x 2750 gal./inch
= (18.9" - 18.0") x 2750
= 2475 gal.

Solids Volume = (Solids Level x 2750 gal./in.) + 12,500 gal.
= 18" x 2750 + 12,500
= 62,000 gal.

Drainable Interstitial Liquid = (Total Solids - Capillary Height x 2750 gal./in.) x Porosity

Tank 103-BX contains sludge, which is estimated to have a capillary height of 24" and a porosity of 0.125 DIL = (62,000 - 2750 x 24) x 0.125 = 0 by definition --- Total Drainable Liquid = DIL + Supernate = 2475 gal.

Calculation made by N E Bell

Checked by T A Kilpatrick

INTERIM STABILIZATION EVALUATION - NON-JET PUMPED TANKS

(CONTINUATION PAGE)

Evaluation Calculations and Comments

TANK: 103-BX

A worst-case assumption is that the sludge acts like salt cake, which is estimated to have a capillary height of 12" and a porosity of 0.45. For this case,

DIL = (62,000 - 12 x 2750) x 0.45 = 13,050 gal.
Total Drainable Liquid = 13,050 + 2475 = 15,525 gal.

Both the DIL and the supernate liquid are far below the criteria for pumping. The tank should be Interim Stabilized.

Calculations made by N G Ball

Checked by T. L. Hipsteck

STABILIZATION EVALUATION
NON-JET PUMPED TANKS

TANK: 241-BX-104

EVALUATION (see continuation page for calculations and additional comments):

[X] Photograph review completed - Date of most recent photographs: 9-21-89

[X] Tank history review completed

[X] Tank temperature profile review completed

Surface Description: Dark brown sludge with a liquid film covering 30 to 35% of the tank surface.

Date 9-22-89

Solids Level 31.5 Date 9-22-89 Method FIC

Liquid Level 31.5 Date 9-22-89 Method FIC

Solids Volume 96,237 gallons

Estimated Drainable Liquid Remaining Volume 32,644 gallons

Average Maximum Tank Temperature, past 6 months 77°F

Estimated Supernatant Volume 2,888 gallons

[NA] Cost/Benefit Analysis attached

DISPOSITION OF TANK:

[X] Tank Interim Stabilized at 32,644 gallons of drainable liquid remaining

[ ] Tank not Interim Stabilized; stabilization activities resumed

Evaluation Performed by JC Boyle Date 9/26/89 Checked by [illegible] Date 9/26/89

APPROVED BY:

Manager, Single-Shell Tanks RE Raymond Date 9/26/89

Manager, Tank Farm Programs [illegible] Date 9/26/89

Manager, Tank Farms [illegible] Date 9/26/89

DISTRIBUTION: SST Tank File, Tank Farm Surveillance Analysis & Support, Defense Waste Safety Section, Approval Signatures

TANK: 241-BX-104

EVALUATION CALCULATIONS AND COMMENTS:

Tank 241-BX-104 was supernatant pumped from September 17 through 19, 1989 until the pump cavitated. A total of 17,486 gallons was pumped.

Total Waste = (Solids Level) (2750) + 12,500 (Dished Bottom)
(31.5 in) (2750 gal/in) + 12,500 gallons
= 99,125 gallons

Supernatant Volume - Approximately 35% of the tank surface is liquid covered with an average depth of 3 inches.

= (0.35) (3 in) (2750 gal/in)
= 2,888 gallons

Solids Volume = Total Waste - Supernatant
= 99,125 - 2,888
= 96,237 gallons

Drainable Interstitial Liquid (DIL) = (Total Waste - 12* in X 2750 gal/in) (0.45 porosity)
= (99,125 - 33,000) (·45)
= 29,756 gallons

*Per WHC-CM-5-7, it is assumed that the bottom 12 inches of waste is non-drainable due to capillary action.

Drainable Liquid Remaining = DIL + Supernatant
= 29,756 + 2,888
= 32,644 gallons

Calculations made by VC Boyle Date 9/26/89

Checked by RA Kumar Date 9/26/89

INTERIM STABILIZATION EVALUATION
NON-JET PUMP TANKS

Tank: 105-BX

Evaluation (see continuation page for calculations and additional comments):

☒ Photograph review completed - Date of most recent photographs 8/25/86

☒ Tank History review completed

☒ Tank temperature profile review completed

Surface Description: Sludge surface with supernate approximately 1-2" deep covering ~ 75 - 85% of the surface. FIC contacting solids. Solids exposed along outer surfaces Date 8/25/86

Solids Level 24.8" Date 9/2 Method FIC

Liquid Level 24.8" Date 9/2 Method FIC / PHOTO

Solids Volume 46,025

Estimated Drainable Liquid Volume 10,525

Average Maximum Tank Temperature, past 6 months 70°F

Estimated Supernatant Volume 4675 Gallons

☐ Cost/Benefit Analysis attached

Evaluation Performed by K L Hodge Date 9/2/86 Checked by [signature] Date 9/3/86

Disposition of Tank:

☒ Tank Interim Stabilized at 10,525 gallons of drainable liquid

☐ Tank not Interim Stabilized; stabilization activities resumed

Approved by: Manager, TF&EPE [signature] Date 9/3/86

Manager, TFS&O [signature] Date 9/3/86

Program Manager [signature] Date 9/3/86

DISTRIBUTION: TF&EPE Tank File, Tank Farm Surveillance Analysis, Approval Signatures

EVALUATION CALCULATIONS AND COMMENTS

Tank: 105-BX - DISHED BOTTOM TANK Page 2 of 2

Volume Calculations

CASS FIC READING – 24.8" - CONTACTING SOLIDS

IRREGULAR SURFACE

SUPERNATANT VOLUME

[2750 GAL/IN] [2 in] 85% = 4675 GALLONS SUPERNATE

TOTAL Volume (DISH BOTTOM)

(24.8" - 12") 2750 GAL/IN + 12,500 GALLONS = 47,700 GAL

47,700 GALLONS ASSUMES A FLAT EVEN SURFACE

SUBTRACTING SUPERNATE

47,700 - 4675 = 43,025 GAL SLUDGE

Adding for exposed solids above FIC [3000 GALLONS, ASSUME SALT CAKE]

47,700 + 3,000 GAL = 50,700 GALLONS – TOTAL WASTE

→ 43,025 GALLONS SLUDGE
→ 4,675 GALLONS SUPERNATE
→ 3,000 GALLONS SALT CAKE
→ 50,700 GALLONS TOTAL WASTE

Calculations made by: KL Mudge

Checked by: Ed Jones

EVALUATION CALCULATIONS AND COMMENTS

Tank: 105-BX

Page 3 of 3

INTERSTITIAL LIQUID CALCULATION — SD-RE-TI-101

CAPILLARITY - 1 FOOT - 33,000 GALLONS

[SOLIDS VOLUME - CAPILLARY VOLUME] · POROSITY -

[46,025 GAL - 33,000 GAL] · 45% = 5900 GALLONS

→ 5900 GALLONS DRAINABLE INTERSTITIAL (DI)

TOTAL DRAINABLE = DI + SUPERNATE

= 5900 GAL + 4625 GAL

TOTAL DRAINABLE = 10,525 GALLONS

SUPERNATE PUMPING DISCONTINUED IN AUGUST 1986

15,000 GALLONS SUPERNATE REMOVED. PUMP LOWERED

AS FAR AS POSSIBLE, CANNOT REMOVE MORE SUPERNATE

WITH ~~[illegible]~~ PUMP IN CURRENT CONFIGURATION

Calculations made by: KZ Munger

Checked by: GA Jones

Attachment D

Interim Stabilization Evaluation of 100- & 200-Series Non-Jet-Pumped Tanks.

Page 1 of 2

TANK: 241-BX-106

EVALUATION (see continuation page for calculations and additional comments):

[X] Photograph review completed - Date of most recent photographs: 07/17/95

[X] Tank history review completed

[X] Tank temperature profile review completed

Surface Condition & Comments: Wet sludge slumping toward center of tank. Dry saltcake against tank sidewalls. Less than 200 gallons liquid surrounding submersible pump suction (suspected to be flush water and drain back). No other liquid visible.

Solids Level 9.2 inches Date 07/14/95 Method ENRAF

Liquid Level N/A Date N/A Method N/A

Solids Volume 37,600 gallons

Estimated Drainable Insterstitial Liquid Volume 0 gallons

Estimated Supernatant Volume Remaining 200 gallons

Tank was pumped with a submersible pump ___ No X Yes, 14,000 gallons pumped.

[ ] Cost/Benefit Analysis attached

DISPOSITION OF TANK:

[X] Tank Interim Stabilized at 200 gallons of supernatant and 0 gallons of drainable interstitial liquid

[ ] Tank not Interim Stabilized; continue stabilization activities

Evaluation Performed by Randy L Powers Date 07/31/95

Checked by V C Boyles Date 7/31/95

APPROVED BY:

Team Lead, Stabilization Engineering V C Boyles Date 7/31/95

Manager, Interim Stabilization Engineering Judith Bustard Date 8/1/95

Manager, E. Tank Farm Transition Project for THG Date 8/1/95

DISTRIBUTION: Surveillance Engineering, Single Shell Tank History File, TWRS Nuclear Safety, TPA Integration Control, Approval Managers, Evaluation Performer, Team Lead and Checker signatures.

Attachment D (cont.)

Page 2 of 2

EVALUATION CALCULATIONS AND COMMENTS:

TANK: 241-BX-106

Assume:

- Tank contains sludge, 200 gallons supernatant, no saltcake (per video 07/17/95).
- waste is consistent along the surface (flat surface)

Use:

- 45% porosity per WHC-IP-0842 Section 5.2.1
- 24 inches capillary height (sludge)

Amount of waste remaining:

ENRAF reads 9.2 inches.

9.2 inches x 2750 gallons/inch = 25,300 gallons
add volume of dish bottom, + 12,500 gallons

total waste remaining = 37,800 gallons

total sludge vol. = total waste - supernatant
total sludge vol. = 37,800 gallons - 200 gallons

total sludge vol. = 37,600 gallons

Drainable Interstitial Liquid (DIL), Drainable Liquid Remaining (DLR), Pumpable Liquid Remaining (PLR):

DIL = (sludge vol. - sludge capillary height vol.) x porosity
DIL = (37,600 gal. - (24 in. x 2750 gal./in.)) x .45

DIL = 0 gallons

DLR = supernatant + DIL
DLR = 200 gallons + 0

DLR = 200 gallons

PLR = DLR - (unpumpable vol. x porosity)
PLR = 200 - (18 inches x 2750 gal./in. x .45)

PLR = 0 gallons.

Calculations made by Cindy L Powers Date 07/31/95

Checked by UC Boyles Date 7/31/95

Page 1 of 2

STABILIZATION EVALUATION
JET PUMPED TANKS

TANK: 107-BX

Reason Jet Pumping Halted:

[X] Meets 0.05 gpm Criteria, Date of Shutdown 9-14-90
[ ] Major Failure of Jet Pump, Date of Shutdown _____

Additional Comments: The surface is light brown, pot marked sludge fine material with a pool of liquid located north of riser #4.
Evaluation: (See continuation page for calculations and additional comments)

Photograph review completed - Date of most recent photograph 9/11/90
Tank history review completed. [X]
Tank temperature profile reviews completed. [X]
Starting Liquid Level 130.2" Date 6/20/90

Final Liquid Level Measured After Equilibration of Interstitial Liquid:
Dip Tubes 98.6 Date 9/24/90 LOW N/A Date N/A FIC/Manual 120.7" Date 9/18/90

Total Net Jet Pump Production 23,113 gallons
Supernatant volume 600 Date 9/24/90

Calculated Solid Characteristics:

Porosity 13.2 % Permeability/viscosity (^{K}/u) N/A
Capillary Height 24" Est. Drainable Liquid Remain. 29330 gallons
Final Avg. Flowrate <.05 gpm Date 9/24/90

Disposition of Tank:

[X] Tank Interim Stabilized at 29,330 gallons of Drainable Liquid Remaining
23,330 ~~thousand~~ gallons of Pumpable Liquid Remaining.
[ ] Tank Not Interim Stabilized; Jet Pumping Restarted

Evaluation Performed by: V C Boyles Date 9/24/90
Checked by: R. K. Ironbarger Date 9/25/90

APPROVED BY:

Manager, Single-Shell Tanks N W R Raymond Date 9-26-90
Manager, Tank Farm Programs D J Hirschfelder Date 9-25-90
Manager, Tank Farms T B Skaggs Date 9-26-90

Distribution: SSTPE Tank History File, Defense Waste Safety, Tank Farm Surveillance Analysis & Support, Prepared by Signatures, Managers approval Signature

Page 2 of 2

TANK: 107-BX

EVALUATION CALCULATIONS AND COMMENTS:

Wt. Factor Final = 155.6 } From work packet 26-90-029%
Sp. Gravity Final = 1.46 }

Capillary ht. for sludge 24"

Starting liquid level was 130.2" measured by FIC

Final liquid level measured by dip tube = $\frac{\text{Wt. factor}}{\text{Sp. Gr.}} = \frac{155.6}{1.46} = 106.6 - 8" = 98.6$

Note: FIC zero is located on tank sidewall base and dip tube is located 8" lower than the FIC. The 8" above in the dip tube adjustment, adjusts the two readings so they are equivalent.

Supernatant Start 14,000 gallons
Supernatant Pumped 13,400 gallons } Estimated volumes based from plotted actual pumpdown curve
Supernatant Remaining 600 gallons

Net Jet Pump Production = Gross vol. pumped - Total water added = 23,705 - 592 = 23,113 gallons

Calculate Porosity = $\frac{\text{Net Jet Pump Volume} - \text{Pumped Supernatant}}{(\text{Starting liq. level} - \frac{\text{Pumped Supernatant}}{2750} - \text{Final liq. level})(2750)} =$

$= \frac{23,113 - 13,400 \quad (100)}{(130.2 - \frac{13,400}{2750} - 98.6)\,2750} = 13.2\%$ Porosity

Drainable Interstitial Liquid = (Final liq. level - capillary ht)(Porosity) + (Vol. in dished tank bottom)(Porosity) =
$= (98.6 - 24)(2750)(.132) + 12,500\,(.132) =$
$= 28,730$ gallons (DIL)

Drainable Liquid Remaining = DIL + Supernatant Remaining = 28,730 + 600 = 29,330 gallons (DLR)

Pumpable Liquid Remaining = DLR - 6,000 = 29,330 - 6,000
= 23,330 gallons

Calculations made by VC Boyles Date 9/24/90

Checked by R.K Swanson Date 9/25/90

INTERIM STABILIZATION EVALUATION

TANK NUMBER: 108-BX EFFECTIVE DATE: 7-31-79

LIQUID LEVEL & RISER NO. R-8 5.0" Solids level Reading

SOLIDS LEVEL & RISER NO. R-8 5"

EST. SUPERNATE LIQUID VOLUME < 1000 gallons*

EST. DRAINABLE INTERSTITIAL LIQUID VOLUME 1000 gallons

* Best guess liquid volume is 400 gallons. The interstitial volume is based on sludge containing 12.5% drainable liquid. Also 2000 gallons have been pumped from this tank Via P-10.

TEMPERATURE: 68°F Maximum

IS THIS TEMPERATURE A PROBLEM? yes ____ no x unknown ____

IS THERE A POTENTIAL DOME LOAD PROBLEM? yes ____ no x

PHOTOGRAPH EVALUATION: (Order #771263 : LL 5" ; Date 2-7-77)

These photographs show a liquid pool approximately 25' in diameter and extremely shallow. The rest of the tank surface is damp sludge.

COMMENTS:

There is no further salt well pumping scheduled for this tank.

Advanced Stabilization Recommendation: It appears that the remaining surface liquid could be removed by air drying; therefore, air drying is recommended.

Prepared By: F. D. Manzini

Reviewed By: John W Bailey 7-31-79

STABILIZATION EVALUATION
JET PUMPED TANKS

TANK: 109-BX

Reason Jet Pumping Halted:

[X] Meets 0.05 gpm Criteria, Date of Shutdown 8-17-90
[ ] Major Failure of Jet Pump, Date of Shutdown _____

Additional Comments: Surface is ~95% solids with red and white surfaces. The reddish surface appears to be pitted with fine size material
Evaluation: (See continuation page for calculations and additional comments)

Photograph review completed - Date of most recent photograph 9-11-90
Tank history review completed. [X]
Tank temperature profile reviews completed. [X]
Starting Liquid Level 56.4" Date 6/28/90

Final Liquid Level Measured After Equilibration of Interstitial Liquid:
Dip Tubes 48.1" Date 9/16/90 LOW N/A Date N/A FIC/Manual 65.7" Date 9/17/90

Total Net Jet Pump Production 8247 gallons
Supernatant volume 400 gallons Date 9/17/90

Calculated Solid Characteristics:

Porosity	20%	Permeability/viscosity ($^K/_u$)	N/A
Capillary Height	24"	Est. Drainable Liquid Remain.	13,655
Final Avg. Flowrate	<.05gpm	Date	9/17/90

Disposition of Tank:

[X] Tank Interim Stabilized at 13,655 gallons of Drainable Liquid Remaining
2655 ~~thousand~~ gallons of Pumpable Liquid Remaining.
[ ] Tank Not Interim Stabilized; Jet Pumping Restarted

Evaluation Performed by: VC Boyle Date 9/17/90
Checked by: [signature] Date 9/17/90

APPROVED BY:

Manager, Single-Shell Tanks [signature] Date 9/26/90
Manager, Tank Farm Programs [signature] Date 9/20/90
Manager, Tank Farms [signature] Date 9-26-90

Distribution: SSTPE Tank History File, Defense Waste Safety, Tank Farm Surveillance Analysis & Support, Prepared by Signatures, Managers approval Signature

TANK: 109-BX

EVALUATION CALCULATIONS AND COMMENTS:

	Final	Start
WT. Factor	63.5"	70.5"
Spec. Gravity	1.32	1.25

Final liquid level = $\frac{63.5"}{1.32}$ = 48.1" (Dip Tube)

Starting liquid level = $\frac{70.5}{1.25}$ = 56.4" on 6/28/90 (Dip Tube)

Supernatant at start of pumping = 5,000 gallons
Supernatant Pumped = 4,600 gallons
Supernatant Remaining = 400 gallons
} Estimated from tank photos

Net Jet Pump Production = Gross vol. pumped - Flush water = 9,425 - 1178 = 8,247 gallons

Calculate Porosity = $\frac{\text{Net Jet Pump Volume} - \text{Pumped Supernatant}}{(\text{Starting liq level} - \text{Pumped Supernatant} - \text{Final liq. level})2750}$ =

$= \frac{8,247 - 4,600}{\left(56.4 - \frac{4600}{2750} - 48.1\right)2750} = 0.20 = 20\%$

Assume capillary ht. of 24" for sludge tanks

Drainable Interstitial Liquid = (Final liq. level - capillary ht)(porosity)
= (48.1 - 24)(2750)(.20)
= 13,255 gallons (DIL)

Drainable Liquid Remaining = DIL + Supernatant Remaining
= 13,255 + 400
= 13,655 gallons (DLR)

Pumpable Liquid Remaining = DLR - 6,000
= 13,655 - 6,000 = 7,655 gallons

Calculations made by VC Boyles Date 9/17/90

Checked by [signature] Date 9/18/90

Tank: 110-BX

Evaluation (see continuation page for calculations and additional comments):

☒ Photograph review completed - Date of most recent photographs 7-31-85

☒ Tank History review completed

☒ Tank temperature profile review completed

Surface Description: Small supernatant pool covering 15% of surface with maximum 3" liquid. Solids appear to be sludge with salt cake crystals on the surface Date 8/21/85

Solids Level 67.25 Date 7/31/85 Method Plug Detection

Liquid Level 67.25 Date 7/31/85 Method Manual Tape

Solids Volume 198,600

Estimated Drainable Liquid Volume 20,700 gal

Average Maximum Tank Temperature, past 6 months N/A

Estimated Supernatant Volume 1300 gal

☐ Cost/Benefit Analysis attached

Evaluation Performed by KK Mudge Date 8/21/85 Checked by RAV Date 8/22/85

Disposition of Tank:

☒ Tank Interim Stabilized at 20,700 gallons of drainable liquid

☐ Tank not Interim Stabilized; stabilization activities resumed

Approved by: Manager, TF&EPE RA Van Vleet Date 8/22/85

Manager, TFS&O J.T. Trauger Date 8/22/85

Program Manager R.D. Wojtasek Date 8/22/85

DISTRIBUTION: TF&EPE Tank File, Tank Farm Surveillance Analysis, Approval Signatures

EVALUATION CALCULATIONS AND COMMENTS

Tank: 110-BX

Page 2 of 2

Solids volume

(67.25 in • 2750 gallons/in) = 198,000 gallons

Sludge volume from tank history / SR-14

189,000 gallons

Salt Cake volume

198,000 − 189,000 = 9,000 gallons - does not include volume of shelf.

Drainable Interstitial in Sludge

(189,000 - 66,000) 0.125 = 15,375 gallons

Drainable Interstitial in Salt Cake

(9,000 gal)(0.45) = 4050 gal

Total Drainable Interstitial (DI)

15,375 + 4050 = 19,425 gallons ←

DRAINABLE TOTAL

19,425 + 1237.5 =

20,662.5 gal

Supernate volume (SUP)

0.15 (2750 gal/in) 3 in = 1237.5 gallons

Pumpable Liquid Remaining = 0 gal

Calculations made by: K L Mudge

Checked by: R A Van Vleet

Figure 2. Interim Stabilization Evaluation for Jet-Pumped Tanks
(Sheet 1 of 2)

TANK: 241-BX-111

Page 1 of 4

Reason Jet Pumping Halted:

I. [ ] Meets 0.05 gpm criteria. Date of Shutdown _____
II. [X] Major equipment failure. Date of Shutdown 02/04/95

Surface Condition & Comments:

In-tank video reveals dry saltcake slumping dramatically downward from tank sidewalls with isolated pools of semi-clear liquid within a circular area 30 foot in diameter surrounding the saltwell screen (located at tank center). Liquid depth varies from 0 to 6 inches, with an average depth of less than 3 inches. Various sized islands of saltcake deplete the liquid surface area. Estimated surface liquid volume less than 1300 gallons. Major jet pump jumper spray leak in two locations (identified by leak detection element and verified by video recording) disabled pumping equipment.

Evaluation: (See continuation page for calculations and additional comments)

Photograph review completed - Date of most recent photograph 02/28/95
Tank history review completed. [X]
Tank temperature profile reviews completed. [X]
Starting liquid level 79.75 INCHES Method MANUAL TAPE Date 10/22/93
Final liquid level (after equilibration) 21.3 INCHES Method DIP TUBES Date 02/07/95

Total Net Jet Pump Production 116,900 GALLONS
Capillary Height Used in Calculation: 12 AND 24 INCHES. (TANK CONTAINS BOTH SALTCAKE AND SLUDGE.)
Final Average Flowrate N/A
Calculated Porosity 66 %
Supernatant 1300 GALLONS
Drainable Interstitial Liquid 1300 GALLONS
Drainable Liquid Remaining 2600 GALLONS
Pumpable Liquid Remaining 1300 GALLONS

Disposition of Tank:

[X] Tank Interim Stabilized
[ ] Tank not Interim Stabilized: Jet Pumping Restarted

Evaluation Performed by: RANDY L. FOWENS Date 03/13/95
Checked by: VC Boyles Date 3/13/95

APPROVED BY:*

Team Lead, Stabilization Engineering VC Boyles Date 3/13/95
Manager, Tank Stabilization & Engineering Support [signature] Date 3/13/95
Manager, SST Stabilization Program [signature] Date 3/14/95
Manager, Tank Farm Operations Judith Bunton for J Wicks Date 3/14/95

Distribution: Nuclear Facility Safety, Shift Surveillance Engineering, Systems Engineering, Single-Shell Tank History File, TPA Integration Control, Approving Managers, Evaluation Performer, and Checker signatures.

* ADDITIONAL SIGNATURES REQUIRED ON LETTER OF JUSTIFICATION.

Figure 2. Interim stabilization Evaluation for Jet-Pumped Tanks

BX-111 Waste Porosity Calculations:

NOTE - All volumes are rounded to the nearest 100 gallons.

Inches of supernatant removed:
manual tape reading at start of pumping..... 79.75 inches
interstitial liquid level*..... 68.0 inches
inches of supernatant removed..... 11.75 inches

Volume supernatant removed:
11.75 inches x 2750 gallons/inch..... 32,300 gallons

Interstitial removed:
total liquid pumped to date..... 116,900 gallons
volume supernatant removed..... 32,300 gallons
total interstitial removed..... 84,600 gallons

Theoretical equivalent interstitial liquid removed at 100% porosity:
interstitial liquid level..... 68.0 inches
dip tube liquid level reading at conclusion of pumping..... 29.3 inches
adjusted liquid level reading**..... 21.3 inches
equivalent interstitial liquid removed = 68.0 - 21.3..... 46.7 inches
volume interstitial removed at 100% porosity =
46.7 inches x 2750 gallons/inch..... 128,400 gallons

Porosity is the ratio of the total interstitial removed to the theoretical equivalent interstitial liquid removed at 100% porosity:

porosity = 84,600 gallons/128,400 gallons..... 0.66 porosity

waste porosity = 66%

* last manual tape reading providing supernatant data is the assumed interstitial liquid level. (to be used in subsequent calculations.)

** dip tubes are 8 inches deeper than manual tape "zero" reading so 8 inches was subtracted from the liquid level reading.

Evaluation Performed By: RANDY L. POWERS Date 03/13/95

Checked By: V C Boyles Date 3/13/95

Figure 2. Interim stabilization Evaluation for Jet-Pumped Tanks

BX-111 DIL, DLR, PLR calculations:

NOTE - Technical definitions can be found in WHC-IP-0842 Section 7.2.

NOTE - All volumes are rounded to the nearest 100 gallons.

Assume sludge, saltcake, and supernatant remain in the tank.

Volume of waste remaining in tank (saltcake, sludge):
adjusted liquid level (see porosity calculations)..... 21.3 inches

volume below 21.3 inches = 21.3 inches x 2750 gallons/inch..... 58,500 gallons
BX-111 has a 12,500 gallon heal..... 12,500 gallons
volume of waste remaining in tank (saltcake, sludge)..... 71,000 gallons

Individual volumes:
sludge volume (ref. WHC-EP-0182-81, 12/31/95)..... 68,000 gallons

saltcake volume = 71,000 gallons - 68,000 gallons..... 3,000 gallons

Sludge DIL, DLR, PLR:
sludge DIL = (sludge volume - sludge capillary height vol.) x porosity
= (68000 - (4 inches x 2750 gal./inch)) x .66..... 1300 gallons

sludge DLR = supernatant + DIL = 1300 + 1300..... 2600 gallons

sludge PLR = DLR - (heal x porosity)
= 2600 - ((18 x 2750) x .66)..... 0 gallons

Saltcake DIL, DLR, PLR:
saltcake DIL = (saltcake volume - saltcake capillary height vol.) x porosity
= (3000 - (12 inches x 2750 gal./inch)) x .66..... 0 gallons

saltcake DLR = supernatant + DIL = 1300 + 0..... 1300 gallons

saltcake PLR = DLR - (heal x porosity) = 1300 - (18 x 2750) x .66....0 gallons

Totals:

DIL = sludge DIL + saltcake DIL = 1300 + 0..... 1300 gallons

DLR = sludge DLR + saltcake DLR = 2600 + 0..... 2600 gallons

PLR = sludge PLR + saltcake PLR + supernatant
= 0 + 0 + 1300..... 1300 gallons

Evaluation Performed By: RALPH L. POWERS Date 3/13/95

Checked By: V C Boyles Date 3/13/95

Interim Stabilization Evaluation for Jet-Pumped Tanks

Letter of Justification for Declaring 241-BX-111 Stabilized

Tank BX-111 has been subject to saltwell pumping since it was declared an Assumed Re-leaker in April 1993. Over 116,000 gallons of liquid waste was removed from the tank prior to a major equipment failure which halted pumping on February 4, 1995. It has been determined that there is approximately 1300 gallons of pumpable liquid remaining in the tank. This remaining liquid is contained on a solid waste surface in a pocket of saltcake at the center of the tank -- It does not impose a threat of leakage into the environment.

It is not economically practical to replace the failed equipment and remove the remaining liquid. It is estimated that it would cost over $40,000 to repair the equipment, and disposal costs for the failed components would be significant. The tank currently meets the established criteria for declaring Single-Shell Tanks interim stabilized as mandated by the Tank Farms Interim Stabilization Evaluation Procedure, WHC-IP-0842 Section 7.2.

In addition, the equipment failure resulted in contamination spread in the saltwell pump pit. Replacement of the failed equipment would subject workers to exposures to high level radioactive waste, which is not compliant with ALARA principles.

This letter of Justification concludes the requirements for declaring Tank 241-BX-111 Interim Stabilized.

Required Signatures:

R. E. Raymond, Manager Waste Tank Plant Engineering

Signature R E Raymond Date 3/14/95

D. M. Lucoff, Manager TWRS Operations Program

Signature D M Lucoff Date 03/14/95

J. L. Lee, Director TWRS Plant

Signature J Lee Date 3/15/95

Page 1 of 2

STABILIZATION EVALUATION
JET PUMPED TANKS

TANK: 112-BX

Reason Jet Pumping Halted:

[X] Meets 0.05 gpm Criteria, Date of Shutdown 8-17-90
[ ] Major Failure of Jet Pump, Date of Shutdown _____

Additional Comments: Band of liquid running across tank. Solids are brownish in color and looks like a mud flat

Evaluation: (See continuation page for calculations and additional comments)

Photograph review completed - Date of most recent photograph 9/11/90
Tank history review completed. [X]
Tank temperature profile reviews completed. [X]
Starting Liquid Level 57.7" Date 7/5/90

Final Liquid Level Measured After Equilibration of Interstitial Liquid:
Dip Tubes 48.6" Date 9/17/90 LOW N/A Date N/A FIC/Manual 55.3" Date 9/17/90

Total Net Jet Pump Production 4,143 gallons
Supernatant volume 1300 gallons Date 9/11/90

Calculated Solid Characteristics:

Porosity 8.5% Permeability/viscosity ($^K/_u$) N/A
Capillary Height 24" Est. Drainable Liquid Remain. 8,100 gallons
Final Avg. Flowrate <.05 gpm Date 9/17/90

Disposition of Tank:

[X] Tank Interim Stabilized at 8,100 gallons of Drainable Liquid Remaining & 2,106 ~~thousand~~ gallons of Pumpable Liquid Remaining.
[ ] Tank Not Interim Stabilized; Jet Pumping Restarted

Evaluation Performed by: VC Boyles Date 9/17/90
Checked by: [signature] Date 9/18/90

APPROVED BY:

Manager, Single-Shell Tanks [signature] Date 9-26-90
Manager, Tank Farm Programs [signature] Date 9-19-90
Manager, Tank Farms [signature] Date 9-26-90

Distribution: SSTPE Tank History File, Defense Waste Safety, Tank Farm Surveillance Analysis & Support, Prepared by Signatures, Managers approval Signature

Page 2 of 2

TANK: 112-BX

EVALUATION CALCULATIONS AND COMMENTS:

Wt. Factor (Final) 65.7" Capillary Ht. for sludge 24"
Spec. Gravity (Final) 1.16

Starting liquid level was 57.7" measured by FIC

Final liq. level measured by dip tube = $\frac{65.7"}{1.16}$ = 56.6" - 8" = 48.6"

Note: The 8" dimension adjusts the zero point on the FIC and dip tubes together. FIC zero is located at the tank sidewall base and the dip tube zero is located 8" lower within 4" of the tank dished bottom.

Supernatant at start = 3,500 gallons
Supernatant Pumped = 2,200 gallons
Supernatant Remaining = 1,300 gallons
} Estimated volumes based from photos

Net Jet Pump Production = Gross vol. pumped - Flush water = 4,723 - 580 = 4,143 gallons

Calculate Porosity = $\frac{\text{Net Jet Pump Volume} - \text{Pumped Supernatant}}{(\text{Starting liq. level} - \text{Pumped Supernatant} - \text{Final liq. level})(2750)}$ =

$= \frac{4,143 - 2,200}{(57.7 - \frac{2200}{2750} - 48.6)(2750)} = .085 = 8\frac{1}{2}\%$

Drainable Interstitial Liquid = (Final liq. level - capillary ht)(Porosity) + (Volume in dished bottom)(Porosity) =
$= (48.6 - 24)(2750)(.085) + 12,500(.085)$
$= 6,800$ gallons (DIL)

Drainable Liquid Remaining = DIL + Supernatant = 6,800 + 1,300 = 8,100 gallons (DLR)

Pumpable Liquid Remaining = DLR - 6,000 = 2100 gallons

Calculations made by VC Boyles Date 9/17/90

Checked by [signature] Date 9/18/90

INTERIM STABILIZATION EVALUATION - JET PUMPED TANKS

Tank: 101-BY

Reason Jet Pumping Halted:

[X] Meets 0.05 gpm Criteria, Date of Shutdown 1-28-84

[ ] Major Failure of Jet Pump, Date of Shutdown _____

Additional Comment:

Evaluation: (See Continuation Sheet for calculations and additional comment)

Starting Liquid Level 162" Date 4-28-83

Supernatant Volume 0 gallons Date 4-28-83

Final Liquid Level Measured After Equilibration of Interstitial Liquid:

Dip Tubes 30.7" Date 4-27-84

LOW _____ Date _____

Manual _____ Date _____

Total Net Jet Pump Production 35,785 gallons

Calculated Solid Characteristics:

Porosity 0.099

Permeability/Viscosity (K/N) –

Capillary Height 12" (assumed)

Estimated Drainable Liquid Remaining 5100 gallons

Final Average Flowrate 0.039 gpm Date 1-26-84

Evaluation Performed by Nancy E Bell Date 5-17-84

Evaluation Checked by ROBERT VAN METER Date 5-17-84

Disposition of Tank:

[X] Tank Interim Stabilized at 5.1 thousand gallons of Drainable Liquid
0 thousand gallons of Pumpable Liquid

[ ] Tank Not Interim Stabilized; Jet Pumping Restarted

Approval By: Manager, TF&EPC R A V A. R. Date 5/15/84

Manager, TFS&O G. J. Dukelow Date 5-16-84

Program Manager K C Kunsle Date 5-22-84

DISTRIBUTION: TF&EPC Tank File, HS&E Surveillance Analysis, Approval Signatures

INTERIM STABILIZATION EVALUATION - JET PUMPED TANKS

(CONTINUATION PAGE)

Evaluation Calculations and Comments

TANK: 101-BY

Current Liquid Level

Date	Weight Factor	Specific Gravity	Liquid Level
4-27-84	37.6	1.41	30.7
5-4	38.6	1.48	30.1
5-11	38.2	1.44	30.5

$$\text{Liquid Level} = \frac{\text{Weight Factor}}{\text{Specific Gravity}} + 4'' = 30.7''$$

Starting Liquid Level = 162"

Starting Supernatant = 0 gallons

Total Net Production = 35,785 gal.

$$\text{Porosity} = \frac{\text{Production}}{(\text{Starting LL} - \text{Current LL}) \times 2750\ \text{gal/in.}} = \frac{35,785}{(162 - 30.7) \times 2750} = 0.099$$

$$\text{Drainable Interstitial Liquid (DIL)} = (\text{Current Liquid Level} - \text{Capillary Height}) \times 2750\ \text{gal/in.} \times \text{Porosity}$$

For saltcake, assume 12" capillary height.

$DIL = (30.7 - 12) \times 2750 \times 0.099 = 5091$ gallons

Pumpable Interstitial Liquid = 0 by definition

Total Drainable Liquid = Supernatant + DIL = 5091

Total Pumpable = Supernatant + PIL = 0

Final Average Flowrate = 0.039 gpm

Final Flowrate at Shutdown = 0.0052 gpm

Calculations by Nancy J Bell Date 5-17-94 Checked by R A Van Note Date 5/17

Figure 2. Interim Stabilization Evaluation for Jet-Pumped Tanks
(Sheet 1 of 2)

TANK: 241-BY-102 Page 1 of 3

Reason Jet Pumping Halted:

I. ✓ Meets 0.05 gpm criteria, Date of Shutdown 03/27/95
II. [ ] Major equipment failure, Date of Shutdown _____

Surface Condition & Comments:
Dry, slumping saltcake with no visible liquid.

Evaluation: (See continuation page for calculations and additional comments)

Photograph review completed - Date of most recent photograph 4/11/95 VIDEO
Tank history review completed. ✓
Tank temperature profile reviews completed. ✓
Starting liquid level 166½ INCHES Method MANUAL TAPE Date 06/12/91
Final liquid level (after equilibration) 30.8 INCHES Method DIP TUBES Date 03/28/95

Total Net Jet Pump Production 158,800 GALLONS
Capillary Height Used in Calculation: 12 INCHES

Final Average Flowrate 0.03 GPM
Calculated Porosity 26 %
Supernatant 0 GALLONS
Drainable Interstitial Liquid 11,000 GALLONS
Drainable Liquid Remaining 11,000 GALLONS
Pumpable Liquid Remaining 0 GALLONS

Disposition of Tank:

✓ Tank Interim Stabilized
[ ] Tank not Interim Stabilized; Jet Pumping Restarted

Evaluation Performed by: Randy L Powers Date 04/25/95
Checked by: VC Boyles Date 4/25/95

APPROVED BY:

Team Lead, Stabilization Engineering VC Boyles Date 4/25/95
Manager, Tank Stabilization & Engineering Support [signature] Date 4/26/95
Manager, SST Stabilization Program [signature] Date 4/26/95
Manager, Tank Farm Operations [signature] for JT Wicks Date 4/27/95

Distribution: Nuclear Facility Safety, Shift/Surveillance Engineering, Systems Engineering, Single-Shell Tank History File, TPA Integration Control, Approving Managers, Evaluation Performer, and Checker signatures.

Figure 2. Interim Stabilization Evaluation for Jet-Pumped Tanks

NOTE - All volumes are rounded to the nearest 100 gallons.

BY-102 Waste Porosity Calculations:

NOTE - Porosity calculations performed on most recent data. (From 2nd major pumping campaign, 5/30/94 - 3/27/95.)

Dip Tube readings 9/22/94:

high	80.9	inches
medium	67.2	inches
SP.G. = (80.9 - 67.2) / 10	1.37	SP.G.
adjusted liquid level = 80.9 / 1.37	59.0	inches

Dip Tube readings 3/28/95:

high	57.0	inches
medium	38.5	inches
SP.G. = (57.0 - 38.5) / 10	1.85	SP.G.
adjusted liquid level = 57.0 / 1.37	30.8	inches

Volume pumped between 9/22/94 and 3/28/95..... 20,200 gallons

Theoretical equivalent interstitial liquid removed at 100% porosity = 59.0 - 30.8..... 28.2 inches

volume interstitial removed at 100% porosity = 28.2 inches x 2750 gallons/inch..... 77,700 gallons

Porosity is the ratio of the total interstitial removed to the theoretical equivalent interstitial liquid removed at 100% porosity:

porosity = 20,200 gallons/77,700 gallons..... 0.26 porosity

waste porosity = 26 %

Evaluation Performed By: Randy L Powers Date 4/25/95

Checked By: VC Boyles Date 4/25/95

Figure 2. Interim Stabilization Evaluation for Jet-Pumped Tanks

BY-102 DIL, DLR, PLR calculations:

Assume - Saltcake and Supernatant remain in the tank.

Volume of waste remaining in tank:

adjusted liquid level (see porosity calculations)	30.8 inches
add 4 inches, dip tubes are 4 inches above tank bottom	34.8 inches
subtract 12 inches for dish bottom (compensate below)	22.8 inches
convert to gallons, 22.8 x 2750	62,700 gallons
add 12,500 gallons to compensate for dish bottom	12,500 gallons
volume of waste remaining in tank	75,200 gallons

DIL, DLR, PLR:

DIL = (saltcake volume - saltcake capillary height vol.) x porosity
= ((75,200 - (12 inches x 2750 gal./inch)) x .26 ..... 11,000 gallons

DLR = supernatant + DIL = 0 + 11,000 ..... 11,000 gallons

PLR = DLR - (unpumpable volume x porosity) =
11,000 - (18 inches x 2750 gal./in x .26).... ..... 0 gallons

Evaluation Performed By: Lonty L Powers Date 4/25/95

Checked By: VC Boyles Date 4/25/95

INTERIM STABILIZATION EVALUATION - JET PUMPED TANKS

Tank 104-BY

Reason Jet Pumping Halted:
Meets 0.05 gpm Criteria, date of shutdown 11/1/84
Major Failure of Jet Pump, date of shutdown _____

Additional Comments:

Evaluation: (see Continuation Sheet for calculations and additional comment)

Starting Liquid Level 7.5 ft Date 4/20/83
Supernatant Volume 315,000 gallons Date 4/20/83

Final Liquid Level measured after equilibration of Interstitial Liquid:

Dip Tubes 48.4 inches Date 1/23/85
LOW N/A Date —
Manual N/A Date —

Total Net Jet Pumped Production 329,500 gallons

Calculated Solid Characteristics:

Porosity .45 (assumed for saltcake)
Permeability/Viscosity (K/N) N/A
Capillary Height 12"-saltcake 24"-sludge (assumed)

Estimated Drainable Liquid Remaining 17,800 gallons
Final Average Flowrate .03 gpm Date 11/1/84
Evaluation performed by [illegible] Date 1/23/85

Disposition of Tank

Tank Interim Stabilized at 17.8 thousand gallons of Drainable Liquid
0 thousand gallons of Pumpable Liquid

Tank not Interim Stabilized; Jet Pumping restarted _____

Approved by: Manager, TF&EPC [signature] Date 1/25/85
Manager, TFS&O [signature] Date 1-25-85
Program Manager [signature] Date 1-25-85

DISTRIBUTION: TF&EPC Tank File, HS&E Surveillance Analysis, Approval Signatures

Figure 2 (cont'd.)

Evaluation Calculations and Comment

Tank: 104 BY

$$L.L. = \frac{W.F.}{(W.F. - SpG)/10} = \frac{92}{(92-73)/10} = 48.4 \text{ inches}$$

Per SR-14 : 40,000 gallons of sludge

$$\text{Inches} = \left(\frac{\text{Volume} - 12500}{2750}\right) + 12 = \frac{(40000 - 12500)}{2750} + 12 = 22 \text{ inches of sludge}$$

48.4 in − 22 in = 26.4 inches of saltcake

Drainable Interstitial in saltcake = $[(26.4)(2750) - 33000] .45 = 17800$ gallons

Drainable Interstitial in sludge = $[(22)(2750) - 66000] .125 = 0$ gallons
(all retained within capillary height for sludge)

Total Drainable Interstitial Remaining = 17,800 gallons

Total Pumpable Remaining = (17,800 − 22500) = 0 gallons

Calculations made by: J Stan Hill

Checked by: T S Vail

INTERIM STABILIZATION EVALUATION

TANK NUMBER: 107-BY EFFECTIVE DATE: 7-31-79

LIQUID LEVEL
INTERSTITIAL ≡ 68"
Based on averaging of liquid level observation well data.

SOLIDS LEVEL & RISER NO. Riser # Not Avail.
125" CO-14
114.5 R-4

EST. SUPERNATE LIQUID VOLUME 0

EST. DRAINABLE INTERSTITIAL LIQUID VOLUME 24,000 gallon*

* Assumes drainability of sludge and salt cake to be 12.5% and 30%, respectively. (18,750 gal. contained in 150,000 gal. (62") of sludge and 4,950 in 6" of salt cake). Per the attached DSI, the interstitial liquid level is =68". The sludge level is estimated to be 62" leaving 6" of drainable liquid contained in the salt cake

TEMPERATURE: Maximum 80° F
Minimum 75° F

IS THIS TEMPERATURE A PROBLEM? yes ____ no X unknown

IS THERE A POTENTIAL DOME LOAD PROBLEM? yes ____ no X

These are small lollipops on the airlift circulators and a thermocouple. The total potential dome load represented by the visible lollipops is estimated to be 3000 pounds.

PHOTOGRAPH EVALUATION: (Order #87079, LL 10' 3", Date 6-21-79)

The surface is 100% dry solids. There appears to be a mound at the center of the tank. There is salt encrusted on the tank wall, and tar can be seen under the flashing and on the tank wall.

COMMENTS: This tank is being jet pumped by the second prototype jet pump. Production rates have dropped below the .05 gpm minimum pump-out criteria established in the Waste Concentration Program Plan, RHO-CD-330. The salt well screen has been flushed to clear any pluggage and the rate has again dropped below criteria. Therefore, this tank meets all criteria for interim stabilization. Prototype neutron and gamma probe data taken in this tank on 6-28-79 indicates a liquid level of 42 ±6". From this it is concluded that the above drainable liquid volume is a conservative estimate.

Prepared By: V. Dennis Mauss

Reviewed By: John H Bailey 7-31-79

INTERIM STABILIZATION EVALUATION - JET PUMPED TANKS

Tank 108-BY

Reason Jet Pumping Halted:
Meets 0.05 gpm Criteria, date of shutdown _____
Major Failure of Jet Pump, date of shutdown 12/9/84

Additional Comments:
Plugged Jet

Evaluation: (see Continuation Sheet for calculations and additional comment)

Starting Liquid Level 99.5 inches Date 12/31/83
Supernatant Volume 700 gallons Date 12/31/83

Final Liquid Level measured after equilibration of Interstitial Liquid:

Dip Tubes 57.1 inches Date 2/4/85
LOW — Date —
Manual — Date —

Total Net Jet Pumped Production 27280 gallons

Calculated Solid Characteristics:

Porosity .125
Permeability/Viscosity (K/N) —
Capillary Height 24 inches (assumed worse case)

Estimated Drainable Liquid Remaining 8800 gallons
Final Average Flowrate .07 Date 12/8/84
Evaluation performed by J Ham Hill Date 2/4/85

Disposition of Tank

Tank Interim Stabilized at 8.8 thousand gallons of Drainable Liquid
0 thousand gallons of Pumpable Liquid

Tank not Interim Stabilized; Jet Pumping restarted _____

Approved by: Manager, TF&EPC [signature] Date 2-5-85
Manager, TFS&O [signature] Date 2-6-85
Program Manager [signature] Date 2-6-85

DISTRIBUTION: TF&EPC Tank File, HS&E Surveillance Analysis, Approval Signatures

Figure 2 (cont'd.)

Evaluation Calculations and Comment

Tank: 108-BY

$L.L. = \frac{WF}{(WF-SpG)/10} = \frac{80}{(80-66)/10} = 57.1$ inches

Tank contents of 154,000 gallons of sludge

inches of sludge = $\frac{(154,000-12600)}{2760} + 12 = 63.5$ in

All liquid is in sludge

Volume of sludge with liquid = $(57.1-12)(2750)+12500 = 136,500$ gallons

D.I. = $(136,500-66000).125 = 8800$ gallons

Calculations made by: J Stan Hill

Checked by: Terry S Vail

INTERIM STABILIZATION EVALUATION - JET PUMPED TANKS

Tank 110-BY

Reason Jet Pumping Halted:
Meets 0.05 gpm Criteria, date of shutdown 12/23/84
Major Failure of Jet Pump, date of shutdown _____

Additional Comments:

Evaluation: (see Continuation Sheet for calculations and additional comment)

Starting Liquid Level 190.8 Date 5/20/84
Supernatant Volume 101,000 gallons Date 5/20/84

Final Liquid Level measured after equilibration of Interstitial Liquid:

Dip Tubes 60" Date 1/23/85
LOW N/A Date —
Manual N/A Date —

Total Net Jet Pumped Production 213,300 gallons

Calculated Solid Characteristics:

Porosity .13
Permeability/Viscosity (K/N) —
Capillary Height 12" saltcake 24" sludge (assumed)

Estimated Drainable Liquid Remaining 8500
Final Average Flowrate .02 Date 12/23/84
Evaluation performed by J. Ham Hill Date 1/24/85

Disposition of Tank

Tank Interim Stabilized at 8.5 thousand gallons of Drainable Liquid
0 thousand gallons of Pumpable Liquid

Tank not Interim Stabilized; Jet Pumping restarted _____

Approved by: Manager, TF&EPC [signature] Date 1/25/85
Manager, TFS&O [signature] Date 1-25-85
Program Manager [signature] Date 1-25-85

DISTRIBUTION: TF&EPC Tank File, HS&E Surveillance Analysis, Approval Signatures

Figure 2 (cont'd.)

Evaluation Calculations and Comment

Tank: 110-BY

Amount of Liquid Pumped Since Last Manometer Readings = 3220 gallons
Liquid Level Decrease in manometer readings: (69" - 60") = 9"

$$\text{Porosity} = \phi = \frac{3220}{9(2750)} = .13$$

44.9 - inches of sludge (103,000 gallons)

inches of saltcake = (60 - 44.9) = 15.1 inches

Volume of saltcake = (15.1)(2750) = 41,500 gallons

Drainable Interstitial in Sludge = (103,000 - 66,000)(.13) = 4810 gallons

Drainable Interstitial in Saltcake = (41,500 - 33000)(.13) = 1105 gallons

Total Drainable Interstitial = 4810 + 1105 = 5915 gallons

Pumpable Liquid Remaining: (4810 → 0 / 6500) + (1105 → 0 / 22500) = 0

Sludge Saltcake

Calculations made by: J. Stan Hill

Checked by: T. S. Vail

INTERIM STABILIZATION EVALUATION - JET PUMPED TANKS

Tank 111-BY

Reason Jet Pumping Halted:
Meets 0.05 gpm Criteria, date of shutdown 11/16/84
Major Failure of Jet Pump, date of shutdown —

Additional Comments:

Evaluation: (see Continuation Sheet for calculations and additional comment)

Starting Liquid Level 20.02' Date 8/31/83
Supernatant Volume Not Available Date —

Final Liquid Level measured after equilibration of Interstitial Liquid:

Dip Tubes 27.4" Date 1/23/85
LOW — Date —
Manual — Date —

Total Net Jet Pumped Production 313,200 gallons

Calculated Solid Characteristics:

Porosity .46 (assumed for saltcake)
Permeability/Viscosity (K/N) —
Capillary Height 12-inches saltcake + 24-inches sludge

Estimated Drainable Liquid Remaining 0
Final Average Flowrate .01 Date 11/16/84
Evaluation performed by J Tom Hill Date 1/24/85

Disposition of Tank

Tank Interim Stabilized at 0 thousand gallons of Drainable Liquid
0 thousand gallons of Pumpable Liquid

Tank not Interim Stabilized; Jet Pumping restarted —

Approved by: Manager, TF&EPC [signature] Date 1/25/85
Manager, TFS&O [signature] Date 1-25-85
Program Manager [signature] Date 1-25-85

DISTRIBUTION: TF&EPC Tank File, HS&E Surveillance Analysis, Approval Signatures

Figure 2 (cont'd.)

Evaluation Calculations and Comment

Tank: 111-BY

By manometers, liquid level = 27.4"

per SR-14 15.1" sludge (21,000 gallons)

∴ 27.4 - 15.1 = 12.3 inches of saltcake

Capillary height of saltcake = 12 inches

Capillary height of sludge = 24 inches

∴ Drainable interstitial in sludge and saltcake = 0 gallons

since the amount of liquid in each substance is less than the capillary height.

Calculations made by: J. Stan Hill

Checked by: T. S. Vail

INTERIM STABILIZATION EVALUATION - JET PUMPED TANKS

Tank: 112-BY

Reason Jet Pumping Halted:

[X] Meets 0.05 gpm Criteria, Date of Shutdown 5-7-84

[ ] Major Failure of Jet Pump, Date of Shutdown _____

Additional Comment:

Shut down with flowmeter problem

Evaluation: (See Continuation Sheet for calculations and additional comment)

Starting Liquid Level 118.0 " Date 4-28-82

Supernatant Volume 3000 gallons Date 4-28-82

Final Liquid Level Measured After Equilibration of Interstitial Liquid:

Dip Tubes 18.7 " (maximum) Date 5-29-84

LOW _____ Date _____

Manual _____ Date _____

Total Net Jet Pump Production 116,402 gallons

Calculated Solid Characteristics:

Porosity 0.42

Permeability/Viscosity (K/N) —

Capillary Height 12" (assumed)

Estimated Drainable Liquid Remaining 7700 gallons

Final Average Flowrate 0.038 gpm Date May4-6, 1984

Evaluation Performed by Nancy J Bell Date 6-11-84

Evaluation Checked by K A Van Pelt Date 6-13-84

Disposition of Tank:

[X] Tank Interim Stabilized at 7.7 thousand gallons of Drainable Liquid
0 thousand gallons of Pumpable Liquid

[ ] Tank Not Interim Stabilized; Jet Pumping Restarted

Approval By: Manager, TF&EPC BMJ _____ Date 6/12/84

Manager, TFS&O _____ Date 6-13-84

Program Manager _____ Date 6-13-84

DISTRIBUTION: TF&EPC Tank File, HS&E Surveillance Analysis, Approval Signatures

INTERIM STABILIZATION EVALUATION - JET PUMPED TANKS

(CONTINUATION PAGE)

Evaluation Calculations and Comments

TANK: 112-BY

Current Liquid Level	Date	Weight Factor	Specific Gravity	Liquid Level
	5-14-84	17.1	1.26	17.6
	5-23-84	14.8	1.38	14.8
	5-29-84	14.7	1.00	18.7
			(if 1.3 is used,	15.3)

$$\text{Liquid Level} = \frac{\text{Weight Factor}}{\text{Specific Gravity}} + 4 = 18.7'' \text{ (maximum)}$$

Starting Liquid Level = 118.0"

Starting Supernatant = 3000 gal

Starting Solids Level = $118.0 - \frac{3000 \text{ gal}}{2750 \text{ gal/in}} = 116.9''$ (Starting Interstitial Liquid Level)

Total Net Production = 116,402 gal.

$$\text{Porosity} = \frac{\text{Total Net Production} - \text{Supernatant}}{(\text{Starting Solid Level} - \text{Current Liquid Level}) \times 2750 \text{ gal/in.}}$$

$$= \frac{116{,}402 - 3{,}000}{(116.9 - 18.7) \times 2750} = 0.42$$

Drainable Interstitial Liquid (DIL) = (Current Liquid Level − Capillary Height) × 2750 gal/in × Porosity

For salt cake, assume 12" capillary height.

DIL = (18.7 − 12) × 2750 × 0.42 = 7739 gal.

Pumpable Interstitial Liquid = 0 by definition

Final Supernatant = 0

Total Drainable Liquid = 7739 gal.

Total Pumpable Liquid = 0

Final Flowrate (Average) = 0.838 gpm

Calculated by Nancy Bell Date 6-11-84

Checked by R.L. Van Liete Date 6-12-84

INTERIM STABILIZATION EVALUATION - NON-JET PUMPED TANKS

Tank: 101 C

Evaluation (see Continuation Page for calculations and additional comments):

[X] Photograph review completed - Date of most recent photographs 9/25/74

[X] Tank history review completed

[X] Tank temperature profile review completed

Surface Description: 1974 Photos show sludge surface with shallow pools of liquid. More recent photos have been too hazy even though a portable exhauster was used. Date 1974

Solids Level 27 1/2" Date 10/31/83 Method manual tape

Liquid Level 27 1/2 " Date 10/31/83 Method manual tape

Solids Volume 88,000± gallons.

Estimated Drainable Liquid Volume 2800 gal

Average Maximum Tank Temperature, past 6 months 97°F

Estimated Supernatant Volume 0 gallon

[ ] Cost/Benefit Analysis attached

Evaluation Performed by N Bell Date 11/15/83 Checked by TDK Date 11/16/83

Disposition of Tank:

[X] Tank Interim Stabilized at 2800 gallons of drainable liquid

[ ] Tank not Interim Stabilized; stabilization activities resumed

Approved by: Manager, TF&EPC R. A. Van Meter Date 11/16/83

Manager, TFS&O D. Y. Duncan Date 11-28-83

Program Manager R. A. Kinsel Date 11-29-83

DISTRIBUTION: TF&EPC Tank File, Tank Farm Surveillance Analysis, Approval Signatures

INTERIM STABILIZATION EVALUATION - NON-JET PUMPED TANKS

(CONTINUATION PAGE)

Evaluation Calculations and Comments — Calculations made by M E Bell

TANK: 101 C — Checked by D. D. Kilgrich

Liquid level = 27.5"

Photos indicate the solids level is equal to liquid level. The only central riser has a saltwell screen installed and is weathercovered so current solids level measurements are not possible.

Supernatant Liquid = 0 gal.

Solids Volume = 27.5 in. x 2750 gal./in. + 12,500 gal
= 88,000 gal.

Drainable Interstitial Liquid = (Solids - Capillary Height x 2750 gal./in.) x Porosity = DIL

For sludge, capillary height is estimated to be 24" and porosity is 0.125.
DIL = (88,000 - 24 x 2750) x 0.125 = 2750 gal.

For the worst case (assuming sludge acts like saltcake which has a capillary height of 12" and a porosity of 0.45),
DIL = (88,000 - 12 x 2750) x 0.45 = 24,750 gal.
This valve is below the criterion for jet pumping.

Drainable Liquid Volume = DIL + Supernate = 2750 gal.

Single Shell Tank Interim Stabilization Evaluation Form

TANK: 241-C-102 Page 1 of 6

Reason Jet Pumping Halted:

[ ] Meets 0.05 gpm criteria, Date of Shutdown ____
[X] Major equipment failure, Date of Shutdown 07/15/95

Surface Condition & Comments: WASTE APPEARS LIGHT BROWN IN COLOR, WITH NO VISIBLE LIQUID IN THE TANK. WASTE IS SLOPED AWAY FROM THE TANK WALLS AND HAS LARGE CRACKS. THE SALTWELL SCREEN IS COMPLETELY DRY AT THE SURFACE. THE FIC IS LOCATED IN A LARGE MOUND OF WASTE, APPROXIMATELY THREE FEET ABOVE THE SURFACE.

Evaluation: (See continuation page for calculations and additional comments)

Photograph review completed - Date of most recent photograph 08/24/95
Tank history review completed. [X]
Tank temperature profile reviews completed. [X]
(Jet) Starting Liquid Level 149.4 IN Method FIC Date 11/18/91
Final liquid level 82.3 IN Method DIP TUBES Date 08/15/95

(All exc. Aux) Total Net Pumped Volume 46.7 KGAL
(Jet) Capillary Height Used in Calculation 24 IN
Final Solids Volume 315.8 KGAL
(Jet) Final Average Flowrate 0.33 GPM.
(Jet) Calculated Porosity 26%
Supernatant Ø KGAL
(All exc. Aux) Drainable Interstitial Liquid 30.2 KGAL
(All exc. Aux) Drainable Liquid Remaining 30.2 KGAL
(All exc. Aux) Pumpable Liquid Remaining 17.3 KGAL
(Jet & Aux) [X] Justification letter attached

Disposition of Tank:

[X] Tank Interim Stabilized
[ ] Tank Not Interim Stabilized; Restart Pumping

Evaluation Performed by: D. A. Bragg Date 09/18/95
Checked by: V. C. Boyles Date 9/18/95

APPROVED BY:

Team Lead, Stabilization Engineer V C Boyles Date 9/18/95
Manager, Interim Stabilization Engineering [signature] Date 9/18/95
Manager, East or West Tank Farm Transition Project [signature] Date 9/21/95

Distribution: TWRS Nuclear Safety, Surveillance Engineering, Systems Engineering, Single Shell Tank History File, TPA Integration Control, Approving Managers, Evaluation Performer, Team Lea and Checker signatures.

Figure 2. Interim Stabilization Evaluation for Jet-Pumped Tanks (Sheet 2 of 6)

EVALUATION CALCULATIONS AND COMMENTS: TANK 241-C-102

PUMPING DATA: Campaign I (11/19/91 - 01/21/92)

Net volume pumped from 11/91 to 01/92 = 10,485 gal

Starting Surface Level 11/18/91 (FIC) = LL_{start} = 149.4 in
Ending Surface Level (FIC) 01/27/92 = LL_{end} = 149.0 in
Decrease in Surface Level = LL_{delta} = (LL_{start} - LL_{end}) = 0.4 in

Note that the above surface levels were based on FIC readings taken in Campaign I, before and after pumping. These readings do not provide adequate data for determination of the interstitial liquid levels (ILL) corresponding with the volume of liquid pumped. Without sufficient data, the ILL, waste porosity, and the estimated liquid remaining in the tank can not be estimated.

The final interstitial liquid level, waste porosity, and the estimated liquid remaining in the tank will be determined based on data collected during the second pumping campaign.

PUMPING DATA/CALCULATIONS Campaign II (09/28/94 - 07/15/95)

Net volume pumped from 09/94 to 07/95 = P_{net} = 36,243 gal
Estimated supernatant pumped = S_{total} = 0 gal

Waste Surface level beginning of pumping 07/01/94 (FIC) = 149.0 in
Waste Surface level after pumping 08/14/95 (FIC)* = 146.3 in
Decrease in Waste Surface Level = 2.7 in

Final Solids Volume Estimate, based on FIC reading* and video depicting irregular surface = (146.3 - 36) in * (2,750) gal/in + 12,500 gal
= 315,825 gal

* Note that the FIC is located on top of a mound of waste approximately 3 feet above the waste surface. Consequently, for estimating the final solids volume, 36 inches were subtracted from the FIC reading.

Evaluation performed by: D. A. Bragg Date 09/18/95
Checked by: VC Boyles Date 9/18/95

Figure 2. Interim Stabilization Evaluation for Jet-Pumped Tanks (Sheet 3 of 6)

EVALUATION CALCULATIONS AND COMMENTS: TANK 241-C-102

PUMPING DATA/CALCULATIONS Campaign II (09/28/94 - 07/15/95) (continued)

Interstitial liquid level 08/29/94 (Diptubes)

Weight Factor$_{ave\ start}$ = 101.3 in Specific Gravity$_{start}$ = 1.14
WF/SpG = 101.3/1.14 = 88.9 in
Adjusted liquid level = LL = (88.9 + 16.0**) in = 104.9 in

Interstitial liquid level 08/15/95 (Diptubes)

Weight Factor$_{end}$ = 75.6 in Specific Gravity$_{end}$ = 1.14
WF/SpG = 75.6/1.14 = 66.3 in
Adjusted ending liquid level = LL$_{end}$ = (66.3 + 16.0**) in = 82.3 in

Decrease in Interstitial Liquid Level = LL$_{delta}$ = (LL$_{start}$ - LL$_{end}$) = 22.6 in

WASTE POROSITY

Tank 241-C-102 was plagued throughout both pumping campaigns with problems of plugged diptubes (required for interstitial liquid levels) and plugged foot valves. These problems were not easy to overcome given the nature of the waste inside the tank and the fact that 241-C-102 is located within a controlled zone requiring personnel to wear supplied air equipment, making routine maintenance more difficult. This situation made it hard to obtain adequate and reliable data to determine waste porosity.

Due to the lack of liquid level data during the first pumping campaign, the liquid level data and volumes pumped during the second campaign will be used for determining the waste porosity.

The 241-C-102 pump operated only 6 days between September 28, 1994, and May 12, 1995, because of equipment problems associated with waste pluggage. Because of the additional flush water added and the extended down time, it is believed that porosity calculations for this period are highly unreliable. Consequently, no porosity calculations will be performed for this time period. Tank 241-C-102 resumed pumping on May 13, 1995, and operated nearly continuously until equipment failure on July 15, 1995. The most credible liquid level data was obtained between May 01, 1995, and June 20, 1995.

Porosity = (Net volume pumped - supernatant pumped) gal/{[Total decrease in liquid level - decrease in liquid level due to supernatant pumped in] * 2,750 (gal/in)}

** The diptubes are 16 inches higher than the manual tape "zero" reading so 16 inches were added to the liquid level reading.

Evaluation performed by: D.A. Brazz Date 09/18/95
Checked by: VC Boyles Date 9/18/95

Figure 2. Interim Stabilization Evaluation for Jet-Pumped Tanks (Sheet 4 of 6)

EVALUATION CALCULATIONS AND COMMENTS: TANK 241-C-102

WASTE POROSITY (continued)

During the second pumping campaign, between 05/01/95 and 06/20/95, 17,668 gallons were pumped from C-102. The interstitial liquid level decreased by 24.9 inches during this period.

P_{net} = 17,668 gallons, estimated supernatant pumped = S_{total} = 0 gallons
Porosity = 17,668 gallons/[(24.9 in) * (2,750 gal/in)] = 26%

DIL, DLR, PLR CALCULATIONS

In Tank 241-C-102, the saltwell screen was reduced in length by 24 inches because of installation problems, bringing the diptubes 16 inches above the tank datum. The pumpable liquid remaining volume takes into account the shortened saltwell screen.

ASSUMPTIONS: The waste above the final Interstitial Liquid Level does not contain pumpable liquid.

Adjusted ending liquid level = LL_{end} = (66.3 + 16.0**) in = 82.3 in

Total waste volume (below interstitial liquid level I.L.L.) = [(82.3 in)*(2,750 gal/in) + 12,500 gal (dish bottom tank)] = 238,825 gal

Drainable Interstitial Liquid (DIL) = (Total Waste below I.L.L. - unpumpable column due to shorter screen - capillary height for sludge tank) * porosity = (Waste Volume below ILL - 12,500 gal - (16 in)*(2,750 gal)- [(24 in)*(2,750 gal/in)])*(0.26)

DIL = {(238,825 gal) - 12,500 gal - [(40 in)*(2,750 gal/in)]}*(0.26) = 30,244 gal

Drainable Liquid Remaining (DLR) = DIL + Remaining Supernatant
Supernatant = 0 kgal; DLR = DIL = 30,244 gal

Pumpable Liquid Remaining (PLR) = DLR - [(unpumpable height) * porosity]
= 30,244 - [(18 in)*(2,750 gal/in)*(0.26)] = 17,374 gal = 17.3 kgal

The volume of pumpable liquid remaining in 241-C-102 is estimated as 17.3 kgal.

** The diptubes are 16 inches higher than the manual tape "zero" reading so 16 inches were added to the liquid level reading.

Evaluation performed by: D A Braaf Date 09/18/95
Checked by: V C Boyles Date 9/18/95

Figure 2. Interim Stabilization Evaluation for Jet-Pumped Tanks (Sheet 5 of 6)

Letter of Justification for Declaring 241-C-102 Stabilized

Saltwell pumping of Tank 241-C-102 resumed on September 28, 1994, after a two year hiatus. This hiatus was the result of a noxious vapor incident in the BX/BY and C Farms and subsequent administrative reviews of conduct of operations in the tank farms. A total of 46,700 gallons of liquid waste was removed from the tank prior to a major equipment failure which halted pumping on July 15, 1995. This volume pumped includes both the 1991-1992, and the 1994-1995 campaigns. There is approximately 17,300 gallons of pumpable liquid remaining in the tank.

Repairs required to resume pumping at 241-C-102 would include replacement of the jetpump lower leg assembly, and the pressure switch. However, it is not economically practical to replace the failed equipment and remove the remaining liquid. It is estimated that it would cost $70,000 to replace the equipment and meet waste disposal costs at 241-C-102. This task was already performed once at 241-C-102, in May, 1995. The new foot valve replacement remained functional for approximately 8 weeks before failing, despite higher pump flow rates (0.75 - 1.4 gpm) and regular flushes with hot water.

The average infiltration flow rate of liquid into the saltwell screen at 241-C-102 decreased to 0.33 gpm or 237 gpd, during the final week of pumping. At 100% pump efficiency and a constant flow rate of 0.33 gpm, it would take over 11 weeks to remove the remaining pumpable liquid from the tank. However, infiltration rates and consequently flow rates, decrease with time as the interstitial liquid level drops. The actual estimated time to remove the remaining pumpable liquid from 241-C-102, based on expected saltwell infiltration rates, is 22 weeks, not accounting for any major equipment problems or operational delays. There is a very high probability of foot valve failure before pumping can be completed at 241-C-102 based on past experience in this tank.

At low pump flow rates (less than 0.4 gpm), 300 - 400 gallons of flush water will be added to the waste stream to maintain the 241-C-102 transfer system operable during each week that pumping would be ongoing. In the last week the 241-C-102 pump operated in the second campaign, a total of 450 gallons of flush water was required to maintain the transfer system operable. During that time, a total of 1,400 gallons of tank waste was pumped. If pumping were restarted, this would result in adding between 6,600 and 8,800 gallons of flush water to the waste stream to remove the remaining pumpable liquid (17,300 gallons) from 241-C-102. Given the probability of pluggage in the foot valve, the required flush water volume may exceed the above estimate by double, or a third foot valve failure may occur. The required water addition to the waste stream is not compliant with ALARA principles.

In addition, if the foot valve does fail, the jetpump lower leg assembly would have be replaced, which requires the pump and pump plate to be lifted approximately 40 feet into the air. Tank 241-C-102 is located inside a zone requiring personnel to wear fresh-air supplied equipment, which results in increased hazards and exposure time to facilitate repairs. Workers received approximately 200 mrem exposure during the May, 1995 replacement of the jetpump lower leg assembly.

Figure 2. Interim Stabilization Evaluation for Jet-Pumped Tanks (Sheet 6 of 6)

Letter of Justification for Declaring 241-C-102 Stabilized (continued)

Another concern in resuming pumping operations at 241-C-102 is the high probability for pluggage in the main-header transfer line SN-275. The transfer line is unique in that it runs uphill from the C Farm Valve Pit to the receiver vessel by approximately 12 feet. In one section alone, the line raises nearly vertically by 10 feet. This transfer line became obstructed on March 28, 1995, and was not successfully cleared until early May, 1995. A water ram was attached to the main header where it enters the C Farm Valve Pit to clear the line. The cost to clear this line was over $41,000, involved a 46 day delay in pumping operations, added 1,000 gallons of flush water to the waste stream, and exposed workers to 50 mrem of exposure. Note that the line became obstructed with two pumps in operation, pumping a combined average of 0.56 gallons of liquid in the 3" pipe. Flow rates from C-102 are expected to decrease below 0.33 gpm within two weeks of resumed pumping. An aggressive flush schedule will be required to maintain the header unobstructed at low flow rates, increasing the amount of water added to the receiver vessel. This transfer line will be reused for stabilization activities during the pumping of 241-C-103 which contains an estimated 133,000 gallons of pumpable liquid.

With the line pluggage, ALARA and cost concerns, it is recommended the tank be declared interim stabilized on the basis of major equipment failure as mandated by the Tank Farms Interim Stabilization Evaluation Procedure, WHC-IP-0842, Volume IV, Section 4.1.

This letter of justification concludes the requirements for declaring Tank 241-C-102 interim stabilized.

Required Signatures:

Judith Burton
~~T. Morton,~~ Manager Interim Stabilization Project

Signature Judith Burton Date 9/21/95

W. E. Ross, Manager East Tank Farms Transition Project

Signature [signature] Date 9/21/95

J. H. Wicks, Director, Tank Farms Transition Project

Signature [signature] Date 21Sep95

STABILIZATION EVALUATION
NON-JET PUMPED TANKS

TANK: 241-C-104

EVALUATION (see continuation page for calculations and additional comments):

[X] Photograph review completed - Date of most recent photographs: 4-14-88

[X] Tank history review completed

[X] Tank temperature profile review completed

Surface Description: 1988 photos indicate dry sludge-dark, dry cracked clay like surface with no apparent supernatant. 1983 photos indicate a small liquid puddle under the photography riser and 1988 photos show the area dry. Date 9-22-89

Solids Level 102.7 Date 9-19-89 Method FIC/Photographs

Liquid Level -- Date -- Method --

Solids Volume 294,925

Estimated Drainable Liquid Remaining Volume 10,912 gallon

Average Maximum Tank Temperature, past 6 months 87°F

Estimated Supernatant Volume 0

[NA] Cost/Benefit Analysis attached

Evaluation Performed by DK Boyle Date 9/26/89 Checked by [illegible] Date 9/26/89

DISPOSITION OF TANK:

[X] Tank Interim Stabilized at 10,912 gallons of drainable liquid remaining

[ ] Tank not Interim Stabilized; stabilization activities resumed

APPROVED BY:

Manager, Single-Shell Tanks DK RE Raymond Date 9/22/89

Manager, Tank Farm Programs WJ Winkenfelder Date 9/25/89

Manager, Tank Farms [illegible] Date 9/26/89

DISTRIBUTION: SST Tank File, Tank Farm Surveillance Analysis & Support, Defense Waste Safety Section, Approval Signatures

TANK: 241-C-104

EVALUATION CALCULATIONS AND COMMENTS:

Tank 241-C-104 will be stabilized based on the core sample data taken during April 1986 and on photographs taken on April 14, 1988.

Documents SD-RE-TI-101 and WHC-CM-5-7 section 1.11 allows the use of core sample data to determine the remaining drainable interstitial liquid in the tank. A core sample was obtained during April 1986 and the results were published in document SD-RE-TI-199. The liquid content data of each core segment was taken from this document and the tank liquid volume was calculated. The results show little or no drainable liquid in the upper 82 inches of the tank and 1,935 gallons, representing a 3.7% porosity, in the lower 19 inch segment. For a conservative estimate in this evaluation, the 3.7% was assumed throughout the tank. Using this porosity gives a current estimate of potentially drainable liquid in the tank at 10,912 gallons. Normally the bottom 12 inches of the waste is assumed to be non drainable per SD-RE-TI-101 and WHC-CM-5-7, but due to the nature of core sampling, no allowance will be made for capillary action in the stabilization evaluation.

Comparison of in-tank photographs taken in tank 241-C-104 on November 11, 1983 and April 14, 1988, indicate the surface of the waste material has dried. The waste surface in 1983 was a wet muddy appearing material with isolated puddles of liquid. Since that time, the surface has become dry and cracked (4/88 photos). Photos taken in 1983 indicate the tank had about a 75% solid surface at 102.7 inches. The 1988 photos show considerable drying. The 102.7 inch reading carried in the waste status summary was used to conservatively determine total waste volume in this evaluation.

The WHC-CM-5-7 guideline states that photos under three months old must be used. Photos used in this evaluation are 17 months old and their use is justified based on a review of level monitoring data indicating that no liquid intrusions have occurred in the last 17 months. For this reason, the three month guideline will be waived.

Total Waste = (Solids Level) (2750) + 12,500 (dished bottom)
= (102.7 in) (2750 gal/in) + 12,500 gallons
= 294,925 gallons

Solids Volume = Total Waste - Supernatant Volume
= 294,925 - 0 = 294,925 gallons

Drainable Interstitial Liquid (DIL) = (Total Waste) (3.7% porosity)
= 10,912 gallons

Note: A capillary height of 12" is waived in this calculation.

Drainable Liquid Remaining = DIL + Supernatant
= 10,912 + 0
= 10,912 gallons

Calculations made by V C Boyle Date 9/22/89

Checked by R A Bunnell Date 9/22/89

Single Shell Tank Interim Stabilization Evaluation Form

TANK: 241-C-105 Page 1 of 2

Reason Jet Pumping Halted: N/A

[ ] Meets 0.05 gpm criteria, Date of Shutdown N/A
[ ] Major equipment failure, Date of Shutdown N/A

Surface Condition & Comments: THE WASTE SURFACE, WHICH IS LIGHT YELLOW IN COLOR, APPEARS FLAT & UNIFORM. A FIVE TO EIGHT FOOT WIDE SHORELINE OF SOLIDS SURROUNDS A BROWNISH LIQUID POOL APPROXIMATELY ONE INCH DEEP. THE FIC IS IN CONTACT WITH A SOLIDS WASTE SURFACE.

Evaluation: (See continuation page for calculations and additional comments)

Photograph review completed - Date of most recent photograph VIDEO 08/30/95
Tank history review completed. [X]
Tank temperature profile reviews completed. [X]

(Jet) Starting Liquid Level 48.0 in Method FIC Date 05/07/93
Final liquid level 44.0 in Method FIC Date 10/25/95

(All exc. Aux) Total Net Pumped Volume NO LIQUID PUMPED. LIQUID EVAPORATED = 11.3 kgal
(Jet) Capillary Height Used in Calculation 24 in
Final Solids Volume 131.5 kgal
(Jet) Final Average Flowrate N/A
(Jet) Calculated Porosity 45% PER REQUIREMENTS OF WHC-IP-0842, VOL IV SECTION 4.1.
Supernatant 2.0 kgal
(All exc. Aux) Drainable Interstitial Liquid 29.5 kgal
(All exc. Aux) Drainable Liquid Remaining 31.5 kgal
(All exc. Aux) Pumpable Liquid Remaining 9.2 kgal
(Jet & Aux) [ ] Justification letter attached

Disposition of Tank:

[X] Tank Interim Stabilized
[ ] Tank Not Interim Stabilized; Restart Pumping

Evaluation Performed by: David Bragg Date 10/26/95

Checked by: VC Boyle Date 10/30/95

APPROVED BY:

Team Lead, Stabilization Engineering VC Boyle Date 10/30/95
Manager, Interim Stabilization Engineering [signature] Date 10/30/95
Manager, East or West Tank Farm Transition Project [signature] Date 10/31/95

Distribution: TURS Nuclear Safety, Surveillance Engineering, Systems Engineering, Single Shell Tank History File, TPA Integration Control, Approving Managers, Evaluation Performer, Team Lea: and Checker signatures.

Figure 2. Interim Stabilization Evaluation for Jet-Pumped Tanks (Sheet 2 of 2)

EVALUATION CALCULATIONS AND COMMENTS: TANK 241-C-105

SURFACE LEVEL DATA: (05/93 - 10/95)

Net volume evaporated from 241-C-105 between 05/93 to 10/95 = 12,000 gal

Starting Surface Level 05/07/93 (FIC) = LL_{start} = 48.0 in
Ending Surface Level (FIC) 10/23/95 = LL_{end} = 44.0 in
Decrease in Surface Level = LL_{delta} = (LL_{start} - LL_{end}) = 4.0 in

Final Solids Volume = (44.0) in * (2,750) gal/in - 2,000 gal supernatant + 12,500 gal = 131.5 kgal

No jetpumping has occurred in 241-C-105, nor does interstitial liquid level data exist for this tank. There are no diptubes or LOWs installed in the tank. The drainable and pumpable liquid remaining estimates will be based conservatively on a waste porosity of 45%, per the requirements of WHC-IP-0842, Volume IV, Section 4.1, Paragraph 5.2.

DIL, DLR, PLR CALCULATIONS

Total waste volume = Final Solids Volume + supernatant = (131,225 + 2,000) gal = 133.5 kgal

Drainable Interstitial Liquid (DIL) = (Total Waste - capillary height for sludge tank - supernatant) * porosity = (Liquid Waste Volume - [(24 in)*(2,750 gal/in)] - 2,000 gal)*(0.45)

DIL = {(133,500 gal) - [(24 in) * (2,750 gal/in)] - 2,000 gal} * (0.45) = (133,500 - 68,000) * (0.45) = (65,500) * (0.45) = 29,475 gal = = 29.5 kgal

Drainable Liquid Remaining (DLR) = DIL + Remaining Supernatant

Supernatant = 2 kgal

DLR = DIL + 2,000 gal = 31,475 gal = 31.5 kgal

Pumpable Liquid Remaining (PLR) = DLR - [(unpumpable height) * porosity] = 31,475 gal - [(18 in)*(2,750 gal/in)*(0.45)] = 9,200 gal = 9.2 kgal

The volume of pumpable liquid remaining in 241-C-105 is estimated as 9.2 kgal.

Evaluation performed by: David Bragg Date 10/26/95
Checked by: VC Boyles Date 10/30/95

Single Shell Tank Interim Stabilization Evaluation Form

TANK: 241-C-107 Page 1 of 7

Reason Jet Pumping Halted:

[ ] Meets 0.05 gpm criteria, Date of Shutdown ____
[X] Major equipment failure, Date of Shutdown 07/28/95

Surface Condition & Comments: PHOTO/VIDEO NOT AVAILABLE. SEE THE ATTACHED LETTER.

Evaluation: (See continuation page for calculations and additional comments)

Photograph review completed - Date of most recent photograph SEE ATTACHED LETTER
Tank history review completed. [X]
Tank temperature profile reviews completed. [X]
(Jet) Starting Liquid Level 105.2 IN Method FIC Date 11/19/91
Final liquid level 67.5 IN Method DIPTUBES Date 08/22/95

(All exc. Aux) Total Net Pumped Volume 40.8 kgal
(Jet) Capillary Height Used in Calculation 24 IN
Final Solids Volume 237 kgal
(Jet) Final Average Flowrate 0.13 gpm
(Jet) Calculated Porosity 18.1%
Supernatant Ø kgal
(All exc. Aux) Drainable Interstitial Liquid 24 kgal
(All exc. Aux) Drainable Liquid Remaining 24 kgal
(All exc. Aux) Pumpable Liquid Remaining 15 kgal
(Jet & Aux) [X] Justification letter attached

Disposition of Tank:

[X] Tank Interim Stabilized
[ ] Tank Not Interim Stabilized; Restart Pumping

Evaluation Performed by: D A Bragg Date 08/28/95

Checked by: VC Boyles Date 8/29/95

APPROVED BY:

Team Lead, Stabilization Engineer VC Boyles Date 8/29/95
Manager, Interim Stabilization Engineering [signature] Date 9/11/95
Manager, East or West Tank Farm Transition Project [signature] Date 9/13/95

Distribution: TWRS Nuclear Safety, Surveillance Engineering, Systems Engineering, Single Shell Tank History File, TPA Integration Control, Approving Managers, Evaluation Performer, Team Lead and Checker signatures.

Figure 2. Interim Stabilization Evaluation for Jet-Pumped Tanks (Sheet 2 of 7)

EVALUATION CALCULATIONS AND COMMENTS: TANK 241-C-107

PUMPING DATA: Campaign I (11/19/91 - 01/28/92)

Net volume pumped from 11/91 to 01/92 = 16,214 gal

Starting Surface Level 11/19/91 (FIC) = LL_{start} = 105.2 in
Ending Liquid Level (FIC) 01/31/92 = LL_{end} = 95.4 in
Decrease in Surface Level = LL_{delta} = (LL_{start} - LL_{end}) = 9.8 in

Note that the above surface levels were based on FIC readings taken in Campaign I, before and after pumping. These readings do not provide adequate data for determination of the interstitial liquid levels (ILL) corresponding with the volume of liquid pumped. Without sufficient data, the ILL, waste porosity, and the estimated liquid remaining in the tank can not be estimated.

The final interstitial liquid level, waste porosity, and the estimated liquid remaining in the tank will be determined based on data collected during the second pumping campaign.

PUMPING DATA/CALCULATIONS Campaign II (09/28/94 - 07/28/95)

Net volume pumped from 09/94 to 07/95 = P_{net} = 24,600 gal
Estimated supernatant pumped = S_{total} = 2,000 gal

Waste Surface level beginning of pumping 09/29/94 (FIC) = 93.3 in
Waste Surface level after pumping 08/08/95 (ENRAF)* = 86.3 in
Decrease in Waste Surface Level = 7.0 in

Final Solids Volume = (86.3) in * (2,750) gal/in + 12,500 gal = 249,825 gal

Interstitial liquid level 09/26/94 (Diptubes)

Weight $Factor_{start}$ = 118.0 in Specific $Gravity_{start}$ = 1.18
WF/SpG = 100.0 in
Adjusted** liquid level = LL = (100.0 - 8.0) in = 92.0 in

Interstitial liquid level 08/22/95 (Diptubes)

Weight $Factor_{end}$ = 89.4 in Specific $Gravity_{end}$ = 1.18
WF/SpG = 75.7 in
Adjusted** ending liquid level = LL_{end} = (75.7 - 8.0) in = 67.7 in

Decrease in Interstitial Liquid Level = LL_{delta} = (LL_{start} - LL_{end}) = 24.3 in

* The ENRAF surface level reading is assumed to represent the average depth of the waste across the surface. This number, and the final solids volume will be readjusted, if necessary, when an in-tank video is taken.

** The diptubes are 8 inches deeper than the manual tape or ENRAF "zero" reading so 8 inches was subtracted from the liquid level reading.

Evaluation performed by: D A Bragg Date 08/29/95
Checked by: UC Boyles Date 8/29/95

Figure 2. Interim Stabilization Evaluation for Jet-Pumped Tanks (Sheet 3 of 7)

EVALUATION CALCULATIONS AND COMMENTS: TANK 241-C-107

WASTE POROSITY

Liquid level data and volumes pumped during the second campaign will be used for determining the waste porosity.

Porosity = (Net volume pumped - supernatant pumped) gal/{[Total decrease in liquid level - decrease in liquid level due to supernatant pumped in] * 2,750 (gal/in)}

Between 09/28/94 and 02/20/95, 8,535 gallons were pumped from C-107. Of the volume pumped, approximately 2,000 gallons were supernatant. The interstitial liquid level decreased by 14.3 inches during this period.

P_{1net} = 8,535 gallons
Estimated supernatant pumped = S_{total} = 2,000 gallons
$Porosity_1$ = 6,535 gallons/[(14.3 in) * (2,750 gal/in)] = 0.166 = 16.6%

While jetpumping continued into March, 1995, repeated flushes were required as the transfer line became plugged. By late March, 1995, the main header was completely obstructed, allowing no pumping to occur during the month of April. Consequently, no porosity calculations will be performed for the March-April timeframe. Pumping resumed in May, 1995, after the line was cleared.

Between 05/08/94 and 07/07/95, 6,727 gallons were pumped from C-107. The interstitial liquid level decreased by 13.5 inches during this period.

P_{2net} = 6,727 gallons
Estimated supernatant pumped = S_{total} = 0 gallons
$Porosity_2$ = 6,727 gallons/[(13.5 in) * (2,750 gal/in)] = 0.181 = 18.1%

To remain conservative, a porosity of 18.1% will be used in estimates of drainable and pumpable remaining liquid, instead of the 16.6%.

Evaluation performed by: D A Briggs Date 08/29/95

Checked by: V C Boyles Date 8/29/95

Figure 2. Interim Stabilization Evaluation for Jet-Pumped Tanks (Sheet 4 of 7)

EVALUATION CALCULATIONS AND COMMENTS: TANK 241-C-107

DIL, DLR, PLR CALCULATIONS

ASSUMPTIONS: The waste above the final Interstitial Liquid Level does not contain pumpable liquid.

Total waste volume (below interstitial liquid level I.L.L.) = [(67.7 in)*(2,750 gal/in) + 12,500 gal (dish bottom tank)] = 198,847 gal

Drainable Interstitial Liquid (DIL) = (Total Waste below I.L.L. - capillary height for sludge tank) * porosity.
= {Liquid Waste Volume - [(24 in)*(2,750 gal/in)]}*(0.181)

DIL = {(198,847 gal) - [(24 in) * (2,750 gal/in)]} * (0.181) =
= (198,847 - 66,000) * (0.181) = (132,847) * (0.181) = 24,045 gal = 24 kgal

Drainable Liquid Remaining (DLR) = DIL + Remaining Supernatant
Supernatant = 0 kgal (Assumed volume)

DLR = DIL = 24,045 gal = 24 kgal

Pumpable Liquid Remaining (PLR) = DLR - [(unpumpable height) * porosity]
= 24,045 - [(18 in)*(2,750 gal/in)*(0.181)] = 15,085 gal = 15 kgal

The volume of pumpable liquid remaining in 241-C-107 is estimated as 15,085 gallons or 15 kgal.

Evaluation performed by: D a Bregg Date 08/29/95

Checked by: V C Boyles Date 8/29/95

Figure 2. Interim Stabilization Evaluation for Jet-Pumped Tanks (Sheet 5 of 7)

Letter of Justification for Declaring 241-C-107 Stabilized

Saltwell pumping of Tank 241-C-107 resumed on September 28, 1994, after a two year hiatus. A total of 40,800 gallons of liquid waste was removed from the tank prior to a major equipment failure which halted pumping on July 28, 1995. There is approximately 15,000 gallons of pumpable liquid remaining in the tank.

Repairs required to resume pumping at 241-C-107 would include replacement of the pump and pressure switch, the jetpump jumper (DOV & JR-2 valve), the jetpump lower leg assembly, and the installation of a hydrogen gas monitoring system. It is not economically practical to replace the failed equipment to remove the remaining liquid. It is estimated that it would cost $300,000 to replace the equipment, install a hydrogen gas monitoring system and meet waste disposal costs at 241-C-107. Operating expenses to remove the remaining liquid would also cost an additional $100,000.

In addition, replacing the jetpump lower leg assembly requires the pump and pump plate to be lifted approximately 40 feet into the air. In May, 1995, the lower leg assembly was replaced at 241-C-102. Those repairs resulted in approximately 200 mrem exposure to workers. The 241-C-107 and 241-C-102 pump pits provide nearly equivalent dose rate exposures. However, the repairs at 241-C-107 are far more extensive in nature, and will consequently require more time to complete, increasing the dose exposures to workers. This is not compliant to ALARA principals.

Even if repairs at 241-C-107 were completed, the time to pump the remaining liquid from the tank is still dependent upon the infiltration rates of the liquid waste into the saltwell screen. The average infiltration flow rate of liquid into the saltwell screen at 241-C-107 was 0.13 gpm, or 187 gpd. At 100% pump efficiency and a constant flow rate of 0.13 gpm, it would take over 12 weeks to remove the remaining pumpable liquid from the tank. However, infiltration rates and consequently flow rates, decrease with time as the interstitial liquid level drops. The actual estimated time to remove the remaining pumpable liquid from 241-C-107, based on expected saltwell infiltration rates, is 25 weeks, not accounting for any major equipment problems or operational delays. Pump repairs would not begin until after the hydrogen monitoring system were already installed, since allowing new equipment to remain idle in the saltwell screen greatly increases the probability for pluggage in the footvalve, and the need for future repairs.

Note also that at low pump flow rates (less than 0.2 gpm), for each week of run time, 350 - 700 gallons of flush water will be added to the waste stream to maintain the 241-C-107 transfer system operable. In the last week the 241-C-107 pump operated, a total of 715 gallons of flush water was required to maintain the transfer system operable. This would result in adding between 8,800 and 17,500 gallons of flush water to the waste stream to remove the remaining pumpable liquid (15,000 gallons) from 241-C-107. The required water addition to the waste stream is not compliant to ALARA principles.

Figure 2. Interim Stabilization Evaluation for Jet-Pumped Tanks (Sheet 6 of 7)

Letter of Justification for Declaring 241-C-107 Stabilized (continued)

Stabilization of 241-C-107 Pending In-Tank Video

Tank 241-C-107 was added as a potential hydrogen tank to Appendix B of OSD-T-151-00030, "Operating Specifications For Watch List Tanks," in July, 1995. Currently, there are no video camera/light systems available at Hanford that are approved for performing in-tank videos of hydrogen and potential hydrogen tanks. Further, there are no photos or videos of the 241-C-107 tank waste surface in existence. WHC is attempting to construct a video camera that will meet all the requirements of a Class I, Division I, Group B system. The estimated date of completion of the camera is mid-October, 1995. While it is preferable to obtain an in-tank video prior to stabilizing the tank, sufficient data exists to show that the volume of remaining supernatant is less than 5,000 gallons.

For every 2,750 gallons of supernatant transferred, the surface level in Tank 241-C-107 decreases by one inch. If the surface level decreases by less than one inch for every 2,750 gallons transferred from a waste tank, then the supernatant has been effectively removed.

The waste surface level at 241-C-107 has been monitored throughout the pumping campaign. Pumping data indicates that the surface level rate of decrease from January, 1995, through July, 1995, was less than one inch for every 2,750 gallons pumped. For example, during January, 1995, approximately 3,000 gallons were pumped from 241-C-107. The surface level decreased by only 0.7 inches, characteristic of waste settlement after pumping interstitial liquid from a waste tank.

While it is possible that small pools of supernatant may still exist on the waste surface, isolated from the saltwell screen, pumping and surface level data provide adequate evidence that Tank 241-C-107 contains less than 5,000 gallons of supernatant. For this evaluation, 0 gallons of supernatant will be assumed.

WHC intends to perform an in-tank video of 241-C-107 once an approved camera/video system is available, and will provide updates to the Waste Status Summary Report and Interim Stabilization Evaluation, when additional information is obtained from the video.

Figure 2. Interim Stabilization Evaluation for Jet-Pumped Tanks (Sheet 7 of 7)

Letter of Justification for Declaring 241-C-107 Stabilized

Stabilization of 241-C-107 Pending In-Tank Video (continued)

The tank currently meets the established criteria, except for the in-tank video requirement, for declaring single-shell tanks interim stabilized as mandated by the Tank Farms Interim Stabilization Evaluation Procedure, WHC-IP-0842, Volume IV, Section 4.1.

This letter of justification concludes the requirements for declaring Tank 241-C-107 interim stabilized.

Required Signatures:

J. G. Burton, Manager Interim Stabilization Project

Signature Judith Burton Date 9/11/95

J. H. Wicks, Manager East Tank Farms Transition Project

Signature [signature] Date 9/13/95

J. L. Lee, Director Tank Farms Transition Project

Signature [signature] Date 9-14-95

RECEIVED
BY TIDMELOW

INTERIM STABILIZATION EVALUATION - NON-JET PUMPED TANKS

Tank: 108-C

Evaluation (see Continuation Page for calculations and additional comments):

[X] Photograph review completed - Date of most recent photographs 12-5-1974

[X] Tank history review completed

[X] Tank temperature profile review completed

Surface Description: Solids and liquid measurements and visual inspection indicate the surface is solids. Available photographs were taken before the tank was removed from service. Recent attempts to take photographs have been unsuccessful because of haze. the tank was saltwell pumped, and the surface level has not changed since then. Date 2-24-84

Solids Level 19.5" Date 8-3-1979 Method solids weight

Liquid Level 19.5" Date 2-21-1984 Method manual tape

Solids Volume 66,000 gal

Estimated Drainable Liquid Volume 0

Average Maximum Tank Temperature, past 6 months 83°F

Estimated Supernatant Volume 0

[ ] Cost/Benefit Analysis attached

Evaluation Performed by M F Bell Date 2-22-84 Checked by J G R Date 2-24-84

Disposition of Tank:

[X] Tank Interim Stabilized at 0 gallons of drainable liquid

[ ] Tank not Interim Stabilized; stabilization activities resumed

Approved by: Manager, TF&EPC [signature] Date 2/24/84

Manager, TFS&O [signature] Date 2-27-84

Program Manager [signature] Date 2-9-84

DISTRIBUTION: TF&EPC Tank File, Tank Farm Surveillance Analysis, Approval Signatures

INTERIM STABILIZATION EVALUATION - NON-JET PUMPED TANKS

(CONTINUATION PAGE)

Evaluation Calculations and Comments

TANK: 108-C

Solids and liquid measurements and visual inspection indicate the surface is solid.

Solids level = 19.5"

Liquid level = 19.5"

Supernatant liquid = 0

Solids volume = 19.5" x 2750 gal/in. + 12,500 gal = 66,000 gal.

Drainable Interstitial Liquid = (Solids - Capillary Height x 2750 gal/in. x Porosity
(DIL)

For sludge, capillary height is estimated to be 24" and porosity to be 0.125

DIL = (66,000 - 24 x 2750) x 0.125 = 0

Total Drainable Liquid = DIL + Supernatant = 0

If the sludge were to act like saltcake (capillary height of 12" and porosity of 0.45),

DIL = (66,000 - 12 x 2750) x 0.45 = 15,000 gal

Total Drainable Liquid = 15,000 gal.

This is for below the 30,000 gal criterion for pumping interstitial liquid.

Calculations by Nancy G Ball

Checked by J. K. Riddle

INTERIM STABILIZATION EVALUATION - NON-JET PUMPED TANKS

Tank: 109 C

Evaluation (see Continuation Page for calculations and additional comments):

[X] Photograph review completed - Date of most recent photographs 1/30/76

[X] Tank history review completed

[X] Tank temperature profile review completed

Surface Description: 1976 photos show a liquid surface. 1974 photos show cloudy liquid with oil. No solids around edge. More recent photos have been too hazy even though a portable exhauster was used. Date 1976 and 1974

Solids Level 18.0" Date 12/31/75 Method manual tape

Liquid Level 19.5" Date 10/31/83 Method manual tape

Solids Volume 62,000 gal

Estimated Drainable Liquid Volume 4100 gal.

Average Maximum Tank Temperature, past 6 months 86°F

Estimated Supernatant Volume 4100 gal.

[ ] Cost/Benefit Analysis attached

Evaluation Performed by N Bell Date 11/15/83 Checked by TDK Date 11/16/83

Disposition of Tank:

[X] Tank Interim Stabilized at 4100 gallons of drainable liquid

[ ] Tank not Interim Stabilized; stabilization activities resumed

Approved by: Manager, TF&EPC R. A. Van Meter Date 11/16/83

Manager, TFS&O [signature] Date 11-28-83

Program Manager [signature] Date 11-29-83

DISTRIBUTION: TF&EPC Tank File, Tank Farm Surveillance Analysis, Approval Signatures

INTERIM STABILIZATION EVALUATION - NON-JET PUMPED TANKS

(CONTINUATION PAGE)

Evaluation Calculations and Comments — Calculations made by T T Bell

TANK: 109 C — Checked by Tim D. Kirkpatrick

The liquid level has been stable since 1981 at 19.5".

The solids level was measured at 18". The only central riser has a saltwell screen installed and is weather-covered, so current solids level measurements are not possible.

Supernatant Liquid = (19.5" - 18") x 2750 gal./in.
= 4125 gal.

Solids Volume = 18" x 2750 gal./in. + 12,500 = 62,000 gal.

Drainable Interstitial Liquid (DIL) =
(Solids - Capillary Height x 2750 gal./in.) x Porosity
For sludge, capillary height is estimated to be 24" and porosity = 0.125.
DIL = 0 by definition
For the worst case (assuming sludge acts like saltcake which has a capillary height of 12" and a porosity of 0.45),
DIL = (62,000 - 12 x 2750) x 0.45 = 13,050 gal.
This value is below the criterion for jet pumping.

Drainable Liquid Volume = DIL + Supernate = 4125 gal.

Figure 2. Interim Stabilization Evaluation for Jet-Pumped Tanks

(Sheet 1 of 5)

TANK: 241-C-110 Page 1 of 5

Reason Jet Pumping Halted:

I. [X] Meets 0.05 gpm criteria, Date of Shutdown 05/27/95
II. [ ] Major equipment failure, Date of Shutdown _____

Surface Condition & Comments:
VIDEO TAKEN ON 05/23/95. NORTHERN HALF OF WASTE SURFACE IS DRY AND CRACKED. WASTE APPEARS MOIST AT THE TANK CENTER, DARK BROWN IN COLOR. A 3 FOOT DIAMETER POOL SURROUNDS THE SALTWELL SCREEN AT THE TANK CENTER. THE SOUTHERN HALF OF THE WASTE SURFACE HAS APPROXIMATELY 30% OF ITS AREA COVERED BY SUPERNATANT.

Evaluation: (See continuation page for calculations and additional comments)

Photograph review completed - Date of most recent photograph (VIDEO) 05/23/95
Tank history review completed. [X]
Tank temperature profile reviews completed. [X]
Starting liquid level 69" Method MANUAL TAPE Date 11/18/95
Final liquid level (after equilibration) 56.7" Method DIP TUBES Date 05/31/95

Total Net Jet Pump Production 15,500
Capillary Height Used in Calculation: 24 in

Final Average Flowrate 0.03 gpm
Calculated Porosity 27 %
Supernatant 900 gal
Drainable Interstitial Liquid 27,600 gal
Drainable Liquid Remaining 28,500 gal
Pumpable Liquid Remaining 15,100 gal

Disposition of Tank:

[X] Tank Interim Stabilized
[ ] Tank not Interim Stabilized; Jet Pumping Restarted

Evaluation Performed by: David Bregy Date 6/12/95
Checked by: VC Boyles Date 6/12/95

APPROVED BY:

Team Lead, Stabilization Engineering VC Boyles Date 6/12/95
Manager, Tank Stabilization & Engineering Support [illegible] Date 6/12/95
Manager, SST Stabilization Program Judith Bunton Date 6/12/95
Manager, Tank Farm Operations [signature] for THN. Date 6/12/95

Distribution: Nuclear Facility Safety, Shift Surveillance Engineering, Systems Engineering, Single-Shell Tank History File, TPA Integration Control, Approving Managers, Evaluation Performer, and Checker signatures.

Figure 2. Interim Stabilization Evaluation for Jet-Pumped Tanks
(Sheet 2 of 5)

EVALUATION CALCULATIONS AND COMMENTS:

TANK: 241-C-110

BACKGROUND

Initial saltwell pumping of Tank 241-C-110 began in November, 1991, and was suspended in January, 1992. Pumping resumed at Tank 241-C-110 on September 28, 1994, and ended on May 27, 1995, after pumping flow rates dropped below 0.05 gpm. For the purposes of interim stabilization, this analysis will be divided into two pumping campaigns. The waste porosity and the estimates of liquid remaining in the tank shall be based on the most current pumping data (Campaign II).

Total net volume of liquid waste pumped from Tank 241-C-110 for the two campaigns is 15,500 gallons.

PUMPING STATUS

Tank 241-C-110 was pumped 6 times during May, 1995, with 2,564 gallons pumped, of which 1,790 gallons was flush water and liquid drainback. On May 18, the net gallons pumped was 2 gallons, while on May 19, the net gallons pumped was only 1 gallon.

After a saltwell system flush, the pump was restarted on May 19. By May 21, the net gallons pumped dropped to 0 gallons. The pump was then shut down due to low flow and was not restarted for 3 days. The infiltration rate of liquid into the saltwell was only 0.03 gpm.

Pumping resumed on May 24 and again was shut down on May 25 due to low flow. The saltwell screen required over 10 hours for liquid infiltration to refill it sufficient to resume pumping.

Pumping was restarted on May 26 and again on May 27. Both times the saltwell screen was empty in less than 2 hours and the pump was shut down due to low flow.

The net volume extracted from Tank 241-C-110 the last three days the pump operated was 59 gallons, 46 gallons, and 44 gallons respectively.

The 241-C-110 pump last operated on 05/27/95.

Evaluation performed by: David Bragg Date 06/12/95

Checked by: VC Boyles Date 6/12/95

Figure 2. Interim Stabilization Evaluation for Jet-Pumped Tanks
(Sheet 3 of 5)

EVALUATION CALCULATIONS AND COMMENTS:

TANK: 241-C-110

PUMPING DATA/CALCULATIONS Campaign I (11/27/91 - 01/28/92)

Net volume pumped from 11/91 to 01/92 = (P_{total} - W_{total}) gal

P_{total} = Total pumped = 9,614 gallons
W_{total} = Flush water = 1,050 gallons
P_{net} = (P_{total} - W_{total}) gal = (9,614 - 1,050) gallons = 8,564 gallons

Starting Liquid Level (Manual Tape): = LL_{start} = 69.0 in
Ending Liquid Level (Manual Tape) = LL_{end} = 64.0 in
Decrease in Liquid Level = LL_{delta} = (LL_{start} - LL_{end}) = 5.0 in

Note that the above liquid levels were based on manual tape readings taken in Campaign I, before and after pumping. These readings do not provide adequate data for determination of the interstitial liquid levels corresponding with the volume of liquid pumped. Without sufficient data, the final interstitial liquid level, waste porosity, and the estimated liquid remaining in the tank can not be accurately estimated.

The final interstitial liquid level, waste porosity, and the estimated liquid remaining in the tank will be determined based on the most current data collected (Campaign II).

LIQUID LEVEL EQUILIBRIUM IN 241-C-110 BETWEEN 01/92 AND 09/94

Between end of pumping on 1/28/92 and restart of pumping on 09/28/94, the liquid level (as measured by the manual tape) increased from 64.00" to 65.5." The liquid baseline level was reset 08/93, from 64.0" to 65.0"

Note that the waste solids on the south section of the tank are at a lower elevation than solids located on the north section of the tank. The manual tape, which is used to determine the surface level is located in Riser 4, on the south side of Tank 241-C-110. Between the end of pumping, Campaign I, and the start of pumping, Campaign II, the liquid level increased from 64.0 inches to 65.5 inches as solids and liquids of the north and south sections settled, reaching a new equilibrium level.

Evaluation performed by: David Bragg Date 06/12/95

Checked by: VC Boyle Date 6/14/95

Figure 2. Interim Stabilization Evaluation for Jet-Pumped Tanks (Sheet 4 of 5)

EVALUATION CALCULATIONS AND COMMENTS:

TANK: 241-C-110

PUMPING DATA/CALCULATIONS Campaign II (09/28/94 - 05/27/95)

Diptubes provide weight factor and specific gravity readings within a waste tank. The interstitial liquid level at 241-C-110 is determined by dividing its weight factor by its specific gravity, then subtracting 8 inches from the result. The 8 inches is subtracted from the liquid level because 241-C-110 is a dish-bottom tank. The manual tape, which measures surface level, uses the bottom of the tank wall as its reference point, or datum. The diptubes are located 4 inches above the centerline of the dish bottom, or 8 inches below the datum. This means that 8 inches must be subtracted from the liquid level determined by the diptubes to adjust or "zero" the liquid level to correspond with the manual tape reading. Note that in determining the final pumpable liquid remaining, the volume of the dish bottom (12,500 gallons) is multiplied by the estimated tank porosity, and the corresponding product is added to the total pumpable liquid remaining estimate. All waste calculations are made from the zero datum.

Adjusted liquid level 09/29/94 (Diptubes)

Weight Factor$_{start}$ = 82.2 in Specific Gravity$_{start}$ = 1.13
WF/SpG = 72.7 in
Adjusted starting liquid level = LL_{start} = (72.7 - 8.0) in = 64.7 in

Adjusted liquid level 05/31/95 (Diptubes)

Weight Factor$_{end}$ = 73.1 in Specific Gravity$_{end}$ = 1.13
WF/SpG = 64.7 in
Adjusted ending liquid level = LL_{end} = (64.7 - 8.0) in = 56.7 in

Decrease in Liquid Level = LL_{delta} = (LL_{start} - LL_{end}) = 8.0 in

P_{total} = Total pumped = 11,860 gallons
W_{total} = Flush water = 4,933 gallons

Porosity = (Net volume pumped - supernatant pumped) gal/{[Total decrease in liquid level - decrease in liquid level due to supernatant pumped in] * 2,750 (gal/in)}

The waste porosity, required for estimating the pumpable liquid remaining (PLR) in the tank, is as follows: Net volume pumped from 09/94 to 05/95 = P_{net} = (P_{total} - W_{total}) gal = (11,860 - 4,933) gallons = 6,927 gallons liquid waste

Evaluation performed by: David Bragg Date 06/12/95

Checked by: VC Boyles Date 6/12/95

Figure 2. Interim Stabilization Evaluation for Jet-Pumped Tanks (Sheet 5 of 5)

EVALUATION CALCULATIONS AND COMMENTS:

TANK: 241-C-110

PUMPING DATA/CALCULATIONS Campaign II (09/28/94 - 05/27/95) (continued)

Estimated supernatant pumped = S_{total} = 1,300 gallons (This account for approximately 0.5 in of liquid level decrease which must be subtracted from LL_{delta} when determining porosity)

Porosity of waste P = $(P_{net} - S_{total})/[(LL_{delta} - 0.5)in * (2,750 gal/inch)]$
P = (6,927- 1,300) gallons/[(7.5 in) * (2,750 gal/in)] = 0.27 = 27%

ASSUMPTIONS: The waste above the final Interstitial Liquid Level is considered unpumpable.

Total liquid waste volume (below interstitial liquid level I.L.L.) = [(56.7 in)*(2,750 gal/in) + 12,500 gal (dish bottom tank)] = 168,425 gal

Drainable Interstitial Liquid (DIL) = (Total Waste below I.L.L. - capillary height for sludge tank) * porosity.
= {Liquid Waste Volume - {[(24 in)*(2,750 gal/in)]}*(0.27)

DIL = {(168,425 gal) - [(24 in) * (2,750 gal/in)]} * (0.27) = 27,600 gal

Drainable Liquid Remaining (DLR) = DIL + Remaining Supernatant
(From the in-tank video, the remaining supernatant volume is estimated as 900 gal. One-sixth of the tank surface is covered in liquid conservatively estimated as 2 inches deep. One inch of liquid = 2,750 gal of waste) Supernatant = (1/6) * (2,750 gal/in) * (2 in) = 900 gal

DLR = (27,600 + 900) gal = 28,500 gal

Pumpable Liquid Remaining (PLR) = DLR - [(unpumpable height) * porosity]
= DLR -[(18 in) * (2,750 gal/in) * (0.27)]

PLR = 28,500 - [(18 in) * (2,750 gal/in) * (0.27)] = 15,100 gal
The volume of pumpable liquid remaining in 241-C-110 is estimated as 15,100 gallons.

INTRUSION PREVENTION

This tank has had prior liquid intrusions. Work is scheduled for the summer of 1995, to slope the C Farm soil cover so that liquid run off (from rain & snow) will be directed away from Tank 241-C-110. Completion of this work will eliminate the known intrusion source.

Evaluation performed by: David Bragg Date 06/12/95

Checked by: VC Boyles Date 6/12/95

INTERIM STABILIZATION EVALUATION - NON-JET PUMPED TANKS

Tank: 111-C

Evaluation (see Continuation Page for calculations and additional comments):

[X] Photograph review completed - Date of most recent photographs 2-25-1970

[X] Tank history review completed

[X] Tank temperature profile review completed

Surface Description: Solids and liquid measurements and visual inspection indicate the surface is solids. Available photographs were taken before the tank was removed from service. Recent attempts to take photographs have been unsuccessful because of haze. The tank was salt-well pumped, and the liquid/solid level has not changed since then. Date 2-24-84

Solids Level 16" Date 12-31-1974 Method solids weight

Liquid Level 16" Date 1-1-1984 Method manual tape

Solids Volume 57,000 gal

Estimated Drainable Liquid Volume 0

Average Maximum Tank Temperature, past 6 months 83°F

Estimated Supernatant Volume 0

[ ] Cost/Benefit Analysis attached

Evaluation Performed by JI Bill Date 2-22-84 Checked by JSR Date 2-24-84

Disposition of Tank:

[X] Tank Interim Stabilized at 0 gallons of drainable liquid

[ ] Tank not Interim Stabilized; stabilization activities resumed

Approved by: Manager, TF&EPC [signature] Date 2/24/84

Manager, TFS&O [signature] Date 2-29-84

Program Manager [signature] Date 3-9-84

DISTRIBUTION: TF&EPC Tank File, Tank Farm Surveillance Analysis, Approval Signatures

STABILIZATION EVALUATION
NON-JET PUMPED TANKS

TANK: 112-C

EVALUATION (see continuation page for calculations and additional comments):

[X] Photograph review completed - Date of most recent photographs: 9/18/90

[X] Tank history review completed

[X] Tank temperature profile review completed

Surface Description: The surface is brown in color, pot marked, sludge type fine material with small puddles of liquid throughout

Date 9/21/90

Solids Level 33.25" Date 9/18/90 Method Manual Tape

Liquid Level 33.25" Date 9/18/90 Method Manual Tape

Solids Volume 104,000 gallons

Estimated Drainable Liquid Remaining Volume 32,200 gallons

Average Maximum Tank Temperature, past 6 months 80 °F

Estimated Supernatant Volume 200 gallons

DISPOSITION OF TANK:

[X] Tank Interim Stabilized at 32,200 gallons of drainable liquid remaining

[ ] Tank not Interim Stabilized; stabilization activities resumed

Evaluation Performed by J.C. Boyle Date 9/21/90 Checked by [illegible] Date 9/24/90

APPROVED BY:

Manager, Single-Shell Tanks [signature] Date 9-26-90

Manager, Tank Farm Programs DJ Washenfelder Date 9-25-90

Manager, Tank Farms [signature] Date 9-26-90

DISTRIBUTION: SST Tank File, Tank Farm Surveillance Analysis & Support, Defense Waste Safety Section, Approval Signatures

TANK: 112-C

EVALUATION CALCULATIONS AND COMMENTS:

This tank will be administratively stabilized using the accepted porosity of 45% and one foot capillary height. This tank is classed as a sludge tank.

Supernatant volume from photos = 200 gallons

Drainable Interstitial Liquid (DIL) =

= (Liquid Level - capillary ht)(porosity)(2750 gallons/in) + (vol. in dished bottom)(Porosity)

= (33.25 - 12)(.45)(2750) + 12,500 (.45)

= 31,921 gallons ⇒ Use 32,000 gallons

Drainable Liquid Remaining (DLR) = DIL + Supernatant

= 32,000 + 200

= 32,200 gallons

Pumpable Liquid Remaining = DLR - 6K gallons

= 32,200 - 6,000

= 26,200 gallons

Calculations made by VC Boyles Date 9/24/90

Checked by Rhett Jacobsen Date 9/24/90

INTERIM STABILIZATION EVALUATION

TANK NUMBER: 201 C EFFECTIVE DATE: 3-31-82

LIQUID LEVEL & RISER NO. 16.50"

SOLIDS LEVEL & RISER NO. NA

EST. SUPERNATE LIQUID VOLUME 600 Gal.

EST. INTERSTITIAL LIQUID VOLUME 0

TEMPERATURE: 65° F.

IS THIS TEMPERATURE A PROBLEM?

yes ____ no X unknown

IS THERE A POTENTIAL DOME LOAD PROBLEM? yes ____ no X

PHOTOGRAPH EVALUATION:

Photographs taken 1/06/81 (when the surface level was 17.25") indicate a surfac that is mostly shallow liquid 1 to 4 inches deep and with a 1-2 foot wide band of exposed sludge around most of the tank perimeter.

COMMENTS:

201 C is currently listed as inactive, the amount of liquid remaining cannot be practically removed. Therefore reclassification of this tank to primary stabilized is justifiable.

Prepared By: [signature] 3/31/82

Reviewed By: [signature] 3/31/82

INTERIM STABILIZATION EVALUATION

TANK NUMBER: 241-C-202 EFFECTIVE DATE: 8-10-81

LIQUID LEVEL & RISER NO. 10.3" R-4

SOLIDS LEVEL & RISER NO. 8.0"

EST. SUPERNATE LIQUID VOLUME less than 500 gallons

EST. DRAINABLE INTERSTITIAL LIQUID VOLUME 0

TEMPERATURE: 57 F

IS TANK HEAT LOAD A PROBLEM?

yes ____ no X unknown ____

IS THERE A POTENTIAL DOME LOAD PROBLEM? yes ____ no X

PHOTOGRAPH EVALUATION: Photo Date - December 16,1980

Exposed sludge is seen over approximately 60 percent of the waste surface. The liquid pool portion is ungulate shaped and appears to be quite shallow. The maximum pool depth at the sidewall is estimated to be less than three(3) inches, and the liquid level gauge plummet is seen to be above the liquid surface. By photo interpretation, the volume of the pool is estimated to be less than 500 gallons.

COMMENTS:

Prepared By: Clement E. Parker 9-11-81

Reviewed By: R. Dennis Mayer

INTERIM STABILIZATION EVALUATION

TANK NUMBER: 203 C EFFECTIVE DATE: 3-31-82

LIQUID LEVEL & RISER NO. 29.0"

SOLIDS LEVEL & RISER NO. NA

EST. SUPERNATE LIQUID VOLUME 500 Gal.

EST. INTERSTITIAL LIQUID VOLUME 0

TEMPERATURE: 79° F.

IS THIS TEMPERATURE A PROBLEM?

yes ____ no X unknown ____

IS THERE A POTENTIAL DOME LOAD PROBLEM? yes ____ no X

PHOTOGRAPH EVALUATION:

Photographs taken 12/16/80 (when surface level reading was 27.5") indicate 60 to 70% exposed sludge and the remainder a shallow pool 1 to 4 inches deep.

COMMENTS:

203 C is currently listed as inactive. The amount of liquid remaining can not be paractically removed. Therefore, reclassification of this tank to primary stabilized is justifiable.

Prepared By: [signature] 3/31/82

Reviewed By: [signature] 3/31/82

Interim Stabilization Evaluation

TANK NUMBER: TK-204-C

EFFECTIVE DATE: 9-10-82

LIQUID LEVEL & RISER NO. 18"

SOLIDS LEVEL & RISER NO. NA

EST. SUPERNATE LIQUID VOLUME <400 gallons

EST. DRAINABLE INTERSTITIAL LIQUID VOLUME <500 gallons

TEMPERATURE: 76

IS HEAT LOAD A PROBLEM? YES____ NO X UNKNOWN____

IS THERE A POTENTIAL DOME LOAD PROBLEM: YES____ NO X

PHOTOGRAPH EVALUATION:
Photo series # 093996 (12-16-80) The photographs show that the water surface consists of approximately 10 percent exposed wet solids and 40 percent shallow liquid. The estimated depth of this pool is between 1 and 2 inches. The manual gauge is contacting solids.

COMMENTS:
The tank contains approximately 3000 gallons of sludge.

Prepared By: [signature] 9-3-82

Reviewed By: [signature] 9-3-82

Tank: 104-S

Evaluation (see continuation page for calculations and additional comments):

☒ Photograph review completed - Date of most recent photographs 12/12/84

☒ Tank History review completed

☒ Tank temperature profile review completed ~~prior to~~ 2/84

Surface Description: The surface consists of a smooth, light gray, damp sludge with a small supernate pool (< 500 gallons) around the saltwell screens. The supernate pool is mustard brown in color. Date 12/17/84

Solids Level 114.26 in Date 12/14/84 Method Manual FIC

Liquid Level 114.26 in Date 12/14/84 Method Manual FIC

Solids Volume 294,000 gallons

Estimated Drainable Liquid Volume 29,000 gallons

Average Maximum Tank Temperature, past 6 months Not Available

Estimated Supernatant Volume 500 gallons

☐ Cost/Benefit Analysis attached

Evaluation Performed by _____ Date _____ Checked by _____ Date _____

Disposition of Tank:

☒ Tank Interim Stabilized at 29,000 gallons of drainable liquid

☐ Tank not Interim Stabilized; stabilization activities resumed

Approved by: Manager, TF&EPE [signature] Date 12/17/84

Manager, TFS&O [signature] Date 12/19/84

Program Manager [signature] Date 12-20-84

DISTRIBUTION: TF&EPE Tank File, Tank Farm Surveillance Analysis, Approval Signatures

EVALUATION CALCULATIONS AND COMMENTS

Tank: 104-S

Supernate Volume: 500 gallons

Solids Volume: (114.25 - 12) 2750 + 12500 = 293688 gallons => 294,000

Drainable Interstitial Liquid: (294,000 - 66000)(.125) = 28500 gallons

Total Drainable Liquid Volume: 28500 gallons + 500 gallons = 29,000 gallons

Total Pumpable: (28500 - 6500) + 500 = 22,500 gallons

Calculations made by: J. Stan Hall

Checked by: Terry L Vail

INTERIM STABILIZATION EVALUATION - JET PUMPED TANKS

Tank 241-S-105

Reason Jet Pumping Halted:
Meets 0.05 gpm Criteria, date of shutdown NOT AVAIL
Major Failure of Jet Pump, date of shutdown 10/78

Additional Comments:

Evaluation: (see Continuation Sheet for calculations and additional comment)

Starting Liquid Level 173.3 Date 8/78
Supernatant Volume 0 Date 8/78

Final Liquid Level measured after equilibration of Interstitial Liquid:

Dip Tubes Date
LOW 50" (Vertron) Date 4/14/88
Manual Date

Total Net Jet Pumped Production 114,300

Calculated Solid Characteristics:

Porosity 33.7%
Permeability/Viscosity (K/N) NOT APPLICABLE
Capillary Height 12" (ASSUMED)

Estimated Drainable Liquid Remaining 35K
Final Average Flowrate NOT AVAILABLE Date
Evaluation performed by VC Boyles Date 7/20/88

Disposition of Tank

Tank Interim Stabilized at 35 thousand gallons of Drainable Liquid
18 thousand gallons of Pumpable Liquid.

Tank not Interim Stabilized; Jet Pumping restarted

Approved by: Manager, TF&EPC [signature] Date 9/26/88
Manager, TFS&O K J Baumhardt Date 9/26/88
Program Manager D J Washenfelder Date 9/26/88

DISTRIBUTION: TF&EPC Tank File, HS&E Surveillance Analysis, Approval Signatures

JET PUMPED TANKS

Evaluation Calculations and Comment

Tank: 241-S-105

$$\text{Porosity} = \frac{\text{Total Jet}}{(\text{Starting Liquid Level} - \text{Final Liquid Level})(2750)} = \frac{114,300}{(193.3-50)(2750)} = .337 \text{ or } 33.7\%$$

Drainable interstitial remaining = $(50-12)(2750)(.337) = 35K$ Gallons

Pumpable interstitial liquid = Drainable interstitial liquid $-(18)(2750)(.337)$.

$= 35K - 17K = 18K$ Gallons

As a double check and worse case situation, using the conservative 45% porosity factor for saltcake type waste, drainable interstitial liquid remaining follows:

Drainable interstitial liquid remaining = $(50-12)(2750)(.45) = 47K$ Gallons.

Tank 241-S-105 was jet pumped in 1978 and pumping was halted because of a malfunction of the pump. Based on the solids level prior to pumping, the interstitial liquid volume was estimated at approximately 210,000 gallons using an assumed 45% salt cake porosity. The remaining interstitial liquid volume of 100,000 gallons was determined by subtracting the total pumped volume from the original estimate. The porosity of the solids was never calculated. Pumping of 105-S was not restarted because of funding restraints. A liquid observation well (LOW) was installed during 1984 and the readings show the actual liquid level at 50 inches. By using the pumping data taken in 1978 a porosity factor of 33.7% was calculated and from this an estimated 35,000 gallons of drainable interstitial liquid remain. As a worse case situation, using the conservative 45% porosity factor for salt cake type wastes, the calculations show 47,000 gallons of drainable interstitial liquid remaining which still meets the 50,000 gallon stabilization criterion. Interim stabilization of this tank at this time is based on the ability to determine the interstitial liquid level of the tank with the use of the LOW's and on the 50,000 gallon interstitial liquid criteria.

Calculations made by: V. Coyle

Checked by: Jack A. Tucker

INTERIM STABILIZATION EVALUATION

SD-RE-TI-178 Rev. 3

TANK NUMBER: 107-SX EFFECTIVE DATE: 10-19-79

LIQUID LEVEL & RISER NO. Manual Tape R-2 43.25"
This is a solids level reading.

SOLIDS LEVEL & RISER NO.: ** R-2 43.25"; Riser Unknown 44.75"
**This one inch variation is due to the slope of the solids.

EST. SUPERNATE LIQUID VOLUME 0

EST. DRAINABLE INTERSTITIAL LIQUID VOLUME *14,000 Gallons
This volume is based on sludge containing 12.5% by volume drainable interstitial liquid

TEMPERATURE: Maximum 180°

IS TANK HEAT LOAD A PROBLEM?
yes + X no ____ unknown ____

+This temperature would only become a problem if the SX-sludge cooler was discontinued.

IS THERE A POTENTIAL DOME LOAD PROBLEM? yes ____ no X

PHOTOGRAPH EVALUATION: (Order #776893 ; L.L. 44.0" ; Date 8-5-77)
This surface is 100% dry solids. This set of photographs was compared to a set taken in 1970. Since the earlier photographs the small liquid puddles have dried completely.

COMMENTS: *The 14,000 Gallons of interstitial liquid does not take into account any liquid that has been removed by the SX-sludge cooler.

ADVANCED STABILIZATION RECOMMENDATIONS: Continue the operation of the sludge cooler to maintain the tank temperature and remove more interstitial liquid.

Prepared By: H. Dennis Mayer

Prepared By: John H. Bailey 10-19-79

INTERIM STABILIZATION EVALUATION

TANK NUMBER: 108-SX EFFECTIVE DATE: 8-31-79

LIQUID LEVEL & RISER NO. R-2 47.25"

SOLIDS LEVEL & RISER NO. R-2 47.25".

EST. SUPERNATE LIQUID VOLUME 0

EST. DRAINABLE INTERSTITIAL LIQUID VOLUME 14,000 gallons
This figure is based on sludge being 12.5% drainable interstitial liquid.

TEMPERATURE: Maximum 235° F

IS TANK HEAT LOAD A PROBLEM?

yes * X no ____ unknown ____

* This temperature is not a serious problem as long as the SX sludge cooler continues to operate.

IS THERE A POTENTIAL DOME LOAD PROBLEM? yes ____ no X

PHOTOGRAPH EVALUATION: (Order # 776539: Liquid Level 47.25 ; "Date 7-26-77)
The surface is 100% dry cracked solids. The manual tape is touching on solids. There is an old tape in the area where the manual tape touches. There is some sediment on the stiffener rings.

COMMENTS: There is an excellent photographic history of this tank beginning in March of 1968. The photographs were taken after pump down and there are pools of liquid remaining. Photographs taken in 1969, 70, 71, 72, 74, 76 and 77 show the solid surface getting continuously dryer. Today there is no liquid visible on the surface. The sludge is showing some cracks from drying.

Prepared By: K. Dennis Mayer 8-22-79

Reviewed By: John M Bailey 8-23-79
Advanced Stabilization

Recommendation: Continue the operation of the sludge cooler.

Figure 4. Interim Stabilization Evaluation of 100- & 200-Series Non-Jet-Pumped Tanks. (sheet 1 of 2)

Page 1 of 3

TANK: 241-SX-109

EVALUATION (see continuation page for calculations and additional comments):

[✓] Photograph review completed - Date of most recent photographs: 5/21/86

[✓] Tank history review completed: SEE TANK HISTORY FILE

[✓] Tank temperature profile review completed SEE CASS FOR DATA.

Surface Condition & Comments: A VERY IRREGULAR, DRY SURFACE IS VISIBLE IN PHOTOS FROM 1986. NO VISIBLE LIQUIDS. SOLIDS FORM MOUNDS OVER FOUR BOTTOM-MOUNTED AIR-LIFT CIRCULATORS, AND VARIOUS PIPES THAT ENTER THE SOLIDS ARE CAKED WITH ENCRUSTATIONS. COLORS RANGE FROM YELLOW TO GRAY TO NEARLY BLACK.

Solids Level 96" Date 5-21-86 Method MANUAL TAPE
Liquid Level 96" Date 5-21-86 Method MANUAL TAPE
Solids Volume 244,450 GALLONS
Estimated Drainable Insterstitial Liquid Remaining Volume 47,900 GALLONS (DIL)
Estimated Supernatant Volume Remaining ZERO GALLONS
Tank was pumped with a submersible pump ___Yes ✓No; if yes, _____ gallons pumped.

[✓] Cost/Benefit Analysis attached

DISPOSITION OF TANK:

[✓] Tank Interim Stabilized at ZERO gallons of supernatant and 47,900 gallons of drainable interstitial liquid

[ ] Tank not Interim Stabilized; continue stabilization activities

Evaluation Performed by J. D. Winship Date 12/30/91 Checked by C. J. [illegible] Date 12/30/91

APPROVED BY:

Manager, Single Shell Tanks V C Boyles Date 12/30/91
Manager, Single Shell Tanks Technology R E Raymond Date 1-2-92
Manager, Facility Operations [illegible] Date 1/27/92

DISTRIBUTION: Tank Farm Surveillance Analysis, SST Tank History File, Nuclear Facility Safety, TPA Integration Control, Managers Approval; Evaluation Performer, and Checker signatures.

Figure 4. Interim Stabilization Evaluation (sheet 2 of 2)

EVALUATION CALCULATIONS AND COMMENTS:

TANK: 241-SX-109

NOTES: THIS TANK REMOVED FROM SERVICE: 1965
DECLARED CONFIRMED LEAKER: 1965
CLASSIFIED INTERIM STABILIZED: MAY 1981, 1984
INTERIM ISOLATED: SEPTEMBER 1992
ONE MILLION GALLON SINGLE-SHELL TANK WITH DISH BOTTOM (CONSTR: 1954)
USE MOST CONSERVATIVE ESTIMATE OF POROSITY; 45% (SALT CAKE)
SURFACE LEVEL MEASURING METHOD IS REFERENCED TO THE BOTTOM OF THE TANK.

1) VOLUME OF WASTE, TOTAL:
VOL. = VOL. OF CYLINDER (RADIUS OF TANK, AND HEIGHT OF SURFACE LEVEL - DISH DEPTH) + DISH VOLUME.

VOLUME OF CYLINDER = π (TANK RADIUS)^2 (SURFACE LEVEL - DISH DEPTH)

SURFACE LEVEL = 96 IN.
RADIUS = 37' 6½" SEE DRWG H-2-39511 SHT 1
DISH DEPTH = 1' 2 7/8" SEE DRWG H-2-39511 SHT 1

$$\text{VOLUME OF CYLINDER} = \pi\,(37'6\tfrac{1}{2}")^2\left[(96\text{ IN} - 14\tfrac{7}{8}\text{ IN})\,\frac{1\text{ FT}}{12\text{ IN}}\right] = 29{,}933\text{ FT}^3 = 223{,}914\text{ GALLONS}$$

$1\text{ FT}^3 = 7.4805$ GALLONS

$$\text{VOLUME OF DISH} = \frac{1}{6}\pi h(h^2+3a^2)$$

CRC STANDARD MATHMATICS TABLE, 14TH EDITION, 1965

where h = DISH DEPTH = 1' 2 7/8"
a = TANK RADIUS = 37' 6½"

$$\text{VOL OF DISH} = \frac{1}{6}\pi\,(19.875\text{ IN}\,\frac{1\text{ FT}}{12\text{ IN}})\left[(14.175\text{ IN}\,\frac{1\text{ FT}}{12\text{ IN}})^2 + 3(37.541667\text{ FT})^2\right]$$

$$= 2{,}745\text{ FT}^3 = 20{,}536\text{ GALLONS}$$

VOLUME OF TOTAL WASTE = 223,914 GALLONS + 20,536 GALLONS
= 244,450 GALLONS

Calculations made by_____ Date_____

Checked by_____ Date_____

Figure 4. Interim Stabilization Evaluation
(sheet 2 of 2)

Page 3 of 3

EVALUATION CALCULATIONS AND COMMENTS:

TANK: 241-SX-109

2) DRAINABLE INTERSTITIAL LIQUID (DIL):

CORE SAMPLING DONE IN JAN 1988 SHOWS THAT THERE IS NO INTERSTITIAL LIQUID IN THE TOP 38 INCHES (SEE TANK HISTORY FILE). DIL CALCULATIONS WILL NOT INCLUDE THESE TOP 38 INCHES.

DIL = (TOTAL WASTE VOLUME - DRY SOLIDS - CAPILARY HEIGHT VOL) POROSITY

DRY SOLIDS $= \pi (37.5416667)^2 FT^2 (38 IN \frac{1 FT}{12 IN}) = 14,021 FT^3$

$= 104,884$ GALLONS

CAPILARY HEIGHT VOL $= \pi (37.5416667 FT)^2 \ 1 FT = 4,429 FT^3 = 33,121$ GALLONS

DIL = (344,450 GALLONS - 104,884 GALLONS - 33,121 GALLONS) 0.45

= 47,900 GALLONS

3) DRAINABLE LIQUID REMAINING (DLR) = DIL + SUPERNATANT

= 47,900 GALLONS + 0 = 47,900 GALLONS

4) PUMPABLE LIQUID REMAINING (PLR) = DLR - REMAINING DRAINABLE LIQUID AFTER JET PUMPING

= 47,900 GALLONS - 22,500 GALLONS (AVERAGE):
= 25,400 GALLONS SEE RHO-CD-925, REV. 2, PAGE 3.

NOTE: THIS PAPERWORK IS A RESUBMITTAL BECAUSE ORIGINAL INTERIM STABILIZATION EVALUATION IS MISSING.

Calculations made by _____ Date _____

Checked by _____ Date _____

INTERIM STABILIZATION EVALUATION

TANK NUMBER: 110-SX EFFECTIVE DATE: 8-31-79

LIQUID LEVEL & RISER NO.: R-2 28.25" This is a solids level reading

SOLIDS LEVEL & RISER NO.: Riser # unknown- 28.75 R-2 28.25

EST. SUPERNATE LIQUID VOLUME: 0

EST. DRAINABLE INTERSTITIAL LIQUID VOLUME: 8,000 gallons (*)

(*) This volume estimate assumes sludge contains 12.5% drainable interstitial liquid by volume.

TEMPERATURE: Max 189°F Probe #3 Min 119°F Probe #1

IS TANK HEAT LOAD A PROBLEM?

yes X* no ____ unknown ____

* These temperatures do not pose a problem as long as this tank is cooled by the SX sludge cooler.

IS THERE A POTENTIAL DOME LOAD PROBLEM? yes ____ no X

PHOTOGRAPH EVALUATION: (Order #776538 ; LL 28.25" ; 7-26-77)

The surface is 99% dry sludge. There is one small patch of liquid at the base of an airlift circulator. The manual tape is touching on solids. There is debris from broken tapes, sludge weights and broken airlift circulator lines evident. There are a number of objects on the sludge surface. These are believed to be bottles of plutonium waste.

COMMENTS:

This tank meets the criteria set forth in RHO-CD-330 for interim stabilization. Another reference used in evaluating this tank was RHO-CD-756 "Evaluation of Special Tanks".

ADVANCED STABILIZATION RECOMMENDATIONS: Continue the use of the sludge cooler to control tank temperatures.

Prepared By: V. Dennis Mayfield 8-22-79

Reviewed By: John M. Bailey 8-22-79

INTERIM STABILIZATION EVALUATION

TANK NUMBER: 111-SX EFFECTIVE DATE: 7-31-79

LIQUID LEVEL INTERSTITIAL: R-2 50"

SOLIDS LEVEL & RISER NO.: Riser # Not Available 50"

EST. SUPERNATE LIQUID VOLUME: 50 gallons*

EST. DRAINABLE INTERSTITIAL LIQUID VOLUME: 10,000 gallons**

TEMPERATURE: Max 205° F Min 105° F

IS THIS TEMPERATURE A PROBLEM?

yes X*** no ____ unknown

*** This tank is presently being air cooled by the SX Farm sludge cooler to maintain temperature within acceptable limits.

IS THERE A POTENTIAL DOME LOAD PROBLEM? yes ____ no X

* PHOTOGRAPH EVALUATION: (Order #85024 ; LL 4'2" ; 1-3-79)

The surface is 99% dry solids. There is a very small amount of liquid showing at the base of one airlift circulator.

** COMMENTS: It is estimated that 10,000 gallons of drainable interstitial liquid remain in this tank. This estimate is based on the assumption that sludge contains 12.5% by volume of drainable interstitial liquid. The 10,000 gallon figure is less than 12.5% of the sludge volume by 6000 gallons. This is due to P-10 pumping which is estimated to have removed 6000 gallons of drainable interstitial liquid. The continued operation of the SX Farm sludge cooler will further reduce the remaining drainable liquid volume.

Prepared By: V. Dennis Mayer

Reviewed By: John W. Bailey 7-31-79

INTERIM STABILIZATION EVALUATION

TANK NUMBER: 112-SX EFFECTIVE DATE: 7-31-79

LIQUID LEVEL INTERSTITIAL R-2 38.5"

SOLIDS LEVEL & RISER NO. R-2 38.5" Riser Unknown 43.5"

EST. SUPERNATE LIQUID VOLUME 0*

EST. DRAINABLE INTERSTITIAL LIQUID VOLUME 13,000 gallons*

** This figure assumes the entire tank contents consists of sludge and the drainable liquid is 12.5% of the total sludg volume.

TEMPERATURE: Max 132° F*** Min 100° F

IS THIS TEMPERATURE A PROBLEM?

yes ____ no X*** unknown

*** This temperature doesn't appear to be a problem. This tank is currently on the sludge cooler.

IS THERE A POTENTIAL DOME LOAD PROBLEM? yes ____ no X

* PHOTOGRAPH EVALUATION: (Order #752802 : LL 3' 7 1/2" ; 5-2-75)

In these four year old pictures there are small isolated puddles of liquid scattered across the surface. The surface is approximately 95% dry solids. These photos were compared to a set taken 1 year earlier and the SX Farm sludge cooler had evaporated approximately 90% of the surface liquid present in the earlier pictures during that one year period.
Four years have elapsed since the most recent photographs and it is assumed that all surface liquid has been evaporated during this period.

COMMENTS:

The continued operation of the SX Farm sludge cooler will further reduce the remaining drainable liquid volume.

Prepared By: H. Dennis Maupin

Reviewed By: John M Bailey 7-31-79

INTERIM STABILIZATION EVALUATION
PAGE 2

ADVANCED STABILIZATION RECOMMENDATIONS

Continue to operate the SX Farm sludge cooler to control tank temperatures and further reduce the drainable interstitial liquid volume remaining in this tank.

INTERIM STABILIZATION

TANK: 113-SX EFFECTIVE DATE: 11-30-78

TEMPERATURE: 94°F MAX 78°F MIN

SAMPLE REQUIRED: YES ☐ NO ☒

PHOTO EVALUATION: YES ☒ NO ☐

COMMENTS: TANK 241-SX-113 has been changed from LEAKER - PRIMARY STABILIZED - PARTIALLY ISOLATED TO LEAKER - INTERIM STABILIZED - PARTIALLY ISOLATED.

The temperature and photo interpretation sheets are attached to this form. Tank 113-SX has not been on the stabe corrosion and the in tank temperatures have remained below 95°F. This figure is well within the 265°F figure carried in the SPECS & STANDARDS manual for single shell tanks.

The photo evaluation indicates a dry cracked surface over the entire tank. There is less than two feet of solids present and no sample is required for interim stabilization. Diatomaceous earth has stabilized any free surface liquid.

Tank: 113-SX

Photo Date: 4-2-76

Photo I.D: 763162

Liquid Level: 1' 2¼"

Observation of Surface: The tank surface is 100% dry cracked solids.

Salt Well Status: NO casing installed. There is one open hole pump standing in solids

Lollipops? ___ Yes X No

Other: The manual tape is touching on solids. The is one T.C. probe visible. There are air lift circulator air associated air lines. Also some old worn off tapes in the sludge

Interpreted by : V. P. Raymer

Date: 11-30-78

Reviewed by :

Date :

INTERIM STABILIZATION EVALUATION

TANK NUMBER: 114-SX EFFECTIVE DATE: 7-31-79

LIQUID LEVEL & RISER NO. R-2 71.25"

SOLIDS LEVEL & RISER NO. Riser # Unknown 78"

EST. SUPERNATE LIQUID VOLUME 0

EST. DRAINABLE INTERSTITIAL LIQUID VOLUME 25,000 gallons*

TEMPERATURE: Max 227° F
Min 142° F

IS THIS TEMPERATURE A PROBLEM?

yes ____ no X** unknown ____

** This tank is presently connected to the SX Farm sludge cooler to maintain the temperatures within acceptable limits.

IS THERE A POTENTIAL DOME LOAD PROBLEM? yes ____ no X

PHOTOGRAPH EVALUATION: (Order Number 85025, LL 5' 11 1/4", Date 1-3-79)

The entire surface is solids. There are some areas of wet solids at the base of the air lift circulators. This set of photographs was compared to a set of photos taken on 5-1-74. The surface appears dryer in the recent photographs.

COMMENTS:

This tank is connected to the SX-Farm sludge cooler which will continue to reduce the amount of drainable liquid. There is no salt well pumping scheduled for this tank.

* This estimate assumes that 12.5% of the sludge volume is drainable interstitial liquid.

ADVANCED STABILIZATION RECOMMENDATIONS: Continue to operate SX Farm sludge cooler to control the tank temperatures and further reduce the volume of drainable interstitial liquid.

Prepared By: D. Orme

Reviewed By: John H Bailey 7-31-79

Figure 4. Interim Stabilization Evaluation of 100- & 200-Series Non-Jet-Pumped Tanks. (sheet 1 of)

Page 1 of 3

TANK: 241-T-101

EVALUATION (see continuation page for calculations and additional comments):

[X] Photograph review completed - Date of most recent photographs: 04/07/93

[X] Tank history review completed

[X] Tank temperature profile review completed

Surface Condition & Comments: Mottled brown to black in color. A pockmarked, moist sludge surface remains; surface-cracked near the outer perimeter of the tank. Approximately 3 feet of saltwell screen is not visible below the waste remaining in the center of Tank T-101, The FIC Plummet is visible contacting solids. A liquid pool is visible surrounding the Saltwel Screen. See page 2 for additional Comments.

Solids Level 24.5" / 36.25" Date 4/12/93 / 4/07/93 Method Saltwell Screen Zip-Cord / Manual Tape (flake housing)

Liquid Level 24.5" Date 4/12/93 Method Saltwell Screen Zip-cord

Solids Volume 101,800 Gallons (SEE PAGE 3: 1.A.B.2) DDW 04/07/93

Estimated Drainable Liquid Remaining(DLR) : Volume = 16,500 Gallons

Estimated Supernatant Volume Remaining 700 Gallons

Tank was pumped with a submersible pump X Yes __ No; if yes, 25,300 gallons pumped.

[ ] Cost/Benefit Analysis attached

DISPOSITION OF TANK:

[X] Tank Interim Stabilized at 700 gallons of supernatant and 15,800 gallons of drainable interstitial liquid

[ ] Tank not Interim Stabilized; continue stabilization activities

Evaluation Performed by D. D. Wiggins Date 4/12/93 Checked by RANDY L. POWERS Date 4/14/93

APPROVED BY:

Manager, Single Shell Tanks VC Boyles Date 4/14/93

Manager, Single Shell Tanks Technolog RE Raymond Date 4-14-93

Manager, WT Facility Operations [illegible] Date 4/14/93

DISTRIBUTION: Surveillance and Data Acquisition, SE Tank History File, Nuclear Facility Safety, TPA Integration Control, Managers Approval, Evaluation Performer, and Checker signatures

Figure 2. Interm Stabilization Evaluation for Non Jet-Pumped Tanks.

EVALUATION CALCULATION AND COMMENTS:
TANK: 241-T-101

Tank 241-T-101 was declared an assumed leaker on October 4, 1992. Tank 241-T-101 was submersible pumped starting on March 12, 1993, from a measured height of 40.5 inches to a measured height of 36.25 inches (manual tape resting on solids). The "0" datum for this tank is at the bottom of the sidewall. Multiple pumping campaigns resulted in the removal of 25,300 gallons of waste. A total of four transfer line flushes, and two saltwell screen flushes resulted in the use of an additional 1670 gallons of flush water.

During the final pump campaign, completed on April 6, 1993, prior to the final transfer line flush, approximately 1.5 Rad/hr was detected near the flushing valves in the Tank 241-T-101 pump pit. This indicated the probable transfer of limited quantities of sludge into the pump pit valves. Due to ALARA concerns, and the fact that transfer line flushes were approximately equal to waste transfers, the decision was made to shut down any additional transfers.

In-Tank photographs (April 7, 1993) were used to estimate the quantity of remaining supernatant in Tank 241-T-101. Engineering estimates that 700 gallons of supernatant remains near the middle of this tank, in a roughly circular shaped pool offset from the center, seven and one half inches deep at the deepest point, and occupying no more than 10 percent of the tank waste surface area. These estimates are the result of comparing the visible size of the liquid pool to the overall size of the tank, and to objects within the tank of known dimension. The pool depth is estimated considering the gently sloping nature of the solids within this tank.

The final zip-cord measurement within the central saltwell screen indicated a liquid surface at 24.5 inches in the middle of the tank, using the same baseline as the manual tape. Tank 241-T-101 has a dish-bottomed configuration. The manual tape is located at a distance of 150 inches in from the side of the tank, and rests on a gently sloping solid waste surface. For the purposes of determining waste volumes, an average slope of the waste surface indicated by the manual tape and the zip-cord was determined to be no greater than three degrees from the horizontal. The average sloping waste height as determined by the manual tape is eight inches higher than the solid waste height based on the zip-cord reading. These factors were used to determine supernatant volumes, and to estimate the total waste volumes.

See calculations on the following page for a summary of waste volumes remaining in 241-T-101.

Calculations made by D D. Wiggins Date 04/13/93
Checked by [illegible] Date 04/14/93

Figure 2. Interm Stabilization Evaluation for Non Jet-Pumped Tanks.

page 3 of 3

EVALUATION CALCULATION AND COMMENTS:
TANK: 241-T-101

1. Volume Calculations

A. 1. Supernatant Volume* = Pool Volume =
1/3[(Pool Depth)π(Pool Radius)^2]
Pool Radius=12 ft =144 in.
Pool Depth= 144 in. (Tan 3 degrees)
7.48 Gal/cubic ft, 1728 cubic in./cubic ft.
1/3[144"(Tan 3°)(144")$^2(\pi)$= 163,870 in.^{3}= 94.8 ft^3=700 Gal.

B. 1. Total Waste Volume= Upper Waste Volume (manual tape) + Lower Waste Volume (zip-cord) + 12,500 (Dish Volume)=
*(8in.)(2,750 Gal./in.) + *(24.5 in.)(2,750 Gal./in.) +
12,500 Gal.= 101,900 Gal.

2. Solids Volume= Total Waste Vol. - Supernatant=
101,900 Gal. - 700 Gal.= 101,200 Gal.

C. Interstitial Liquids
Porosity= 45%, Capilliary Height (Sludge)= 24in.

1. Drainable Interstitial Liquid (DIL)=
[101,200 Gal. - 24(2,750 Gal./in.)] 0.45= 15,800 Gal.

2. Drainable liquid remaining (DLR)= DIL + Supernatant
15,800 Gal. + 700 Gal. = 16,500 Gal.

3. Pumpable liquid remaining (PLR)=
DLR- 0.45[18in.(2,750 Gal./in.)]=
16,500 Gal. - 22,300 Gal.= 0

* See page 2 of 3 for description of this evaluation.

Calculations made by D. D. Wiggins Date 04/13/93
Checked by [illegible] Date 04/14/93

INTERIM STABILIZATION EVALUATION - NON-JET PUMPED TANKS

Tank: 103-T

Evaluation (see Continuation Page for calculations and additional comments):

[X] Photograph review completed - Date of most recent photographs 4/2/81

[X] Tank history review completed

[X] Tank temperature profile review completed

Surface Description: A supernatant pool, estimated from photos to have an average depth of 2", covers approximately 80% of the tank surface. The rest is sludge. The FIC is contacting liquid. Date 4/2/81

Solids Level 3.85" at the edge Date 12/29/78 Method FIC

Liquid Level 5.0" Date 10/27/83 Method FIC

Solids Volume 22,500 gal

Estimated Drainable Liquid Volume 3500 gal

Average Maximum Tank Temperature, past 6 months 68 F

Estimated Supernatant Volume 3500 gal

[ ] Cost/Benefit Analysis attached

Evaluation Performed by T.E. Kerrick Date 11/15/83 Checked by W.E. Kirk Date 11/15/83

Disposition of Tank:

[X] Tank Interim Stabilized at 3500 gallons of drainable liquid

[ ] Tank not Interim Stabilized; stabilization activities resumed

Approved by: Manager, TF&EPC R.A. Van Vleet Date 11/18/83

Manager, TFS&O G.T. Dukelow Date 11-22-83

Program Manager L.C. Hinds Date 11-25-83

DISTRIBUTION: TF&EPC Tank File, Tank Farm Surveillance Analysis, Approval Signatures

INTERIM STABILIZATION EVALUATION - NON-JET PUMPED TANKS

(CONTINUATION PAGE)

Evaluation Calculations and Comments

TANK: 103-T

TOTAL WASTE VOLUME = (WASTE LEVEL (IN)) X 2750 $\frac{GAL}{IN}$ + 12,500 GAL

WASTE LEVEL = 5.0"

TOTAL WASTE VOLUME = 5 IN X 2750 $\frac{GAL}{IN}$ + 12,500 GAL = 26,250 GAL ≈ 26,000 GAL.

SUPERNATANT VOLUME: SUPERNATANT POOL IS ESTIMATED TO AVERAGE 2" DEPTH AND COVERS 80% OF THE TANK SURFACE FROM 4/2/81 PHOTOS.

SUPERNATANT VOLUME = 2 IN X 2750 $\frac{GAL}{IN}$ X $.80^2$ = 3520 GAL ≈ 3500 GAL.

SOLIDS VOLUME = TOTAL WASTE VOLUME − SUPERNATANT VOLUME

SOLIDS VOLUME = 26,000 GAL − 3500 GAL = 22,500 GAL.

DRAINABLE INTERSTITIAL LIQUID = (SOLIDS VOLUME − CAPILLARY HEIGHT X 2750 $\frac{GAL}{IN}$) X POROSITY

CAPILLARY HEIGHT FOR SLUDGE = 24" SLUDGE POROSITY = 12.5%

DRAINABLE INTERSTITIAL LIQUID = (26,000 GAL − 24 IN X 2750 $\frac{GAL}{IN}$) X .125 = 0 by definition

ASSUMING THE sludge HAS SALTCAKE CHARACTERISTICS:

CAPILLARY HEIGHT = 12" POROSITY = 45%

DRAINABLE INTERSTITIAL LIQUID = (26,000 GAL − 12 IN X 2750 $\frac{GAL}{IN}$) X .45 = 0

DRAINABLE LIQUID REMAINING = DRAINABLE INTERSTITIAL LIQUID + SUPERNATANT

DRAINABLE LIQUID REMAINING = 0 + 3500 GAL = 3500 GAL.

Calculations done by Tim S. Bilyard

Checked by Nancy G Bill

INTERIM STABILIZATION EVALUATION - NON-JET PUMPED TANKS

(CONTINUATION PAGE)

Evaluation Calculations and Comments

TANK: 103-T

Tank 103-T has had intrusions between 1978 and 1981. In the spring of 1981 an unusual occurrence report was written on the tank because it exceeded the liquid level increase criteria. In August 1981, the tank was interim isolated. Since then, the liquid level has fluctuated between 5.0" and 5.5". It is suspected that the fluctuation is due to instrument error.

The lack of recent photographs is not a problem as the liquid level at the time the photographs were taken (4/2/81) was 5.0". While the lowest liquid level (5.0") was used in estimating supernatant volume, the supernatant volume if the liquid level were 5.5" would be 4500 gallons which is still below the 5000 gallon criteria.

Evaluation done by Tim D. Kirkpatrick

Checked by Nancy G. Hall

INTERIM STABILIZATION EVALUATION
NON-JET PUMP TANKS

Tank: 105-T

Evaluation (see continuation page for calculations and additional comments):

☒ Photograph review completed - Date of most recent photographs 5-12-87

☒ Tank History review completed

☒ Tank temperature profile review completed

Surface Description: DARK SLUDGE SURFACE WITH 10% OF SURFACE COVERED WITH 1" TO 2" SUPERNATANT PUDDLES. UNEVEN SURFACE. FIC IS CONTACTING SOLIDS Date 5/12/87

Solids Level 30.1" Date 5/28/87 Method CASS-FIC

Liquid Level 30.1" Date 5/28/87 Method FIC, PHOTO

Solids Volume 98,025 GALLONS

Estimated Drainable Liquid Volume 22,812 GALLONS

Average Maximum Tank Temperature, past 6 months 89°F

Estimated Supernatant Volume N/A GALLONS

☐ Cost/Benefit Analysis attached

Evaluation Performed by [illegible] Date 5/28/87 Checked by [illegible] Date 5/29/87

Disposition of Tank:

☒ Tank Interim Stabilized at 22,812 gallons of drainable liquid

☐ Tank not Interim Stabilized; stabilization activities resumed

Approved by: Manager, TF&EPE [signature] Date 5/29/87

Manager, TFS&O [signature] Date 6-2-87

Program Manager [signature] Date 5/29/87

DISTRIBUTION: TF&EPE Tank File, Tank Farm Surveillance Analysis, Approval Signatures

EVALUATION CALCULATIONS AND COMMENTS

Tank: 105-T

VOLUME CALCULATIONS

SUPERNATANT VOLUME = (2750 GAL/IN)(1.5 IN)(10%)

= 413 GALLONS

SOLIDS VOLUME

SOLIDS LEVEL = 30.1"

DISH BOTTOM TANK

(30.1 INCHES)(2750 GAL/IN) + 12,500 GALLONS

= 95,275 GALLONS

ADD ANOTHER 2750 GALLONS FOR EXPOSED SOLIDS ABOVE FIC DUE TO UNEVEN SURFACE:

TOTAL SOLIDS VOL = 95,275 + 2750 = 98,025 GALLONS

Calculations made by: C.S. Yonco 5-7/87

Checked by: [signature]

EVALUATION CALCULATIONS AND COMMENTS

Tank: 105-T

Page 3 of 3

DRAINABLE INTERSTITIAL LIQUID REMIANING:

CAPILLARY HEIGHT = 33,000 GALLONS

DIL = (SOLIDS LEVEL - CAPILLARY HEIGHT)(POROSITY)(VOL. CONV)

= (30.1" - 12")(0.45)(2750 GAL/IN)

= 22,399 GALLONS

TOTOL DRAINABLE = DIL + SUPERNATANT

= 22,399 + 413

= 22,812 GALLONS

Calculations made by: [signature] 5/09/97

Checked by: [signature]

INTERIM STABILIZATION EVALUATION

TANK NUMBER: 241-T-106 EFFECTIVE DATE: 8-10-81

LIQUID LEVEL & RISER NO. 3.2" R-1

SOLIDS LEVEL & RISER NO. # 3.2" R-1

EST. SUPERNATE LIQUID VOLUME Less than 1000 gallons

EST. DRAINABLE INTERSTITIAL LIQUID VOLUME 0

TEMPERATURE: 67 F

IS TANK HEAT LOAD A PROBLEM?

yes ____ no X unknown ____

IS THERE A POTENTIAL DOME LOAD PROBLEM? yes ____ no X

PHOTOGRAPH EVALUATION: Photo date - July 24,1980

The waste surface is composed of damp peripheral sludge sloping inward to an irregular center liquid. The diameter of the pool is estimated to be in the range of 22' ± 3', and its shallowness is attested by islets and bands of exposed sludge. Both the manual and automatic(FIC) liquid level gauges are seen to be contacting solids.

COMMENTS:

Prepared By: [signature] 7-22-81

Reviewed By: V. Dennis Bazzi

INTERIM STABILIZATION

TANK: 108-T Effective Date: 11-30-78

Temperature: 64°F

Sample Required: yes ☐ no ☒

Photo Evaluation: yes ☒ no ☐

COMMENTS: 108-T is changed from Inactive - Primary Stabilized TO Inactive - Interim Stabilized.

Temperature data and photo evaluation sheets are attached. The temperature did not exceed 65°F during any period covered. The photographs taken in October 1977 show a dense solids surface across 95% of the tank. There is a small liquid pool at the very center of the tank. This liquid pool contains approximately 100 gals of liquid.

There is less than two feet of solids in this tank. There is no requirement for a sample to interim stabilize this tank.

TANK : 108-T
DATE OF PHOTO = 10/26/77
PHOTO # : 7710966
LL : 12.25 "

SURFACE DESCRIPTION: 95% SOLID.

LOCATION OF SALT WELL : NONE IN PHOTOS

OTHER :

INTERPRETER: TBD

DATE = 1/16/78

Tank: 109-T

Evaluation (see continuation page for calculations and additional comments):

☒ Photograph review completed - Date of most recent photographs* 7/23/84

☒ Tank History review completed

☒ Tank temperature profile review completed prior to 11/13/82.

Surface Description: The surface appears to be a dry sludge with No supernate present.

Date 12/13/84

Solids Level 16.7 inches Date 12/7/84 Method Manual Tape

Liquid Level 16.7 inches Date 12/7/84 Method Manual Tape

Solids Volume 58,400

Estimated Drainable Liquid Volume 0

Average Maximum Tank Temperature, past 6 months Not Available

Estimated Supernatant Volume 0

☐ Cost/Benefit Analysis attached

Evaluation Performed by _____ Date ____ Checked by ____ Date____

Disposition of Tank:

☒ Tank Interim Stabilized at 0 gallons of drainable liquid

☐ Tank not Interim Stabilized; stabilization activities resumed

Approved by: Manager, TF&EPE [signature] Date 12/17/84

Manager, TFS&O [signature] Date 12/19/84

Program Manager [signature] Date 12-20-84

DISTRIBUTION: TF&EPE Tank File, Tank Farm Surveillance Analysis, Approval Signatures

* TANK LEVEL HAS REMAINED CONSTANT SINCE PHOTOGRAPHS WERE LAST TAKEN

EVALUATION CALCULATIONS AND COMMENTS

Tank: 109-T

Page 2 of 2

Solids level: 16.7 inches (Sludge)

Solids Volume: (16.7 inches)(2750) + 12500 = 58425 gallons

Supernate Volume: 0 gallons

Drainable Interstitial Liquid = Drainable Liquid = (58425 - 66000)(.126) = -947 gal ⇒ 0 gallons

Calculations made by: J. Alan Hill

Checked by: K. Van Meter

Figure 2. Interim Stabilization Evaluation for Jet-Pumped Tanks
(Sheet 1 of 2)

TANK: 241-T-111 Page 1 of 3

Reason Jet Pumping Halted:

I. [M] Meets 0.05 gpm criteria, Date of Shutdown 2/8/95
II. [ ] Major equipment failure, Date of Shutdown _____

Surface Condition & Comments:
Surface is a smooth, brown tinted sludge with visible cracks. The sludge slopes from the tank sidewall to the middle of the tank where the slope increases downward to the saltwell screen. The F.I.C. is contacting a solid surface approximately 2" into the waste surface. A small pool of 60 gallons is visible around the central saltwell screen.

Evaluation: (See continuation page for calculations and additional comments)

Photograph review completed - Date of most recent photograph 2/13/95
Tank history review completed. [M]
Tank temperature profile reviews completed. [M] ~64°F (2/22/95)
Starting liquid level 169.9" Method Dip Tubes Date 5/15/94
Final liquid level (after equilibration) 146.0" Method Dip Tubes Date 2/21/95

Total Net Jet Pump Production 9600 gal
Capillary Height Used in Calculation: 24"

Final Average Flowrate 0.04 gpm
Calculated Porosity 10.5 %
Supernatant 60.0 gal
Drainable Interstitial Liquid 34.2 kgal
Drainable Liquid Remaining 34.3 kgal
Pumpable Liquid Remaining 29.1 kgal

Disposition of Tank:

[M] Tank Interim Stabilized
[ ] Tank not Interim Stabilized; Jet Pumping Restarted

Evaluation Performed by: S L Swan Date 2/22/95
Checked by: V C Boyles Date 2/22/95

APPROVED BY:

Team Lead, Stabilization Engineering V C Boyles Date 2/22/95
Manager, Tank Stabilization & Engineering Support W S Eaton Date 2/22/95
Manager, SST Stabilization Program _____ Date 2/22/95
Manager, Tank Farm Operations _____ Date 2/22/95
Add'l Sig. for Reason # II: Manager, TWRS Plant _____ Date _____

Distribution: Nuclear Facility Safety, Shift/Surveillance Engineering, Systems Engineering, Single-Shell Tank History File, TPA Integration Control, Approving Managers, Evaluation Performer, and Checker signatures.

Figure 2. Interim Stabilization Evaluation for Jet-Pumped Tanks
(Sheet 2 of 2)

EVALUATION CALCULATIONS AND COMMENTS:

TANK: 241-T-111

Tank 241-T-111 was pumped 9 times during January 1995 with 1149 net gallons pumped. The pumping times varied from a few hours to several days, but were all stopped due to low flow into the saltwell screen. After pumping stopped, it took an average of 24 hours for the saltwell screen to refill with interstitial liquid. To calculate flowrate, the actual hours pumped plus 216 hours to refill (9 campaigns times 24 hours) will be used. A total of 446 (216 + 230) hours was required to pump 1149 gallons for an average flow rate of 0.04 gallons per minute. This flowrate holds true for February 1995 where 376 net gallons were pumped over 152 hours or 0.04 gpm. Also of interest was the monitoring of the saltwell screen refill rate. The refill rate, based on dip tube information, was shown to average less than 0.02 gpm.

A total of 9600 net gallons of waste was pumped from T-111. This was figured on a 13,400 gallon increase in 244-TX DCRT level minus flush water usage of 3800 gallons. Based on pumping data, 3000 of the 9600 net gallons was supernatant liquid.

Evaluation Performed by: S L Swanson Date 2/22/95

Checked by: V C Boyles Date 2/22/95

Figure 2. Interim Stabilization Evaluation for Jet-Pumped Tanks
(Sheet 2 of 2)

Page 3 of 3

EVALUATION CALCULATIONS AND COMMENTS:

TANK: 241-T-111

DATA: Starting Liquid Level (Dip Tubes): Wft= 174", SpG= 1.020, L.L.= 169.9"
Ending Liquid Level (Dip Tubes): Wft= 150", SpG= 1.027, L.L.= 146.0"
Interstitial Liquid Level (I.L.L.) = Ending Liquid Level = 146.0"

NOTE: Liquid Level readings will be zeroed at the F.I.C. elevation of tank sidewall (-12") minus the height of dip tubes above the tank bottom (+4") or a net difference of (-8") for all calculations except porosity.

Net Pumped = Gross Pumped - flushes/primes = 13,400 - 3800 = 9600 gals.
Supernatant Volume = 3000 gallons (from pumping data).

$$\text{Calculate Porosity} = \frac{[(\text{net pumped volume}) - (\text{supernatant volume})] * 100}{[(\text{starting L.L.}) - (\text{supernatant}/2750) - (\text{ending L.L.})] * 2750}$$

$$= \frac{[9600 \text{ gallons} - 3000 \text{ gallons}] * 100}{[169.9 - (3000/2750) - 146] * 2750} = \frac{660{,}000}{62{,}725} = 10.5\%$$

ASSUMPTIONS: The waste above the final Interstitial Liquid Level is considered unpumpable.

Total Waste below I.L.L. = (146" - 8")*2750 + 12,500 gal (dished bottom)
= 392,000 gallons or 392.0 kgal.

Drainable Interstitial Liquid (D.I.L.) = (Total Waste below I.L.L. - capillary height) * porosity.

(where capillary height for sludge tank is 24" * 2750 = 65,000 gallons.)

= (392,000 - 66,000) * .105
= 34,230 gallons or 34.2 kgal.

Drainable Liquid Remaining (D.L.R.) = D.I.L. + supernatant remaining
= 34,230 + 60 gallons
= 34,290 gallons or 34.3 kgal.

Pumpable Liquid Remaining (P.L.R.) = D.L.R. - (unpumpable height) * porosity

(where unpumpable height for sludge tank is 18" * 2750 = 49,500 gallons.)

= 34,290 - (49,500) * .105
= 29,092 gallons or 29.1 kgal.

Evaluation Performed by: S L Swanson Date 2/22/95

Checked by: VC Boyles Date 2/22/95

INTERIM STABILIZATION EVALUATION

TANK NUMBER: 241-T-202 EFFECTIVE DATE: 8-10-81

LIQUID LEVEL & RISER NO. 109.0" R-4

SOLIDS LEVEL & RISER NO. 109.0"

EST. SUPERNATE LIQUID VOLUME Less than 500 gallons

EST. DRAINABLE INTERSTITIAL LIQUID VOLUME 2000 gallons

TEMPERATURE: 70 F

IS TANK HEAT LOAD A PROBLEM?

yes ____ no X unknown ____

IS THERE A POTENTIAL DOME LOAD PROBLEM? yes ____ no X

PHOTOGRAPH EVALUATION: Photo date - January 30,1981

COMMENTS: With the exception of a small pool of clear liquid at the salt well screen, the photographs show the waste surface to consist of fissured solids. The pool is approximately 4 feet in diameter and its bottom is visible to within 10 inches of the well casing. The volume of surface liquid is therefor estimated to be less than 500 gallons. The gauge plummet is contacting the sludge surface.

Prepared By: [signature] 9-11-81

Reviewed By: H. Dennis Mayer

STABILIZATION EVALUATION

Page 1 of 2

TANK: 241-T-203

EVALUATION (see continuation page for calculations and additional comments):

[✓] Photograph review completed - Date of most recent photographs: 8/3/89

[✓] Tank history review completed SEE TANK HISTORY FILE.

[✓] Tank temperature profile review completed 1/1/89 HIGH 66°F; AVE 64°F

Surface Condition & Comments: PHOTOS FROM 8/3/89 SHOW A DEEPLY CREVASSED SLUDGE SURFACE GENTLY SLOPING TO THE SALT WELL SCREEN WHERE A LIQUID POOL, APPROXIMATELY 6 FEET IN DIAMETER, IS LOCATED. THE VOLUME OF THE STANDING POOL IS ESTIMATED TO BE LESS THAN 200 GALLONS. THE LIQUID POOL IS ESTIMATED TO BE LESS THAN 6 INCHES DEEP WITHIN ONE FOOT OF THE SALT WELL SCREEN.

Solids Level 181.5 INCHES Date 4/2/91 Method MANUAL TAPE

Liquid Level 181.5 INCHES Date 4/2/91 Method MANUAL TAPE

Solids Volume 35,000 GALLONS

Estimated Drainable Insterstitial Liquid Remaining Volume 14,900 GALLONS (DIL)

Estimated Supernatant Volume Remaining < 200 GALLONS

Tank was pumped with a ~~submersible~~ P-10 pump ✓ Yes ___ No; if yes, 16700 gallons pumped.

Record # 2774
APRIL 1978

[ ] Cost/Benefit Analysis attached

DISPOSITION OF TANK:

[✓] Tank Interim Stabilized at 4200 gallons of supernatant and 14,900 gallons of drainable interstitial liquid

[ ] Tank not Interim Stabilized; continue stabilization activities

Evaluation Performed by D.D. Wiggins Date DDW 6/27/91 Checked by K.A. White Date KAW 6/27/91 ~~6/25/91~~

APPROVED BY:

Manager, Stabilization Engineering V.C. Boyles Date 6/27/91

Manager, Single Shell Tanks R.E. Raymond Date 7-5-91

Manager, Tank Farms Facility Operations [signature] Date 7/9/91

DISTRIBUTION: Tank Farm Surveillance Analysis, SE Tank History File, Nuclear Facility Safety, TPA Integration Control, Managers Approval, Evaluation Performer, and Checker signatures

STABILIZATION EVALUATION
CONTINUATION SHEET

Page 2 of 2

EVALUATION CALCULATIONS AND COMMENTS:

TANK: 241-T-203

1- COMMENTS:

* DECLARED INTERIM STABILIZED IN APRIL, 1981, INTERIM ISOLATED, AUGUST 1981. THIS PAPERWORK IS A RESUBMITTAL BECAUSE THE ORIGINAL INTERIM STABILIZATION EVALUATION IS MISSING.
* SINGLE-SHELL DISH-BOTTOM TANK: 55,000 GALLON CAPACITY, 200 SERIES.
* USE MOST CONSERVATIVE ESTIMATE. 45% POROSITY TO CALCULATE DIL AND 12.5% POROSITY TO DETERMINE PLR.

2- TOTAL WASTE VOLUME: (INCHES - DISH HEIGHT) X $\frac{\text{VOL}}{\text{IN}}$ + DISH VOLUME
$= (181.5\ \text{IN} - 6\ \text{IN} \times 196\ \frac{\text{GALLONS}}{\text{IN}}) + 590\ \text{GALLONS}$
$= 35{,}000$ GALLONS

3- DRAINABLE INTERSTITIAL LIQUID (DIL): (TOTAL WASTE - 12 IN CAPILLARY VOL) 0.45 POROSITY
$\text{DIL} = [35{,}000 - (12\ \text{IN} \times 196\ \frac{\text{GALLONS}}{\text{IN}})]\ 0.45$ POROSITY
$\text{DIL} = 14{,}700$ GALLONS

4- SUPERNATANT VOLUME: TO ACCOUNT FOR AREA AROUND SALT-WELL, CALCULATE A 6 FT DIAMETER POOL USE 10 INCHES DEEP.
$= \frac{\pi (6\text{FT})^2}{4} (10\ \text{IN} \frac{1\text{FT}}{12\ \text{IN}} \times 7.4805\ \frac{\text{GALLONS}}{\text{FT}^3}) = 176$ GALLONS
(use 200 gallons)

5- DRAINABLE LIQUID REMAINING (DLR): DIL + SUPERNATANT
$\text{DLR} = 14{,}700 + 200$ GALLONS $= 14{,}900$ GALLONS

6- PUMPABLE LIQUID REMAINING (PLR): DLR - 18 INCH @ 12.5% POROSITY
$= [14{,}900 - [(18\ \text{INCHES} \times 196\ \frac{\text{GALLONS}}{\text{IN}}) 0.125]] = 14{,}500$ GALLONS

Calculations made by Dirk D. Wiggins Date 6/27/91

Checked by Katie White Date 11/27/91

INTERIM STABILIZATION EVALUATION

TANK NUMBER: 241-T-204 EFFECTIVE DATE: _____

LIQUID LEVEL & RISER NO. 197.0" R-4

SOLIDS LEVEL & RISER NO. 197.0"

EST. SUPERNATE LIQUID VOLUME Less than 500 gallons

EST. DRAINABLE INTERSTITIAL LIQUID VOLUME 4000 gallons

TEMPERATURE: 75 F

IS TANK HEAT LOAD A PROBLEM?

yes _____ no X unknown

IS THERE A POTENTIAL DOME LOAD PROBLEM? yes _____ no X

PHOTOGRAPH EVALUATION: Photo date - March 17,1981

Greater than 90 percent of the waste surface appears to be composed of wet sludge. Drainage of this material as a result of P-10 salt well pumping is evidenced by its radially cracked appearance. The liquid pool, located at the salt well casing, is approximately 4 feet in diameter.

COMMENTS:

Prepared By: [signature] 7-22-81

Reviewed By: V. Dennis Rayzi

INTERIM STABILIZATION EVALUATION - NON-JET PUMPED TANKS

Tank: 101-TX

Evaluation (see Continuation Page for calculations and additional comments):

[X] Photograph review completed - Date of most recent photographs 1/31/84

[X] Tank history review completed

[X] Tank temperature profile review completed

Surface Description: Tank surface is covered by a shallow liquid pool approximately 1.5" deep and 60' in diameter. The FIC is resting on a mound of solids. Date 1/31/84

Solids Level 37.5" Date 1/31/84 Method photo

Liquid Level 39.0" Date 2/2/84 Method I-FIC

Solids Volume 84,100 gallons

Estimated Drainable Liquid Volume 4900 gallons

Average Maximum Tank Temperature, past 6 months 128 F 8/15/82 most recent data

Estimated Supernatant Volume 2640 gallons

[ ] Cost/Benefit Analysis attached

Evaluation Performed by T. S. Hibbs Date 2/2/84 Checked by M S Bell Date 2/2/84

Disposition of Tank:

[X] Tank Interim Stabilized at 4900 gallons of drainable liquid

[ ] Tank not Interim Stabilized; stabilization activities resumed

Approved by: Manager, TF&EPC [signature] Date 2/3/84

Manager, TFS&O [signature] Date 2-3-84

Program Manager [signature] Date 2-3-84

DISTRIBUTION: TF&EPC Tank File, Tank Farm Surveillance Analysis, Approval Signatures

INTERIM STABILIZATION EVALUATION - NON-JET PUMPED TANKS

(CONTINUATION PAGE)

Evaluation Calculations and Comments

TANK: 101-TX

TOTAL WASTE VOLUME = (WASTE LEVEL (IN) - 12IN) X 2750 gal/in + 12,500 gal

WASTE LEVEL = 37.0"

TOTAL WASTE VOLUME = (39 - 12) in X 2750 gal/in + 12,500 gal = 86,750 gal

SUPERNATANT VOLUME: POOL DIAMETER ESTIMATED 60 ft DEPTH ESTIMATED 1.5"

SUPERNATANT VOLUME = $60^2 ft^2 \times \pi \times \frac{1}{4} \times 1.5 in \times \frac{ft}{12 in} \times 7.48 \frac{gal}{ft^3}$ = 2640 gallons

SLUDGE VOLUME = TOTAL WASTE VOLUME - SUPERNATANT VOLUME

SLUDGE VOLUME = 86,750 gal - 2640 gal = 84,110 gallons

DRAINABLE WITERSTITIAL LIQUID (DIL) = (SLUDGE VOLUME - CAPILLARY HEIGHT X 2250 $\frac{gal}{in}$) X POROSITY

SLUDGE CAPILLARY HEIGHT = 24 in SLUDGE POROSITY = 12.5%

DIL = (84,110 - 24 X 2750) X .125 = 2,260 gallons

DRAINABLE LIQUID REMAINING (DLR) = DIL + SUPERNATANT

DLR = 2,260 + 2640 = 4900 gallons

ASSUMING SLUDGE TO HAVE SALT CAKE PROPERTIES:

CAPILLARY HEIGHT = 12 in POROSITY = 45%

DIL = (84,110 - 12 X 2750) X .45 = 23,000 gallons

DLR = 23,000 + 2640 = 25,640 gallons.

CALCULATIONS DONE BY T. A. Bilanin

CHECKED BY Nancy L Bell

Stabilization Evaluation

Tank: 102-TX

Reason Jet Pumping Halted:

☐ Management Decision, Date of Shutdown _____

☒ Major Failure of Jet Pump, Date of Shutdown 11-14-82

Additional Comment: Shutdown of 102-TX was due to a failed flowmeter.

Evaluation: (See Sheet 2 for calculations and additional comment)

Starting Liquid Level 129" Date 12-4-81

Supernatant Volume 0 Date 12-4-81

Final Liquid Level Measured After Equilibration of Interstitial Liquid:

Dip Tubes 34.5" Date 3-24-83

LOW - Date _____

Manual - Date _____

Total Net Jet Pump Production 94439

Calculated Solid Characteristics:

Porosity 0.363

Permeability/ Viscosity ($^{K}/_{\mu}$) -

Capillary Height 12" (assumed)

Estimated Drainable Liquid Remaining 22 K gal

Final Average Flowrate 0.232 Date November, 1982

Evaluation Performed by S. J. Joncus Date 3-24-83

Disposition of Tank:

☒ Tank Interim Stabilized at 22 thousand gallons of Drainable Liquid,
4 thousand gallons of Pumpable Liquid.

☐ Tank Not Interim Stabilized; Jet Pumping Restarted

Approval By: Manager, TF&EPC [signature] Date 4/1/83

Manager, TFS&O [signature] Date 4/4/83

Program Manager [signature] Date 4/5/83

Distribution: TF&EPC Tank File, HS&E Surveillance Analysis, Approval Signatures.

Evaluation Calculations and Comment

TANK: 102 TX

Weight Factor 39.7
Specific Gravity 1.3

Current IL level = $\frac{39.7}{1.3} + 4 = 34.5$

Starting LL = 129"
Starting Supernatant = 0
Current Production = 94439 gallons

Porosity = $\frac{\text{Jet Pump Production}}{[\text{Starting LL} - \text{Current LL}]\,2750}$

$= \frac{94439}{[129 - 34.5]\ 2750} = 0.363$

Drainable IL Remaining = [Current LL - Capillary Height] [2750 gal/in] [porosity]
= [34.5 - 12] [2750] [0.363]
= 22.5 kgal

Pumpable IL Remaining = Drain IL Remaining − Non Pumpable Drainable Heel
= [34.5-12] [2750] [0.363] - 18 [2750] [0.363] = 4.5 kgal

Final Average Flowrate = $\frac{\text{Gallons Pumped}}{\text{Minutes Operated}}$

$= \frac{3952}{[277]\ 60} = 0.232$ gpm

Stabilization Evaluation

Tank: 103-TX

Reason Jet Pumping Halted:

☐ Management Decision, Date of Shutdown ____

☒ Major Failure of Jet Pump, Date of Shutdown 6-1-83

Additional Comment:
Shutdown of 103-TX was due to a pump leak.

Evaluation: (See Sheet 2 for calculations and additional comment)

Starting Liquid Level 82" Date 12-2-81

Supernatant Volume 47 K gal Date 12-2-81

Final Liquid Level Measured After Equilibration of Interstitial Liquid:

Dip Tubes 34.00" Date 7-19-83

LOW - Date -

Manual - Date -

Total Net Jet Pump Production 68,302

Calculated Solid Characteristics:

Porosity 0.25

Permeability/ Viscosity (K/μ) -

Capillary Height 12" (assumed)

Estimated Drainable Liquid Remaining 15.1 K gal

Final Average Flowrate .046 gal/min Date May, 1983

Evaluation Performed by J. G. Riddelle Date 7-19-83

Disposition of Tank:

☒ Tank Interim Stabilized at 15.1 thousand gallons of Drainable Liquid
0 thousand gallons of Pumpable Liquid.

☐ Tank Not Interim Stabilized; Jet Pumping Restarted

Approval By: Manager, TF&EPC [signature] Date 7/22/83

Manager, TFS&O [signature] Date 7/23/83

Program Manager [signature] Date 8-12-83

Distribution: TF&EPC Tank File, HS&E (Surveillance Analysis), Approval Signatures

Evaluation Calculations and Comment

TANK: 103-TX

7/19/83 WEIGHT FACTOR 36.71
SPECIFIC GRAVITY 1.2236

CURRENT IL LEVEL = $\frac{36.71}{1.2236}$ + 4.0 = 34.0"

STARTING LIQUID LEVEL = 82"

STARTING SUPERNATANT VOLUME = 47,000 gal

CURRENT PRODUCTION = 68,302 gal

CALCULATION OF CURRENT INTERSTITIAL LIQUID VOLUME

$$\text{POROSITY} = \frac{\text{JET PUMP PRODUCTION} - \text{SUPERNATANT VOLUME}}{(\text{STARTING L. LEVEL} - \frac{\text{SUPERNATANT}}{2750} - \text{ENDING L. LEVEL})\ 2750}$$

$$= \frac{68,302 - 47,000}{(82" - \frac{47,000}{2750} - 34")\ 2750}$$

$$= 0.25$$

$$\text{FINAL AVERAGE FLOW RATE (MAY 1983)} = \frac{\text{VOLUME PUMPED}}{\text{MINUTES OPERATED}}$$

$$= \frac{1979}{722\ (60)}$$

$$= 0.046 \text{ gpm}$$

DRAINABLE IL REMAINING = (34.0" - 12")(2750)(0.25) = 15.1 Kgal

PUMPABLE IL REMAINING = 0 by definition

Jeff S. Riddell
Calculations made by

Wm R. Tamosaitis
Calculations checked by

INTERIM STABILIZATION EVALUATION - NON-JET PUMPED TANKS

Tank: 104-TX

Evaluation (see Continuation Page for calculations and additional comments):

[X] Photograph review completed - Date of most recent photographs April 3,1984

[X] Tank history review completed

[X] Tank temperature profile review completed

Surface Description: Photos show solid surface with small liquid pool in center. Pool area is estimated at 330 square feet. FIC is now hitting a small spot of liquid separated from the larger pool. Date

Solids Level 31.2 " Date 4-3-84 Method photos

Liquid Level 31.2" Date 3-31-84 Method FIC

Solids Volume 64,800 gallons

Estimated Drainable Liquid Volume 14,800 gallons

Average Maximum Tank Temperature, past 6 months 98°F

Estimated Supernatant Volume 500 gallons

[ ] Cost/Benefit Analysis attached

Evaluation Performed by MEKell Date 4-6-84 Checked by JSC Date 4-4-84

Disposition of Tank:

[X] Tank Interim Stabilized at 14,800 gallons of drainable liquid

[ ] Tank not Interim Stabilized; stabilization activities resumed

Approved by: Manager, TF&EPC RAV Date 4/10/84

Manager, TFS&O [signature] Date 4-12-84

Program Manager [signature] Date 4-13-84

DISTRIBUTION: TF&EPC Tank File, Tank Farm Surveillance Analysis, Approval Signatures

NOTE: Tank 104-TX was declared Interim Stabilized on 9-19-79. This form is for record purposes only. 2000 gallons of supernatant were removed on 1-24-84 and 1600 gallons were removed on 3-30-84.

INTERIM STABILIZATION EVALUATION - NON-JET PUMPED TANKS

(CONTINUATION PAGE)

Evaluation Calculations and Comments

TANK: 104-TX

Solids level: most of tank 31.2" by photos and FIC
center pool 28.7" taken 2-1-84

Total waste volume (waste level (in.) - 12) x 2750 gal. per in. + 12,500
= (31.2-12) x 2750 + 12,500
= 65,300 gallons

Supernatant volume = area x depth = 332 ft^2 x 2.5/12 ft = 69.2 ft^3 = 517 gallons

Solids volume = total waste volume - supernatant volume
= 65,300 - 500 = 64,800 gallons

Drainable interstitial liquid = (solids volume - [capillary height x 2750 gal./in.]) x porosity

For salt cake, capillary height = 12" and porosity = 0.45

DIL = (64,800 - [12 x 2750]) x 0.45 = 14,300 gallons

Drainable liquid remaining = DIL + supernatant = 14,300 + 500 = 14,800 gallons

Calculations by T Lacey & Bell Date April 6, 1984

Checked by J S Caldwell Date April 5, 1984

INTERIM STABILIZATION EVALUATION - JET PUMPED TANKS

Tank: 105-TX

Reason Jet Pumping Halted:

[X] Meets 0.05 gpm Criteria, Date of Shutdown Aug. 8, 1983

[ ] Major Failure of Jet Pump, Date of Shutdown _____

Additional Comment:

Evaluation: (See Continuation Sheet for calculations and additional comment)

Starting Liquid Level 147.5" Date March 30, 1982

Supernatant Volume 0 Date March 30, 1982

Final Liquid Level Measured After Equilibration of Interstitial Liquid:

Dip Tubes 31.3" Date Sept. 22, 1983

LOW 28.8" (gamma), 27.6" (neutron) Date Aug. 25, 1983

Manual - Date _____

Total Net Jet Pump Production 121,533 gal

Calculated Solid Characteristics:

Porosity 0.38

Permeability/Viscosity (K/μ) -

Capillary Height 12" (assumed)

Estimated Drainable Liquid Remaining 20,200 gal

Final Average Flowrate 0.022 gpm Date Aug. 1-8, 1983

Evaluation Performed by N.E. Bell Date Sept. 23, 1983

Disposition of Tank:

[X] Tank Interim Stabilized at 20.2 thousand gallons of Drainable Liquid
0 thousand gallons of Pumpable Liquid

[ ] Tank Not Interim Stabilized; Jet Pumping Restarted

Approval By: Manager, TF&EPC RAJ _____ Date 9/29/83

Manager, TFS&O _____ Date 9/29/83

Program Manager _____ Date 9/29/83

DISTRIBUTION: TF&EPC Tank File, HS&E Surveillance Analysis, Approval Signatures

INTERIM STABILIZATION EVALUATION - JET PUMPED TANKS

(CONTINUATION PAGE)

Evaluation Calculations and Comments

TANK: 105-TX

Liquid Level (LL) by Dip Tubes (by Manometer)

8/26	Weight Factor	39.43"	
9/7	Weight Factor	39.44"	
9/22	Weight Factor	40.1 "	
9/7	Specific Gravity	1.428	average 1.47
9/22	Specific Gravity	1.51	

$$\text{Liquid Level} = \frac{\text{Weight Factor}}{\text{Specific Gravity}} + \text{Height of Tubes Above Bottom}$$

$$= \frac{40.1}{1.47} + 4 = 31.3"$$

Liquid Level by LOW

gamma 28.8"
neutron 27.6"

Porosity

$$\text{Porosity} = \frac{\text{Net Production}}{(\text{Initial Interstital LL} - \text{Current Interstitial LL}) \times 2750 \frac{\text{gal}}{\text{in.}}}$$

$$= \frac{121{,}533 \text{ gal}}{(147.5\text{-}31.3) \text{ in} \times 2750 \frac{\text{gal}}{\text{in.}}} = 0.380$$

Drainable Liquid

$$= (\text{Current Interstitial LL} - \text{Capillary Height}) \times \text{Porosity} \times 275$$

$$= (31.3 - 12) \text{ in.} \times 0.38 \times 2750$$

$$= 20{,}169 \text{ gal}$$

Final Flowrate (Aug)

$$= \frac{234 \text{ gal}}{176 \text{ h} \times 60 \text{ min/h}} = 0.022 \text{ gpm}$$

Calculations Checked By

L J Van Sickle Date 9/28/93

Stabilization Evaluation

Tank: 106-TX

Reason Jet Pumping Halted:

☐ Management Decision, Date of Shutdown _____

☒ Major Failure of Jet Pump, Date of Shutdown 4-16-83

Additional Comment:

Shutdown was due to electrical failure of the pump motor.

Evaluation: (See Sheet 2 for calculations and additional comment)

Starting Liquid Level 156" Date 12-18-81

Supernatant Volume 37,400 Date 12-18-81

Final Liquid Level Measured After Equilibration of Interstitial Liquid:

Dip Tubes 64" Date 5-24-83

LOW --- Date _____

Manual 67.2" Date 5-12-83

Total Net Jet Pump Production 134.6 kgal

Calculated Solid Characteristics:

Porosity 0.47

Permeability/ Viscosity ($^{K}/_{\mu}$) 0.72*

Capillary Height 4.9 ft*

Estimated Drainable Liquid Remaining 11 kgal

Final Average Flowrate 0.06 gpm Date March & April 1983

Evaluation Performed by S. J. Joncus Date 6-7-83

Disposition of Tank:

☒ Tank Interim Stabilized at 11 thousand gallons of Drainable Liqu
0 thousand gallons of Pumpable Liquic

☐ Tank Not Interim Stabilized; Jet Pumping Restarted

Approval By: Manager, TF&EPC RAV [signature] Date 6/9/93

Manager, TFS&O [signature] Date 6-8-83

Program Manager [signature] Date 6-8-83

Distribution: TF&EPC Tank File, HS&E Surveillance Analysis, Approval Signatur

Evaluation Calculations and Comment

TANK: 106-TX

Manual (zip cord) - Distance from top of cover plate to liquid = 42.38'

Cover plate elevation = 671.71'

Bottom elevation = 623.73'

Current LL = 671.71 - 623.73 - 42.38 = 5.6' = 67.2"

Current Production = 134645

Capillary Height = 4.9' = 58.8"

Starting Supernatant = 37400

Starting LL = 156"

$$\text{Porosity} = \frac{\text{Jet Pump Production} - \text{Supernatant}}{\left[\text{Starting LL} - \frac{\text{Supernatant}}{2750} - \text{Current LL}\right] 2750 \text{ gal/in.}}$$

$$= \frac{134645 - 37400}{\left(\left[156 - \frac{37400}{2750}\right] - 67.2\right) 2750} = 0.470$$

$$\text{Final Average Flowrate (Mar + April '83)} = \frac{\text{Volume Pumped}}{\text{Minutes Operated}}$$

$$= \frac{1790 + 2207}{60[363 + 717]} = 0.00 \text{ gpm}$$

Drainable IL Remaining = $[67.2 - (4.9)(12)][2750][0.470] = 10.9$ kgal

Pumpable IL Remaining = 10.9 kgal - 18"(2750)(0.470) = 0 kgal

* Values calculated by D.E. Kurath of the Waste Management Process Technology Group. The capillary height calculated was physically verified by lancing the solids. During lancing an inpenetrable layer of solids was found at 4½ feet

INTERIM STABILIZATION EVALUATION - NON-JET PUMPED TANKS

Tank: 107-TY

Evaluation (see Continuation Page for calculations and additional comments):

[X] Photograph review completed - Date of most recent photographs 1/17/84

[X] Tank history review completed

[X] Tank temperature profile review completed

Surface Description: A supernatant pool covers approximately 10% of the tanks surface. The remainder of the surface is saltcake.

Date

Solids Level 20.4 " Date 1/13/84 Method FIC

Liquid Level 20.4" Date 1/13/84 Method FIC

Solids Volume 35,000 gal

Estimated Drainable Liquid Volume 1,800 gal

Average Maximum Tank Temperature, past 6 months 72° F

Estimated Supernatant Volume 800 gal

[ ] Cost/Benefit Analysis attached

Evaluation Performed by [illegible] Date 1/17/84 Checked by MSB Date 1/20/84

Disposition of Tank:

[X] Tank Interim Stabilized at 1,800 gallons of drainable liquid

[ ] Tank not Interim Stabilized; stabilization activities resumed

Approved by: Manager, TF&EPC RAN [signature] Date 1-24-84

Manager, TFS&O [signature] Date 1-25-84

Program Manager [signature] Date 1-26-84

DISTRIBUTION: TF&EPC Tank File, Tank Farm Surveillance Analysis, Approval Signatures

NOTE: Tank 107-TX was previously Interim Stabilized on 10/19/79. This form is for record purposes only.

INTERIM STABILIZATION EVALUATION

TANK NUMBER: 107-TX EFFECTIVE DATE: 10-19-79

LIQUID LEVEL & RISER NO. FIC R-8 20.35"
M.T. R-11 - 20.75"

SOLIDS LEVEL & RISER NO. CD-14 - 22.0"
M.T. 20.75"

EST. SUPERNATE LIQUID VOLUME *1,000 Gallons

EST. DRAINABLE INTERSTITIAL LIQUID VOLUME **12,000 Gallons

This figure is based on the assumption that salt cake contains 30% by volume drainable interstitial liquid.

TEMPERATURE: Maximum 66°F

IS TANK HEAT LOAD A PROBLEM?

yes ____ no X unknown ____

IS THERE A POTENTIAL DOME LOAD PROBLEM? yes ____ no X

PHOTOGRAPH EVALUATION: (Order #7801790 : Liquid Level 21:0" ; Date 2-16-78)
The surface is 75% solids. The liquid shows as a liquid pool at tank center. There is a submersible pump installed in the pool. The manual tape is touching on solids and the FIC is touching at the liquid-solids interface.

COMMENTS: *The submersible pump was installed to pump the remaining surface liquid. All attempts to pump this liquid pool failed.

** The 22.0" solids level carried in CD-14 was established through photographic analysis and solids level readings. This volume of solids and the amount of liquid in the surface pool yields approximately 13,000 gallons of drainable liquid. This meets the criteria in RHO-CD-330 for interim stabilization.

ADVANCED STABILIZATION RECOMMENDATION: This tank appears to be a good canidate for air drying.

Prepared By: G. Dennis Klazzi

Reviewed By: John M. Bailey 10-19-79

INTERIM STABILIZATION EVALUATION - NON-JET PUMPED TANKS

(CONTINUATION PAGE)

Evaluation Calculations and Comments

TANK: 107-TX

TOTAL WASTE VOLUME = (WASTE LEVEL (IN) - 12IN) x 2750 gal/in + 12,500 gal

WASTE LEVEL = 20.4"

TOTAL WASTE VOLUME = (20.4 - 12) in x 2750 gal/in + 12,500 gal = 35,600 gallons ≈ 36,000 g.

SUPERNATANT POOL ESTIMATED FROM PHOTOS TO COVER 10% OF SURFACE AT AN AVERAGE DEPTH OF 3 inches.

SUPERNATANT VOLUME = .10 x 2750 gal/IN x 3 IN = 825 gallons ≈ 800 gallons.

SOLIDS VOLUME = TOTAL WASTE VOLUME - SUPERNATANT VOLUME

SOLIDS VOLUME = 36,000 gallons - 800 gallons = 35,200 gallons. ≈ 35,000 gallons.

DRAINABLE INTERSTITIAL LIQUID (DIL) = (SOLIDS VOLUME - 33,000 gallons)

x porosity

SALTCAKE POROSITY = 45%

DIL = (35,000 gallons - 33,000 gallons) x .45 = 900 gal ≈ 1000 gal

DRAINABLE LIQUID REMAINING = DIL + SUPERNATANT

DRAINABLE LIQUID REMAINING = 1000 gallons + 800 gallons = 1800 gallons

CALCULATIONS DONE BY T. S. Fitzpatrick

CHECKED BY Nancy E Bell

Stabilization Evaluation

Tank: 108 TX

Reason Jet Pumping Halted:

☐ Management Decision, Date of Shutdown _____

☒ Major Failure of Jet Pump, Date of Shutdown 01/12/83

Additional Comment:

108-TX was not restarted after 01/12/83 due to a leak.

Evaluation: (See Sheet 2 for calculations and additional comment)

Starting Liquid Level 55" Date 12/03/81

Supernatant Volume 12 kgal Date 12/03/81

Final Liquid Level Measured After Equilibration of Interstitial Liquid:

Dip Tubes 19.6" Date 03/15/83

LOW - Date -

Manual - Date -

Total Net Jet Pump Production 13.7 kgal

Calculated Solid Characteristics:

Porosity 0.02

Permeability/ Viscosity (K/μ) -

Capillary Height 12" assumed

Estimated Drainable Liquid Remaining 0

Final Average Flowrate 0.002 gpm Date Dec. 1982 & Jan. 1983

Evaluation Performed by S. J. Joncus Jr. Date 03/17/83

Disposition of Tank:

☒ Tank Interim Stabilized at 0 thousand gallons of Drainable Liquid,
0 thousand gallons of Pumpable Liquid.

☐ Tank Not Interim Stabilized; Jet Pumping Restarted

Approval By: Manager, TF&EPC [signature] Date 3/22/83

Manager, TFS&O [signature] Date 3/24/83

Program Manager [signature] Date 3/28/83

Distribution: TF&EPC Tank File, HS&E Surveillance Analysis, Approval Signatures.

Evaluation Calculations and Comment.

TANK: 108-TX

Weight Factor = 19.5"
Specific Gravity = 1.25

Current LL = $\frac{19.5}{1.25} + 4 = 19.6"$

Starting LL = 55"
Starting Supernatant = 12 kgal
Current Production = 13656

$$\text{Porosity} = \frac{\text{Jet Pump Prd.} - \text{Supernatant}}{\left[\text{Starting LL} - \frac{\text{Supernatant}}{2750} - \text{Current LL}\right] 2750 \frac{\text{gal.}}{\text{in.}}}$$

$$= \frac{13656 - 12000}{\left[55 - \frac{12000}{2750} - 19.6\right] 2750} = 0.02$$

Drainable IL Remaining = [Current LL - Capillary Height] [2750 gal/in.] [Por

= [19.6 - 12] [2750] [0.02] = 0 kgal

Final Average Flowrate (Dec '02 - Jan '03) = $\frac{\text{Volume Pumped}}{\text{Minutes Operated}}$

= $\frac{35 \text{ gal.}}{246 \text{ hrs.}} = 0.002$ gpm

Pumpable IL Remaining = 0 by definition.

Stabilization Evaluation

Tank: 109-TX

Reason Jet Pumping Halted:

☐ Management Decision, Date of Shutdown _____

☒ Major Failure of Jet Pump, Date of Shutdown 3-4-83

Additional Comment: 109-TX was shut down due to a pump leak which contaminated the cover plate. Additional problems identified at shut down were 1) leaking foot valve, 2) plugged DOV, 3) plugged dip tubes, and 4) leaking JR-2 valve.

Evaluation: (See Sheet 2 for calculations and additional comment)

Starting Liquid Level 170" Date 3-16-82

Supernatant Volume 0 Date 3-16-82

Final Liquid Level Measured After Equilibration of Interstitial Liquid:

Dip Tubes - Date _____

LOW 90" Date 3-17-83

Manual 111.8" Date 4-1-83

Total Net Jet Pump Production 72.3 K gal

Calculated Solid Characteristics:

Porosity 0.452

Permeability/ Viscosity ($^{K}/_{\mu}$) 0.76*

Capillary Height 104"*

Estimated Drainable Liquid Remaining 10 K gal

Final Average Flowrate 0.04 Date 2-20-83 to 3-4-83

Evaluation Performed by S. J. Joncus Date 4-11-83

Disposition of Tank:

☒ Tank Interim Stabilized at 10 thousand gallons of Drainable Liquid,
0 thousand gallons of Pumpable Liquid.

☐ Tank Not Interim Stabilized; Jet Pumping Restarted

Approval By: Manager, TF&EPC RAV [signature] Date 4/15/83

Manager, TFS&O G. T. Dukelow Date 4/18/83

Program Manager [signature] Date _____

Distribution: TF&EPC Tank File, HS&E Surveillance Analysis, Approval Signatures.

Evaluation Calculations and Comment

TANK: 109-TX

Manual (2 ip Cord) - Distance from top of baseplate to liquid = 30' 7½"
= 30.63'

Riser Elevation = 664.76'
Bottom elevation = 624.73'
Pump baseplate = 1" = 0.08'

Current LL = [664.76 + 0.08] - 624.73 - 30.63 = 9.32' = 111.8"

Current Production = 72302
Capillary Height = 104."
Starting Supernatant = 0
Starting LL = 170"

$$\text{Porosity} = \frac{\text{Jet Pump Production}}{[\text{Starting LL} - \text{Current LL}]\,2750}$$

$$= \frac{72302}{[170 - 111.8]\,2750} = 0.452$$

Drainable IL Remaining = [Current LL - Capillary Height] [2750] [porosity]
= [111.8 - 104] [2750] [0.452]
= 9.7 kgal

Final Average Flowrate = $\frac{\text{Gallons Pumped}}{\text{Minutes Operated}}$ (2-20-83 to 3-4-83)

$$= \frac{548 + 93}{[178 + 67]\,60}$$

= 0.04 gpm

Pumpable IL Remaining = 0 by definition

* Values calculated by D. E. Kurath of the Waste Management Process Technology Group. Refer to Internal Letter # 65411-83-024, D.E. Kurath to K. G. Carruthers, "Low Pumpout Rates from Tank 109-TX", February 7, 1983. The specific values of K/μ = 0.76 and cap. ht. = 104" were recalculated based on a 45% porosity as opposed to 34% used in the letter.

Stabilization Evaluation

Tank: 110-TX

Reason Jet Pumping Halted:

[X] Management Decision, Date of Shutdown 12-15-82

[ ] Major Failure of Jet Pump, Date of Shutdown _____

Additional Comment: 110-TX was not restarted due to very low production rates.

Evaluation: (See Sheet 2 for calculations and additional comment)

Starting Liquid Level 194" Date 12-18-81

Supernatant Volume 0 Date 12-18-81

Final Liquid Level Measured After Equilibration of Interstitial Liquid:

Dip Tubes 33.0 Date 3-24-83

LOW Neutron - 32.4" Gamma - 33.6" Acoustic - 34.7' Date N:3-4-83 G:3-3-83 A:3-16-83

Manual - Date _____

Total Net Jet Pump Production 115.4 K gal

Calculated Solid Characteristics:

Porosity 0.261

Permeability/ Viscosity ($^{K}/_{\mu}$) -

Capillary Height 12" (assumed)

Estimated Drainable Liquid Remaining 15 K gal

Final Average Flowrate 0.05 gpm Date November & December 1982

Evaluation Performed by S. J. Joncus Date 3-25-83

Disposition of Tank:

[X] Tank Interim Stabilized at 15 thousand gallons of Drainable Liquid,
0 thousand gallons of Pumpable Liquid.

[ ] Tank Not Interim Stabilized; Jet Pumping Restarted

Approval By: Manager, TF&EPC RAW Date 4/1/83

Manager, TFS&O Date 4/4/83

Program Manager Date 4/5/83

Distribution: TF&EPC Tank File, HS&E Surveillance Analysis, Approval Signatures.

Evaluation Calculations and Comment

TANK: 110-TX

Weight Factor 39.2
Specific Gravity 1.35

Current LL = $\frac{39.2}{1.35} + 4 = 33.0$"

Starting LL = 194"

Starting Supernatant = 0

Current Production = 115432 gallons

$$\text{Porosity} = \frac{\text{Jet Pump Production}}{[\text{Starting LL} - \text{Current LL}]\ 2750}$$

$$= \frac{115432}{[194 - 33.0]\ 2750} = 0.261$$

Drainable IL Remaining = [Current LL − Capillary Height] [2750 gal/in] [porosity]

= [33.0 − 12] [2750] [0.261] = 15.1 kgal

$$\text{Final Average Flowrate} = \frac{\text{Gallons Pumped}}{\text{minutes operated}}$$

$$= \frac{104 + 2856}{[310 + 663]\ \text{hrs}\ [60]} = 0.051\ \text{gpm}$$

Pumpable IL Remaining = 0 by definition

Stabilization Evaluation

Tank: 111-TX

Reason Jet Pumping Halted:

[X] Management Decision, Date of Shutdown 12-15-82

[ ] Major Failure of Jet Pump, Date of Shutdown _____

Additional Comment: Pump not restarted due to difficulty with priming. Placed on observation mode because of low flow-rates experienced.

Evaluation: (See Sheet 2 for calculations and additional comment)

Starting Liquid Level 173" Date 1-29-82

Supernatant Volume 33,000 Date 1-29-82

Final Liquid Level Measured After Equilibration of Interstitial Liquid:

Dip Tubes 30" Date 3-15-83

LOW - Date _____

Manual - Date _____

Total Net Jet Pump Production 98.5 K gal

Calculated Solid Characteristics:

Porosity 0.182

Permeability/ Viscosity ($^{K}/_{\mu}$) -

Capillary Height 12" (assumed)

Estimated Drainable Liquid Remaining 9 K gal

Final Average Flowrate 0.05 gpm Date December 1982

Evaluation Performed by S. J. Joncus Date 3-24-83

Disposition of Tank:

[X] Tank Interim Stabilized at 9 thousand gallons of Drainable Liquid,
0 thousand gallons of Pumpable Liquid.

[ ] Tank Not Interim Stabilized; Jet Pumping Restarted

Approval By: Manager, TF&EPC RAV [signature] Date 3/31/93

Manager, TFS&O [signature] Date 4/4/83

Program Manager [signature] for RPZ Date 4/5/83

Distribution: TF&EPC Tank File, HS&E Surveillance Analysis, Approval Signatures.

Evaluation Calculations and Comment

TANK: 111 TX

Weight Factor 35
Specific Gravity 1.35

Current LL : $\frac{35}{1.35} + 4 = 30"$

Starting LL = 173"

Starting Supernatant: 33000 gallons

Current Production = 98477 gallons

$$\text{Porosity} = \frac{\text{Jet Pump Production} - \text{Supernatant}}{\left[\text{Starting LL} - \frac{\text{Supernatant}}{2750} - \text{Current LL}\right] 2750 \text{ gal/in.}}$$

$$= \frac{98477 - 33000}{\left[173 - \frac{33000}{2750} - 30\right] 2750} = 0.182$$

$$\text{Drainable IL Remaining} = [\text{Current LL} - \text{Capillary Height}][2750][\text{porosity}]$$

$$= [30 - 12][2750][0.182] = 9.0 \text{ kgal}$$

$$\text{Final Average Flowrate} = \frac{\text{Gallons Pumped}}{\text{Minutes Operated}}$$

$$= \frac{817}{[262]\,60} = 0.052 \text{ gpm}$$

Pumpable IL Remaining = 0 by definition

Stabilization Evaluation

Tank: 112-TX

Reason Jet Pumping Halted:

☐ Management Decision, Date of Shutdown _____

☒ Major Failure of Jet Pump, Date of Shutdown 11-17-82

Additional Comment: Shutdown of 112-TX was due to a failed low pressure switch (PS-1).

Evaluation: (See Sheet 2 for calculations and additional comment)

Starting Liquid Level 245.6" Date 12-7-81

Supernatant Volume 9 K gal Date 12-7-81

Final Liquid Level Measured After Equilibration of Interstitial Liquid:

Dip Tubes 62.5" Date 3-24-83

LOW Gamma - 69.6" Date 3-3-83

Manual - Date _____

Total Net Jet Pump Production 94.0 K gal

Calculated Solid Characteristics:

Porosity 0.173

Permeability/ Viscosity ($^{K}/_{\mu}$) -

Capillary Height 12" (assumed)

Estimated Drainable Liquid Remaining 24 K gal

Final Average Flowrate 0.04 gpm Date November 1982

Evaluation Performed by S. J. Joncus Date 3-25-83

Disposition of Tank:

☒ Tank Interim Stabilized at 24 thousand gallons of Drainable Liquid,
0 thousand gallons of Pumpable Liquid.

☐ Tank Not Interim Stabilized; Jet Pumping Restarted

Approval By: Manager, TF&EPC RAV [signature] Date 3/31/83

Manager, TFS&O [signature] Date 4/4/83

Program Manager [signature] for KMZ Date 4/5/83

Distribution: TF&EPC Tank File, HS&E Surveillance Analysis, Approval Signatures.

Evaluation Calculations and Comment

TANK: 112 TX

Weight Factor 79
Specific Gravity 1.35

Current LL : $\frac{79}{1.35} + 4 = 62.5"$

Starting LL : 245.6"

Starting Supernatant = 9000

Current Production = 94017 gallons

$$\text{Porosity} = \frac{\text{Jet Pump Prod.} - \text{Supernatant}}{\left[\text{Current LL} - \frac{\text{Supernatant}}{2750} - \text{Starting LL}\right] 2750 \text{ gal/in}}$$

$$= \frac{94017 - 9000}{\left[245.6 - \frac{9000}{2750} - 64\right] 2750} = 0.173$$

$$\text{Drainable Liquid Remaining} = [\text{Current LL} - \text{Capillary Height}][2750 \text{ gal/in}][\text{porosity}]$$

$$= [62.5 - 12][2750][0.173] = 24.0 \text{ kgal}$$

$$\text{Final Average Flowrate} = \frac{\text{Gallons Pumped}}{\text{minutes Operated}}$$

$$= \frac{953}{(360)\ 60} = 0.044 \text{ gpm}$$

Pumpable IL Remaining = 0 by definition

Stabilization Evaluation

Tank: 113-TX

Reason Jet Pumping Halted:

☐ Management Decision, Date of Shutdown _____

☒ Major Failure of Jet Pump, Date of Shutdown 5-11-82

Additional Comment: 113-TX shutdown due to an electrical failure of the motor.

Evaluation: (See Sheet 2 for calculations and additional comment)

Starting Liquid Level 88" Date 3-11-82

Supernatant Volume 0 Date 3-11-82

Final Liquid Level Measured After Equilibration of Interstitial Liquid:

Dip Tubes 46.9 Date 3-15-83

LOW — Date _____

Manual — Date _____

Total Net Jet Pump Production 19.2 K gal

Calculated Solid Characteristics:

Porosity 0.170

Permeability/ Viscosity ($^{K}/_{\mu}$) —

Capillary Height 12" (assumed)

Estimated Drainable Liquid Remaining 16 K gal

Final Average Flowrate 0.03 gpm Date May 1982

Evaluation Performed by S. J. Joncus Date 3-17-83

Disposition of Tank:

☒ Tank Interim Stabilized at 16 thousand gallons of Drainable Liquid.
0 thousand gallons of Pumpable Liquid.

☐ Tank Not Interim Stabilized; Jet Pumping Restarted

Approval By: Manager, TF&EPC [signature] Date 4/1/83

Manager, TFS&O [signature] Date 4/4/83

Program Manager [signature] Date 4/5/83

Distribution: TF&EPC Tank File, HS&E Surveillance Analysis, Approval Signatures.

Evaluation Calculations and Comment

TANK: 113TX

Weight Factor 60
Specific Gravity 1.4

Current LL: $\frac{60}{1.4} + 4 = 46.9$"

Starting LL: 88"

Supernatant = 0

Current Production: 19179

$$\text{Porosity} = \frac{\text{Jet Pump Prod.} - \text{Supernatant}}{\left[\text{Starting LL} - \frac{\text{Supernatant}}{2750} - \text{Current LL}\right] 2750 \text{ gal/in}}$$

$$= \frac{19179}{[88 - 46.9][2750][0.170]} = 16.3 \text{ kgal}$$

$$\text{Final Average Flowrate} = \frac{\text{Gallons Pumped}}{\text{Minutes Operated}}$$

$$= \frac{417}{[221]\ 60} = 0.031 \text{ gpm}$$

Pumpable IL Remaining = 0 by definition

Stabilization Evaluation

Tank: 114-TX

Reason Jet Pumping Halted:

[ ] Management Decision, Date of Shutdown _____

[X] Major Failure of Jet Pump, Date of Shutdown 11-24-82

Additional Comment: Shutdown of 114-TX was due to a leak from the JP-1 valve.

Evaluation: (See Sheet 2 for calculations and additional comment)

Starting Liquid Level 213 Date 1-29-82

Supernatant Volume 0 Date 1-29-82

Final Liquid Level Measured After Equilibration of Interstitial Liquid:

Dip Tubes 36.7" Date 3-23-83

LOW Gamma - 40.8" Neutron - 43.2" Acoustic - 36.8 Date G:3-3-83 N:3-4-83 A:3-24-83

Manual - Date _____

Total Net Jet Pump Production 104.3 K gal

Calculated Solid Characteristics:

Porosity 0-215

Permeability/ Viscosity ($^{K}/_{\mu}$) -

Capillary Height 12" (assumed)

Estimated Drainable Liquid Remaining 15 K gal

Final Average Flowrate 0.07 gpm Date November 1982

Evaluation Performed by S. J. Joncus Date 3-28-83

Disposition of Tank:

[X] Tank Interim Stabilized at 15 thousand gallons of Drainable Liquid,
4 thousand gallons of Pumpable Liquid.

[ ] Tank Not Interim Stabilized; Jet Pumping Restarted

Approval By: Manager, TF&EPC [signature] Date 4/1/83

Manager, TFS&O [signature] Date 4/4/83

Program Manager [signature] for RHZ Date 4/5/83

Distribution: TF&EPC Tank File, HS&E Surveillance Analysis, Approval Signatures.

Evaluation Calculations and Comment

TANK: 114 TX

Weight Factor 46
Specific Gravity 1.5
2" spool piece under SW screen

Current LL = $\frac{46}{1.5} + 41 2 = 36.7"$

Starting LL = 213"

Starting Supernatant = 0

Current Production = 104304 gallons

Porosity = $\frac{\text{Jet Pump Production}}{[\text{Starting LL} - \text{Current LL}]\ 2750\ \text{gd/in}}$

$= \frac{104304}{[213 - 36.7]\ 2750} = 0.215$

Drainable IL Remaining = [Current LL - Capillary Height] [2750 gal/in.] [porosity]

$= [36.7 - 12][2750][0.215] = 14.6$ kgal

Final Average Flowrate = $\frac{\text{Gallons Pumped}}{\text{minutes Operated}}$

$= \frac{1575}{[377\ \text{hrs}][60]} = 0.070$ gpm

Pumpable IL Remaining = Drainable IL Remaining − Non Pumpable Drainable Heel

$= [36.7 - 12][2750][0.215] - [12"][2750][0.215]$

$= 4.0$ kgal

INTERIM STABILIZATION EVALUATION - JET PUMPED TANKS

Tank: 115-TX

Reason Jet Pumping Halted:

[X] Meets 0.05 gpm Criteria, Date of Shutdown Aug. 8, 1983

[ ] Major Failure of Jet Pump, Date of Shutdown _____

Additional Comment:

Evaluation: (See Continuation Sheet for calculations and additional comment)

Starting Liquid Level 183" Date March 30, 1982

Supernatant Volume 0 Date March 30, 1982

Final Liquid Level Measured After Equilibration of Interstitial Liquid:

Dip Tubes 35.4" Date Sept. 22, 1983

LOW 39.6" (gamma), 32.0" (neutron) Date Aug. 25, 1983

Manual - Date _____

Total Net Jet Pump Production 99,100 gal.

Calculated Solid Characteristics:

Porosity 0.25

Permeability/Viscosity (K/μ) _____

Capillary Height 12" (assumed)

Estimated Drainable Liquid Remaining 19,100 gal.

Final Average Flowrate 0.047 gpm Date Aug. 1-8, 1983

Evaluation Performed by N.E. Bell Date Sept. 23, 1983

Disposition of Tank:

[X] Tank Interim Stabilized at 19.1 thousand gallons of Drainable Liquid
0 thousand gallons of Pumpable Liquid

[ ] Tank Not Interim Stabilized; Jet Pumping Restarted

Approval By: Manager, TF&EPC RAV [signature] Date 9/28/83

Manager, TFS&O [signature] Date 9/29/83

Program Manager [signature] Date 9/29/83

DISTRIBUTION: TF&EPC Tank File, HS&E Surveillance Analysis, Approval Signatures

INTERIM STABILIZATION EVALUATION - JET PUMPED TANKS

(CONTINUATION PAGE)

Evaluation Calculations and Comments

TANK: 115-TX

Liquid Level (LL) By Dip Tubes (Manometer)

8/26	Weight Factor	25.83"
9/7	Weight Factor	23.12"
9/22	Weight Factor	23.0"
9/7	Specific Gravity	2.72
9/22	Specific Gravity	1.40 ← use

$$LL = \frac{\text{Weight Factor}}{\text{Specific Gravity}} + \text{Height of Tubes Above Bottom}$$

$$= \frac{23.0}{1.4} + .19 = 35.4"$$

LL by LOW

Gamma 39.6" ← use
Neutron 32.0"

$$\text{Porosity} = \frac{\text{Net Production}}{(\text{Initial Interstitial LL} - \text{Current Interstitial LL}) \times 2750}$$

$$= \frac{99{,}100 \text{ gal}}{(183-39.6) \text{ in.} \times 2750} = 0.251$$

Drainable Liquid = (Current Interstitial LL-Capillary Height) x Porosity x 2750
= (39.6-12) in. x 0.251 x 2750
= 19,051 gal.

Final Flow Rate (Aug.) = $\frac{467 \text{ gal.}}{166\text{h} \times 60 \frac{\text{min.}}{\text{h}}} = 0.047$ gpm

Calculations Checked By

K J Van Mathen Date 7/25/93.

Stabilization Evaluation

Tank: 116-TX

Reason Jet Pumping Halted:

[X] Management Decision, Date of Shutdown 12-12-82

[ ] Major Failure of Jet Pump, Date of Shutdown _____

Additional Comment:
Pump not restarted due to difficulty in priming. Placed on observation mode because of the low flow rates experienced.

Evaluation: (See Sheet 2 for calculations and additional comment)

Starting Liquid Level 94" Date 3-10-82

Supernatant Volume 0 Date 3-10-82

Final Liquid Level Measured After Equilibration of Interstitial Liquid:

Dip Tubes 52" Date 3-24-83

LOW - Date _____

Manual - Date _____

Total Net Jet Pump Production 23.9 Kgal

Calculated Solid Characteristics:

Porosity 0.152 20.7

Permeability/ Viscosity (K/μ) -

Capillary Height 12" (assumed)

Estimated Drainable Liquid Remaining 23 Kgal

Final Average Flowrate 0.02 gpm Date December 1982

Evaluation Performed by S. J. Joncus Date 03-25-83

Disposition of Tank:

[X] Tank Interim Stabilized at 23 thousand gallons of Drainable Liquid.
0 thousand gallons of Pumpable Liquid.

[ ] Tank Not Interim Stabilized; Jet Pumping Restarted

Approval By: Manager, TF&EPC [signature] Date 4/4/83

Manager, TFS&O [signature] Date 4/4/83

Program Manager [signature] Date 4/5/83

Distribution: TF&EPC Tank File, HS&E Surveillance Analysis, Approval Signatures.

Evaluation Calculations and Comment

TANK: 116 TX

Weight Factor 48.0
Specific Gravity 1.45
15" Spool Piece Installed Under Pump

Current LL = $\frac{48.0}{1.45} + 4 + 15 = 52"$

Starting LL = 79" + 15" = 94"
Starting Supernatant = 0
Current Production = 23881

Porosity = $\frac{\text{Jet Pump Production}}{[\text{Starting LL} - \text{Current LL}][2750\ \text{gal/in.}]}$

$= \frac{23881}{[94 - 52]\ 2750} = 0.207$

Drainable IL Remaining = [Current LL - Capillary Height] [2750 gal/in.] [porosity]
= [52" - 12"] [2750] [0.207] = 22.8 kgal

Final Average Flowrate = $\frac{\text{Gallon Pumped}}{\text{Minutes Operated}}$

$= \frac{179}{[130]\ 60} = 0.023$ gpm

Pumpable IL Remaining = 0 by definition *

* By definition the pumpable limit is 0.05 gpm which assumes that the pump reaches all the way to the bottom of the saltwell. This is not the case in 116-TX due to 13" of solids in the saltwell screen. However, the pump is at the lowest position considered practical, has reached the lowest practical flowrate, and therefore meets the jet pumping endpoint criteria.

Stabilization Evaluation

Tank: 117 TX

Reason Jet Pumping Halted:

☐ Management Decision, Date of Shutdown _____

☒ Major Failure of Jet Pump, Date of Shutdown 06/06/82

Additional Comment:

Jet pump shutdown was due to electrical failure of the pump motor.

Evaluation: (See Sheet 2 for calculations and additional comment)

Starting Liquid Level 153" Date 12/18/81

Supernatant Volume 0 Date 12/18/81

Final Liquid Level Measured After Equilibration of Interstitial Liquid:

Dip Tubes plugged Date -

LOW not installed Date -

Manual (zipcord) 30" Date 03/15/83

Total Net Jet Pump Production 54.3 kgal

Calculated Solid Characteristics:

Porosity 0.160

Permeability/ Viscosity ($^{K}/_{\mu}$) .06*

Capillary Height 12" *

Estimated Drainable Liquid Remaining 8.0 kgal

Final Average Flowrate .03 gpm Date May 1, 1982 to June 6, 1982

Evaluation Performed by S. J. Joncus Jr. Date 03/17/83

Disposition of Tank:

☒ Tank Interim Stabilized at 8.0 thousand gallons of Drainable Liquid,
0 thousand gallons of Pumpable Liquid.

☐ Tank Not Interim Stabilized; Jet Pumping Restarted

Approval By: Manager, TF&EPC RAW _____ Date 3/22/83

Manager, TFS&O _____ Date 3/24/83

Program Manager _____ Date 3/28/83

Distribution: TF&EPC Tank File, HS&E Surveillance Analysis, Approval Signatures.

Evaluation Calculations and Comment

TANK: 117 TX

Distance from top of pump baseplate to IL level = 41.0'

Flange elevation = 667.13'

Bottom elevation = 623.73'

Distance from top of pump baseplate to bottom of tank = 667.13 - 623.73 + $\frac{1}{12}$ = 43.48'

Current IL level = 43.48' - 41.0' = 2.48' = 30"

$$\text{Porosity} = \frac{\text{Jet Pump Production}}{[\text{Starting ILL} - \text{Current ILL}]\ 2750\ \frac{\text{gallons}}{\text{inch}}}$$

$$= \frac{54255}{[153-30]\ 2750} = 0.160$$

Drainable IL Remaining = [Current ILL - Capillary Height] [2750 gal/in] [porosity]

= [30 - 12] [2750] [0.160] = 8 kgal

Pumpable IL Remaining = Drainable IL Remaining - Non Pumpable Drainable Heel

= [30-12][2750][0.160] - 18" [2750][0.160] = 0 kgal

Average Flowrate for May + June '02 = $\frac{\text{Volume Pumped}}{\text{Minutes Operated}}$

$$= \frac{[147 + 1267]\ \text{gal}}{[128 + 623]\ \text{hrs}\ [60\ \frac{\text{min}}{\text{hr}}]} = 0.03\ \text{gpm}$$

* Jet pump flowrates at the end of jet pumping match the theoretical model using these estimated values for K/u and capillary height.

Stabilization Evaluation

Tank: 118-TX

Reason Jet Pumping Halted:

☐ Management Decision, Date of Shutdown _____

☒ Major Failure of Jet Pump, Date of Shutdown 02-11-83

Additional Comment:

Shutdown of the 118-TX jet pump was caused by an electrical failure of the centrifigal pump motor.

Evaluation: (See Sheet 2 for calculations and additional comment)

Starting Liquid Level 123" Date 02-01-82

Supernatant Volume 13Kgal Date 02-01-82

Final Liquid Level Measured After Equilibration of Interstitial Liquid:

Dip Tubes 39.7 Date 03-24-83

LOW Gamma - 40.8" Date 3-3-83

Manual - Date _____

Total Net Jet Pump Production 89.1 Kgal

Calculated Solid Characteristics:

Porosity 0.352

Permeability/ Viscosity (K/μ) -

Capillary Height 12" (assumed)

Estimated Drainable Liquid Remaining 27 Kgal

Final Average Flowrate 0.02 gpm Date February 1983

Evaluation Performed by S. J. Joncus Date 03-25-83

Disposition of Tank:

☒ Tank Interim Stabilized at 27 thousand gallons of Drainable Liquid.
0 thousand gallons of Pumpable Liquid.

☐ Tank Not Interim Stabilized; Jet Pumping Restarted

Approval By: Manager, TF&EPC RAJ [signature] Date 4/4/83

Manager, TFS&O [signature] Date 4/4/83

Program Manager H Sparkman for RAZ Date 4/5/83

Distribution: TF&EPC Tank File, HS&E Surveillance Analysis, Approval Signatures.

Evaluation Calculations and Comment

TANK: 118TX

Weight Factor 40.8
Specific Gravity 1.14

Current IL level = $\frac{40.8}{1.14} + 4 = 39.7$

Starting LL = 123"

Starting Supernatant = 13 kgal

Current Production = 89137

$$\text{Porosity} = \frac{\text{Jet Pump Production} - \text{Supernatant}}{\left[\text{Starting LL} - \frac{\text{Supernatant}}{2750} - \text{Current LL}\right] 2750 \text{ gal/in.}}$$

$$= \frac{89137 - 13000}{\left[123 - \frac{13000}{2750} - 39.7\right] 2750} = 0.352$$

Drainable IL Remaining = [Current LL - Capillary Height] [2750 gal/in] [porosity]

= [39.7 - 12] [2750] [0.352] = 26.8 kgal

$$\text{Final Average Flowrate} = \frac{\text{Gallons Produced}}{\text{Minutes Operated}}$$

$$= \frac{323}{[250]\ 60} = 0.022 \text{ gpm}$$

Pumpable IL Remaining = 0 by definition

Stabilization Evaluation

Tank: 101-TY

Reason Jet Pumping Halted:

[X] Management Decision, Date of Shutdown 02-14-83

[ ] Major Failure of Jet Pump, Date of Shutdown _____

Additional Comment:

101-TY was placed on observation mode due to very low flowrates.

Evaluation: (See Sheet 2 for calculations and additional comment)

Starting Liquid Level 50" Date 11-12-82

Supernatant Volume 0 Date 11-12-82

Final Liquid Level Measured After Equilibration of Interstitial Liquid:

Dip Tubes 17" Date 03-24-83

LOW - Date _____

Manual - Date _____

Total Net Jet Pump Production 8.2 Kgal

Calculated Solid Characteristics:

Porosity 0.09

Permeability/ Viscosity (K/μ) -

Capillary Height 12" (assumed)

Estimated Drainable Liquid Remaining 1 Kgal

Final Average Flowrate 0.025 gpm Date February 1983

Evaluation Performed by S. J. Joncus Date 03-27-83

Disposition of Tank:

[X] Tank Interim Stabilized at 1 thousand gallons of Drainable Liquid
0 thousand gallons of Pumpable Liquid.

[ ] Tank Not Interim Stabilized; Jet Pumping Restarted

Approval By: Manager, TF&EPC R A V [illegible] Date 4/5/83

Manager, TFS&O [illegible] Date 4/4/83

Program Manager [illegible] Date 4/5/83

Distribution: TF&EPC Tank File, HS&E Surveillance Analysis, Approval Signatures

Evaluation Calculations and Comment

TANK: 101-TY

Weight Factor 15.3
Specific Gravity 1.2

Current LL: $\frac{15.3}{1.2} + 4 = 16.8"$

Starting LL: 50"
Starting Supernatant: 0
Current Production: 8213 gal.

$$\text{Porosity} = \frac{\text{Jet Pump Production}}{[\text{Starting LL} - \text{Current LL}]\ 2750\ \text{gal/in.}}$$

$$= \frac{8213}{[50 - 16.8]\ 2750} = 0.09$$

Drainable IL Remaining: [Current LL - Capillary Height][2750 gal/in][porosity]

$$= [16.8 - 12][2750][0.09] = 1.2\ \text{kgal}$$

$$\text{Final Average Flowrate} = \frac{\text{Gal. Produced}}{\text{min. Run}}$$

$$= \frac{444}{[292]\ 60} = 0.025\ \text{gpm}$$

Pumpable IL Remaining: 0 by definition

INTERIM STABILIZATION EVALUATION - NON-JET PUMPED TANKS

Tank: 102-TY

Evaluation (see Continuation Page for calculations and additional comments):

[X] Photograph review completed - Date of most recent photographs 3-26-84

[X] Tank history review completed

[X] Tank temperature profile review completed

Surface Description: Solid surface with small liquid pool in center. Pool is about 16 feet in diameter and about 1 inch deep. FIC is now touching solids, Date 3-26-84

Solids Level 30.0 inches Date 2-28-84 Method solids weight

Liquid Level 30.0 inches Date 3-24-84 Method FIC

Solids Volume 62,000 gallons

Estimated Drainable Liquid Volume 13,200 gallons

Average Maximum Tank Temperature, past 6 months 60°F

Estimated Supernatant Volume 100 gallons

[ ] Cost/Benefit Analysis attached

Evaluation Performed by NEBell Date 3-27-84 Checked by JSR Date 3-27-8

Disposition of Tank:

[X] Tank Interim Stabilized at 13,200 gallons of drainable liqui

[ ] Tank not Interim Stabilized; stabilization activities resumed

Approved by: Manager, TF&EPC RN [signature] Date 3/28/84

Manager, TFSO [signature] Date 3-29-84

Program Manager [signature] Date 4-2-84

DISTRIBUTION: TF&EPC Tank File, Tank Farm Surveillance Analysis, Approval Signatures

★ NOTE: Tank 102-TY was previously declared interim Stabilized on 9/18/79. This form is for record purposes only.

6500 gallons of supernatant was removed on March 23, 1984

INTERIM STABILIZATION EVALUATION - NON-JET PUMPED TANKS

(CONTINUATION PAGE)

Evaluation Calculations and Comments

TANK: 102-TY

Solids Level Riser 3 30" in October 1983
Riser 8 30.0" on Feb. 28, 1984

Total Waste Volume = (Waste Level (in.) −12) x 2750 gal/in. + 12500 gal.

= (30−12) x 2750 + 12500 = 62,000 gallons

Supernatant Volume = $\left(\frac{\text{15 foot diameter}}{2}\right)^2 \pi \times \frac{1}{12}$ foot deep

= 15 ft^3 x 7.48 gal/ft^3 = 110 gal

Solids Volume = Total Waste Volume − Supernatant

= 62,000 − 110 ≅ 62,000 gallons

Drainable Interstitial Liquid = (Solids Volume − Capillary Height x 2750 gal/in.) x porosity

For salt cake, Cap. height = 12" Porosity = 0.45

Drainable Interstitial Liquid = DIL = (62,000 − 12 x 2750) x 0.

= 13,100 gallons

Drainable Liquid Remaining = DIL + Supernatant = 13,200 gal

Calculations Performed by Haney & Bell 3-27-84 DATE

Checked by J.S. Liddle 3-27-84 DATE

Stabilization Evaluation

Tank: 103-TY

Reason Jet Pumping Halted:

☐ Management Decision, Date of Shutdwon _____

☒ Major Failure of Jet Pump, Date of Shutdown 12-18-82

Additional Comment: Failed Pressure Switch and plugged DOV. 103-TY was placed on observation mode on 1-3-83.

Evaluation: (See Sheet 2 for calculations and additional comment)

Starting Liquid Level 69" Date 8-23-82

Supernatant Volume 0.2 k gal Date 7-9-82

Liquid Level Measured After Equilibration of:

Dip Tubes 56" Date 2-15-83

LOW 64" (PRELIMINARY EVALUATION) Date 2-23-83

Manual _____ Date _____

Total Net Jet Pump Production 11.5 k gal.

Calculated Solid Characteristics:

Porosity 0.32

Permeability _____

Capillary Height 50"

Estimated Drainable Liquid Remaining 5 k gal.

Final Average Flowrate 0.01 gpm Date Dec. 1982

Evaluation Performed by S. J. Joncus, SIS Unit Date 2-25-83

Disposition of Tank:

☒ Tank Interim Stabilized at 5000 gallons of Drainable Liquid

☐ Tank Not Interim Stabilized; Jet Pumping Restarted

Approval By: Manager, TF&EPC for R. A. Watrous Date 2-28-83

Manager, TFS&O [signature] Date 3-1-83

Program Manager [signature] Date 2-28-83

Evaluation Calculations and Comment

TANK: 103-TY

$$\text{POROSITY} = \frac{(11500-200)\text{ gal}}{(69-56^{*})2750} = .32$$

$$\text{DRAINABLE LIQUID REMAINING} = [(56^{*}-50)2750].32 = 5.3 \text{ kgal}$$

$$\text{PUMPABLE LIQUID REMAINING} = 0 \text{ by definition}$$

* Note: 56 inch dip tube level was used for evaluation as the LOW level was based on a preliminary evaluation.

INTERIM STABILIZATION EVALUATION - NON-JET PUMPED TANKS

Tank: 104 TY

Evaluation (see Continuation Page for calculations and additional comments):

[X] Photograph review completed - Date of most recent photographs 4/83

[X] Tank history review completed

[X] Tank temperature profile review completed

Surface Description: A supernatant pool approximately 45' in diameter is in the center of the tank. The outer perimeter is sludge. The FIC is contacting liquid. Date 10/25/83

Solids Level 21.5" (R-3) Date 10/25/83 Method Man. Tape

Liquid Level 24.2" Date 10/25/83 Method FIC

Solids Volume 43 kgal

Estimated Drainable Liquid Volume 14.7 kgal

Average Maximum Tank Temperature, past 6 months 80 deg. F Nov.'82'

Estimated Supernatant Volume 3 kgal

[ ] Cost/Benefit Analysis attached

Evaluation Performed by TDK Date 10/83 Checked by NEBell Date 10/25/83

Disposition of Tank:

[X] Tank Interim Stabilized at 14.7 k gallons of drainable liquid

[ ] Tank not Interim Stabilized; stabilization activities resumed

Approved by: Manager, TF&EPC [signature] Date 10/27/83

Manager, TFS&O [signature] Date 10/31/83

Program Manager [signature] Date 11-1-83

DISTRIBUTION: TF&EPC Tank File, Tank Farm Surveillance Analysis, Approval Signatures

INTERIM STABILIZATION EVALUATION - NON-JET PUMPED TANKS

(CONTINUATION PAGE)

Evaluation Calculations and Comments

TANK: 104 TY

TOTAL WASTE VOLUME = (WASTE LEVEL (IN.) - 12 IN) x 2750 GAL/IN + 12,500 GAL

WASTE LEVEL = 24.2" (FIC)

TOTAL WASTE VOLUME = (24.2 - 12) IN x 2750 GAL/IN + 12,500 GAL = 46,050 GAL ≈ 46,000 GAL

SUPERNATANT VOLUME: POOL DEPTH = WASTE LEVEL - SLUDGE LEVEL

WASTE LEVEL = 24.2" SLUDGE LEVEL = 21.5" POOL DEPTH = 24.2" - 21.5" = 2.7" ≈ 3.0"

POOL DIAMETER ESTIMATED AT 45' from 4/5/83 photos

SUPERNATANT VOLUME = $\pi \times \frac{(45\ ft)^2}{4} \times 3\ in \times \frac{ft}{12\ in} \times 7.43 \frac{GAL}{ft^3}$ = 2774 GAL ≈ 3000 GAL

SOLIDS VOLUME = TOTAL WASTE VOLUME - SUPERNATANT VOLUME

SOLIDS VOLUME = 46,000 GAL - 3000 GAL = 43,000 GAL

DRAINABLE LIQUID = CURRENT INTERSTITIAL L.L. - CAPILLARY HEIGHT
x 2750 GAL/IN x Porosity + SUPERNATANT LIQUID

CURRENT INTERSTITIAL L.L. ASSUMED TO EQUAL SOLIDS LEVEL.
CAPILLARY HEIGHT ASSUMED TO BE 12". A 'worst-case' porosity OF 45% WAS USED.

DRAINABLE LIQUID = (21.5 - 12) IN x 2750 GAL/IN x .45 + 3000 GAL = 14,756 GAL ≈ 14,700 GAL

Tim D. Kirkpatrick

checked by Nancy L Bell

Tank: 105-TY

Reason Jet Pumping Halted:

[X] Management Decision, Date of Shutdwon 12-10-82

[ ] Major Failure of Jet Pump, Date of Shutdown

Additional Comment: Several attempts to flush the saltwell screen to increase flowrate resulted in only the flush water being pumped out again. Pumping of 105-TY was halted on the basis that it contains undrainable sludge.

Evaluation: (See Sheet 2 for calculations and additional comment)

Starting Liquid Level 91" Date 11-4-82

Supernatant Volume 0 Date 4-28-82

Liquid Level Measured After Equilibration of:

Dip Tubes 70" Date 2-15-83

LOW NA Date

Manual Date

Total Net Jet Pump Production 3.6 k gal

Calculated Solid Characteristics:

Porosity 0.06

Permeability

Capillary Height 70"

Estimated Drainable Liquid Remaining 0

Final Average Flowrate 0.00 Date Dec. 1982

Evaluation Performed by S. J. Joncus, SIS Unit Date 2-25-83

Disposition of Tank:

[X] Tank Interim Stabilized at 0 gallons of Drainable Liquid

[ ] Tank Not Interim Stabilized; Jet Pumping Restarted

Approval By: Manager, TF&EPC for L.A. Van Keuren Date 2-28-83

Manager, TFS&O G. T. Dukelow Date 3-1-83

Program Manager R. A. Zinski Date 2-28-83

Evaluation Calculations and Comment

TANK: 105-TY

$$\text{POROSITY} = \frac{3600 \text{ gal}}{[(91-70)2750]} = .06$$

$$\text{DRAINABLE LIQUID REMAINING} = [(70-70)2750].06 = 0 \text{ kgal}$$

$$\text{PUMPABLE LIQUID REMAINING} = 0 \text{ by definition}$$

INTERIM STABILIZATION

TANK: 106-TY EFFECTIVE DATE: 11-30-78

TEMPERATURE: 120°F MAX 61°F MIN

SAMPLE REQUIRED: YES ☐ NO ☒

PHOTO EVALUATION: YES ☒ NO ☐

COMMENTS: TANK 241-TY-106 has been changed from LEAKER-PRIMARY STABILIZED-PARTIALLY ISOLATED TO LEAKER-INTERIM STABILIZED-PARTIALLY ISOLATED.

The temperature and photo evaluation sheets are attached to this form. Tank 106 TY was changed to interim stabilized because it has no surface liquid, < 2 ft of solids, and no temperature problem. There is no sample required for interim stabilization of this tank.

Tank: 106-TY

Photo Date: 1-10-78

Photo I.D: 7800281

Liquid Level: 1'2"

Observation of Surface: The tank surface is 100% dry cracked solids. Diatomaceous earth has been added to stabilize surface liquid.

Salt Well Status: NO SW Casing installed. There is no pump of any kind visible.

Lollipops? ___ Yes X No

Other: The manual type is touching or entangled pile of old tapes. There is one T.C. probe still in the tank.

Interpreted by : V.D. Mayer

Date: 11-29-78

Reviewed by :

Date :

INTERIM STABILIZATION EVALUATION

TANK NUMBER: 101-U EFFECTIVE DATE: 9/17/79

LIQUID LEVEL & RISER NO. 4.5" R-8

SOLIDS LEVEL & RISER NO. 4.5" R-8

EST. SUPERNATE LIQUID VOLUME 6500 ± 3500* gallons

EST. DRAINABLE INTERSTITIAL LIQUID VOLUME 2000** gallons

TEMPERATURE: 70° F

IS TANK HEAT LOAD A PROBLEM?

yes ____ no X unknown ____

IS THERE A POTENTIAL DOME LOAD PROBLEM? yes ____ no X

PHOTOGRAPH EVALUATION: (Order #87062; L.L. 4.5" ; Date 6/19/79)

Photo clarity was severly reduced by both haze and radiation damage to the film. Although clarity was reduced, closer photos show extensive areas of liquid. Even in the dim views the exposed sludge is discernible. It appears there remains about 60% of the surface as very shallow liquid. There is a considerable buildup of sludge around the perimeter of the tank. See attached diagram for estimated sludge distribution.

* This is a conservative estimate, based on data contained in the attached diagram. The uncertainty is due to the limited solids and liquid level data available and the very poor visibility in the photographs of this tank.

** This volume estimate assumes sludge contains 12.5% by volume drainable interstitial liquid.

4.5" = 12,375 gals 5,500 solids
7,000
5375

4.5"

INTERIM STABILIZATION EVALUATION PAGE 2

ADVANCED STABILIZATION RECOMMENDATIONS:

Air drying or other in situ drying techniques are recommended for this tank to remove the remaining supernatant liquid.

COMMENTS:

Tank 101-U was pumped down as far as possible with a submersible pump in a side riser R-7. Photographs were taken from the opposite side of the tank, riser R-3, to obtain an indication of the amount of liquid that remained, and to determine if it would be desirable to install a pump in the center riser to remove further liquid.

The very foggy photographs indicated sludge piles in the vicinity of all potential pump acess points. At best this would leave only a minimal liquid heel, beneath these risers. Tank Farm Operations were then requested to obtain further liquid and sludge level readings of the tank to verify the photographic evaluation. While attempting to obtain the desired readings, Operations encountered radiation levels of 5 R/hr when a shielding plug was lifted approximately 6 inches above a cover block to a pit. At this time Radiation Monitoring (RM) called off the job due to the high exposure levels.

Due to the relatively small amount of liquid contained in the tank combined with the low probability of removing a significant portion of the liquid, it has been decided that the benefits of attempting to remove additional liquid from the tank could not justify the exposure that personnel would have to take to install the pump.

Prepared By Barry Carl 9-17-79

Reviewed By John M Bailey 9-17-79

Atlantic Richfield Hanford Company

Tank 104-U

Earth

60 Tons of Diatomatious Added to Tank ≈ 3" of solids ≈ 7000 Gal's

This volume would not contain any drainable liquid. This would leave ≈ 7,600 gal. pumpable interstitial and ≈ 500 gal supernate - total 8,100 gallon. ~~This~~ It was deemed not economically practical by ~~mgt~~ to go after this volume 11-2-78

84-6000-904 (9-70)

* U.S. GOVERNMENT PRINTING OFFICE 1979 698-072 REGION 10

Tank: 110-U

Evaluation (see continuation page for calculations and additional comments):

☒ *Photograph review completed - Date of most recent photographs 12/11/84

☒ Tank History review completed

☒ Tank temperature profile review completed prior to 1/3/84.

Surface Description: Surface consists of a rough, dry and gray colored sludge. Recent photographs did not turn out well, but they did reveal a mound of sludge (~½ a sphere) with a height of ~ 6 ft. Date 12/14/84

Solids Level 61.8 Date 12/14/84 Method Manual FIC

Liquid Level 61.6 Date 12/14/84 Method Manual FIC

Solids Volume 186,000

Estimated Drainable Liquid Volume 15,000

Average Maximum Tank Temperature, past 6 months NOT AVAILABLE

Estimated Supernatant Volume 0

☐ Cost/Benefit Analysis attached

Evaluation Performed by _____ Date ____ Checked by ____ Date____

Disposition of Tank:

☒ Tank Interim Stabilized at 15,000 gallons of drainable liquid

☐ Tank not Interim Stabilized; stabilization activities resumed

Approved by: Manager, TF&EPE R.A. L. D. Ross Date 12/17/84

Manager, TFS&O G. F. Dufelow Date 12/19/84

Program Manager R. A. Zinski Date 12-20-84

DISTRIBUTION: TF&EPE Tank File, Tank Farm Surveillance Analysis, Approval Signatures

* Recent photographs were compared with pictures taken 7/12/79 to verify consistency since current pictures were not of good quality. The mound of sludge was found in both sets of pictures.

EVALUATION CALCULATIONS AND COMMENTS

Tank: 110 U

Page 2 of 2

Approximate Volume of mound: $V_{sphere} = 4/3\,\pi r^3$

Approximate mound to be a ½ · sphere with r = 6ft

$\therefore V_{mound} = 2/3\,\pi r^3 = 2/3\,\pi (6ft)^3 = 452 ft^3$ *

7.481 gallon = $1ft^3$

$V_{mound} = 452 ft^3 \times \frac{7.480 \text{ gallons}}{ft^3} = 3,381$ gallons

Solids Volume: 3,381 + (61.8)(2750) + 12500 = 185831 gallons => 184,000

Drainable Interstitial Liquid = Total Drainable Liquid = (186000 - 66000) .125 = 15,000 gallons

Pumpable Liquid Remaining: (16000 gallons - 6500 gallons) = 8500 gallons

Calculations made by: J Stan Hill

Checked by: RA Van Meter

INTERIM STABILIZATION EVALUATION - NON-JET PUMPED TANKS

(CONTINUATION PAGE)

Evaluation Calculations and Comments

TANK: 112-U

TOTAL WASTE VOLUME = (WASTE LEVEL (in) $\times$ 2750 gal/in) + 12,500 gal

WASTE LEVEL = 13.3"

TOTAL WASTE VOLUME = 13.3 in $\times$ 2750 gal/in + 12,500 gal = 49,000 gal

SUPERNATANT VOLUME: SUPERNATANT POOL IS ESTIMATED TO BE 2.5" deep AND 59' in diameter FROM 7/31/81 photos.

SUPERNATANT VOLUME = $\pi \times \frac{59^2 Ft^2}{4} \times 2.5 in \times \frac{Ft}{12 in} \times 7.48 \frac{gal}{Ft^3}$ = 4260 gal $\approx$ 4300 gal

SOLIDS VOLUME = TOTAL WASTE VOLUME - SUPERNATANT VOLUME

SOLIDS VOLUME = 49,000 gal - 4300 gal = 44,700 gal

DRAINABLE INTERSTITIAL LIQUID = (SOLIDS VOLUME - CAPILLARY HEIGHT $\times$ 2750 gal/in) $\times$ porosity

CAPILLARY HEIGHT FOR SLUDGE = 24" porosity = 12.5%

DRAINABLE INTERSTITIAL LIQUID = (44,700 gal - 24 in $\times$ 2750 gal/in) $\times$ .125 = 0 by definition

DRAINABLE LIQUID REMAINING = DRAINABLE INTERSTITIAL LIQUID + SUPERNATANT

DRAINABLE LIQUID REMAINING = 0 + 4300 gal = 4300 gal.

ASSUMING THE SLUDGE HAS SALT CAKE CHARACTERISTICS:

CAPILLARY HEIGHT = 12" Porosity = 45%

DRAINABLE INTERSTITIAL LIQUID = (44,700 gal - 12 in $\times$ 2750 gal/in) $\times$ .45 = 5300 gal

DRAINABLE LIQUID REMAINING = 5300 gal + 4300 gal = 9,600 gal.

CALCULATIONS DONE BY T. D. Kilpatrick

Checked BY Nancy G Bell

INTERIM STABILIZATION EVALUATION - NON-JET PUMPED TANKS

Tank: 112-U

Evaluation (see Continuation Page for calculations and additional comments):

[x] Photograph review completed - Date of most recent photographs 2/3/84

[x] Tank history review completed

[x] Tank temperature profile review completed

Surface Description: The surface is covered with a supernatant pool approximately 59' in diameter and 2.5" deep. The manual tape is contacting solids. Date 2/3/84

Solids Level 13.3" Date 9/19/79 Method MT

Liquid Level 13.3" Date 2/3/84 Method photo

Solids Volume 44,700 gal

Estimated Drainable Liquid Volume 4,300 gal

Average Maximum Tank Temperature, past 6 months 69°F 6/81 most recent data

Estimated Supernatant Volume 4300 gal

[ ] Cost/Benefit Analysis attached

Evaluation Performed by T. A. Baker Date 2/10/84 Checked by M R Bell Date 2-10-84

Disposition of Tank:

[X] Tank Interim Stabilized at 4300 gallons of drainable liquid

[ ] Tank not Interim Stabilized; stabilization activities resumed

Approved by: Manager, TF&EPC R. D. Crowe Date 2/12/84

Manager, TFS&O W. T. Dunbar Date 2-15-84

Program Manager R. A. Gasser Date 2-15-84

DISTRIBUTION: TF&EPC Tank File, Tank Farm Surveillance Analysis, Approval Signatures

NOTE: Tank 112-U was previously Interim Stabilized on 9/19/79. This form is for record purposes only.

INTERIM STABILIZATION EVALUATION

TANK NUMBER: 201-U EFFECTIVE DATE: 8-31-79

LIQUID LEVEL & RISER NO. R-1 28"

SOLIDS LEVEL & RISER NO. R-1 27 50"

EST. SUPERNATE LIQUID VOLUME 1,000 gallons

EST. DRAINABLE INTERSTITIAL LIQUID VOLUME 600 gallons

This volume assumes sludge to be 12.5% drainable liquid.

TEMPERATURE: Max. 68° F

IS TANK HEAT LOAD A PROBLEM?

yes ____ no X unknown

IS THERE A POTENTIAL DOME LOAD PROBLEM? yes ____ no X

PHOTOGRAPH EVALUATION: (Order #779105 ; L.L. 2'3 1/2" ; Date 9-13-77)

The surface is 90% liquid. The liquid pool takes up the center of the tank and this pool cannot be reached with a pump. There is a band of solids at the tank perimeter.

COMMENTS:

The waste is in a dished shape and the solids level is being taken near the outer edge of the dish. Since there are no access ports near the tank center this perimeter point must be used. Thus the interstitial liquid volume estimate is conservatively high.

ADVANCED STABILIZATION RECOMMENDATION: It appears that further liquid removal could be accomplished by air drying.

Prepared By: W. Dennis Mayer 8-22-79

Reviewed By: John W Bailey 8-23-79

INTERIM STABILIZATION EVALUATION

TANK NUMBER: 202-U EFFECTIVE DATE: 8-31-79

LIQUID LEVEL & RISER NO. R-1 27"

SOLIDS LEVEL & RISER NO. R-1 24"

EST. SUPERNATE LIQUID VOLUME 1,000 gallons

EST. DRAINABLE INTERSTITIAL LIQUID VOLUME 600 gallons

This volume assumes sludge to contain 12.5% drainable liquid.

TEMPERATURE: 61° F

IS TANK HEAT LOAD A PROBLEM?

yes ____ no X unknown ____

IS THERE A POTENTIAL DOME LOAD PROBLEM? yes ____ no X

PHOTOGRAPH EVALUATION: (Order #779106; Liquid Level 2'3" ; Date 9-13-77)

The surface area is 90% liquid. There is a ring of solids at the tank wall. The liquid pool cannot be reached with a pump.

COMMENTS:

The waste is in a dished shape and the solids level is being taken near the outer edge of the dish. Since there are no access ports near the tank center, this perimeter point must be used thus the interstitial liquid volume estimate is conservatively high.

ADVANCED STABILIZATION RECOMMENDATION: It appears that further liquid removal could be accomplished by air drying.

Prepared By: V. D. Lenni Mayer 8-22-79

Reviewed By: John W. Bailey 9-23-79

INTERIM STABILIZATION EVALUATION

TANK NUMBER: 203-U EFFECTIVE DATE: 8-31-79

LIQUID LEVEL & RISER NO. R-1 19"

SOLIDS LEVEL & RISER NO. R-1 19"

EST. SUPERNATE LIQUID VOLUME 500 gallons

EST. DRAINABLE INTERSTITIAL LIQUID VOLUME 400 gallons

This volume assumes sludge to contain 12.5% drainable liquid.

TEMPERATURE: 86° F

IS TANK HEAT LOAD A PROBLEM?

yes ____ no X unknown ____

IS THERE A POTENTIAL DOME LOAD PROBLEM? yes ____ no X

PHOTOGRAPH EVALUATION: (Order #87195 ; Liquid Level ; 1'7 1/4" ; Date 7-3-79)

The surface is approximately 70% liquid. This liquid is in a shallow pool taking up the center portion of the tank which cannot be reached with a pump through any existing risers. The manual tape is touching near the solid liquid interface.

COMMENTS:

The waste is in a dished shape and the solids level is being taken near the outer edge of the dish. Since there are no access ports near the tank center, this perimeter point must be used. Thus the interstitial liquid volume estimate is conservatively high.

ADVANCED STABILIZATION RECOMMENDATION: It appears that further liquid removal could be accomplished by air drying.

Prepared By: V. Dennis Mayer 8-22-79

Reviewed By: John W. Bailey 8-23-79

INTERIM STABILIZATION EVALUATION

TANK NUMBER: 204-U EFFECTIVE DATE: 8-31-79

LIQUID LEVEL & RISER NO. R-1 18"

SOLIDS LEVEL & RISER NO. R-1 12.5"

EST. SUPERNATE LIQUID VOLUME 1,000 gallons

EST. DRAINABLE INTERSTITIAL LIQUID VOLUME 400 gallons

This volume assumes sludge to contain 12.5% drainable liquid.

TEMPERATURE: 80° F

IS TANK HEAT LOAD A PROBLEM? yes ____ no X unknown ____

IS THERE A POTENTIAL DOME LOAD PROBLEM? yes ____ no X

PHOTOGRAPH EVALUATION: (Order #779108 ; Liquid Level 1' 6" ; Date 9-13-77)

The surface area is 90% liquid. The 10% solids are seen as a ring at the tank wall. There is a submersidle pump at the edge of the liquid pool. Attempts have been made to transfer liquid, and these attempts have not been successful.

COMMENTS:

The waste is in a dished shape and the solids level is being taken near the outer edge of the dish. Since there are no access ports near the tank center, this perimeter point must be used. Thus the interstitial liquid volume estimate is conservatively high.

ADVANCED STABILIZATION RECOMMENDATION: It appears that further liquid removal could be accomplished by air drying.

Prepared By: V. Dennis Mayer 8.22-79

Reviewed By: John W Bailey 8-23-79

DISTRIBUTION SHEET

To	From	Page 1 of 1
Distribution	V. C. Boyles	Date 2/29/96
Project Title/Work Order		EDT No. N/A
SINGLE-SHELL TANK STABILIZATION RECORD		ECN No. 625446

Name	MSIN	Text With All Attach.	Text Only	Attach./ Appendix Only	EDT/ECN Only
J. J. Badden	T4-08	X			
D. A. Barnes	R1-80	X			
W. B. Barton	R2-11	X			
V. C. Boyles	R1-49	X			
D. A. Bragg	R1-49	X			
D. B. Engelman	R1-49	X			
G. R. Geschke	R1-49	X			
B. M. Hanlon	R1-80	X			
G. N. Hanson	S5-05	X			
B. J. Harp	S7-54	X			
M. J. Holm	R1-80	X			
J. H. Huber	R1-49	X			
N. W. Kirch	R1-11	X			
M. R. Koch	R1-49	X			
T. Morton	S8-05	X			
R. L. Powers	S5-13	X			
R. E. Raymond	S7-12	X			
D. P. Reber	T4-08	X			
S. H. Rifaey	T4-07	X			
W. E. Ross	S5-08	X			
J. S. Schofield	S7-12	X			
J. J. Toth	K7-94	X			
J. H. Wicks	R2-50	X			
D. D. Wiggins	R2-80	X			
Central Files (Original + 2)	~~L8-04~~ A3-88	X3			