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Demonstration Project

HLW PROCESSING SYSTEMS FLUSHING OPERATIONS RUN PLAN

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WVNS RECORD OF REVISION

Rev. No.	Description of Changes	Revision On Page(s)	Dated
0	Original Issue	All	11/30/00
1	GENERAL REVISION per ECN 13014		
	Requirements -added WVDP-364, 374, 375	1	03/26/01
	2.2- additional references added.	2	
	3.0- added new definitions.	2	
	4.0- High-Level added to define Waste Projects.	2	
	Added Section 5.1 Flushing Operations Strategies.	4-5	
	Minor modifications to the proposed Flushing Matrix table information.	6	
	6.2 -Added chemical cleaning option.	7	
	6.3.1-added 8D-1 inventory & basis for estimates Added WVDP-364 to Data Collection/ Sampling.	7/8	
	6.3.2 -Information about a possible addition of a (third) sluicer inserted.	9	
	6.3.4- added step to rinse 8D-4 w/ water.	12	
	6.3.6 -Schedule for flush path 2,3,and 4 updated as complete. Remaining flushes refer to Attachment B.	19	
	6.3.8 -Added section of continuing operations to process tank residuals and status of flushing/melter equipment.	23	
	6.3.9 -Added a statement on continued operational effects on the radionuclide inventory.	24	
	6.3.11 -Updated Melter condition.	25	
	8.0 -S. Kumar added as designee responsible for maintaining Run Plan Exception Log.	27	
	9.0 Corrected Records title	27	
	9.0 -Work Orders changed to work instructions, added standard to operating procedures.	27	
	Schedule - All to "Refer to Attachment B".	4,8,10,11,12,17 19,22,23,24,25,26,27	
	Punctuation & pagination throughout.	All	
	Attachment B - updated	31	
2	Revision in response to DOE letter DW:2001:0669		11/15/01
	1.0 - Added HLW Operations Technical Support in last para.	1	
	2.2 - Updated list of references	2	
	4.0 - Added HLW Operations Technical Support responsibilities	3,4	
	5.0 - Revised reference to schedule	5	
	5.1 - Updated strategies descriptions	5	

WVNS RECORD OF REVISION CONTINUATION FORM

Rev. No.	Description of Changes	Revision On Page(s)	Dated
2 cont.	6.3.1, 6.3.2 -Referenced curie inventories per released reports and deleted chemical wash option.	7,8,9	
	6.3.4 - Revised flush volume for 8D-4	11	
	Figure 6.5-1 Replaced to make it consistent with current plan for SMS	15	
	Added Section 6.3.12	24	
	ATTACHMENT B Replaced with current version	29	
	Updated status, punctuation and pagination throughout.		
3	Delete the flushing of line 55-PH-2-006 due to the need to reconfigure the plant (removal of several jumpers).	12	02/14/02
	Same as for page 12	14	
	Revised Figure 6.5-1	15	
	Delete flush path which goes to Tank 8D-3 Also deleted pre-conditioning requirement of flushing with water.	17	
	Deleted the process monitors for paths 5 & 6 Sampling of 50D-001 and the valve aisle radiation probes will provide sufficient information.	18	
	Changed volume of flush from 300 to 50 gallons	18	
	Revised Figure 6.6-1 and 6.6-2	19,20	
	Deleted 5D-15B from flushing with water. There is no advantage in flushing 5D-15B with water prior to acid addition.	21	
	Revised department titles & Cover Sheet	1-4	
4	6.3.11 Enhanced the definition of how the final flushing operations will be performed. Also replaced Attachment "B"	23	04/29/02

TABLE OF CONTENTS

HLW PROCESSING SYSTEMS FLUSHING OPERATIONS RUN PLAN

1.0 SCOPE

This run plan defines a set of discrete number of flushes of the High-Level Waste (HLW) processing systems and components prior to deactivation of the Vitrification Melter. The primary objective of these flushes will be to reduce any retrievable residual solids and long-lived radionuclides in the systems so as to incorporate them into the glass form.

This run plan addresses the flushing of systems and components in the Tank Farm and the Vitrification Facility, specifically listed in section 5.0 of this document. The systems and components which have been used in the HLW solidification operations will be flushed with acid, water, or cold chemicals and treated by other technological processes (e.g. high-pressure water spray, reflux in CFMT) as defined here based on appropriateness and effectiveness within the system safety parameters. Although necessary and integrated as accompanying activities, the procurement and installation of instrumentation, needed system modifications, collection of data for evaluating the effectiveness of the flushes or characterization of the systems and components, are not within the scope of this document. These are to be addressed in separate documents as needed.

The flushing operations will be carried out under the cognizance of High-Level Waste Project. Vitrification Operations and WTF Operation groups will be conducting the radioactive operations. Supporting organizations include Analytical Chemistry, Quality Assurance, Slurry Acceptance Engineers, Radiation Protection, Vitrification Deactivation Project, HLW Completion Project, and HLW Tank Farm Deactivation Engineering.

2.0 REQUIREMENTS & REFERENCES

2.1 Requirements

(1) WVNS-IRP-002 - Phase II Vitrification Facility Radioactivity Operation Run Plan
(2) SOP 00-13 - WTF/STS/LWTS Run Plan and Fissile Material Tracking
(3)WVDP-218 Process Safety Requirements
(4) WVDP-364 - Data Collection and Analysis Plan (DAP) for Tanks 8D-1 and 8D-2 as Part of the Waste Tank Farm (WTF) Project
(5) WVDP-374 - Field Measurement to Support Waste Incidental to Reprocessing (WIR) Evaluation for the Supernatant Treatment System
(6) WVDP-375 - Field Measurements to Support Waste Incidental to Reprocessing (WIR) for Tank 8D-4 and the Sludge Mobilization System (SMS)

Detailed operations of the systems and equipment involved will be as per approved work instructions and Standard Operating Procedures (SOPs). All systems will be operated within currently approved process safety requirements and applicable operating parameters.

2.2 References

Engineering and Operations Procedures

EP-14-001	-	Preparation of Integrated Run Plan
WVDP-010	-	WVNS Radiological Control Manual
SOP 050-23	-	Tank 8D-3 Liquid Collection and Transfer Operation
SOP 050-24	-	STS Water Supply
SOP 050-29	-	STS Sampling and Pneumatic Sample Transfer
SOP 055-05	-	Operation of the WTF Chemical Addition System
SOP 055-07	-	Sludge/Zeolite Mobilization Pump Operating Procedure
SOP 055-10	-	Zeolite Transfer
SOP 055-12	-	Tank 8D-2 Waste Transfer
SOP 055-14	-	Waste Transfer for Tank 8D-4 to Tank 8D-2
SOP 055-17	-	SMS Alarm Response
SOP 055-21	-	Tank 8D-2 Decant Operation
SOP 063-21	-	Concentrator Feed Make-up Tank Operation
SOP 063-22	-	Slurry Sample and Sample Transfer Station Operations
SOP 065-19	-	Cold Chemical Feed Batch Preparation
SOP 065-26	-	Miscellaneous Transfers from the Cold Chemical Facility
SOP 071-02	-	Operation of the LWTS High TDS Treatment System
SOP 071-10	-	Transfer of LWTS Evaporator Concentrate Tanks
SOP 071-23	-	Transfer of Liquid from LWTS to the Waste Tank Farm

Referenced Documents

1. Deleted

2. Letter WFH:0216-76389-434.1 (DW:2001:0131), W. F. Hamel to R. R. Campbell, "Revision to High-Level Waste Processing Systems Flushing Operations Run Plan," dated February 20, 2001

3. Letter EAL:0134-79780-547.1.1a (DW:2001:0669), A. C. Williams to J. L. Little, "Award Fee Performance Evaluation Criteria for the Period October 1, 2001, Through January 31, 2002; Contract Number DE-AC24-81NE44139," dated September 28, 2001

4. Letter WD:2001:0239, T. F. Kocialski to A. C. Williams, "Risk Management Plan for Continuing Melter Operations," dated April 23, 2001

5. Letter WD:2000:0729, Contract DE-AC24-81NE44139; "High-Level Waste Tanks 8D-1 and 8D-2 Radionuclide Inventory Report," dated September 29, 2000

6. Letter WD:2001:0631, Contract DE-AC24-81NE44139; "Tank 8D-1 and 8D-2 Radionuclide Inventory Quantification," dated September 28, 2001

7. Letter DW:2001:0381, A. C. Williams to R. R. Campbell, "Risk Management Plan for Continuing Melter Operations," dated May 29, 2001

3.0 DEFINITIONS & ACRONYMS

CFMT	Concentrator Feed Makeup Tank	SOP	Standard Operating Procedure
DW	Demineralized Water	SS	Shift Supervisor
HLW	High-Level Waste	STS	Supernatant Treatment System
LWTS	Liquid Waste Treatment System	WIR	Waste Incidental to Reprocessing
MFHT	Melter Feed Holding Tank	WO	Work Order
SBS	Submerged Bed Scrubber	WTF	Waste Tank Farm
SMS	Sludge Mobilization System	WVDP	West Valley Demonstration Project

4.0 RESPONSIBILITIES

The overall responsibility of the flushing operations rests with the High-Level Waste Projects. Coordination and support from various groups in this organization and outside this organization is expected. The following support is anticipated:

Analytical Chemistry

(1) Perform analysis and documentation of those samples required to support processing of radiological waste. Provide results of these analyses to Vit Operations and SAEs on a timely basis.

(2) Perform VF System non-radiological waste preshipment analysis and provide results to vit operations and waste ops management, if requested.

QA - (Quality Assurance)

(1) Responsible for performing in-process inspections.

(2) Provides oversight to ensure implementation of the quality assurance program.

RP - (Radiation Protection)

(1) Monitor all radiation and contamination levels.

(2) Ensure all radiological work is performed in accordance with WVNS Radiological Control Manual, WVDP-010.

(3) Perform surveys and additional area postings as requested.

SAE - (Slurry Acceptance Engineer)

(1) Perform acceptance of slurry chemistry and analyze sampling data.

(2) Complete all analytical request forms (for feed, batch, and/or glass acceptance analysis), analyze results, provide direction regarding the acceptability of slurry batches, provide recipe and recipe modification/shimming instructions, sign for acceptance of slurry batches, maintain slurry traveler and other records such as fill height calculations and shard sampling.

Vitrification Deactivation Project

(1) Provide systems engineering support during all flushing operations leading to vitrification.

(2) Evaluate results of the flushing operations.

(3) Where necessary, develop work instructions to support flushing.

Vitrification Operations

(1) Provide qualified Vitrification Operations personnel in support of flushing operations in Vitrification Facility.

(2) Manipulate controls to maintain safe operation of Vitrification Facility systems and equipment.

HLW Tank Farm Deactivation Engineering

(1) Provide engineering support during all flushing operations in the WTF.

(2) Evaluate results of the flushing operations.

(3) Where necessary, develop work instructions to support flushing.

WTF Operation

(1) Provide qualified Tank Farm Operations personnel in support of flushing operations in the WTF.

(2) Manipulate controls to maintain safe operation of WTF systems and equipment.

HLW Completion Project

(1) Provide engineering support during all flushing operations in the WTF

(2) Evaluate results of the flushing operations

(3) Where necessary, develop work instructions to support flushing

5.0 OPERATING SUMMARY

The systems and components to be flushed under this run plan are located in the Tank Farm, Liquid Waste Treatment System, and the Vitrification Facility. These are identified in the Flushing Matrix that follows. Also included in the table are the target areas being cleaned, the contaminants being removed, and the flushing media.

Each flush is identified as an independent flush. Flushes may be repeated based on the results obtained. The sequence of the flushes is anticipated to be in accordance with the latest Flushing and Melter Shutdown Schedule. A copy of the schedule in effect at the time of this revision is included in Attachment B for information. Section 6.0 provides the pre and post flushing conditions. In addition to the sampling required for vitrification batches and specified in the applicable SOPs, certain data will be collected for qualitative evaluation of the effectiveness of the flush. These data collection and sampling requirements will be identified in work instructions. System parameters during flush such as rad probes, video camera observations for such monitoring are identified in Section 6.0 for individual flushes, if required.

5.1 Flushing Operations Strategies

The flushing of HLW systems and components will result in mobilized HLW which will be vitrified. Primary objectives of the flushing are to transfer to the melter as much HLW as technically and economically practical and at the earliest opportunity so that it can be vitrified. The HLW remaining in the HLW processing systems, components, and transfer lines is believed to be quite small (less than 1% of initial). However, as a part of the overall objective of reducing the HLW in the facilities, it is important to vitrify, as much as practical, any retrievable HLW containing long-lived radionuclides.

The flushing run plan incorporates the following key strategies:

Waste Form Qualification: In order to avoid generation of non-standard HLW canisters, all flushing media beyond currently accepted (e.g. water and nitric acid) shall be reviewed and approved for its suitability and acceptance of the resulting glass. The current requirement of sampling of the melter feed slurry in the CFMT prior to vitrification shall continue.

Melter Life Concern: A detailed risk management plan for continuing melter operation was submitted to DOE in April, 2001 (Reference 4)and has been reviewed and concurred by DOE per Reference 7. Due to pending concerns for limited life of the melter, it is important to flush all systems which contain significant amounts of HLW at the earliest, followed by flushing of other remaining components.

Deleted

PROPOSED FLUSHING MATRIX

Component/System Being Flushed	Target Areas	Contaminants	Flushing Media	Implementing Documents
1. Tank 8D-1	Mobile waste on tank bottom	Cs-137 and trace TRU	Process Liquid	SOP/WO
2. Tank 8D-2	Mobile waste on tank bottom and waste attached to wall, grid & internal surfaces	Cs-137 and trace TRU	Process Liquid & possibly chemical(s)	SOP/WO
3. Waste Header	Internal pipe surfaces	Solids & radioactive heel	Acid & Water	WO
4. Tank 8D-4	Wall and cooling coil surfaces	Solids & radioactive heel	Dilute Acid & Water	WO
5. SMS Piping & Jumpers	Internal surfaces of piping, jumpers, and valves	Cs-137 and trace TRU	Water & Acid	WO
6. STS	1. Pre-filter (F-001) and associated piping paths 1-4 2. Post Filter (F-002) and inactive Zeolite Column D and the associated piping (Path 5) 3. STS Valve Aisle sump to 8D-2 splash box	Cs-137 and trace TRU	Water and/or Acid	WO
7. LWTS Evaporator	Evaporator internal surfaces	Uranium and Plutonium	Water & Acid	WO
8. CFMT	Wall and roof surfaces	Activity from sludge and zeolite	Water	WO
9. MFHT	Wall and roof surfaces	Activity from sludge and zeolite	Water	WO
10. SBS	Scrubber internal surface deposits	Activity from heel	Water & or Acid	WO
11. Melter	Internal surfaces	Activity from sludge and zeolite	Simulated Waste & Glass Formers	WO

6.0 PREPARATION ACTIONS

6.1 Administration

No additional administrative requirements, over and above the existing requirements, are needed specific to this flushing run plan.

6.2 Material/Special Tools and Equipment

The flushing media to be used is primarily nitric acid, water, simulated waste and glass formers. Use of other flushing media will be reviewed and if used, will require revision to this run plan. Several special tools such as rad-probes, burnishing sampler, Beta-Gamma detector, Gamma Camera may be used to support the characterization effort during or after the flushing operations. Data collection requirements for characterization are to be addressed in separate documents under the characterization project.

6.3 Flushing Preparation and Actions

For each system or component identified in the flushing matrix, detailed information as to what constitutes a flush is included in this section. The expected outcome of the flush, though uncertain, is also projected where possible.

6.3.1 HLW Storage Tank 8D-1

Pre-flushing Condition - Zeolite Column C of the STS was emptied into Tank 8D-1 in late May, 2000 and was re-loaded with fresh zeolite in late June, 2000. Four zeolite transfers from the Tank 8D-1 to 8D-2 took place during the month of June 2000. These transfers resulted in zeolite solids and Cs-137 curies being transferred from 8D-1 to 8D-2. Tank 8D-1 contains residual zeolite solids at the tank bottom and small amounts of other radionuclides in the liquid. From FY-2000 and FY-2001 characterization activities, subsequent zeolite transfers, and 8D-1 liquid processing through the STS, the tank contents at the start of FY-01 (as of August 1, 2000) are noted in the High-Level Waste Tanks 8D-1 and 8D-2 Radionuclide Inventory Report (Reference 5).

Flushing Operations - The flushing of Tank 8D-1 was accomplished by performing mobilized transfers of liquid and zeolite from 8D-1 to 8D-2 per SOP 055-10. The flushes were conducted from October 25, 2000 to February 6, 2001. Waste from the tank wall, floor and the gridwork were dislodged by selectively aiming the mobilization pumps and the sluicer spray. The large size zeolite particles (300-800 um) remaining in the Tank 8D-1 are difficult to maintain in suspension. All available mobilization pumps were used per SOP 055-07 to maximize re-suspension of solids collected at the tank bottom and transfer the same to Tank 8D-2. These operations for 8D-1 were aimed at removing mobile Cs-137 curies in the zeolite and trace amounts of alpha-TRU remaining in the residual waste. Water leakage from the mobilization pump seals during mixing resulted in some dilution of the tank contents and supported flushing of Tank 8D-1.

Expected Condition After Flushes - The flushing of Tank 8D-1 has been completed. Thirteen zeolite transfers were conducted and approximately 112000 Ci of Cs-137 were transferred from Tank 8D-1 to Tank 8D-2. Estimate of the residual radioactivity as of July 31, 2001 has been reported in High-Level Waste Inventory Report (Reference 6). At the end of flushing of 8D-1, Cs-137 radioactivity contained on zeolite and suspended solids in the tank was transferred to Tank 8D-2 for subsequent vitrification. Tank 8D-1 will be receiving some of the flushing liquids as a result of flushing of the STS and SMS jumpers in pit 8D-1. These liquids are expected to be quite dilute in terms of radioactive contaminants and will not need to be vitrified. Potential future additions to Tank 8D-1 may also include radioactivity/zeolite from STS columns A, B, and C which may ultimately contain approximately 30,000 Ci of Cs-137.

Data Collection / Sampling - As per SOP 055-05, 055-10, 055-17, 050-29, and WVDP-364.

Schedule - Complete

6.3.2 HLW Storage Tank 8D-2

Pre-flushing Conditions - Following HLW Transfer series 63(Batch 72) to CFMT, zeolite flushes from 8D-1 to 8D-2 were resumed during mid-October to the end of February, 2001. The Tank 8D-2 flushes are followed by transfers of Cs-137 in zeolite solids and trace amounts of alpha-TRU remaining in the mobile waste to CFMT for vitrification. Estimates of 8D-2 inventory at the start of FY-01, prior to flushing, are noted in the High-Level Waste Tanks 8D-1 and 8D-2 Radionuclide Inventory Report (Reference 5).

Flushing Operations - Washing of Tank 8D-2 interior surfaces with two sluicers; one in M-7 riser and another in M-4 riser has been carried out. These two sluicers provide a line of sight to approximately 80% of the tank surfaces above the gridwork. The sluicers used the tank liquid to wash the tank surfaces. It is anticipated that with these two sluicers, most of the removable wall activity above the gridwork has been reduced. Recent analyses of the waste transfers to the CFMT indicate that only a small quantity of the remaining waste is being removed by sluicing. Therefore, only small amount of additional flushing of Tank 8D-2 surfaces by sluicing may be performed based on available schedule.

Expected Condition After Flushing - At the end of the final transfer of Tank 8D-2 contents, most of the retrievable radionuclides will have been transferred to the CFMT for vitrification. It is the goal that at the end of wall washing and flushing Tank 8D-2 that the radioactivity remaining in the tank is reduced to the extent technically and economically practical.

Subsequent to flushing high activity inflows to the tank 8D-2 shall be limited by re-directing the flows to the CFMT. Recent estimate of the residual radioactivity as of July 31, 2001, have been reported in High-Level Waste Inventory Report. (Reference 6)

Data Collection / Sampling - The burnishing sampler and Beta-Gamma detector will be used to quantify the residual waste.

Schedule - Refer to Attachment B

6.3.3 Waste Header

Pre-flushing Conditions - The waste header is expected to have some amount of feed slurry material deposited between the Vit Facility and Tank 8D-4. The header has been determined to be clear by conducting water flushes previously. Currently the waste header receives waste from the north and south sumps of the Vitrification Facility. The flows from the south sump are mostly water, while north sump flows may contain over-flows from the Vitrification Facility components and residue from washing of expended materials.

Flushing Operation - The waste header will receive water and acid from the cold chemical facility. Nitric acid as it passes through the waste header will result in flushing the waste header. This acid will be sent to Tank 8D-4. Subsequent to the acid flush, the waste header will be flushed with water. SOP 65-19, 65-26 and SOP 55-14 provide details of applicable operating procedures.

Equipment to Flush	Flush Paths No.	Min. Volume to Complete Flush	Flush Media	Required System Parameters During Flush	Flush Liquid Destination
55-PH-3-003 Waste Header (Cold Chem Facility - Vit to Tank 8D-4)	1	3 Line Volumes	Nitric acid and Water flushes	Rad Probe in Vault 8Q-4	8D-4

Post Flushing Condition Expected - Subsequent to the acid and final water flushes of the waste header, the contaminated flows from the north sump will be re-routed to the CFMT. All other flows, under normal operations, are expected to be mostly water or contain only small amounts of contamination.

Data Collection / Sampling - A record of radiation probe dose rate measurements taken in 8D-4 vault and SMS trench as well as acid and water volumes transferred to 8D-4 will be made.

Schedule - Refer to Attachment B

6.3.4 Tank 8D-4

Pre-flushing Conditions - Tank 8D-4 contains residual solids from THOREX waste, flows from vit waste header during vitrification, and liquids from the north and south sumps of the vitrification facility. In addition to the tank 8D-4 inventory, flushing liquids (acid and water) during the waste header flushing will be received in this tank.

Flushing Operations - Tank 8D-4 flushing operations will consist of at least one acid soak followed by one or more water rinses of the tank. Acid will be added to tank 8D-4 via the waste header as part of the waste header flush. Make up water will be added to the tank volume to achieve desired acid concentration. Acid soaking of the Tank 8D-4 for a period of 20-25 days will be completed to dissolve any unmobile residual solids from the tank bottom and the tank internal cooling coils. The 55-G-013 transfer pump in recirculation mode per SOP 55-14 or air sparging through the tank bubbler tubes will be used for providing agitation to aid in the dissolution process during the tank 8D-4 acid soak. At the completion of the acid soak the acid solution containing dissolved residual solids will be transferred to the CFMT. Additional tank flushing will be completed by a water rinse which will also be transferred to the CFMT to further reduce tank radionuclide inventory.

Expected Condition After Flushing - Residual 8D-4 solids dissolved in the acid will have been transported to the CFMT for vitrification. A slightly acidic water heel will remain the Tank 8D-4.

Equipment to Flush	Volume to Complete Flush	Flush Media	Required System Parameters During Flush	Flush Liquid Destination
8D-4	Approximately 15,000 liters	Acid & water	20-25 day acid soak. Moderate agitation (using pump re-circulation or air sparging through bubbler) is desired	CFMT via SMS lines

Data Collection / Sampling - Rad probes in the Tank 8D-4 vault will record the changes in activity as flushing progresses.

Schedule - Refer to Attachment B

6.3.5 Sludge Mobilization System (SMS)

Pre-flushing Conditions - Subsequent to each transfer of HLW sludge, zeolite and THOREX waste the SMS transfer piping is, and has been, flushed with at least one line volume of water and allowed to gravity drain per WVNS SOPs. All SMS Transfer piping is located in a concrete shielded transfer trench over 1000 feet in length. The table below lists the piping used for HLW sludge, zeolite and THOREX waste transfers. In addition to routine flushing to keep contamination to a minimum, all piping has been constructed of 304L stainless steel and welded with full penetration butt weld joints to preclude accumulation of HLW in crud traps. Final flushing of these pipelines will be completed following the last Tank 8D-1 flush to 8D-2 and the last flush from 8D-2 to the CFMT.

Pipeline	Service	Location
55-PH-3-003	Waste Header	Vit Noz 4033 to Tank 8D-4
55-PH-2-018	THOREX Transfer	8Q-4 Noz 2 to 8Q-1 Noz 4
55-PH-2-014	Zeolite Transfer	8Q-4 Noz 3 to 8Q-1 Noz 3
55-PH-2-034	THOREX Transfer	8Q-1 Noz 5 to 8Q-2 Noz 5
55-PH-2-038	Zeolite Transfer	8Q-1 Noz 6 to 8Q-2 Noz 4
55-PH-2-008	CFMT Decant	8Q-2 Noz 6 to 8Q-5 Noz 6
55-PH-2-004	Sludge Transfer	8Q-2 Noz 7 to 8Q-5 Noz 7
Deleted		
55-PH-2-033	Sludge Transfer	Vit Noz 4126 to 8Q-5 Noz 3

The remaining SMS Piping also located inside the HLW Transfer Trench is listed below. It is anticipated this piping will have negligible radiological contamination and will therefore not require flushing based on its previous service history.

Pipeline	Service	Location
55-PH-2-002	8Q-5 Drain	
55-PH-2-032	Spare	Vit Noz 4225 to 8Q-5 Noz 4
55-PH-2-015	Spare	Vit Noz 4124 to 8Q-5 Noz 2
55-PH-2-005	Spare	8Q-2 Noz 8 to 8Q-5 Noz 8
55-PH-2-189	Waste Header Tie-in	8Q-5 Noz. 5 to Waste Header
55-PH-3-021	Condensate Drain	Vit Noz 4031 to Tank 8D-3
55-VE-6-207	Pit Vent	8Q-4
55-VE-8-208	Pit Vent	8Q-1
55-VE-8-209	Pit Vent	8Q-5
55-VE-8-210	Pit Vent	8Q-2

In addition to flushing the SMS Trench piping, all jumpers in pump pits 8Q-1, 8Q-2, 8Q-4, 8Q-5, and transfer pumps will be flushed with utility water. Gamma radiation probes will be installed in each pit. Radiation measurements taken before and after each flush will enable evaluation of the effectiveness of the flushes.

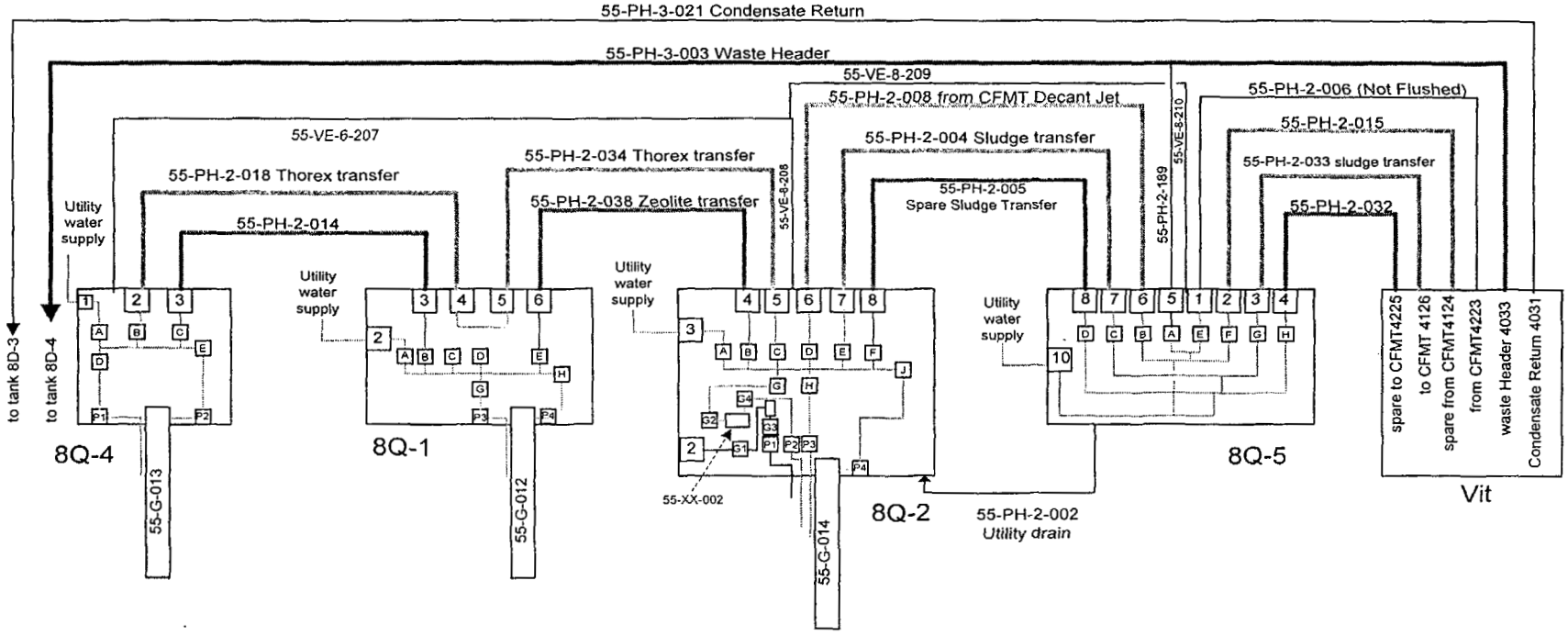
Flushing Operation - The flushing of the SMS trench piping, jumpers and transfer pumps is intended to wash various piping segments between CFMT/Vitrification Facility and the HLW storage tanks, and associated pump pits (8Q-1, 8Q-2, 8Q-4 and 8Q-5). Figure 6.5-1 shows potential flow paths to accomplish flushing of all contaminated SMS piping segments at least once. Two of the SMS flushing paths shown are to accomplish zeolite line flushes, sludge line flushes and THOREX line flushes including the HLW transfer lines located in the trenches. Acid for these flushes will be provided from 8D-4 and transferred to CFMT. Four of the flushing paths in Figure 6.5-1 are for flushing of the pump pits and related jumpers.

SMS Flush Table

Equipment to Flush	Flush Path No.	Min. Volume to Complete Flush	Flush Media	System Parameters Before and After Flush	Flush Liquid Desti-n ation
55-PH-3-003 Waste Header (Cold Chem Facility - Vit 4003 to Tank 8D-4)	See Waste Header Flushing				8D-4
55-PH-2-018 (THOREX Transfer 8Q-4 to 8Q-1)	2	3 Line Volume	Acid/Water	Rad Probes in 8Q Pits, sms trench & 8D-4 vault	CFMT
55-PH-2-014 (Between 8Q1 & 8Q4)	3	3 Line Volume	Acid/Water	Rad Probes in 8Q Pits, sms trench & 8D-4 vault	CFMT
55-PH-2-034 (THOREX Transfer Between 8Q-1 & 8Q2)	2	3 Line Volume	Acid/Water	Rad Probes in 8Q Pits,sms trench & 8D-4 vault	CFMT
55-PH-2-038 (Zeolite Transfer 8Q-1 & 8Q-2)	3	3 Line Volume	Acid/Water	Rad Probes in 8Q Pits,sms trench & 8D-4 vault	CFMT
55-PH-2-008 (From CFMT Decant Jet between 8Q-2 & 8Q-5)	5	3 Line Volume	Water	Rad Probes in 8Q Pits,sms trench & 8D-4 vault	CFMT
55-PH-2-004 (Sludge Transfer 8Q-2 to 8Q-5)	2	3 Line Volume	Acid/Water	Rad Probes in 8Q Pits,sms trench & 8D-4 vault	CFMT
Deleted					
55-PH-2-033 (Sludge Transfer 8Q-5 To CFMT 4126)	2	3 Line Volume	Acid/Water	Rad Probes in 8Q Pits,sms trench & 8D-4 vault	CFMT
8Q-1 Pit Jumpers Transfer Pump 55-G-012	4	3 Line Volume	Water	Rad Probes in 8Q Pits,sms trench & 8D-4 vault	8D-1
8Q-2 Pit Jumpers Transfer Pump 55-G-014	5	3 Line Volume	Water	Rad Probes in 8Q Pits,sms trench & 8D-4 vault	8D-2
8Q-4 Pit Jumpers Transfer Pump 55-G-013	6	3 Line Volume	Water	Rad Probes in 8Q Pits,sms trench & 8D-4 vault	8D-4
8Q-5 Pit Jumpers	7	3 Line Volume	Water	Rad Probes in 8Q Pits,sms trench & 8D-4 vault	8D-2

Performance Test of 8D-4 Transfer Pump 55-G-013 was performed to verify sufficient pump capacity.

SLUDGE MOBILIZATION SYSTEM
FLUSHING PLAN



Flush Path 1 - Waste Header 55-PH-3-003 from Vit 4033 to 8D-4

Flush Path 2 - 8D-4 to 55-PH-2-018, 55-PH-2-034, 55-PH-2-004, 55-PH-2-033,Vit 4126

Flush Path 3 - 8D-4 to 55-PH-2-014, 55-PH-2-038, 55-PH-2-005, 55-PH-2-032,Vit 4225

Flush Path 4 - 8Q-1 Pit Jumpers

Flush Path 5 - 8Q-2 Pit Jumpers & 55-PH-008, 55-PH-015

Flush Path 6 - 8Q-4 Pit Jumpers

Flush Path 7 - 8Q-5 Pit Jumpers & 55-PH-189

Post Flushing Condition Expected -

No further transfers from the Tank Farm using the SMS piping/equipment will be necessary. Equipment will be ready to be placed in a safe shutdown condition.

Data Collection / Sampling - Rad probes in Tank 8D-4 vault and 8Q-1,2,4 ,5 pits before and after the flushes will be used to record changes in activity as SMS flushing progresses.

Schedule - Refer to Attachment B

6.3.6 Supernatant Treatment System (STS)

Pre-Flushing Conditions - The STS System will be placed in standby mode prior to the start of flushing activities. This means no water processing will occur while the system flushing is in progress. An exception to this is STS Flush Path 6, which can be performed at any time because it does not affect the processing portion of the STS System.

STS configuration prior to flushing activities are: STS Supernatant Feed Pump (50-G-001) out of service, all piping and equipment used to transfer and filter supernatant to the STS not in use, Column B filled with regular zeolite (IE-96), Column C filled with regular zeolite (but also has a small spent zeolite heel), and Column A filled with Ti-Coated zeolite (TIE-96).

STS flushing activities will mainly flush equipment associated with the supernatant transfer system which includes; all piping between the STS and the 8D-2 M-8 pump pit, pump 50-G-001, Pre-Filter 50-F-001, STS Feed Tank (50-D-001), but also STS Post-Filter (50-F-002) and the STS Valve Aisle sump. The purpose of the flushes is to remove any residue sludges in lines or equipment which could have accumulated during processing activities.

Flushing Operation - Six flushing paths were identified for the STS System. Flushing Paths 1 - 4 will ensure flushing of the STS Pre-Filter (50-F-001), Supernatant Feed Pump (50-G-001) and associated piping from the STS Building to the 8D-2 pump pit. Flushing Path 5 will flush Column D (which saw supernatant prior to being declared out of service) and STS Post-Filter (which also might have residue sludge). Flushing Path 6 will flush the STS Valve Aisle sump which has residue sludges on it and in it, respectively. All flush paths which go directly back to Tank 8D-2 will be flushed using demineralized water (this includes Flush Paths 2, 3, 4, & 6) due to corrosion and pH concerns in the 8D-2 M-8 pump pit and Tank 8D-2, respectively. Flush paths which will go to 50-D-001 will be flushed using dilute nitric acid & demineralized water (this includes Flush Paths 1 & 5).

The STS flushing strategy uses the STS Feed Tank (50-D-001) and pump 50-G-002 as the main equipment to direct flush solutions to the different flush paths. A specially designed jumper, J70101-F, was built which will be installed on the recirculation line for pump 50-G-002 and to jumper nozzle connection J-101. This would allow flushing the different flush paths by performing valve line-ups and minimizes taking jumpers on and off to accomplish flushing of the different lines and equipment. STS Columns A, B, and C will not need to be flushed at this time. These columns will still be used for water processing of Tanks 8D-1 & 8D-2.

STS FLUSH TABLE

Flush Path No.	Equipment/ Lines to Flush	Min. Volume to Complete Flush/ GAL.	Flush Media	Required System Parameters During Flush	Flush Liquid Destination
1	50-F-001 50-D-001 50-G-002 50-2½-002 50-1½-003	300	Dilute nitric acid & Demineralized water	Radiation probe in valve aisle, and sampling of 50-D-001 before and after flush.	Tank 50-D-001
2	50-F-001 50-D-001 50-G-002 50-2½-002 50-1½-003 50-1-048	300	Demineralized water	Maximize flow to Tank 8D-2, radiation probes in valve aisle and 8D-2 M-8 pump pit, and sampling of 50D-001 prior to flush.	Tank 8D-2
3	50-F-001 50-D-001 50-G-001 50-G-002 50-2½-001 50-2½-002	500 gallons	Demineralized water	Maximize flow to Tank 8D-2, radiation probes in valve aisle and 8D-2 M-8 pump pit, and sampling of 50-D-001 prior to flush.	Tank 8D-2
4	50-D-001 50-G-002 50-2½-002	300	Demineralized water	Maximize flow to Tank 8D-2, radiation probes in valve aisle and 8D-2 M-8 pump pit, and sampling of 50D-001 prior to flush.	Tank 8D-2
5	50-D-001 50-G-002 50-C-004 50-F-002	300	Dilute nitric acid & Demineralized water	Radiation probe in valve aisle and sampling of 50D-001 before the flush. Note: This would be the same flush solution used in Flush Path 1.	Tank 50-D-001
6	STS Valve Aisle Floor STS Valve Aisle Sump 50-G-012 50-2-108 50-1½-109 50-2½ -049	50	Demineralized water	Radiation probe in valve aisle and sampling of STS Valve Aisle Sump prior to and after flush.	Tank 8D-2

Data Collection / Sampling - As per STS Flush Table above and applicable SOPs

Schedule - Flush path 2, 3, and 4 using demin water complete. For remaining flushes Refer to Attachment B

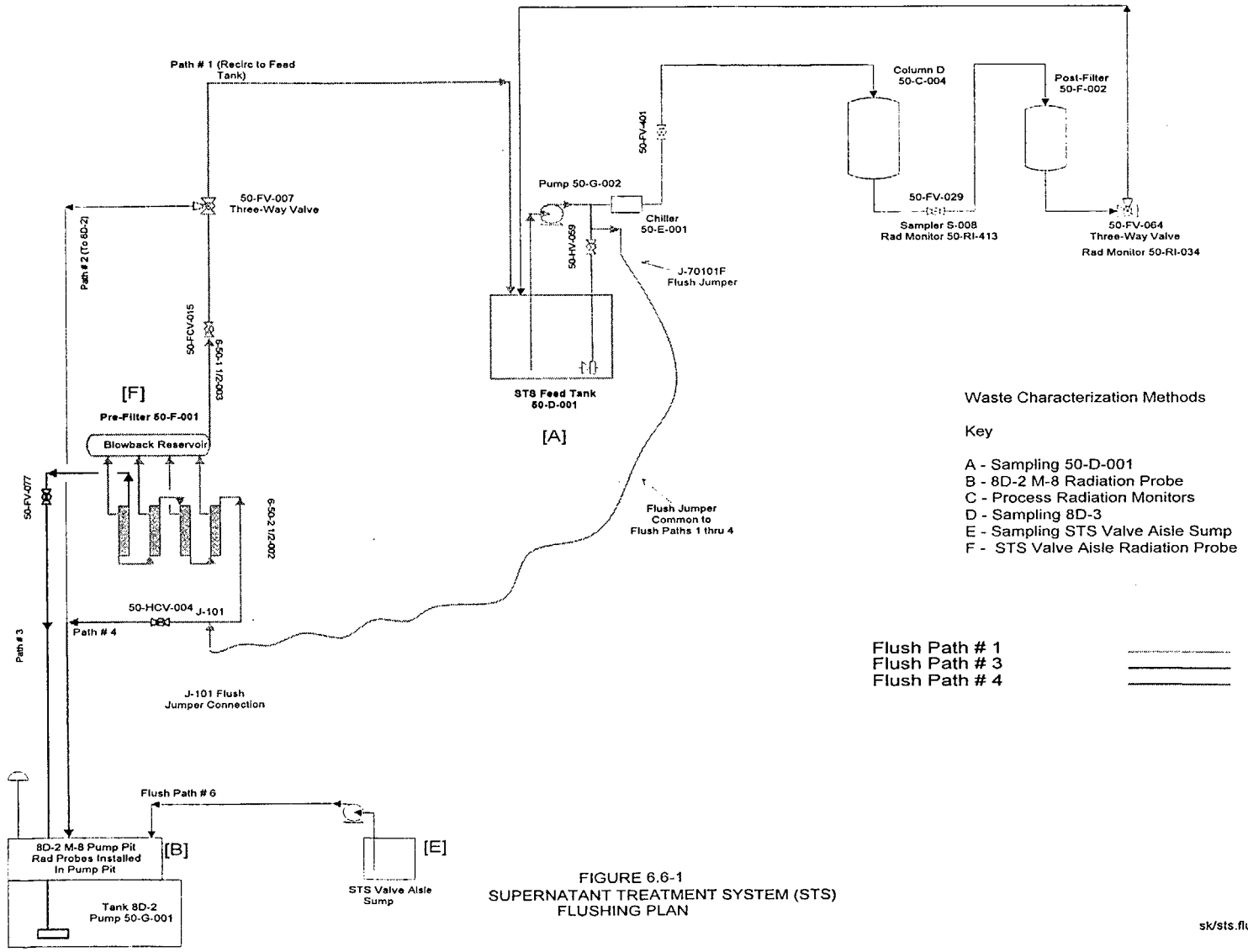


FIGURE 6.6-1
SUPERNATANT TREATMENT SYSTEM (STS)
FLUSHING PLAN

sk/sts.flushpath134.vsd

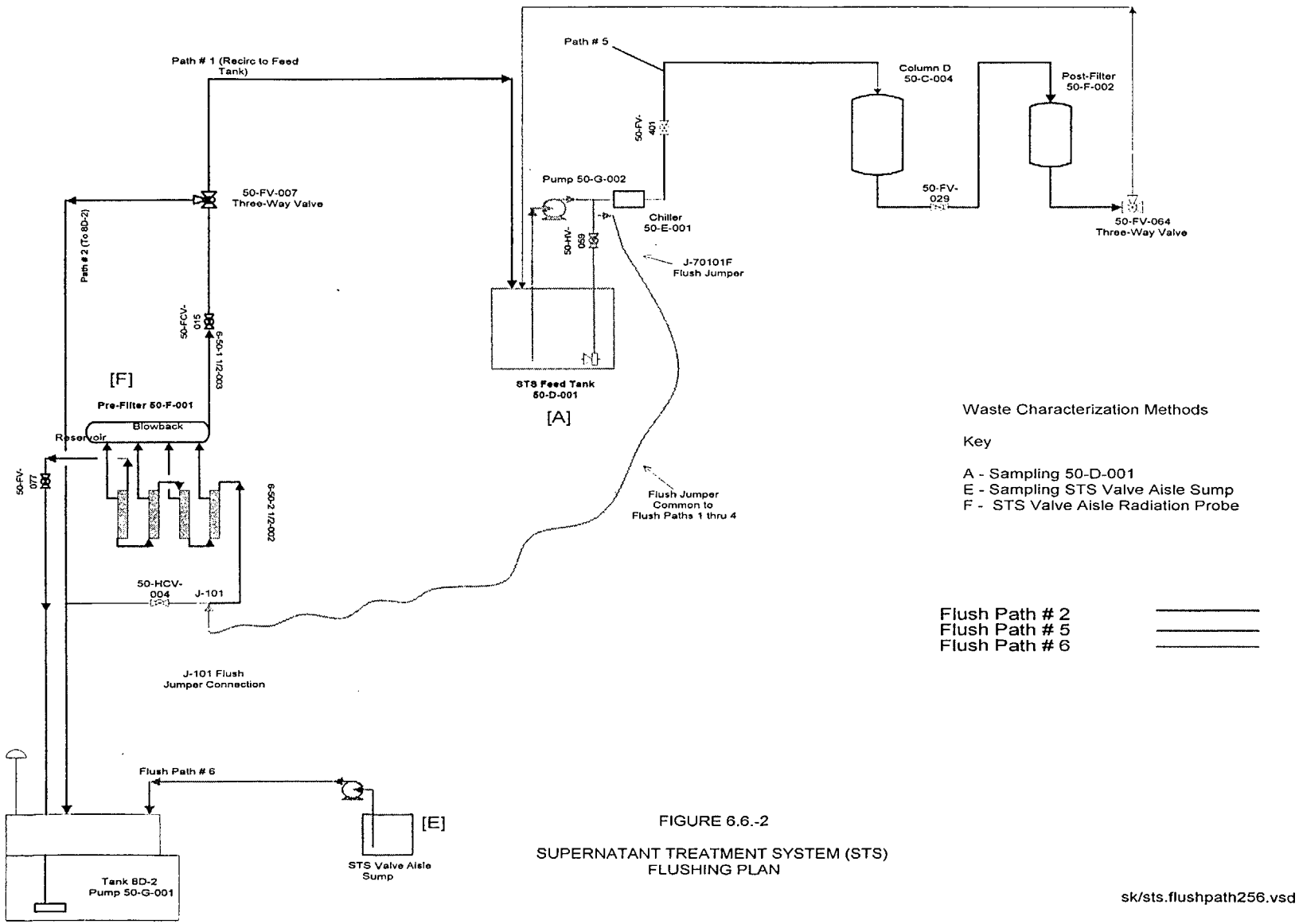


FIGURE 6.6.-2

SUPERNATANT TREATMENT SYSTEM (STS)
FLUSHING PLAN

sk/sts.flushpath256.vsd

6.3.7 LWTS Evaporator

Pre-Flushing Conditions - The LWTS will be in a standby mode with Tanks 5D-15B, 5D-15A1, and 5D-15A2 empty to their tank heels. The LWTS flush will remove excess salts and fissile material from the evaporator body. The flush solution will be collected in one of the evaporator concentrates tanks and eventually sent to the Vitrification System CFMT tank.

Modifications to the chemical addition system for Tank 5D-15B will be performed to allow acid addition to the system.

Flushing Operation - Initially the evaporator will be pre-conditioned by being flushed using demineralized water. Once this is completed, then feed Tank 5D-15B will be filled with a dilute nitric acid & demineralized water solution. Flush solution will be fed to the evaporator until the evaporator is filled to a normal working volume then placed into a reflux condition. Reflux condition is when the evaporator is operated in a re-circulation mode where the overheads are fed back to the evaporator. When the reflux is completed, the evaporator body is emptied to a concentrate tank. Then more flush solution is transferred to the evaporator and the reflux mode is repeated. At least two flushes of the evaporator will be performed.

A mass balance will be performed by sampling 5D-15B and the affected concentrate tank to track how much fissile material is removed from the evaporator. The collected flush solution will then be sent to Vitrification.

LWTS FLUSH TABLE

Flush Path No.	Equipment/ Lines to Flush	Min. Volume to Complete Flush	Flush Media	Required System Parameters During Flush	Flush Liquid Destination
LWTS	5D-15B 31017 (Evaporator)	A minimum of two evaporator body flushes	Dilute nitric acid & demineralized water	Operate the evaporator in a reflux mode (recirculation) and perform a mass balance to track fissile material removed.	CFMT

Post Flushing Condition Expected -

Fissile material (Plutonium and Uranium) inventory in the evaporator will be reduced. Following the flushing, LWTS will be available for processing excess water.

Data Collection / Sampling - As per work orders and SOPs 071-02, SOP 071-10, and SOP 071-23.

Schedule - Refer to Attachment B

6.3.8 Concentrator Feed Makeup Tank (CFMT)

Pre-Flush Condition - The CFMT internals are expected to be relatively clean in the bottom two-thirds of the vessel, with the upper portion coated with residual dried slurry. There could be a "bathtub" ring at the top of concentration zone. Removal of jumpers from the CFMT show a heavy slurry cake on the upper parts of any inserts, also the dead spaces inside nozzles have been observed to have a thick slurry coating.

Flushing Operations - Water spray, soaking, and reflux have all exhibited the ability to remove caked on slurry. Direct flushing will occur with the water spray insert. Two flushes may be performed. Each flush will consist of two passes with a high pressure water sprayer. The spray head directs to spray nozzles to cover the entire inside surface of the vessel. Inspection via CCTV will provide a qualitative assessment of the cleaning process. A second pass will be performed from the same nozzle, but with the spray head indexed to a new position. The second spray/position will reduce any shadowing by the inserts in the tank. The video inspection and spraying will be done by Work Order.

The various flush solutions used in the Vitrification Cell and in the Tank Farm will come to the CFMT, including the nitric acid flushes. These flush liquids will also tend to loosen some of the deposits.

Expected Condition After Flushes - Dried slurry deposits are expected to be removed from the surfaces accessible to the spray head, with some removal from protected areas. Overall cleanliness will be assessed by the video inspection and a radiation probe sitting on the tank head.

Data Collection / Sampling - Samples will be pulled from the CFMT heel per SOPs 063-21 and 063-22 as part of the final batch preparation. Additionally, the video inspections will be recorded.

Schedule - Refer to Attachment B

6.3.9 Melter Feed Hold Tank (MFHT)

Pre-Flush Condition - The MFHT internals are expected to be relatively clean in the bottom two-thirds of the vessel, with the upper portion coated with residual dried slurry. Removal of jumpers from the MFHT show a light slurry cake on the upper parts of any inserts. The MFHT head is reinforced with stiffeners which produce an "egg-crate" series of spaces. Slurry is probably deposited and dried in these areas.

Flushing Operations - Water spray, and soaking, have all exhibited the ability to remove caked on slurry. Direct flushing will occur with the water spray insert. A flush will consist of two passes with a high pressure water sprayer. The spray head directs to spray nozzles to cover the entire inside surface of the vessel. Inspection via CCTV will provide a qualitative assessment of the cleaning process. Several flushes will be performed from nozzles around the tank head to cover the "egg-crate" sections.

Expected Condition After Flushes - Dried slurry deposits are expected to be removed from the surfaces accessible to the spray head, with some removal from protected areas. No criteria have been set. Overall cleanliness will be assessed by the video inspection and a radiation probe sitting on the tank head.

Data Collection / Sampling - The video inspections will be recorded.

Schedule - Refer to Attachment B

6.3.10 Submerged Bed Scrubber (SBS)

Pre-Flushing Condition - The SBS internals are expected to contain a coating of carried over feed material on the scrubber media. The scrubber tank and receiver tank internals should be relatively free of hard deposits. There is an accumulation of undissolved solids at the bottom of each.

Flushing Operation - Water flushes have been effective in the past in removing undissolved solids from the SBS. One previous acid flush has been performed to remove material from internal surfaces. Both of these methods may be employed again prior to melter shutdown

Post Flushing Condition Expected - Removal of the majority of the suspended undissolved solids will likely be accomplished. Removal of hard deposits is expected to occur to some degree.

Data Collection / Sampling - Samples of the SBS and CFMT (receiving tank from flush solutions) will be obtained and analyzed before and after the flushing.

Schedule - Refer to Attachment B

6.3.11 Melter

Pre-Flush Condition - The Melter is full of molten HLW glass. Since the Melter was started on non-radioactive glass, the radioactivity may not have penetrated very far into the refractory.

Flushing Operations - After completion of HLW transfers from the Waste Tank Farm, feed with lower than normal radioactivity will be fed to the melter. The activity in these batches comes from normal recycle streams, such as, the LWTS Evaporator, flushing activities, canister decontamination and the SBS. The lower activity batches will serve to dilute the melter inventory of radioactive species. Although the recycle streams continue to be processed, and tank heels are adsorbed into the next batch, the final batch will consist primarily of simulated waste and glass formers.

Expected Condition After Flushes - It is expected that 3 to 6 inches of glass including a "noble metal sludge" will be left in the bottom of the Melter after the vacuum canisters.

Data Collection / Sampling - Sampling of glass shards from canisters are taken per SOP. Video taping of evacuated canister evolution is expected to occur.

Schedule - Refer to Attachment B

6.3.12 Vitrification Cell Pit (Pit)

Pre-Flush Condition - It is known through process knowledge and visual observation (remote cameras) that some amount of HLW feed slurry material has been deposited on the external surfaces of the pit vessels (CFMT, MFHT, SBS, MELTER), the associated jumpers, and the pit floor. It is desirable to wash as much of this material to the pit floor as possible, after which it can be transferred to the process for encapsulating into glass. Due to a lack of access to the majority of these areas (vessel size and interferences from jumpers) the extent of the accumulation of this material cannot be accurately determined and the ability to access this material with a flushing source is extremely limited. The removal of process equipment and the interfering jumpers will provide the access required, but cannot be accomplished until after Melter shutdown.

Flushing Operations - Flush accessible areas of the pit with a pressurized water source. Transfer flushed material to the CFMT for inclusion in the Melter feed.

Expected Condition After Flushes - Some amount of the HLW slurry material will be removed from the pit and processed through the Melter.

Data Collection / Sampling - Visual examination by remote cameras will aid in determining flushing success. Additionally, CFMT sampling will indicate the amount of activity that has been removed from the pit surfaces.

Schedule - Refer to Attachment B

7.0 PROCEDURE/SEQUENCE

All work under this run plan shall be conducted in accordance with SOPs and/or work instruction issued for specific activities. Section 6 includes a summary of the various flushing activities and identifies applicable SOPs. The general desired sequence of flushing operations is indicated in the planning schedule which reflects availability of systems for flushing to achieve radioactivity removal. The sequence and timing of individual flushing activities can be modified through changes to the working level Flushing Operations Schedule.

8.0 CHANGE CONTROL

Changes to this document will be made by ECN per EP-3-007 and issued as a revision to this IRP. Changes that require immediate, temporary modifications to this IRP may be made using a Run Plan Exception (RPE) using run plan exception form (Attachment A). Also included in the Attachment is the Run Plan Exception Log form. All revisions will require review and concurrence by the Cognizant Manager, Cognizant Engineer, Facility Manager, and QA. Shyam Kumar is the designated person responsible for maintaining the Run Plan Exception Log.

9.0 RECORDS MAINTENANCE

Records generated as a result of implementing this procedure are identified as follows:

(1) Attachment A - WVNS-IRP-005 Run Plan Exceptions and Run Plan Exception Log.

(2) Work Instructions

(3) Additional monitoring data, if required by individual flushes to be recorded in operations log books.

Additional records in accordance with the applicable Standard Operating Procedures shall maintained as specified in those documents.

Records shall be prepared, maintained, and transferred to the Records and Information Department for storage in accordance with WVDP-262, "WVNS Manual for Records Management and Storage."

10.0 ATTACHMENTS

ATTACHMENT A - WVNS-IRP-005 - RUN PLAN EXCEPTION (3 SHEETS)

ATTACHMENT B - PLANNING SCHEDULE - HLW SYSTEMS FLUSHING

ATTACHMENT A
WVNS-IRP-005 - RUN PLAN EXCEPTION
(Page 1 of 3)

INSTRUCTIONS

An RPE is used by the Shift Engineer (SE) or Operations Shift Supervisor (OSS) to make modifications to an IRP.

SE or OSS initiate RPE. Each step listed below corresponds to a block on the RPE sheet (attached) and provides the appropriate instructions for that block.

1. Print name.

2. Enter step or section of the IRP the RPE refers to.

3. Enter the next sequential RPE number. Also, enter required information in the RPEL.

4. Enter the date and time which the RPE was initiated.

5. Enter an accurate and detailed description of the RPE being requested. Note any special conditions/circumstances identified.

6. Sign the Description of Exception (SE or OSS).

7. Enter the appropriate corrective action or problem resolution.

8. Enter the steps or sections of the IRP which will be affected by the listed corrective action or problem resolution.

9. Obtain appropriate approvals. Minimum approvals for a RPE are (Facility Manager), (Cog Manager), and (Cog Engineer). Other approvals may be required based on the Quality Level of the product, radiological conditions, etc. Approval requirements are specified in each IRP.

10. Obtain "Record Work Copy" stamp on RPE.

11. Originator make copies of RPE and distribute to required individuals. As a minimum, those who approved the RPE shall receive a copy. Records Management shall be sent a copy by the next day using the site mail system.

12. After the exception resolution or corrective action is complete and the RPE is no longer required, SE or OSS sign and date the RPE.

13. Maintain original copy of the RPE with the IRP.

WVNS-IRP-005 - RUN PLAN EXCEPTION (RPE)
(Page 2 of 3)

RUN PLAN EXCEPTION IRP-005		
NAME:	STEP No.	RPE No.
DESCRIPTION OF EXCEPTION:		
ORIGINATOR:	DATE:	TIME:
AFFECTED STEPS:		
RESOLUTION OF EXCEPTION:		
SE or OSS:	DATE:	TIME:

CONCURRENCE		
(COG MAN):	QA:	
(COG ENG):		
(FAC MAN):		

[ ] RESOLUTION ACTION COMPLETE. _____ OSS or SE _____ DATE/TIME

WVNS-IRP-005 - RUN PLAN EXCEPTION LOG (RPEL)
(Page 3 of 3)

IRP-005 RPEL			
RPE No.	DESCRIPTION	NAME	DATE

- DUPLICATE AS NECESSARY.

ATTACHMENT B
Planning Schedule - HLW Systems Flushing

Activity ID	Orig Dur	Start	Finish
STS/LWTS FLUSH			
VSW40300	20	12MAR02A	26MAR02A
SLUDGE MOBILIZATION SYSTEM FLUSH			
VSA30145	28	07NOV01A	04DEC01A
VSA30000	10*	11JAN02A	24JAN02A
VSA40155	9*	04FEB02A	14FEB02A
VSW30195	10	19MAR02A	21MAR02A
VIT FACILITY FLUSH AND SHUTDOWN			
VSA20535	3	04NOV01A	06NOV01A
VSA24430	31	22NOV01A	11DEC01A
VSA24510	5	17DEC01A	21DEC01A
VSA24600	5	02JAN02A	04JAN02A
VSW20705	2	18MAR02A	19MAR02A
VSW20716	25	23MAR02A	16APR02A
VSW20370	1	02JUN02	02JUN02
VSH24469	17*	04JUN02	27JUN02
VSW24480	10	28JUN02	12JUL02
VSW21180	2	20JUL02	21JUL02
VSW24540	5	15JUL02	19JUL02
VSW20970	5	22JUL02	26JUL02
VSH25569	16*	30JUL02	19AUG02
VSW24590	20	21AUG02	18SEP02
VSW21111	3	26SEP02	30SEP02
VSC21321	0		30SEP02*