PERMIT ATTACHMENT JJ

Container Management – Following Sections and Figures of the Permit Application

Section 2.3.2	Waste Retrieval and Storage
Section 2.4	Treated Waste Packaging
Section 4.2.9	Vitrification Container Preparation
Section 4.2.10	In-Container Vitrification
Section 4.2.11	Post-Vitrification Activities
Section 7.2.4	Weekly Inspections
Section 7.4	Corrective Action
Figure 2-2	Test and Demonstration Facility Site and Equipment Layout – Page 1
Figure 7-1	Typical Inspection Checklist for Waste Storage Area
Figure B-1	Phase 1 Process Flow Diagram – Page 1
Figure B-4	Phase 2 Process Flow Diagram – Page 1
Appendix F	ICV® Container Refractory Information

Permit Number: WA 7890008967

The following listed documents are hereby incorporated, in their entirety, by reference into this Permit. Some of the documents are excerpts from the Permittees' DBVS Facility Research, Development, and Demonstration Dangerous Waste Permit Application dated May 10, 2004 (document #04-TED-036); hereafter called the Permit Application. Ecology has, as deemed necessary, modified specific language in the attachments. These modifications are described in the permit conditions (Parts I through V), and thereby supersede the language of the attachment. These incorporated attachments are enforceable conditions of this Permit, as modified by the specific permit conditions.

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Section 2.3.2
Waste Retrieval and Storage

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2.3.2 Waste Retrieval and Storage

The retrieval detail for Tank 241-S-109 is presented in RPP-18812, *Tank S-109 Partial Retrieval Functions and Requirements*, and has been submitted to Ecology for approval of the retrieval process.

There will be a difference in the retrieval of waste from Tank 241-S-109 and its transfer to the DBVS between Phases 1 and 2 of the program. During Phase 1, waste from Tank S-109 will be routed through a solids/liquid hydroclone separator and sensing instruments to a staging tank that will hold 3,780 L (1,000 gal) of material (Figure 2-4). The sensing instruments will provide process control or waste characterization information. Staging tank discharge will be pumped to either a DBVS waste receipt tank or, if not suitable for processing in the DBVS, to the DST system.

During Phase 2 the waste will be transferred directly to the waste receipt tanks. The transfer route will go through the solids/liquid hydroclone separator and sensing instrumentation, but bypass the 3,780 L (1,000 gal) waste staging tank (Figure 2-4).

The Test and Demonstration Facility will accept tank waste into waste receipt tanks with capacities shown in Table 2-1.

Table Error! No text of specified style in document.**-1. Waste Receipt Tank Capacity**

Phase	Number of Tanks	Capacity	Total Capacity
1	1	3,780 L (1,000 gal)	3,780 L (1,000 gal)
2	4	68,140 L (18,000 gal)	272,160 L (72,000 gal)

All waste storage tanks and containers including the waste staging tank and waste receipt tanks will be properly and legibly marked in accordance with the requirements of WAC 173-303-395(6). Containers will be managed in accordance with the requirements of WAC 173-303-630. All waste tank systems will comply with the design, installation, and operating requirements of WAC 173-303-640, as applicable. Tank system materials of construction will be selected with appropriate consideration for the corrosion potential of the materials stored and process conditions.

Secondary containment will be provided for all tanks in the form of double-walled tankage or containment structures with sumps. Containment provisions will be designed and constructed for compliance with WAC 173-303-640(4).

During Phase 1, the waste staging tank and waste receipt tank will be double shell tanks or placed in containment structures with sumps (Figures 2-2 and 2-3). For Phase 2, the waste staging tank will be bypassed but will either remain in its structure or be removed and decontaminated in compliance with the Test and Demonstration Facility closure plan (Section 11.0).

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Section 2.4
Treated Waste Packaging

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2.4 TREATED WASTE PACKAGING

Containers of treated waste resulting from the bulk vitrification process will be placed in a dedicated temporary storage area at the Test and Demonstration Facility site (Figure 2-2) during the RD&D permit duration. By generating immobilized treated waste directly in the container, the treatment container also serves as the final disposal container. The storage area will be designed to hold all containers of treated waste generated during the project. The storage area will meet the provisions of WAC 173-303-630(7)(c)(i) and (ii) which are applicable for storage areas that store containers holding only wastes that do not contain free liquids (i.e., the bulk vitrification waste containers):

(i) The storage area is sloped or otherwise designed and operated to drain and remove liquid resulting from precipitation; or

(ii) The containers are elevated or are otherwise protected from contact with accumulated liquids.

All containers, handling procedures, and handling equipment will meet the waste acceptance criteria of the accepting disposal facility. Final disposal of treated waste will be at a permitted Hanford Site facility.

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Section 4.2.9
Vitrification Container Preparation

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4.2.9 Vitrification Container Preparation

The typical waste container for the vitrification process is expected to be a steel box approximately 3.0 m (10 ft) high, 2.4 m (8 ft) wide, and 7.3 m (24 ft) long. Containers will comply with the waste acceptance criteria for the receiving TSD unit (a permitted Hanford Site facility). Prior to waste distribution, the container will be lined with insulating board, sand, and a layer of castable refractory. The castable refractory (Appendix F) will face the waste material. A layer of melt-initiating graphite and soil will be placed over the castable refractory in the bottom of the container. The container will contain a port(s) for sampling the vitrified waste to obtain samples for analyses listed in Section 6.0.

A steel lid with attached electrodes will be sealed onto the container prior to waste deposition using bolted flanges and a refractory gasket. The lid contains several ports for waste material addition, electrode connections, venting, sampling, and introduction of post-vitrification materials. All connections will be mechanically sealed to the container lid. In addition, waste transfer connections will be equipped with shutoff valves to prevent spillage of material as the chute is attached to and removed from the port. To minimize potential contamination to workers and the environment, the connection points will be equipped with secondary containment and spilled material recovery equipment during material transfer, melting, and cooldown. Containment will consist of a ancillary waste transfer enclosure (AWTE) that seals to the container lid before waste is added to the container. The AWTE provides containment while the waste and soil addition connections are made and during the melt process. The operator is able to access the waste and soil addition connections through glove ports in the AWTE. Once the melt is complete and the container is cool enough to add clean soil on the top, the AWTE will be removed to allow the container to move to the temporary storage area. The waste container filling/vitrification station will be equipped with shielding, as required.

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Section 4.2.10
In-Container Vitrification

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4.2.10 In-Container Vitrification

The waste mixture, including simulants and glass formers, from the mixer/dryer will be placed into the vitrification container through ports in the sealed container lid. Electric power will be applied to the electrodes, vitrifying the container contents via resistive heating to produce ILAW. The ILAW is the final RCRA waste form for disposal. Ambient air, filtered through a HEPA filter, is injected to assist in establishing and maintaining airflow through the container to the offgas treatment system, cool the vitrification offgases, and provide thermal protection for HEPA filters in the offgas treatment system. Vitrification offgases are vented under induced draft to the offgas treatment system. During the vitrification process, the depth of material will typically decrease due to consolidation in melting.

Both “bottom-up” and “top-down” melting may be conducted during testing to determine the most effective method of waste treatment. The current plans focus on the bottom-up melt procedure; however, there may be a need to perform top-down melting at some time during the testing process. Top-down melting is conducted by applying power to the electrodes only after all waste materials and process additives have been placed in the container. Bottom-up melting begins melting with a shallow layer of material in the container and continues as more material is added until the desired depth of melt is obtained.

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Section 4.2.11
Post-Vitrification Activities

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4.2.11 Post-Vitrification Activities

After vitrification has been completed, the container connection to the offgas treatment system will be maintained. Clean fill materials will be added to fill cavities around the electrodes and cover the top of the vitrified mass to minimize headspace in the container, creating a container that is at least 90% full.

Sampling of the vitrified waste, radiation surveying, and external decontamination (container wipedown, vacuuming of dust, etc.), as necessary, can be conducted any time after initial cooling has been completed. Sampling of the melt will be conducted by a coring process through a port in the side of the container. The method of sealing the sampling port during and after sampling has not been finalized. However, the port will be sealed in such a manner that the container remains in compliance with the RD&D Permit and the permitted storage/disposal facility waste acceptance criteria. Sampling protocol and methodology is addressed in Section 6.0. The data obtained will be used for waste form qualification, risk assessment, and performance assessment.

Temporary storage for up to 50 treated waste containers will be located at the north end of the Test and Demonstration Facility (Figure 2-2). At the completion of RD&D activities, the containers will be transported to the IDF or to another permitted Hanford Site storage/disposal facility.

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Section 7.2.4
Weekly Inspections

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7.2.4 Weekly Inspections

Weekly inspections will consist of the following:

- Inspection of container storage areas for leaking containers and for deterioration of containers and containment system
- Confirmation that containers are segregated by material compatibility
- Confirmation that adequate and unimpeded aisle space is provided (i.e., thirty inches aisle space as a minimum)
- Confirmation that area security controls including placards and signage are in place, intact, and functional
- Confirmation that containers are properly stacked.

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Section 7.4
Corrective Action

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7.4 CORRECTIVE ACTION

The inspection checklists for each activity or area contain a signature and date block for review and approval of corrective actions (if any) by the operator. Discrepancies and non-compliant conditions noted on the checklist must be corrected at the first opportunity as indicated in the PER procedures. Typical inspection checklists for containerized waste storage areas and waste tank systems are provided in Figures 7-1 and 7-2, respectively.

CH2M HILL is responsible for committing staff and resources to correct any noted conditions. Once a condition is corrected, the inspector is required to sign the inspection checklist, noting the area has been reinspected and is in compliance with permit requirements. The inspector must also provide a brief description of those actions in the space provided. A corrective action log will be maintained by the facility.

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Figure 2-2
Test and Demonstration Facility Site and Equipment Layout – Page 1

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Figure 2-2. Test and Demonstration Facility Site and Equipment Layout - Page 1

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Figure 7-1
Typical Inspection Checklist for Waste Storage Area

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Figure 7-1. Typical Inspection Checklist for Waste Storage Area

AREA: _____

INSPECTOR: _____ DATE: _____

1. Are items properly labeled?
   YES ☐ NO ☐ COMMENT ☐

2. Is adequate aisle space and item segregation being maintained?
   YES ☐ NO ☐ COMMENT ☐

3. Are only authorized items stored in the area?
   YES ☐ NO ☐ COMMENT ☐

4. Are items elevated on pallets or racks to prevent contact with wet surfaces or runoff?
   YES ☐ NO ☐ COMMENT ☐

5. Are item exteriors kept clean (i.e., drips and spills cleaned up)?
   YES ☐ NO ☐ COMMENT ☐

6. Are suitable and adequate spill control supplies and equipment available in the area?
   YES ☐ NO ☐ COMMENT ☐

7. Is area drainage in good repair?
   YES ☐ NO ☐ COMMENT ☐

Comments: _____

_____

_____

Signature of Inspector: _____

Signature of Reviewer: _____

Date of Review: _____

Description of Corrective Actions: _____

_____

_____

Corrective Action Approval: _____

Date of Approval: _____

Corrective Actions Completed: _____
(Signature and Date)

From Permit Application Page 2-3

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Figure B-1
Phase 1 Process Flow Diagram – Page 1

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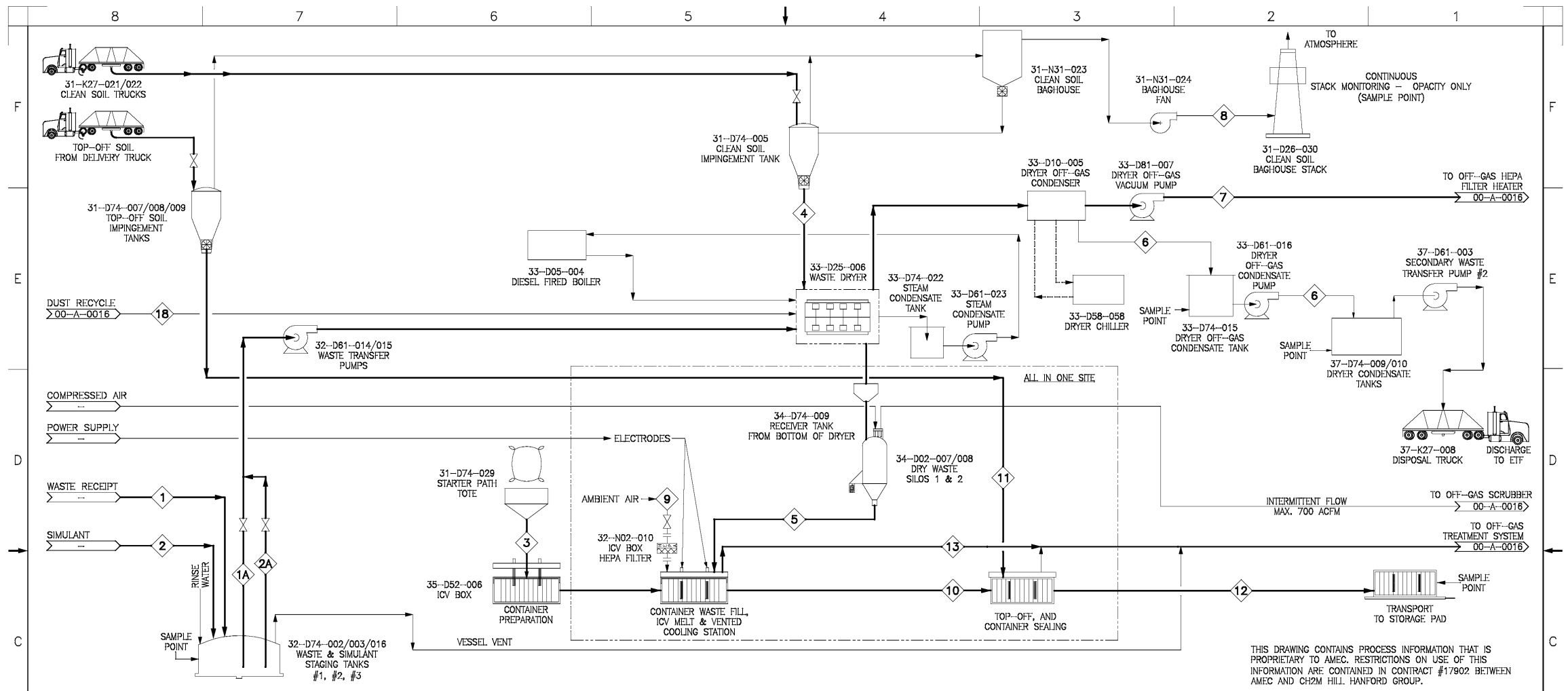
Figure B-1. Phase 1 Process Flow Diagram - Page 1



STREAM No.		1	2	1A	2A	3	4	5	6	7	8	9	10	11	12	13	18
STREAM NAME	UNITS	WASTE RECEIPT	SIMULANT	WASTE FLOW	SIMULANT FLOW	STARTER PATHS	SOIL	ICV FEED	DRYER CONDENSATE	DRYER AIR	OFF GAS AIR	ICV AIR	HOT ICV PRODUCT	TOP UP SOIL	COOLED ICV PRODUCT	ICV OFF GAS	DUST RECYCLE
PHASE		LIQUID	LIQUID	LIQUID	LIQUID	SOLID	SOLID	SOLID	LIQUID	GAS	GAS	GAS	SOLID	SOLID	SOLID	GAS	SOLID
CONTINUOUS MASS FLOWRATE	kg/hr	24.3	295.4	24.3	295.4	7.46	192.2	287.2	226.9	78.7	164.7	172.6	217.2	50	217.2	249.9	2.27
CONT. VOL. FLOW RATE (LIQ/GAS)	GPM/ACFM	0.08	1.01	0.08	1.01	0.89	21.85	0	1.07	47.8	100	86	0	0	0	303	
BATCH VOLUME	USG/ACF	125	1521	125	1521				1607	72003	150751	1037551	0	0	0	3652404	
BATCH MASS	Kg	610	7428	610	7428	1500	4731	7128	5670	1977	4139	34693	43655	10050	43655	50232	456
BATCH TRANSFER TIME	Hr	0.03	0.34	0.03	0.34	0.5	0.25	1	8	8	5	139	201	4	201	139	139
BATCH VOLUME FLOW	USGPM/ACFM	75	75	75	75				3.3	150.0	503	124	0	0	0	438	
BATCH MASS FLOW	kg/hr	2197.2	2197.2	2197.2	2197.2	3000	18924	7128	709	247	828	250	217.2	2513	217.2	361	3.28
DESIGN FACTOR	DIMENSIONLESS	1	1	1	1	1	1	1	1.1	1	1	1	1	1	1	1	1
DESIGN VOLUME FLOW	USGPM/ACFM	75	75	75	75				4	150	503	124	NA	NA	NA	438	
DESIGN MASS FLOW	kg/hr	21972	21972	21972	21972	3000	18924	7128	709	247	828	250	217.2	2513	217.2	361	3.28
SpG		1.29	1.29	1.29	1.29	2.24	2.34	2.08	0.93	0.001	0.001	0.001	2.65	2.6	2.76	0	2.54
SpG (BULK SOLIDS ONLY)						1.5	1.5	1.5					2.65	1.5	2.76		1.5
GAS PRESSURE	in. WG	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	--67	2	0	n/a	n/a	n/a	--1	n/a
TEMPERATURE	oC	28	28	28	28	25	25	28	60	58	25	25	1300	25	50	469	300
H2O LIQUID	kg/hr	16.2	197.2	16.2	197.2	0.37	19.2	5.7	226.9	0	0	0	0	0	0	0	0
H2O Gas	kg/hr									0	0	0				6.15	
FEED Na	kg/hr	2.2	26.3	2.2	26.3	0.07	3.7	32.5	0	0	0	0	32.2	0	32.2	0.3	0.3
SO2 GAS	ppmV									0	0	0				1134	0
NOx GAS	ppmV									0	0	0				137299	
HCl GAS	ppmV									0	0	0				110	
137Cs	Ci/hr	1.16E--01	0.00E+00	1.16E--01	0.00E+00	0.00E+00	0.00E+00	1.16E--01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.15E--01	0.00E+00	1.15E--01	1.17E--03	1.17E--03
99Tc	Ci/hr	8.89E--04	0.00E+00	8.89E--04	0.00E+00	0.00E+00	0.00E+00	9.34E--04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.86E--04	0.00E+00	8.86E--04	4.69E--05	4.68E--05
TRU	Ci/hr	6.83E--05	0.00E+00	6.83E--05	0.00E+00	0.00E+00	0.00E+00	6.82E--05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.81E--05	0.00E+00	6.81E--05	6.84E--09	6.84E--09
129I	Ci/hr	1.71E--06	0.00E+00	1.71E--06	0.00E+00	0.00E+00	0.00E+00	1.55E--06	1.55E--06	0.00E+00	0.00E+00	0.00E+00	1.55E--07	0.00E+00	1.55E--07	1.40E--06	1.40E--06

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GENERAL NOTES:

1. DRAWINGS 0015, 0016 AND 0017 REPLACE 0011 AND 0012.
2. SINGLE TRAIN FACILITY THROUGHPUT: PROCESS FEED IS MODELLED BASED ON A DESIGN FEED OF 1.09 GPM (INCLUDING 1000 GAL OF WASTE). A TOTAL OPERATING EFFICIENCY OF 70% SHOULD BE APPLIED TO ACHIEVE A 0.76 GPM PRODUCTION RATE WITH A 20.0 WT% Na2O GLASS LOADING IN THE GLASS PRODUCT.
3. VALVES ARE ONLY SHOWN TO INDICATE PROCESS INTENT.
4. FEED DATA BASED ON SECTIONS 3.1.2.1.1.1 AND 3.1.2.1.1.2 IN RPP--17403 REV 0.
5. RADIONUCLIDE CONTENT WAS BASED ON TABLE 3--3 IN SECTION 3.1.2.1.1.3 OF RPP--17403 REV 0.
6. NO EQUIPMENT FOR SOIL ADDITIVES IS INCLUDED.

REV.	REVISION DESCRIPTION	Date	By	Chk'd	Approved (Lead Engr.)	Approved (Proj. Mgr.)
A	FINAL ISSUE	28 APR 04	SB	LSG	KN	TH

AMEC DRAWING NO. F--143643--00--A--0015 REV. A

U.S. DEPARTMENT OF ENERGY
Office of River Protection

PARTIAL DBVS
FEED PREPARATION & MELT
PROCESS FLOW DIAGRAM

SIZE F | SCALE NTS

DRAWING TRACEABILITY LIST: DWG NO / TITLE / REFERENCES; REF NUMBER / TITLE / NEXT USED ON

REVISIONS: REV. NO. / DESCRIPTION / REV. DATE / REV. BY / CHECKED BY / ISSUED COMPANY

Figure B-4
Phase 2 Process Flow Diagram – Page 1

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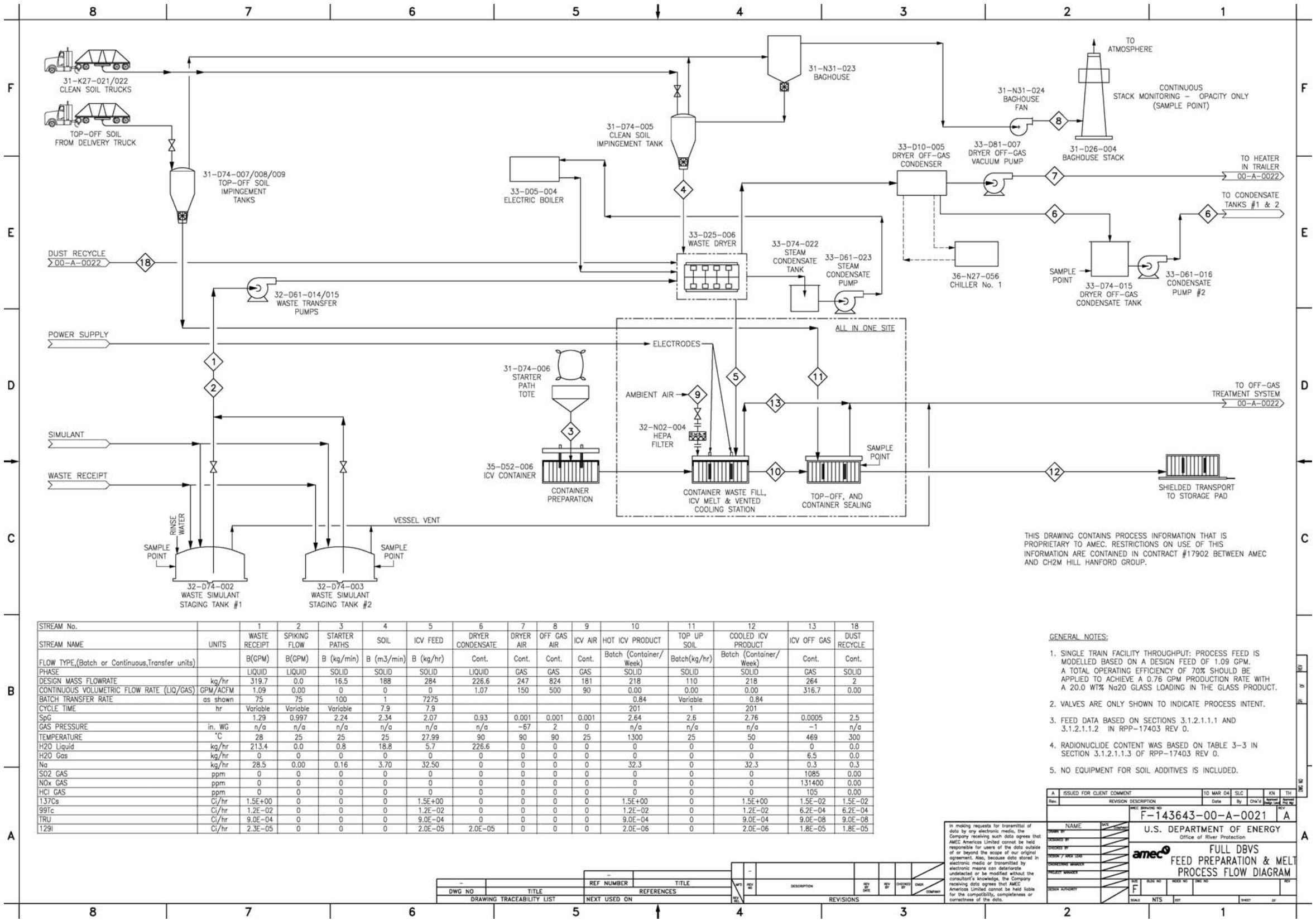
Figure B-4. Phase 2 Process Flow Diagram - Page 1



STREAM No.		1	2	3	4	5	6	7	8	9	10	11	12	13	18
STREAM NAME	UNITS	WASTE RECEIPT	SPIKING FLOW	STARTER PATHS	SOIL	ICV FEED	DRYER CONDENSATE	DRYER AIR	OFF GAS AIR	ICV AIR	HOT ICV PRODUCT	TOP UP SOIL	COOLED ICV PRODUCT	ICV OFF GAS	DUST RECYCLE
FLOW TYPE,(Batch or Continuous,Transfer units)		B(GPM)	B(GPM)	B (kg/min)	B (m3/min)	B (kg/hr)	Cont.	Cont.	Cont.	Cont.	Batch (Container/ Week)	Batch(kg/hr)	Batch (Container/ Week)	Cont.	Cont.
PHASE		LIQUID	LIQUID	SOLID	SOLID	SOLID	LIQUID	GAS	GAS	GAS	SOLID	SOLID	SOLID	GAS	SOLID
DESIGN MASS FLOWRATE	kg/hr	319.7	0.0	16.5	188	284	226.6	247	824	181	218	110	218	264	2
CONTINUOUS VOLUMETRIC FLOW RATE (LIQ/GAS)	GPM/ACFM	1.09	0.00	0	0	0	1.07	150	500	90	0.00	0.00	0.00	316.7	0.00
BATCH TRANSFER RATE	as shown	75	75	100	1	7275					0.84	Variable	0.84		
CYCLE TIME	hr	Variable	Variable	Variable	7.9	7.9					201	1	201		
SpG		1.29	0.997	2.24	2.34	2.07	0.93	0.001	0.001	0.001	2.64	2.6	2.76	0.0005	2.5
GAS PRESSURE	in. WG	n/a	n/a	n/a	n/a	n/a	n/a	~67	2	0	n/a	n/a	n/a	~1	n/a
TEMPERATURE	°C	28	25	25	25	27.99	90	90	90	25	1300	25	50	469	300
H2O Liquid	kg/hr	213.4	0.0	0.8	18.8	5.7	226.6	0	0	0	0	0	0	0	0.0
H2O Gas	kg/hr	0	0	0	0	0	0	0	0	0	0	0	0	6.5	0.0
Na	kg/hr	28.5	0.00	0.16	3.70	32.50	0	0	0	0	32.3	0	32.3	0.3	0.3
SO2 GAS	ppm	0	0	0	0	0	0	0	0	0	0	0	0	1085	0.00
NOx GAS	ppm	0	0	0	0	0	0	0	0	0	0	0	0	131400	0.00
HCl GAS	ppm	0	0	0	0	0	0	0	0	0	0	0	0	105	0.00
137Cs	Ci/hr	1.5E+00	0	0	0	1.5E+00	0	0	0	0	1.5E+00	0	1.5E+00	1.5E-02	1.5E-02
99Tc	Ci/hr	1.2E-02	0	0	0	1.2E-02	0	0	0	0	1.2E-02	0	1.2E-02	6.2E-04	6.2E-04
TRU	Ci/hr	9.0E-04	0	0	0	9.0E-04	0	0	0	0	9.0E-04	0	9.0E-04	9.0E-08	9.0E-08
129I	Ci/hr	2.3E-05	0	0	0	2.0E-05	2.0E-05	0	0	0	2.0E-06	0	2.0E-06	1.8E-05	1.8E-05

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GENERAL NOTES:

1. SINGLE TRAIN FACILITY THROUGHPUT: PROCESS FEED IS MODELLED BASED ON A DESIGN FEED OF 1.09 GPM. A TOTAL OPERATING EFFICIENCY OF 70% SHOULD BE APPLIED TO ACHIEVE A 0.76 GPM PRODUCTION RATE WITH A 20.0 WT% Na2O GLASS LOADING IN THE GLASS PRODUCT.
2. VALVES ARE ONLY SHOWN TO INDICATE PROCESS INTENT.
3. FEED DATA BASED ON SECTIONS 3.1.2.1.1.1 AND 3.1.2.1.1.2 IN RPP-17403 REV 0.
4. RADIONUCLIDE CONTENT WAS BASED ON TABLE 3-3 IN SECTION 3.1.2.1.1.3 OF RPP-17403 REV 0.
5. NO EQUIPMENT FOR SOIL ADDITIVES IS INCLUDED.

REV	DESCRIPTION	DATE	BY	CHK'd	Approved (Engr Lead)	Approved (Proj Mgr)
A	ISSUED FOR CLIENT COMMENT	10 MAR 04	SLC		KN	TH

AMEC DRAWING NO: F-143643-00-A-0021 REV: A

U.S. DEPARTMENT OF ENERGY
Office of River Protection

FULL DBVS
FEED PREPARATION & MELT
PROCESS FLOW DIAGRAM

SIZE: F | BLDG NO | WORK NO | DWG NO | REV
SCALE: NTS | SHEET OF

In making requests for transmittal of data by any electronic media, the Company receiving such data agrees that AMEC Americas Limited cannot be held responsible for users of the data outside of or beyond the scope of our original agreement. Also, because data stored in electronic media or transmitted by electronic means can deteriorate undetected or be modified without the consultant's knowledge, the Company receiving data agrees that AMEC Americas Limited cannot be held liable for the compatibility, completeness or correctness of the data.

DRAWING TRACEABILITY LIST: DWG NO | TITLE | REFERENCES: REF NUMBER | TITLE | NEXT USED ON

REVISIONS: REV NO | DESCRIPTION | REV DATE | REV BY | CHECKED BY | CHKD COMPANY

From Permit Application Page B-4

Appendix F
ICV® Container Refractory Information

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APPENDIX F

ICV® CONTAINER REFRACTORY INFORMATION

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Information to be provided. As discussed with the Washington State Department of Ecology on April 22, 2004, provision of this information will be required as a permit condition.

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