ENGINEERING CHANGE NOTICE

1. ECN 644153

Proj. ECN

2. ECN Category (mark one)	3. Originator's Name, Organization, MSIN, and Telephone No.	4. USQ Required?	5. Date
Supplemental [] Direct Revision [X] Change ECN [] Temporary [] Standby [] Supersedure [] Cancel/Void []	T. M. Blaak, DST Engineering, S5-13, 373-3880	[X] Yes [] No TF-98-0688	9/8/98
	6. Project Title/No./Work Order No. Waste Compatibility Assessments to Support Project W-320	7. Bldg./Sys./Fac. No. Tank Farms	8. Approval Designator N/A
	9. Document Numbers Changed by this ECN (includes sheet no. and rev.) HNF-SD-WM-TI-804, Rev. 0	10. Related ECN No(s). 644154	11. Related PO No. N/A

12a. Modification Work	12b. Work Package No.	12c. Modification Work Complete	12d. Restored to Original Condition (Temp. or Standby ECN only)
[] Yes (fill out Blk. 12b) [X] No (NA Blks. 12b, 12c, 12d)	N/A	N/A Design Authority/Cog. Engineer Signature & Date	N/A Design Authority/Cog. Engineer Signature & Date

13a. Description of Change

13b. Design Baseline Document? [] Yes [X] No

Replace entire document contents with updated compatibility assessment issued to replace expired assessment.

14a. Justification (mark one)

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

14b. Justification Details

Tank 241-AY-102 waste is no longer planned to be transferred to tank 241-AP-106 to support Project W-320.

A new compatibility assessment has been issued to replace the expired assessment for the transfer of waste from tank 241-C-106 to tank 241-AY-102. The new assessment also includes requirements/controls specified in the Tank Farms Authorization Basis.

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

See attached distribution.

RELEASE STAMP

DATE HANFORD RELEASE STA: 4 ID: 58

SEP 28 1998

A-7900-013-2 (05/96) GEF095

ENGINEERING CHANGE NOTICE

1. ECN (use no. from pg. 1): 644153

16. Design Verification Required	17. Cost Impact				18. Schedule Impact (days)	
	ENGINEERING		CONSTRUCTION			
[] Yes	Additional	[] $	Additional	[] $	Improvement	[]
[X] No	Savings	[] $	Savings	[] $	Delay	[]

19. 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 13. Enter the affected document number in Block 20.

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	[]	None	[X]

20. 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		

21. Approvals

	Signature	Date		Signature	Date
Design Authority			Design Agent		
Cog. Eng.	Bob Blook	9-28-98	PE		
Cog. Mgr.	O.L. Baird	9-28-98	QA		
QA			Safety		
Safety			Design		
Environ.			Environ.		
Other	[illegible]	9-28-98	Other		

DEPARTMENT OF ENERGY

Signature or a Control Number that tracks the Approval Signature

ADDITIONAL

S

Waste Compatibility Assessments to Support Project W-320

T. M. Blaak
Lockheed Martin Hanford Corp., Richland, WA 99352
U.S. Department of Energy Contract DE-AC06-96RL13200

EDT/ECN: ECN-644153 UC: 2070 N16B1
Org Code: 74100 Charge Code: ~~A42220~~ HJ220700
B&R Code: EW 3120074 Total Pages: 41 TMB 9-28-98

Key Words: W-320, C-106, Compatibility

Abstract: Waste compatibility assessments in this document have been completed to evaluate the transfers necessary to support Project 93L-EWW-320, "Tank 241-C-106 Sluicing." The assessments are being released into the supporting document system for retrievability purposes.

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T M Williams 9/28/98
Release Approval Date

DATE HANFORD RELEASE ID: 58
STA: 4
SEP 28 1998
Release Stamp

Approved for Public Release

RECORD OF REVISION	(1) Document Number HNF-SD-WM-TI-804	Page 1

(2) Title
Waste Compatibility Assessments to Support Project W-320

CHANGE CONTROL RECORD

(3) Revision	(4) Description of Change - Replace, Add, and Delete Pages	Authorized for Release (5) Cog. Engr.	(6) Cog. Mgr. Date
0	(7) Initially released 04/15/97 on EDT 610268		
1 RS	Incorporate per ECN 644153	[illegible]	[illegible] 9-25-98

CORRESPONDENCE DISTRIBUTION COVERSHEET

Author	Addressee	Correspondence No.
T. M. Blaak 373-3880	P. G. O'Connor	74100-98-019 June 29, 1998

Subject: WASTE COMPATIBILITY ASSESSMENT OF TANK 241-C-106 WASTE (ETF-98-02) WITH TANK 241-AY-102 WASTE

INTERNAL DISTRIBUTION

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		L. A. Stauffer	R2-11	X
		J. N. Strode	R2-11	X

INTEROFFICE MEMO

LOCKHEED MARTIN

From: DST Engineering 74100-98-019
Phone: 373-3880 S5-13
Date: June 29, 1998
Subject: WASTE COMPATIBILITY ASSESSMENT OF TANK 241-C-106 WASTE (ETF-98-02) WITH TANK 241-AY-102 WASTE

To: P. G. O'Connor S5-04

cc: Distribution
TMB:DGB File/LB

INTRODUCTION

The intent of this internal memo is to provide a recommendation for the transfer of tank 241-C-106 waste, Attachment 2, to tank 241-AY-102. This internal memo also identifies additional requirements which have been deemed necessary for safely receiving and storing the waste documented in Attachment 2 from tank 241-C-106 in tank 241-AY-102. This waste transfer is planned in support of tank 241-C-106 solids sluicing activities. Approximately 200,000 gallons of waste and flush water are expected to be pumped from tank 241-C-106 into tank 241-AY-102. Several transfers will be necessary to complete the sluicing of tank 241-C-106 solids. To assure ourselves that this waste transfer will not create any compatibility concerns, a waste compatibility assessment adhering to current waste compatibility requirements has been performed.

RECOMMENDATION

Double-Shell Tank (DST) Engineering recommends that waste currently being stored in tank 241-C-106, Waste Stream ETF-98-02 (Attachment 2), be transferred into tank 241-AY-102 after the successful resolution of all the conditions in the Requirements Section of this letter.

Approximately 200,000 gallons of waste, including flush water, from tank 241-C-106 transfer activities are anticipated to be received into the DST system. The resulting waste mixture in tank 241-AY-102 has been assessed with respect to compatibility requirements, waste categories, waste codes, and tank safety concerns that could potentially be created as a result of mixing the subject waste streams.

BACKGROUND

There are two major layers of waste in tank 241-C-106 with distinct physical properties. The bottom layer consists of 27,000 gallons of Uranium Recovery (UR) solids waste. However, it undoubtedly contains some unsluiced metal waste heel as well. This is the so-called hard pan. The upper layer consists of 170,000 gallons of high heat, high plutonium containing, soft sludge originating primarily from AR Vault and B Plant. The supernatant volume in tank 241-C-106 varies because of evaporation and routine water

additions of 6,000 gallons per month. Attachment 5, Reference 13 contains information about tank 241-C-106's transfer history.

Tank 241-AY-102 contains approximately 811,000 gallons of dilute non-complexed supernate and 22,000 gallons of sludge. This waste originated primarily from the following sources: B Plant, 300 Area, T Plant, 222-S Laboratory, and various single-shell and double-shell tanks. Tank 241-AY-102 is currently designated "in service" and has been designated as the receiver tank for tank 241-C-106 solids. Prior to receiving waste from tank 241-C-106, approximately 370,500 gallons of tank 241-AY-102 waste will be pumped to another DST.

DISCUSSION

Disposition of compatibility issues regarding the commingling of these waste streams is documented in Attachment 1 in accordance with References 3, 5, 7, and 16 (Attachment 5). These documents provide guidance in assessing the subject waste transfer with regard to compatibility and environmental regulations.

Regulatory and Environmental Compliance

DST Engineering has documented the composition of the tank 241-C-106 waste stream, including appropriate waste code designations and Land Disposal Restriction applicability, by completing Waste Stream Profile Sheet (WSPS) ETF-98-02. Process knowledge and analytical data were used to complete the waste stream profile sheet (Attachment 2).

Environmental Permit/Policy has received and reviewed the information contained in Attachment 2 and has determined that the subject waste stream complies with environmental requirements pertaining to the acceptance of waste into the DST system. This determination is voided if the waste in any way deviates from the information contained in Attachment 2.

Authorization Basis and Basis for Interim Operations Requirements

Nuclear criticality safety requirements are specified in chapter 5.7 of HNF-IP-1266 (Attachment 5, Reference 5). The applicability matrix clearly states that this chapter's requirements do not apply to any transfers made between Tank Farm facilities. An evaluation assessing criticality safety has been completed for this transfer (Attachment 5, Reference 6). See Attachment 1, Criticality, for further information on this topic.

Chapter 5.8 of HNF-IP-1266 (Attachment 5, Reference 5) requires new waste streams and changes to existing waste streams being transferred from non-Tank Farm generators into Tank Farms to be analyzed for various radiological and toxicological parameters. Tank 241-C-106 is a single-shell tank (SST) located in East Tank Farms. Thus, the criterion in chapter 5.8 of HNF-IP-1266 does not apply to the transfer of waste from tank 241-C-106 to tank 241-AY-102.

Prior to transfer, chapter 5.12 of HNF-IP-1266 (Attachment 5, Reference 5) requires Engineering to use the compatibility program document (Attachment 5, Reference 16) to evaluate the planned final state of the pumped tank and the receiving tank. The evaluation is necessary to ensure that the tanks will still meet the controls for criticality, tank bumps, flammable gas deflagrations, organic solvent fires, organic salt-nitrate reaction, and moisture after the transfer. See Waste Compatibility section and Attachment 1 for information on the criteria specified above.

In accordance with chapter 5.12 of HNF-IP-1266 (Attachment 5, Reference 5), the DST and Aging-Waste Facility (AWF) tank time to lower flammability limit (LFL) determination must be performed prior to any transfer into a DST or AWF tank. This calculation must be performed to ensure that the minimum time to reach 25 percent of the LFL for the tank vapor space, assuming loss of primary tank ventilation, will remain greater than or equal to seven days. Based on the estimated gas generation rate after the addition of tank 241-C-106 sludge, the amount of time with no forced ventilation flow before the dome space concentration would exceed 25 percent of the LFL is approximately 7.7 days (HNF-SD-WM-CN-114). Thus, the transfer meets the criteria specified above.

Prior to saltwell pumping, chapter 5.15 of HNF-IP-1266 (Attachment 5, Reference 5), requires an Organic-Nitrate end state analysis be performed to ensure that the tank will not be placed in an unsafe condition after pumping in regard to the organic-nitrate issue. Saltwell pumping of liquids below the solid waste surfaces of "safe", "conditionally safe," or "unassigned" SSTs is prohibited unless sampling and analysis have shown that the post salt well pumped condition of the waste meets the criteria specified in Attachment 1, Moisture Controls. Tank 241-C-106 is not being saltwell pumped. Sufficient moisture will remain in tank 241-C-106 to prevent an organic-nitrate reaction. Process Engineering has reviewed the criteria from this particular section and determined that the requirement for an Organic-Nitrate end state analysis is not applicable for this particular transfer.

Programmatic Concerns

Guidelines have been established for waste configuration control to help ensure the feed envelope status of the waste in the DSTs is not adversely impacted. This transfer was discussed at the June 15, 1998, Waste Inventory Control monthly meeting and was subsequently approved.

Per Attachment 5, Reference 8, tank 241-AY-102 has one restriction imposed upon it. The restriction states that no sludge/solids may be removed from this tank. Sludge additions from tank 241-C-106 are permitted. No constraints have been placed on the supernate. The proposed addition will not impact the restriction in any way and is thus consistent with the disposal criteria specified in Attachment 5, Reference 8.

Waste Compatibility

ISSUE 1: The potential to exceed the fissile material concentration limit for transfers has been recognized and is addressed in Addendum 1 of HNF-SD-WM-BIO-001 (Attachment 5, Reference 6). The criticality safety assessment for tank 241-C-106 remediation (Attachment 5, Reference 9) concludes that an inadvertent criticality as a result of the activities associated with Waste Retrieval Sluicing System (WRSS) is not considered possible for the plutonium concentration determined to be in tank waste and the WRSS process to be applied to the tank waste. The criticality safety evaluation considered the potential settling behavior of the sludge in both tanks, the behavior of the sludge in pumps used in both tanks, and the resultant mixture of sludges in the receiver tank.

ISSUE 2: Flammable gas concerns related to WRSS operations have been documented in Addendum 1 of HNF-SD-WM-BIO-001 (Attachment 5, Reference 6). The concerns addressed are the potential for releasing significant amounts of trapped gas and steam at tank 241-C-106 and the potential of creating slurry growth behavior with attendant episodic gas release event (GRE) behavior at tank 241-AY-102.

Adding sludge to tank 241-AY-102 will increase the gas generation rate in this tank. The implementation of the HNF-SD-WM-BIO-001 Appendix E control strategy to tank 241-AY-102 during and following WRSS operations, provides ventilation to prevent accumulation resulting from a steady state gas release. However, the safety margin provided by compliance with the ventilation requirements of the BIO Technical Safety Requirements (TSRs) may be decreased as a result of the sludge addition. This is due to the expected increases in waste volume, decay heat load and waste temperature resulting from the added high heat load waste (Attachment 5, Reference 6).

In order to provide some degree of confidence that the ventilation flow and AWF TSRs for ventilation restoration are adequate to prevent a flammable gas deflagration resulting from the increased gas generation rate, available gas monitoring and ventilation data were reviewed and a scoping analysis was performed via engineering Calculation Note HNF-SD-WM-CN-114.

Under the upper bound hydrogen generation rate conditions, a ventilation flow rate of 8.3×10^{-2} m^3/min (2.95 ft^3/min) is sufficient to ensure the headspace remains below 25 percent LFL. The minimum design flow rate provided by the 241-702-AZ ventilation system, 2.8 m^3/min (100 ft^3/min) per tank, exceeds the 25 percent LFL ventilation requirement by an order of magnitude. This evaluation provides some confidence in the adequacy of the ventilation system to prevent the steady state accumulation of flammable gas to levels above the LFL. To confirm this, flammable gas monitoring will be used for a short time after completing the sludge transfer to tank 241-AY-102 (steady state conditions attained) to confirm the system's ability to keep flammable gas concentrations below 25 percent of the LFL (Attachment 5, Reference 6).

The scoping analysis then determined the flammable gas concentration increase transient, assuming a loss of forced ventilation. Based on the estimated gas generation rate after the addition of tank 241-C-106 sludge, the amount of time with no forced ventilation flow before the dome space concentration would exceed 25 percent of the LFL is approximately 7.7 days,

using upper bound generation rates (HNF-SD-WM-CN-114). In addition, the amount of time with no ventilation flow before exceeding the LFL is more than 33 days. This evaluation provides some confidence in the adequacy of the BIO TSRs to prevent the steady state accumulation of flammable gas to levels above the LFL because ventilation restoration is required immediately, and gas monitoring is required to be initiated within 72 hours (Attachment 5, Reference 6).

In accordance with Reference 2, monitoring for gas retention will be conducted in 241-AY-102 during sluicing operations, during monitoring periods between campaigns and for 1 year following completion of WRSS operations. If gas retention or GRE is not indicated, monitoring may be reduced to the Authorization Basis controls. If gas retention or GRE is indicated the supernate will be removed to reduce the potential for buoyancy induced rollover and increase the tank headspace to reduce the consequences. The Tank 241-C-106 Waste Retrieval Technical Review Group will review the data and make recommendations on supernate removal with appropriate consideration of waste temp. limits. Alternative mitigation options such as mixing may also be considered.

ISSUE 3: A tank bump could occur in tank 241-AY-102 and tank 241-C-106 if operations related to the tanks produce any of the following conditions without compensating measures being taken.

- Removal of supernatant from a tank and the resulting reduction in liquid level will reduce the hydrostatic pressure in the sludge layer and consequently decrease the saturation temperature of the interstitial solution (primarily concerns tank 241-C-106).

- Increasing the heat load in a tank by adding insoluble solids to tank 241-AY-102 and/or operating high power pumps.

- Increase of the sludge layer thickness either by fluffing of the current sludge or adding additional sludge (concerns tank 241-AY-102).

- Inadequately cooling the tank for an extended period (concerns both tanks)

The first three conditions may occur during the WRSS transfer of material from tank 241-C-106 to tank 241-AY-102. The fourth condition could occur as the result of ventilation system failure or operational error. The presence of an organic oil film on the top of the supernatant layer, due to mobilization of the organics currently dispersed in the waste, could impede evaporative cooling of the tank. TSR controls have been specified in the Authorization Basis documents to prevent a tank bump in the respective tanks (Attachment 5, Reference 6).

To prevent the transfer of heat generating sludge to tank 241-AY-102 beyond its cooling capacity, a step-wise transfer of waste is required. Waste will be transferred in several campaigns, each consisting of two transfer increments of one foot. Each transfer increment will be followed by a hold period to monitor waste parameters and thermal response.

ISSUE 4: Tank 241-C-106 waste does not meet the DST corrosion prevention limits for hydroxide. The nitrate, nitrite and hydroxide concentrations are limited in order to inhibit corrosion and stress corrosion cracking in the DSTs. Caustic demand studies were performed on tank 241-C-106 waste to determine the amount of "free" hydroxide necessary for mitigation. Since it is not practical to adjust the waste in tank 241-C-106, sufficient hydroxide will be added to the receiver DST prior to the transfer of tank 241-C-106 waste. The hydroxide concentration in tank 241-AY-102 will be sufficient to ensure that it remains within all applicable corrosion control criteria. Furthermore, periodic hydroxide verification via analysis will be required once sluicing activities commence.

Tank 241-AY-102 waste has exhibited a downward trend of 0.005M per month in hydroxide concentration over the course of the last few years. The target end point for hydroxide concentration upon completion of tank 241-C-106 sluicing activities is 0.1M. Based upon this endpoint and the current caustic depletion rate observed in tank 241-AY-102 waste, it is possible that tank 241-AY-102 waste will again be out-of-specification for hydroxide in 18 months.

ISSUE 5: Waste containing a transuranic (TRU) concentration equal to or greater than 100 nCi/g is designated as TRU waste and should be segregated from non-TRU waste. Tank 241-AY-102 and tank 241-C-106 solids are both designated as TRU waste since they contain greater than 100 nCi/g of transuranic elements. TRU segregation for the commingling of the solids is not a concern. However, tank 241-C-106 supernate exceeds the TRU segregation limit and tank 241-AY-102 does not. According to Department of Energy (DOE) Order 5820.2A, "Radioactive Waste Management," TRU waste must be segregated to avoid the commingling of TRU waste streams with high-level or low-level waste streams. Thus, prior to transfer, Project W-320 personnel must provide sufficient documentation demontrating the commingling of tank 241-C-106 TRU supernate with tank 241-AY-102 non-TRU supernate has been resolved.

ISSUE 6: Under extreme conditions in the laboratory, a separable organic layer was obtained from tank 241-C-106 solids samples. The principal constituent of the separable organic layer is the sodium salt of bis (2-ethylhexyl) phosphoric acid. This phosphate ester salt was used as complexing agent in B Plant during the strontium recovery campaigns. The material likely co-precipitated with the sludge when wastes from B Plant were made alkaline before their transfer to tanks.

Tank 241-C-106 material was centrifuged at 10 G to mimic pumping conditions, which is an order of magnitude less than the those used for separable phase organic recovery in the lab. No noticeable separation of organic from the sludge sample or interstitial liquid occurred at the 10 G centrifuge speeds. Thus, there is no physical process in the WRSS capable of exerting the force necessary to separate the organic layer (Attachment 5, Reference 12).

Caustic leaching studies were performed on tank 241-C-106 sludge by Pacific Northwest National Laboratory and no separable phase organic was reported (Attachment 5, Reference 11). Tank sampling will be conducted to routinely monitor whether or not a separable organic layer is formed.

There is a potential that dissolution of solids could lead to a separable organic phase in tank 241-C-106 and/or tank 241-AY-102. Laboratory testing found phase separation of the organic physically very unstable because the organic easily dispersed into the liquid layer by slight agitation. Any tendency of the organic to separate in the slurry booster pump bowl will redisperse into the aqueous phase as it flows through the transfer pipeline.

ISSUE 7: No chemical incompatibility problems have been identified thus far, using the reactivity group matrix in the compatibility program document (Attachment 5, Reference 16) and the current WSPS for tank 241-C-106 waste. Mixing and compatibility tests were performed on both tank 241-C-106 sludge and the mixture of tank 241-C-106 and tank 241-AY-102 sludge with tank 241-AY-102 supernate. No problem areas resulting from mixing tank 241-AY-102 supernate with either tank 241-C-106 sludge or the mixture of tank 241-C-106 and tank 241-AY-102 sludge were identified. Effects looked for but not found included: foaming, slow settling, significant changes in waste viscosity, gas evolution and creation of significant quantities of new solid phases as a result of pH changes (Attachment 5, Reference 12).

ISSUE 8: Based on the results of the organic solvent fire analysis presented in Addendum 1 of HNF-SD-WM-BIO-001 (Attachment 5, Reference 6), the release of radioactive material without controls could exceed onsite risk guidelines. Maintaining the transfer controls in conjunction with "Ignition Controls" (AC 5.10), "Emergency Preparedness" (AC 5.14), and "HEPA Filter Controls" (AC 5.18) does not reduce the accident frequency or consequences below the risk guidelines for all scenarios. The transfer controls include a compatibility evaluation to minimize the potential for introducing organic solvents into tanks. By restricting transfer to non-organic tanks only when necessary, this prevents the organic solvent fire potential from being applicable to new tanks. Performing a solids loading calculation as part of the material balance every 24 hours during sluicing protects an initial condition assumption for the Unit Liter Dose (ULD) source term.

ISSUE 9: Another concern is the potential for an organic-nitrate reaction. Hazards associated with exothermic chemical reactions between organic chemicals contained within the wastes and oxidizers such as sodium nitrate and sodium nitrite which are also contained within the waste must be addressed. A key conclusion in Addendum 1 of HNF-SD-WM-BIO-001 is that wastes that contain more than 20 wt% water pose no hazard from propagating combustion reactions. Both tank 241-C-106 and tank 241-AY-102 will contain more than 20 wt% water when sluicing operations are complete.

Attachment 1 summarizes the compatibility compliance dispositions in accordance with References 3, 5, 7 and 16. To provide a conservative evaluation, the minimum and maximum values on the waste profile sheet were used to perform the waste compatibility assessment. Once all the requirements as stated below are met, the transfer and subsequent commingling of Waste Stream ETF-98-02 from tank 241-C-106 with tank 241-AY-102 waste may commence.

CONCLUSION

No additional waste categories, waste codes, or tank safety concerns will be created as a result of mixing these subject waste streams upon successful resolution of all requirements below. Based upon the information provided in the references, Attachments 1 and 2, and the assessment documented in Attachment 1, DST Engineering recommends that approximately 200,000 gallons, including flush water, of tank 241-C-106 waste be received into tank 241-AY-102 after the successful resolution of all the conditions in the Requirements Section of this memo.

REQUIREMENTS

The following conditions must be adhered to in order for DST Engineering to recommend the acceptance of tank 241-C-106 waste into the DST system.

1) Prior to transfer, DST Engineering personnel must certify that the tank 241-C-106 waste stream has not deviated from the approved information contained in Waste Stream Profile Sheet ETF-98-02.

2) DOE Order 5820.2A does not permit the commingling of TRU waste with non-TRU waste. Hence, prior to transfer, Project W-320 personnel must provide sufficient documentation demontrating the commingling of tank 241-C-106 TRU supernate with tank 241-AY-102 non-TRU supernate has been resolved.

3) Tank 241-C-106 is on the High Heat Watch List. Because the transfer will involve the transfer of waste to/from a Watch List tank, Project W-320 personnel must provide sufficient documentation demontrating the appropriate approval has been given prior to transfer.

4) Project W-320 personnel must provide DST Engineering with analytical data verifying the following parameters after each campaign: [OH^-], [NO_2^-], [NO_3^-], total organic carbon and visual inspection for separable organics.

5) Additional sampling and analyses may be requested at the discretion of DST Engineering or Environmental Permit/Policy if more data is required to maintain an adequate database. Data Quality Objectives requirements may also change, resulting in the deletion or addition of certain sampling and analytical requirements.

6) Tank 241-C-106 waste must continue to meet all waste acceptance criteria contained in the latest revision of the DST Waste Analysis Plan.

7) The authorization for acceptance of the subject waste shall expire one year from the approval date of Waste Profile Sheet ETF-98-02, June 24, 1999, or earlier if the subject waste stream deviates in any way from the information contained in Attachment 2.

   If an extension is necessary, contact DST Engineering and Environmental Permit/Policy one month prior to the expiration date specified above.

If you have any questions regarding this issue, please contact me at 373-3880 or Ken Fowler at 373-5930.

Todd Blaak

T. M. Blaak, Scientist
DST Engineering

Attachments (5)

CONCURRENCE:

K D Fowler Date: 6/29/98
K. D. Fowler, Engineer
Process Control

Date: 6/29/98
C. H. Mulkey, Scientist II
Environmental Permit/Policy

WASTE COMPATIBILITY COMPLIANCE TABLE
Tank 241-C-106 Waste with Tank 241-AY-102 Waste

CRITERIA	PROGRAM REQUIREMENT	COMPLIANCE STATUS
SAFETY CRITERIA		
Criticality (Attachment 5, Reference 7, CPS-T-149-00010)	Source Pu equivalent ≤ 0.001 g/l, pH > 8, or 0.001 g/l < Pu equiv. < 0.033 g/l, pH > 8, and absorber ratios are within limits in Table 4-1 of Attachment 5, Reference 7, or At least one ratio X/Pu > Table 4-1 242-A Evap. feed Pu equiv. < 0.005 g/l	See Disposition
Disposition: Tank 241-C-106: Pu equivalent ($Pu^{239/240}$, Am^{241}, $U^{233/235}$) = 1.03E-01 g/L (Attachment 2) Tank 241-C-106: pH > 12 (Attachment 2) WHC-SD-W320-CSA-001, *Criticality Safety Assessment of the Tank 241-C-106 Remediation*, concludes that an inadvertent criticality as a result of the activities associated with Waste Retrieval Sluicing System (WRSS) is not considered possible for the plutonium concentration determined to be in tank waste and the WRSS process to be applied to the tank waste. The criticality safety evaluation considered the potential settling behavior of the sludge in both tanks, the behavior of the sludge in pumps used in both tanks, and the resultant mixture of sludges in the receiver tank.		
Flammable Gas (Attachment 5, Reference 7)	Source & receiver tank (Solids depth (in.) x nc SpG) < 148 Report SpG for waste generators	See Disposition
Disposition: Tank 241-C-106: 1 ≤ SpG ≤ 1.3* (Attachment 2) Tank 241-AY-102 = (8.1" x 1.015 SpG) = 8.2 Final mixture in tank 241-AY-102 = (156" x 1.03 SpG) = 160.7 Tank 241-AY-102's final solids level is the maximum estimate as reported in HNF-SD-W320-ER-004, Rev. 1. Flammable gas concerns have been addressed in Addendum 1 of HNF-SD-WM-BIO-001 (Attachment 5, Reference 5). See Issues 2 and 3 in the Waste Compatibility section for a summary of the GRE and tank bump accident scenario dispositions.		
Organic and Energetic Reaction (Attachment 5, Reference 7)	Source Exo/Endo < 1.0; No separable organic layer TOC ≤ 4.5 wt percent dry basis if free water < 20%	In Compliance
Disposition: Tank 241-AY-102 does not contain a separable organic layer or exotherms (Attachment 5, Reference 1). Tank 241-C-106 does contain separable organic phase that is bound to the solids matrix. The process control plan indicates that sluicing activities will not provide sufficient force to separate the organic phase from the solids. Exotherms were detected in tank 241-C-106 grab samples (Attachment 5, Reference 13). However, the endotherms are in excess of the exotherms. Thus, the Exo/Endo < 1.0. Also, the free water will exceed 20 weight percent for both tanks prior to, during and after sluicing.		

WASTE COMPATIBILITY COMPLIANCE TABLE
Tank 241-C-106 Waste with Tank 241-AY-102 Waste

CRITERIA	PROGRAM REQUIREMENT	COMPLIANCE STATUS
Watch List Tanks (Attachment 5, Reference 16)	Transfers involving a Watch List tank shall be reviewed to assure the potential for release of waste is not increased.	See Disposition
Disposition: According to HNF-EP-0182-120, "Waste Tank Summary Report for Month Ending March 31, 1998", tank 241-C-106 is on the High Heat Watch List and tank 241-AY-102 is not a Watch List tank. It is expected that this transfer will mitigate the high heat safety issue associated with tank 241-C-106. Because the transfer will involve the transfer of waste to/from a Watch List tank, Project W-320 personnel must provide sufficient documentation demontrating the appropriate approval has been given prior to transfer.		
Corrosivity (Attachment 5, Reference 7)	Source $[NO_3^-] \leq 1M$, $0.01M \leq [OH^-] \leq 8M$, $0.011 \leq [NO_2^-] \leq 5.5M$, $[NO_3^-]/([OH^-] + [NO_2^-]) < 2.5$; If $0.01M < [OH^-] < 0.015M$ and/or $0.011M < [NO_2^-] < 0.015M$ then check RSD. $1.0 < [NO_3^-] \leq 3.0M$, $0.1 \times [NO_3^-] \leq [OH^-] < 10M$, $[OH^-] + [NO_2^-] \geq 0.4 \times [NO_3^-]$ $[NO_3^-] > 3.0M$, $0.3M \leq [OH^-]$ 10M, $[OH^-] + [NO_2^-] \geq 1.2M$, $[NO_3^-] \leq 5.5M$	See Disposition
Disposition: Tank 241-C-106 (slurry): $0M \leq [NO3-] \leq 0.75M$; $0.01M \leq [OH-] \leq 1M$; $0.05M \leq [NO2-] \leq 1M$ (Attachment 2) Tank 241-AY-102: $[NO_3^-] = 1.24E-02M$, $[OH^-] = 0.5M$*, $[NO_2^-] = 2.68E-02M$, $[NO_3^-]/([OH^-]+[NO_2^-] = 1.2E-02$ (Attachment 3) Final mixture in tank 241-AY-102: $[NO_3^-] = 2.41E-01M$, $[OH^-] = 0.1M$, $[NO_2^-] = 3.36E-02M$, $[NO_3^-]/([OH^-]+[NO_2^-] = 0.47$ * Tank 241-AY-102's waste will be adjusted to a final [OH-] of 0.5M prior to the transfer from tank 241-C-106. The additional caustic is necessary to mitigate the caustic deficient waste that is scheduled to be transferred from tank 241-C-106. Furthermore, periodic hydroxide verification of tank 241-AY-102 waste will be required once tank 241-C-106 sluicing activities commence. Based upon the current caustic depletion rate observed in tank 241-AY-102 waste, tank 241-AY-102 would be out-of-specification for hydroxide in approximately 18 months, assuming the final [OH-] for tank 241-AY-102 waste is 0.1M upon completion of sluicing tank 241-C-106 waste.		
Chemical Compatibility (Attachment 5, Reference 16)	Identify potential hazards for mixing wastes in specific reactivity groups (Attachment 5, Reference 16, Fig. 3-1)	In Compliance
Disposition: Tank 241-AY-102 has the following reactivity groups: 10 - caustics and 106 - water and mixtures containing water. Tank 241-C-106 has reactivity group 106. No potential safety hazards have been identified for the commingling of tank 241-C-106 waste with tank 241-AY-102 waste (see Attachment 5, Reference 16, Figure 3-1). Mixing and compatibility tests were performed on both tank 241-C-106 sludge and the mixture of tank 241-C-106 and tank 241-AY-102 sludge with tank 241-AY-102 supernate. No problem areas resulting from mixing tank 241-AY-102 supernate with either tank 241-C-106 sludge or the mixture of tank 241-C-106 and tank 241-AY-102 sludge were identified. Effects looked for but not found included: foaming, slow settling, significant changes in waste viscosity, gas evolution and creation of significant quantities of new solid phases as a result of pH changes (Attachment 5, Reference 12).		

WASTE COMPATIBILITY COMPLIANCE TABLE Tank 241-C-106 Waste with Tank 241-AY-102 Waste		
CRITERIA	**PROGRAM REQUIREMENT**	**COMPLIANCE STATUS**
OPERATIONAL CRITERIA		
Tank Waste Type (Attachment 5, Reference 16)	Mixing of waste types shall be in accordance with compatibility matrix, (Attachment 5, Reference 16, Fig. 3-2)	In Compliance
Disposition: According to HNF-EP-0182-120, "Waste Tank Summary Report for Month Ending March 31, 1998," tank 241-AY-102 and tank 241-C-106 contain dilute non-complexed (DN) and non-complex waste, respectively. The 241-C-106 supernate may be concentrated further along with tank 241-AY-102 supernate. However, the solids fraction will settle out and not be concentrated further through the 242-A Evaporator. Figure 3-2 of Attachment 5, Reference 16, indicates that DN waste with other waste types has historically occurred without adverse effects.		
TRU Segregation (Attachment 5, Reference 16)	Source TRU ([$Pu^{239/240}$], [Am^{241}]) ≤ 100 nCi/g	See Disposition
Disposition: Tank 241-C-106 SOLIDS: Total Alpha ([Pu 239/240], [Am 241]) = 2,220 nCi/g (Attachment 5, Reference 13) Tank 241-C-106 SUPERNATE: Total Alpha ([Pu 239/240], [Am 241]) = 644 nCi/g (Attachment 5, Reference 13) Tank 241-AY-102: SOLIDS Total Alpha ([Pu 239/240], [Am 241]) = 13,850 nCi/g (Attachment 5, Reference 15) Tank 241-AY-102: SUPERNATE Total Alpha ([Pu 239/240], [Am 241]) < 1 nCi/g (Attachment 5, Reference 1) Prior to transfer, Project W-320 personnel must provide sufficient documentation demontrating the commingling of tank 241-C-106 TRU supernate with tank 241-AY-102 non-TRU supernate has been resolved.		
Heat Generation (Attachment 5, Reference 16)	Sources ≤ 70,000 Btu/hr (except SY, AZ, & AY tanks) ; SY Tanks ≤ 50,000 Btu/hr ; AY & AZ Tanks ≤ 700,000 Btu/hr. Max. Cs^{137} conc: 574 μCi/ml for 241-AN, AP and AW; 410 μCi/ml for 241-SY. Max. Sr^{90} conc: 404 μCi/ml for 241-AN, AP and AW; 288 for 241-SY.	See Disposition
Disposition: Tank 241-C-106: Heat Generation (based on projected 200,000 gallon transfer) ≤ 44,289 Btu/hr (Attachment 2 max. values used) Tank 241-C-106: [Cs^{137}] ≤ 1,500 μCi/ml, [Sr^{90}] ≤ 1,500 μCi/ml (Attachment 2 max. values used) Tank 241-AY-102: Heat Generation = (Sludge + Liquid) = (45,847 + 31) = 45,878 Btu/hr; (Attachment 5, References 1 and 4) Tank 241-AY-102 (Supernate): [Cs^{137}] = 3.52 μCi/ml, [Sr^{90}] = 1.22E-02 μCi/ml (Attachment 5, Reference 1) Final mixture in tank 241-AY-102 (Tank): Heat Generation ≤ 90,167 Btu/hr Final mixture in tank 241-AY-102: [Cs^{137}] ≤ 871 μCi/ml, [Sr^{90}] ≤ 870 μCi/ml		

WASTE COMPATIBILITY COMPLIANCE TABLE
Tank 241-C-106 Waste with Tank 241-AY-102 Waste

CRITERIA	PROGRAM REQUIREMENT	COMPLIANCE STATUS
Complexant Waste Segregation (Attachment 5, Reference 16)	Source TOC ≤ 10 g/l (transfer to a non-complexed waste tank)	In Compliance
Disposition: The TOC concentrations of 241-C-106 supernate and 241-AY-102 supernate are 2.9 g/l and 0.13 g/l respectively. The TOC concentrations exceed 10 g/l at DSSF composition because of the low hydroxide and aluminum concentrations in the dilute liquids. Waste volume reduction will not be significantly affected by mixing approximately 50,000 gal of 241-C-106 liquid with the 811,000 gallons of liquid 241-AY-102. The TOC concentration in tank 241-AY-102 will be increased from approximately 0.13 g/l to approximately 0.29 g/l. The volume of tank solids cannot be reduced in the 242-A Evaporator. Therefore, movement of the solids to tank 241-AY-102 will not adversely affect waste volume reduction potential.		
Phosphate Waste (Attachment 5, Reference 16)	High phosphate waste ($[PO_4^{-3}]$ > 0.1M) not to be mixed with high salt waste (Na^+ > 8.0M).	In Compliance
Disposition: Tank 241-C-106 $[PO_4^{-3}]$ < 7.5E-02M, $[Na^+]$ < 5M (Attachments 2 and 3) Tank 241-AY-102 $[PO_4^{-3}]$ = 6.3E-03M, $[Na^+]$ = 7.62E-01M (Attachment 5, Reference 1) Tank 241-AY-102's reported sodium value takes into account the contribution of sodium from sodium hydroxide addition.		
Reynolds No. (Attachment 5, Reference 16)	Transfer Reynolds No. ≥ 20,000; solids ≤ 30%	In Compliance
Disposition: The Waste Retrieval Sluicing System has been designed to transfer slurry from tank 241-C-106 to tank 241-AY-102. In accordance with the Project W-320 Process Control Plan (Attachment 5, Reference 2) process solution flushing will be used on a routine basis to prevent the buildup of solids in the slurry line.		
BASIS FOR INTERIM OPERATION CRITERIA		
Radiological Source Term Controls - Contribution to ULD for Inhalation (Attachment 5, Reference 5, Chapt. 5.8)	Non-tank farm facility waste: Sr^{90} < 27.77% of ULD, Y^{90} < 0.97% of ULD, Cs^{137} < 45.18% of ULD, Pu^{239} < 12.41% of ULD, Am^{241} < 11.78% of ULD. If one parameter exceeds specified ULD %, then total of ULDs must be < 98.11%.	N/A See Disposition
Disposition: This criterion applies only to transfers from non-Tank Farm facilities. Thus, the subject transfer is in compliance with this particular requirement.		

WASTE COMPATIBILITY COMPLIANCE TABLE
Tank 241-C-106 Waste with Tank 241-AY-102 Waste

CRITERIA	PROGRAM REQUIREMENT	COMPLIANCE STATUS
Radiological Source Term Controls - Contribution to ULD for Ingestion, Ground Shine, and Resuspension (Attachment 5, Reference 5, Chapt. 5.8)	Non-tank farm facility waste: Sr^{90} < 15.60% of ULD, Y^{90} < 1.42% of ULD, Cs^{137} < 82.68% of ULD, Pu^{239} < 0.13% of ULD, Am^{241} < 0.12% of ULD.	N/A See Disposition
Disposition: This criterion applies only to transfers from non-Tank Farm facilities. Thus, the subject transfer is in compliance with this particular requirement.		
Toxic Chemical Source Term Controls (Attachment 5, Reference 5, Chapt. 5.8)	Non-tank farm facility waste: $[NH_3^+]$ < 4.78% of Total Fraction of Risk Guide (TFRG), NaOH < 32.44% of TFRG, $[Na^+]$ < 54.07% of TFRG, TOC - Oxalate < 4.05% of TFRG, U < 3.33% of TFRG.	N/A See Disposition
Disposition: This criterion applies only to transfers from non-Tank Farm facilities. Thus, the subject transfer is in compliance with this particular requirement.		
Tank Time to LFL Determination (Attachment 5, Reference 5, Chapt. 5.12)	DST and AWF : minimum time to reach 25% of LFL for tank vapor space will remain ≥ 7 days, assuming loss of primary tank ventilation. DCRT : DCRT vapor space will remain ≤ 25% of the LFL.	In Compliance
Disposition: Based on the estimated gas generation rate after the addition of tank 241-C-106 sludge, the amount of time with no forced ventilation flow before the dome space concentration would exceed 25 percent of the LFL is approximately 7.7 days, using upper bound generation rates (HNF-SD-WM-CN-114). In addition, the amount of time with no ventilation flow before exceeding the LFL is more than 33 days. This evaluation provides some confidence in the adequacy of the BIO TSRs to prevent the steady state accumulation of flammable gas to levels above the LFL because ventilation restoration is required immediately, and gas monitoring is required to be initiated within 72 hours (Attachment 5, Reference 6).		
Moisture Controls (Attachment 5, Reference 5, Chapt. 5.15)	Only applicable to SSTs. For "safe" tanks: TOC(dry wt%) ≤ 4.5 For "Conditionally Safe" tanks: Wt% of free H_2O ≥ 20%, or if wt% of free H_2O < 20%, then TOC(wt%) ≤ $(4.5 + (0.17 * X_w))$ X_w = wt% of free water for < 20 wt%. TOC(wt%) = wet basis TOC conc. No transfers from facility group 2 tanks without DOE approval.	NA - See Disposition
Disposition: Tank 241-C-106 is a Facility Group 3 tank. Project W-320 does not involve saltwell pumping. Sufficient moisture will remain in tank 241-C-106 to prevent an organic-nitrate reaction. Process Engineering has reviewed the criteria from this particular section and determined that the requirement for an Organic-Nitrate end state analysis is not applicable for this particular transfer.		

74100-98-019

ATTACHMENT 2

Waste Stream Profile Sheet ETF-98-02

Consisting of 17 pages, including this cover sheet

Profile Identification # ETF-98-02
Approval Date 6/24/98

WASTE STREAM PROFILE SHEET

Follow attached instructions when filling out this waste stream profile sheet.

I. WASTE SHIPPER INFORMATION

1. DST customer (waste shipper/generator):

   East Tank Farms

2. Contact: T. M. Blaak

3. Phone: 373-3880 4. Mail stop: S5-13

II. GENERAL WASTE INFORMATION

1. DST customer: East Tank farms

2. Waste stream name: Tank 241-C-106 slurry.

3. Process generating waste: Sluicing of tank 241-C-106 supernate, solids and interstitial liquor via pumping. Tank 241-AY-102 supernate will be used as the sluicing medium for transporting tank 241-C-106 waste into tank 241-AY-102.

4. Anticipated volume including any flush water:

   200,000 gallons

5. Anticipated transfer frequency:

   Eight sluicing campaigns

6. Method of transfer (railcar, truck, pipeline):

   Pipeline

7. Were analytical data used to fill out this profile sheet?

   X Yes _____ No

   If yes, cite document used as the basis for sampling and analysis (i.e., waste analysis plan and/or sampling analysis plan) and attach a complete copy of the latest results.

   WHC-SD-WM-TSAP-080, REV 1, "Tank 241-C-106 Grab Sampling and Analysis Plan."

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8. Does the waste contain waste which was not generated as part of Hanfords Cleanup?

_____ Yes ___X___ No

9. Is the waste subject to the Toxic Substance Control Act? ___ Yes ___X___ No

10. Is the waste subject to any disposal requirements other than those mandated under the Resource Conservation and Recovery Act? X Yes ___ No

If yes, identify those requirements Land Disposal Restrictions

11. At the point of origination, does the waste contain 10% or more organics?
_____ Yes ___X___ No

12. Does the waste qualify for the exemption for mixed waste listed in 40 C.F.R. 264.1080 (b) (6)? ___X___ Yes _____ No

13. Does waste contain any material that was generated by a spill?
_____ Yes ___X___ No

III. WASTE STREAM COMPOSITION

List all constituents which are greater than 1,000 mg/kg.

1. Component	2. Concentration range (%)	3. Average % (sum of average % of waste stream components must total 100)	4. Basis for composition
Water	70 to 100	94	A and PK
Suspended solids	0 to 20	4	A and PK
Sum of all other components	0 to 10	2	A and PK

A = Analysis; PK = Process knowledge

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IV. PHYSICAL PROPERTIES

1. Physical state at 70°F (circle all applicable)

Liquid	Semisolid	**Solid**
Slurry	Sludge	Gas

2. Viscosity at 70oF*(degree)* ___X___ < 10 mPa/ s[1] _____ >10 mPa/ s[1]

3. Is waste multi-layered? _____ Yes ___X___ No

   If yes, describe and quantify each layer:

   a. (Top) _____ 100 %

   b. _____ %

   c. (Bottom) _____ %

   d. Suspended solids: ___ < 1% ___X___ between 1% and 10% ___X___ > 10%

   e. Flash point: ___X___ > 200 °F ___ between 100 and 200 °F ___ < 100 °F

   f. Color: ___Brown___

4. Does the waste contain polychlorinated biphenyls (PCB) ___ Yes ___X___ No

   If so what is the concentration range ___ Maximum ___ Minimum

5. Does the waste contain organics ___X___ Yes ___ No

   If yes what is the range of the organics 15 g/L TOC Maximum ___0___ Minimum.

[1] Millipascals per second

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V. SPECIFIC ANALYSIS OF WASTE

Fill in the following chart giving maximum, minimum, or averages for each specific analyte. Also state whether this information is based on process knowledge or actual analytical data.

Parameter	Minimum	Maximum	Average	Basis
Ammonia (grams/liter)	0	0.1	5E-03	A and PK
Chloride (only for waste going to 204-AR) (moles/liter)	NA	NA	NA	A
Energetics (net exotherm or no net exotherm)	NO NET EXOTHERM	NO NET EXOTHERM	NO NET EXOTHERM	A
Hydroxide (moles/liter)	1E-02	1	1E-01	A and PK
Moisture (volume % water)	70	100	94	A and PK
Nitrate (moles/liter)	0	7.5E-01	3.8E-02	A and PK
Nitrite (moles/liter)	5E-02	1	5.3E-01	A and PK
Organics, separable (visible or no visible organic layer)	NONE	MINIMAL (BOUND TO SOLIDS)	MINIMAL (BOUND TO SOLIDS)	A
pH (pH units)	12	14	12.5	A and PK
Sodium (grams/liter)	0	115	70	A and PK
Sodium Hydroxide (grams/liter)	0	40	0	A and PK
Solids (volume %)	0	20	4	A and PK
Specific gravity	1	1.3	1.07	A and PK
Total Organic Carbon (grams/liter)	0	15	10	A and PK
Americium^{241} (curies/liter)	0	1E-02	1.7E-03	A and PK
Pu$^{239/240}$ or (grams/liter)	0	1E-01	2.7E-02	A and PK
Cesium^{137} (curies/liter)	0	1.5	6.5E-01	A and PK
Strontium^{90} (curies/liter)	0	1.5	5.5E-01	A and PK
Uranium (total or Uranium 233/235) (grams/liter)	0	2.5	1	A and PK
Yttrium-90 (curies/liter)	0	1.5	5.5E-01	PK

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Parameter	Minimum	Maximum	Average	Basis
Chromium (μg/ml)	0	4E+03	1.3E+03	A
Iron (μg/ml)	0	5E+05	1.2E+05	A
Manganese (μg/ml)	0	6E+03	3E+03	A
Nickel (μg/ml)	0	3E+03	1.1E+03	A
Aluminum (μg/ml)	0	5E+05	8.8E+04	A
Zirconium (μg/ml)	0	4E+03	1.3E+03	A

VI. REACTIVITY AND STABILITY

1. What are the Reactivity Group[1] number(s) for this waste?

   10 and 106 (after tank 241-AY-102 supernate is sent to tank 241-C-106)

2. Is this material stable? X Yes ____ No

   If no, explain: ____

3. Is this material shock sensitive? ____ Yes X No

   If yes, explain: ____

[1] From EPA, 1984, *Design and Development of Hazardous Waste Reactivity Testing Protocol*, EPA-600/2-84-057, U. S. Environmental Protection Agency, Washington D.C. Alternatively the categories specified in 40 CFR 265 appendix V may be specified.

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VII. DANGEROUS WASTE INFORMATION

1. Is this waste a dangerous waste as defined by WAC 173-303[1]?

   X Yes _____ No

2. If it is a dangerous waste, list the applicable Hazardous and/or Dangerous Waste number(s) and explain the basis for the number. For example if you assign D001, the reason for selection is that the flash point is less than 140 °F.

Hazardous/Dangerous Waste number	Reason for selection
See Table 1	See Table 1

3. Is waste a mixed waste? X Yes _____ No

4. List any reportable quantities listed in 40 CFR 302.4 which are applicable to the waste.

Constituent	Reportable quantity
See Table 1	See Table 1

[1] WAC 173-303, 1994, "Dangerous Waste Regulations," *Washington Administrative Code*

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VIII. LAND DISPOSAL RESTRICTION INFORMATION

Fill in the following information pertaining to all applicable Land Disposal Restrictions (LDR) (See 40 CFR 268.40[1] and WAC 173-303-140[2]). For certain waste designated as D001, D002, and/or D0012-D043, also indicate any underlying hazardous constituents which do not meet LDR requirements (see 40 CFR 268.7[1]).

Washington and/or EPA Dangerous (Hazardous) Waste Number	Waste Constituent for which the DST system must monitor Place an * before the entry if this is for an underlying hazardous constituent.	Treatability Group (wastewater or nonwastewater)	Is waste analysis data attached? (Yes or No)
See Table 2	See Table 2	See Table 2	See Table 2

1. 40 CFR 268, "Land Disposal Restrictions," *Code of Federal Regulations*, as amended.

2. WAC 173-303, "Dangerous Waste Regulations," *Washington Administrative Code*, as amended.

Tmb 9-28-98

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IX. SUPPLEMENTAL INFORMATION AND ACCOUNTABILITY STATEMENT

1. Is there an attachment containing additional information?

   _____ Yes X No (list below)

2. I hereby certify that to the best of my knowledge all information submitted in this and all attached documents contain true and accurate descriptions of this waste. Any sample that was analyzed or submitted was representative as defined in 40 CFR 261 Appendix I[1] or by using an equivalent method. All relevant information regarding known or suspected hazards in the possession of the DST customer and generator has been disclosed.

Authorized signature	Authorized signature
T. M. Blaak Cognizant Engineer Tank Chemistry	J. D. Guberski East Tank Farms Env. Comp. Officer
Name and title	Name and title
June 24, 1998 Date	June 24, 1998 Date

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Table 1 Waste Designation & Reportable Quantities		
Constituent	**Reason for selection**	**Reportable Quantity in pounds**
D001	Receipt of waste with this code	100
D002	Receipt of waste with this code	100
D003	Receipt of waste with this code	100
D004	Receipt of waste with this code	1
D005	Receipt of waste with this code	1000
D006	Receipt of waste with this code	10
D007	Receipt of waste with this code	10
D008	Receipt of waste with this code	10
D009	Receipt of waste with this code	1
D010	Receipt of waste with this code	10
D011	Receipt of waste with this code	1
D018	Receipt of waste with this code	10
D019	Receipt of waste with this code	10
D022	Receipt of waste with this code	10
D028	Receipt of waste with this code	100

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Table 1 Waste Designation & Reportable Quantities		
Constituent	**Reason for selection**	**Reportable Quantity in pounds**
D029	Receipt of waste with this code	100
D030	Receipt of waste with this code	10
D033	Receipt of waste with this code	1
D034	Receipt of waste with this code	100
D035	Receipt of waste with this code	5000
D036	Receipt of waste with this code	1000
D038	Receipt of waste with this code	1000
D039	Receipt of waste with this code	100
D040	Receipt of waste with this code	100
D041	Receipt of waste with this code	10
D043	Receipt of waste with this code	1
WT01	Receipt of waste with this code	NA
WT02	Receipt of waste with this code	NA
WC02	Receipt of waste with this code	NA
WP01	Receipt of waste with this code	NA

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Table 1 Waste Designation & Reportable Quantities		
Constituent	**Reason for selection**	**Reportable Quantity in pounds**
WP02	Receipt of waste with this code	NA
F001	Receipt of waste with this code	10
F002	Receipt of waste with this code	10
F003	Receipt of waste with this code	100
F004	Receipt of waste with this code	100
F005	Receipt of waste with this code	100

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Table 2
Land Disposal Information

Waste Code	Regulated Constituent or characteristic	Category	Treatment Standard "mg/l" unless noted by Technology Code
D001	Ignitability	Nonwastewater	DEACT & 268.48
D002	Corrosivity	Nonwastewater	DEACT & 268.48
D003	Reactivity	Nonwastewater	DEACT
D004	Arsenic	Nonwastewater	5.0
D005	Barium	Nonwastewater	100
D006	Cadmium	Nonwastewater	1.0
D007	Chromium	Nonwastewater	5.0
D008	Lead	Nonwastewater	5.0

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Table 2
Land Disposal Information

Waste Code	Regulated Constituent or characteristic	Category	Treatment Standard "mg/l" unless noted by Technology Code
D009	Mercury	Nonwastewater	0.20
D010	Selenium	Nonwastewater	5.7
D011	Silver	Nonwastewater	5.0
D018	Benzene	Nonwastewater	10 & 268.48
D019	Carbon Tetrachloride	Nonwastewater	6.0 & 268.48
D022	Chloroform	Nonwastewater	6.0 & 268.48
D028	1,2-Dichloroethane	Nonwastewater	6.0 & 268.48
D029	1,1-Dichloroethylene	Nonwastewater	6.0 & 268.48

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Table 2
Land Disposal Information

Waste Code	Regulated Constituent or characteristic	Category	Treatment Standard "mg/l" unless noted by Technology Code
D030	2,4-Dinitrotoluene	Nonwastewater	140 & 268.48
D033	Hexachlorobenzene	Nonwastewater	5.6 & 268.48
D034	Hexachloroethane	Nonwastewater	30 & 268.48
D035	Methly Ethyl Ketone	Nonwastewater	36 & 268.48
D036	Nitrobenzene	Nonwastewater	14 & 268.48
D038	Pyridine	Nonwastewater	16 & 268.48
D039	Tetrachloroethylene	Nonwastewater	6.0 & 268.48
D040	Trichloroethylene	Nonwastewater	6.0 & 268.48

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Table 2
Land Disposal Information

Waste Code	Regulated Constituent or characteristic	Category	Treatment Standard "mg/l" unless noted by Technology Code
D041	2,4,5-Trichlorophenol	Nonwastewater	7.4 & 268.48
D043	Vinyl chloride	Nonwastewater	6.0 & 268.48
WT01	State Only Extremely Toxic Hazardous Waste	Nonwastewater	None
WT02	State Only Toxic Hazardous Waste	Nonwastewater	None
WC02	Carcinogenic Waste	Nonwastewater	None
WP01	Halogenated Hydrocarbons	Nonwastewater	None
WP02	Halogenated Hydrocarbons	Nonwastewater	None

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Table 2
Land Disposal Information

Waste Code	Regulated Constituent or characteristic	Category	Treatment Standard "mg/l" unless noted by Technology Code
F001	1,1,1-Trichloroethane	Nonwastewater	6.0
F002	Acetone,		160
F003	Methylyne Chloride,		30
F004			
F005	Methyl Isobutyl Ketone,		33
	Methyl Ethyl Ketone,		36
	o-Cresol,		5.6
	p-Cresol		5.6

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ATTACHMENT 3

Parameters for Operational Decisions

Consisting of 2 pages, including this cover sheet

Parameters For Operational Decisions

Fill in the following chart giving maximum, minimum, or averages for each specific analyte. Also state whether this information is based on process knowledge or actual analytical data. This information supplements the information on the Waste Stream Profile Sheet which is required by the DST Waste Analysis Plan.

PARAMETER (Mol/L or Ci/L unless otherwise specified)	**MINIMUM**	**MAXIMUM**	**AVERAGE**	**BASIS** (Process Knowledge or Analysis)
Aluminum	0	2.8	1.8	Both
Americium^{241}	0	1E-02	1.7E-03	Both
Carbonate	0	5	3	Both
Cesium^{137}	0	1.5	6.5E-01	Both
Cyanide	N/A	N/A	N/A	PK
Fluoride	0	5E-02	1.7E-02	Both
Phosphate	0	7.5E-02	1.6E-02	Both
Plutonium$^{239/240}$ (g/L)	0	1E-01	2.7E-02	Both
Sodium (g/L)	69	276	177	Both
Total Dissolved Solids, %	0	20	4	Both
Strontium^{90}	0	1.5	5.5E-01	Both
Sulphate	0	5E-01	7.2E-02	Both
Total alpha	0	1.6E-02	3.4E-03	Both
Total Fuel content	NO NET EXOTHERM	NO NET EXOTHERM	NO NET EXOTHERM	Both
Organic Carbon (g/L)	0	15	10	Both

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ATTACHMENT 4

Tank 241-AY-102 Projected Current and Final Composition Following the Transfer of Tank 241-C-106 (ETF-98-02) Waste

Consisting of 3 pages, including this cover sheet

Title: Projected Composition for Tank 241-AY-102 Prior to the Transfer

Originator: Tim BLAAK Date: 6/29/98

Checker: Date: 6/29/98

TOC 241-AY-102 Initial

Source	Volume	Conc./va	Perce	Contributi	Reference
AY-102	811250	[illegible]134	0.97	130.46	Average values from grab samples 2AY-97-1, 2AY-97-2, 2AY-97-3 and 2AY-97-4.
NaOH Solution	22,000	[illegible]0	0.03	0.00	Process Knowledge
Total	833250		1.00	130.46 ug/ml or 0.13 g/l	

SpG 241-AY-102 Initial

Source	Volume	Conc./va	Perce	Contributi	Reference
AY-102	811250	[illegible].015	0.97	0.99	Average values from grab samples 2AY-97-1, 2AY-97-2, 2AY-97-3 and 2AY-97-4.
NaOH Solution	22000	[illegible].8	0.03	0.04	Process Knowledge
Total	833250		1.00	1.03 ug/ml	

OH 241-AY-102 Initial

Source	Volume	Conc./va	Perce	Contributi	Reference
AY-102	811250	1262.5	0.97	1229.17	Average values from grab samples 2AY-97-1, 2AY-97-2, 2AY-97-3 and 2AY-97-4.
NaOH Solution	22000	323000	0.03	8528.05	Process Knowledge
Total	833250		1.00	9757.22 ug/ml or 5.74E-01 M	

NO3 241-AY-102 Initial

Source	Volume	Conc./va	Perce	Contributi	Reference
AY-102	811250	568.1	0.97	553.10	Average values from grab samples 2AY-97-1, 2AY-97-2, 2AY-97-3 and 2AY-97-4.
NaOH Solution	22000	[illegible]0	0.03	0.00	Process Knowledge
Total	833250		1.00	553.10 ug/ml or 8.92E-03 M	

NO2 241-AY-102 Initial

Source	Volume	Conc./va	Perce	Contributi	Reference
AY-102	811250	1232.5	0.97	1199.96	Average values from grab samples 2AY-97-1, 2AY-97-2, 2AY-97-3 and 2AY-97-4.
NaOH Solution	22000	[illegible]0	0.03	0.00	Process Knowledge
Total	833250		1.00	1199.96 ug/ml or 2.61E-02 M	

PO4 241-AY-102 Initial

Source	Volume	Conc./va	Perce	Contributi	Reference
AY-102	811250	595.35	0.97	579.63	Average values from grab samples 2AY-97-1, 2AY-97-2, 2AY-97-3 and 2AY-97-4.
NaOH Solution	22000	[illegible]0	0.03	0.00	Process Knowledge
Total	833250		1.00	579.63 ug/ml or 6.10E-03 M	

Na 241-AY-102 Initial

Source	Volume	Conc./va	Perce	Contributi	Reference
AY-102	811250	7180	0.97	6990.43	Average values from grab samples 2AY-97-1, 2AY-97-2, 2AY-97-3 and 2AY-97-4.
NaOH Solution	22000	437000	0.03	11537.95	Process Knowledge
Total	833250		1.00	18528.38 ug/ml or 8.06E-01 M	

Al 241-AY-102 Initial

Source	Volume	Conc./va	Perce	Contributi	Reference
AY-102	811250	[illegible]19	0.97	18.50	Average values from grab samples 2AY-97-1, 2AY-97-2, 2AY-97-3 and 2AY-97-4.
NaOH Solution	22000	[illegible]0	0.03	0.00	Process Knowledge
Total	833250		1.00	18.50 ug/ml or 6.86E-04 M	

Pu239/240 241-AY-102 Initial

Source	Volume	Conc./va	Perce	Contributi	Reference
AY-102	811250	1.18E-05	0.97	1.15E-05	Average values from grab samples 2AY-97-1, 2AY-97-2, 2AY-97-3 and 2AY-97-4.
NaOH Solution	22000	[illegible]0	0.03	0.00E+00	Process Knowledge
Total	833250		1.00	1.15E-05 uCi/ml or 1.85E-07 g/l	

Am241 241-AY-102 Initial

Source	Volume	Conc./va	Perce	Contributi	Reference
AY-102	811250	5.73E-06	0.97	5.58E-06	Average values from grab samples 2AY-97-1, 2AY-97-2, 2AY-97-3 and 2AY-97-4.
NaOH Solution	22000	[illegible]0	0.03	0.00E+00	Process Knowledge
Total	833250		1.00	5.58E-06 uCi/ml or 1.63E-09 g/l	

Cs137 241-AY-102 Initial

Source	Volume	Conc./va	Perce	Contributi	Reference
AY-102	811250	3.52	0.97	3.43	Average values from grab samples 2AY-97-1, 2AY-97-2, 2AY-97-3 and 2AY-97-4.
NaOH Solution	22000	[illegible]0	0.03	0.00	Process Knowledge
Total	833250		1.00	3.43 uCi/ml or 3.43E-03 Ci/l	

Sr90 241-AY-102 Initial

Source	Volume	Conc./va	Perce	Contributi	Reference
AY-102	811250	1.22E-02	0.97	1.19E-02	Average values from grab samples 2AY-97-1, 2AY-97-2, 2AY-97-3 and 2AY-97-4.
NaOH Solution	22000	[illegible]0	0.03	0.00E+00	Process Knowledge
Total	833250		1.00	1.19E-02 uCi/ml or 1.19E-05 Ci/l	

Title: Projected Composition for Tank 241-AY-102 Following the Transfer
Originator: Tim Blaak Date: 6/29/98
Checker: Date: 6/29/98

TOC 241-AY-102 final

Source	Volume	Conc./va	Perce	Contributi	Reference
AY-102	440000	130.46	0.69	89.69	Average values from grab samples 2AY-97-1, 2AY-97-2, 2AY-97-3 and 2AY-97-4.
C-106	200000	15000	0.31	4687.50	WSPS# ETF-98-02 maximum range value used.
Total	640000		1.00	4777.19 ug/ml or	4.78 g/l

SpG 241-AY-102 final

Source	Volume	Conc./va	Perce	Contributi	Reference
AY-102	440000	1.03	0.69	0.71	Average values from grab samples 2AY-97-1, 2AY-97-2, 2AY-97-3 and 2AY-97-4.
C-106	200000	1.3	0.31	0.41	WSPS# ETF-98-02 maximum range value used.
Total	640000		1.00	1.11	

OH 241-AY-102 final

Source	Volume	Conc./va	Perce	Contributi	Reference
AY-102	440000	9757.22	0.69	6708.09	Average values from grab samples 2AY-97-1, 2AY-97-2, 2AY-97-3 and 2AY-97-4.
C-106	200000	-17000	0.31	-5312.50	Projected using a buffering capacity of 1M.
Total	640000		1.00	1395.59 ug/ml or	8.21E-02 M

Per Interoffice Memo 7A150-98-027, "Caustic Addition to 241-AY-102," the projected final [OH-] in tank 241-AY-102 following sluicing activities is 0.1M.

NO3 241-AY-102 final

Source	Volume	Conc./va	Perce	Contributi	Reference
AY-102	440000	553.10	0.69	380.26	Average values from grab samples 2AY-97-1, 2AY-97-2, 2AY-97-3 and 2AY-97-4.
C-106	200000	46500	0.31	14531.25	WSPS# ETF-98-02 maximum range value used.
Total	640000		1.00	14911.51 ug/ml or	2.41E-01 M

NO2 241-AY-102 final

Source	Volume	Conc./va	Perce	Contributi	Reference
AY-102	440000	1199.96	0.69	824.97	Average values from grab samples 2AY-97-1, 2AY-97-2, 2AY-97-3 and 2AY-97-4.
C-106	200000	2300	0.31	718.75	WSPS# ETF-98-02 minimum range value used.
Total	640000		1.00	1543.72 ug/ml or	3.36E-02 M

PO4 241-AY-102 final

Source	Volume	Conc./va	Perce	Contributi	Reference
AY-102	440000	579.63	0.69	398.50	Average values from grab samples 2AY-97-1, 2AY-97-2, 2AY-97-3 and 2AY-97-4.
C-106	200000	7130	0.31	2228.13	WSPS# ETF-98-02 maximum range value used.
Total	640000		1.00	2626.62 ug/ml or	2.76E-02 M

Na 241-AY-102 final

Source	Volume	Conc./va	Perce	Contributi	Reference
AY-102	440000	#######	0.69	12738.26	Average values from grab samples 2AY-97-1, 2AY-97-2, 2AY-97-3 and 2AY-97-4.
C-106	200000	15000	0.31	35937.50	WSPS# ETF-98-02 maximum range value used.
Total	640000		1.00	48675.76 ug/ml or	2.12 M

Al 241-AY-102 final

Source	Volume	Conc./va	Perce	Contributi	Reference
AY-102	440000	18.50	0.69	12.72	Average values from grab samples 2AY-97-1, 2AY-97-2, 2AY-97-3 and 2AY-97-4.
C-106	200000	75500	0.31	23593.75	WSPS# ETF-98-02 maximum range value used.
Total	640000		1.00	23606.47 ug/ml or	8.75E-01 M

Pu239/240 241-AY-102 final

Source	Volume	Conc./va	Perce	Contributi	Reference
AY-102	440000	1.15E-05	0.69	7.90E-06	Average values from grab samples 2AY-97-1, 2AY-97-2, 2AY-97-3 and 2AY-97-4.
C-106	200000	1.5E-06	0.31	1.94E+00	WSPS# ETF-98-02 maximum range value used.
Total	640000		1.00	1.94 uCi/ml or	3.13E-02 g/l

Am241 241-AY-102 final

Source	Volume	Conc./va	Perce	Contributi	Reference
AY-102	440000	5.58E-06	0.69	3.84E-06	Average of highest < value from each 2AY-97-1, 2AY-97-2, 2AY-97-3 and 2AY-97-4 grab sample.
C-106	200000	10	0.31	3.13E+00	WSPS# ETF-98-02 maximum range value used.
Total	640000		1.00	3.13 uCi/ml or	9.10E-04 g/l

Cs137 241-AY-102 final

Source	Volume	Conc./va	Perce	Contributi	Reference
AY-102	440000	3.43	0.69	2.36	Average values from grab samples 2AY-97-1, 2AY-97-2, 2AY-97-3 and 2AY-97-4.
C-106	200000	1500	0.31	468.75	WSPS# ETF-98-02 maximum range value used.
Total	640000		1.00	471.11 uCi/ml or	7.60 Ci/l

Sr90 241-AY-102 final

Source	Volume	Conc./va	Perce	Contributi	Reference
AY-102	440000	1.19E-02	0.69	0.01	Average values from grab samples 2AY-97-1, 2AY-97-2, 2AY-97-3 and 2AY-97-4.
C-106	200000	1500	0.31	468.75	WSPS# ETF-98-02 maximum range value used.
Total	640000		1.00	468.76 uCi/ml or	4.69E-01 Ci/l

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ATTACHMENT 5

Reference Page

Consisting of 3 pages, including this cover sheet

REFERENCES

WASTE COMPATIBILITY ASSESSMENT OF TANK 241-C-106 WASTE WITH TANK 241-AY-102 WASTE

(1) Interoffice Memo, F. H. Steen to K. M. Hall, "Compatibility Analyses Results for the 60-Day Report for Tank 241-AY-102," WMH-9852387, dated March 17, 1998.

(2) HNF-SD-WM-PCP-013, "Tank 241-C-106 Waste Retrieval Sluicing System Process Control Plan," Rev. 0, K. G. Carothers, S. D. Estey, N. W. Kirch, L. A. Stauffer, and J. W. Bailey, dated February 1998.

(3) WHC-SD-WM-EV-053, "Double-Shell Tank Waste Analysis Plan," Rev. 4A, C. H. Mulkey, dated September 2, 1997.

(4) Internal Memo, L. A. Stauffer to Distribution, "Double-Shell Tank Composition Status - Quarterly Report," 74650-97-013, dated September 2, 1997.

(5) HNF-IP-1266, "Tank Farms Operations Administrative Controls," Rev. 0, dated August 19, 1997.

(6) HNF-SD-WM-BIO-001, ADDENDUM 1, "Tank Waste Remediation System Basis for Interim Operations," Rev. 0-C, dated July, 1997.

(7) HNF-SD-WM-DQO-001, "Data Quality Objectives for the Waste Compatibility Program," Rev. 2, dated June 23, 1997.

(8) Interoffice Memo, J. H. Wicks to W. M. Funderburke, "Subcontract Number 80232764-9-K001, Configuration Control of Tank Waste Compositions," LMHC-9755448, dated June 20, 1997.

(9) WHC-SD-W320-CSA-001, "Criticality Safety Assessment of Tank 241-C-106 Remediation", Rev. 1, April 17, 1997.

(10) HNF-SD-W320-ER-002, "Project W-320 Thermal Evaluation," Rev. 0, March 18, 1997.

(11) PNNL-11432, UC-721. "Bench Scale Enhanced Sludge Washing and Gravity Settling of Hanford Tank C-106 Sludge," dated January 1997.

(12) WHC-SD-WM-TI-756, "Chemical and Chemically-Related Considerations Associated with Sluicing Tank 241-C-106 Waste to Tank 241-AY-102," Rev. 2, dated April 4, 1996.

(13) WHC-SD-WM-ER-615, "Tank Characterization Report for Single-Shell Tank 241-C-106," Rev. 0, dated September 25, 1996.

(14) Internal memo, S. D. Estey to K. W. Leliefeld, "Modeling for Potential Gas Retention/Gas Release Problems in Tank 241-AY-102 Following Tank 241-C-106 Retrieval," 74A10-96-062, dated May 8, 1996.

(15) Internal Memo, D. L. Herting to J. M. Jones, "Characterization of Sludge Sample from Tank 241-AY-102," 75764-PCS96-021, dated March 6, 1996.

(16) WHC-SD-WM-OCD-015, "Tank Farm Waste Compatibility Program," Rev. 1, dated April 24, 1995.

DISTRIBUTION SHEET

To	From	Page 1 of 1
Distribution	T. M. Blaak	Date 9/8/98
Project Title/Work Order		EDT No. NA
Waste Compatibility Assessments to Support Project W-320		ECN No. 644153

Name	MSIN	Text With All Attach.	Text Only	Attach./ Appendix Only	EDT/ECN Only
D. G. Baide	S5-05	X			
J. W. Bailey	S2-48	X			
T. M. Blaak	S5-13	X			
L. A. Domnoske-Rauch	S5-13	X			
K. G. Carothers	R2-11	X			
S. D. Estey	R2-11	X			
K. D. Fowler	R2-11	X			
N. W. Kirch	R2-11	X			
J. G. Kristofzski	R2-12	X			
J. W. Lentsch	S2-48	X			
P. G. O'Connor	S5-04	X			
T. C. S. R. C.	R1-10	X			