

2. To: (Receiving Organization) Distribution		3. From: (Originating Organization) River Protection Project		4. Related EDT No.: N/A	
5. Proj./Prog./Dept./Div.: Waste Feed Delivery Program		6. Design Authority/Design Agent/Cog. Engr.: S.M. O'Toole		7. Purchase Order No.: N/A	
8. Originator Remarks: For approval and release				9. Equip./Component No.: N/A	
				10. System/Bldg./Facility: N/A	
11. Receiver Remarks:				12. Major Assm. Dwg. No.: N/A	
				13. Permit/Permit Application No.: N/A	
11A. Design Baseline Document? <input type="radio"/> Yes <input checked="" type="radio"/> No				14. Required Response Date: N/A	

15. DATA TRANSMITTED					(F)	(G)	(H)	(I)
(A) Item No.	(B) Document/Drawing No.	(C) Sheet No.	(D) Rev. No.	(E) Title or Description of Data Transmitted	Approval Designator	Reason for Transmittal	Originator Disposition	Receiver Disposition
1	HNF-4599	-	0	WFD Test & Evaluation Plan	n/a	1	1	

16. KEY		
Approval Designator (F)	Reason for Transmittal (G)	Disposition (H) & (I)
E, S, Q, D OR N/A (See WHC-CM-3-5, Sec. 12.7)	1. Approval 2. Release 3. Information 4. Review 5. Post-Review 6. Dist. (Receipt Acknow. Required)	1. Approved 2. Approved w/comment 3. Disapproved w/comment 4. Reviewed no/comment 5. Reviewed w/comment 6. Receipt acknowledged

17. SIGNATURE/DISTRIBUTION (See Approval Designator for required signatures)											
(G) Reason	(H) Disp.	(J) Name	(K) Signature	(L) Date	(M) MSIN	(G) Reason	(H) Disp.	(J) Name	(K) Signature	(L) Date	(M) MSIN
		Design Authority				1		W.T. Thompson	<i>W.T. Thompson</i>	8/2/99	
		Design Agent				1		R.A. Dodd	<i>R.A. Dodd</i>	7/6/99	R3-72
1		Cog. Eng. S.M. O'Toole	<i>S.M. O'Toole</i>			1		W.R. Root	<i>W.R. Root</i>	8/4/99	
1		Cog. Mgr. A.F. Choho	<i>A.F. Choho</i>	8-2-99		1		R.L. Treat	<i>R.L. Treat</i>	8/4/99	
1		QA J.F. Bores	<i>J.F. Bores</i>	07/06/99		1		C. B. Bryan	<i>C.B. Bryan</i>	7/30/99	
		Safety									
		Env.									

18. Signature of EDT Originator <i>S.M. O'Toole</i> 7/6/99		19. Authorized Representative for Receiving Organization <i>Russell J. Treat</i> 8/4/99		20. Design Authority/Cognizant Manager <i>A.F. Choho</i> 8-5-99		21. DOE APPROVAL (if required) Ctrl No. _____ <input type="radio"/> Approved <input type="radio"/> Approved w/comments <input type="radio"/> Disapproved w/comments	
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Waste Feed Delivery Test and Evaluation Plan

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U.S. Department of Energy Contract DE-AC06-96RL13200

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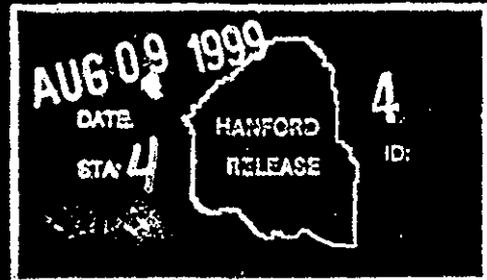
Abstract:

This plan documents the Waste Feed Delivery Program test and evaluation planning and implementation approach. The purpose of this document is to define and communicate the Waste Feed Delivery Program Test and Evaluation scope, objectives, planning and implementation approach.

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WASTE FEED DELIVERY TEST AND EVALUATION PLAN

June 1999

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Richland, Washington

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LIST OF TERMS

ABU	Acceptance for Beneficial Use
ALARA	As low as reasonably achievable
DOE	U.S. Department of Energy
DRD	Design Requirements Document
DST	Double-shell tank
FDC	Functional Design Criteria
HAMMER	Hazardous Material Management and Emergency Response
HLW	High-level waste
HTWOS	Hanford Tank Waste Operations Simulator
LAW	Low-activity waste
ORR	Operational Readiness Review
PDS	Project Development Specification
RA	Readiness Assessment
SST	Single-shell tank
T&E	Test and evaluation
TBR	Technical Basis Review
TEP	Test and evaluation plan
TPM	Technical Performance Measurement
WFD	Waste Feed Delivery

WASTE FEED DELIVERY TEST AND EVALUATION PLAN

1.0 INTRODUCTION

This plan documents the Waste Feed Delivery (WFD) Program test and evaluation (T&E) planning and implementation approach. It is consistent with the requirements in the *Tank Waste Remediation System Testing and Evaluation Management Plan* (Wilson 1999), *Tank Waste Remediation System Test and Evaluation Procedure* (Gibson 1999), and *Project Hanford Management Contract Engineering Requirements* (Skriba 1999).

2.0 PURPOSE

The purpose of this document is to define and communicate the WFD Program T&E scope, objectives, planning and implementation approach. The WFD T&E scope is the validation and verification of those parts of the Double-Shell Tank (DST) System necessary to accomplish the WFD portion of the River Protection Project (RPP) mission. Any Single-Shell Tank (SST) System components necessary for the WFD mission will be included in later revisions of this document after the SST system definition matures. WFD T&E objectives are to validate the system requirements, validate the system models/analysis tools and verify designs and end products satisfy requirements. The balance of this document describes the T&E planning and implementation approach developed to date.

3.0 PROGRAM SCHEDULE AND MILESTONES

The WFD top level milestone T&E schedule is included as Appendix A. This top level milestone schedule incorporates the April 1999 U.S. Department of Energy (DOE) guidance for the Baseline Update and will be reviewed for consistency with the Baseline Update final schedule. The WFD Program level T&E logic, more detailed milestone schedule and activity level planning will be developed from the data generated during the Baseline Update. The update completion is currently planned for the fourth quarter of fiscal year (FY) 1999.

4.0 SYSTEM DESCRIPTION

The WFD mission is to provide the systems and facilities for retrieving waste, and providing waste feed to the DOE waste immobilization contractor. Portions of the DST system perform this mission. The complete DST system is described in section 3.1.2 of the *System Specification for the Double-Shell Tank System* (Grenard 1998). Those portions required for the WFD mission will be defined by the system assessments currently underway.

5.0 TESTING AND EVALUATION CONSTRAINTS

The initial WFD Program level T&E planning activities have not identified any constraints preventing realistic operational testing. As sub-tier documents under this plan, WFD projects will develop Project level test and evaluation plans (TEP) in accordance with the TWRS *Test and Evaluation Management Plan* (TEMP) (Wilson 1999). As part of the project T&E planning, the environment will be reviewed for constraints that would prevent realistic operational testing. Some factors that may impact realistic operational testing are safety issues (equipment and personnel), radiation exposure (ALARA) and program schedule.

6.0 TEST LOCATIONS

WFD T&E activities will take place primarily at the 200 East and 200 West Areas of the Hanford Site. Integrated pre-operational testing will take place within these Areas. Some T&E activities may be performed at the Hazardous Material Management and Emergency Response (HAMMER) Training Center, other Hanford locations or off site at vendor's facilities or other DOE sites. Specifically, possible sites for a pump cold test facility are being investigated. Detailed T&E planning is ongoing; project level TEPs will provide additional detail on test locations.

7.0 TEST MANAGEMENT

The WFD System Definition Manager has the overall responsibility for planning, integrating and approving the WFD T&E activities throughout the program life cycle. The System Definition Manager will develop the top-level system requirements and architecture and provide this data to the Principal Engineer. Figure 1 describes the T&E management responsibilities and relationships. The T&E activities in each of the life cycle phases are described in Figure 2.

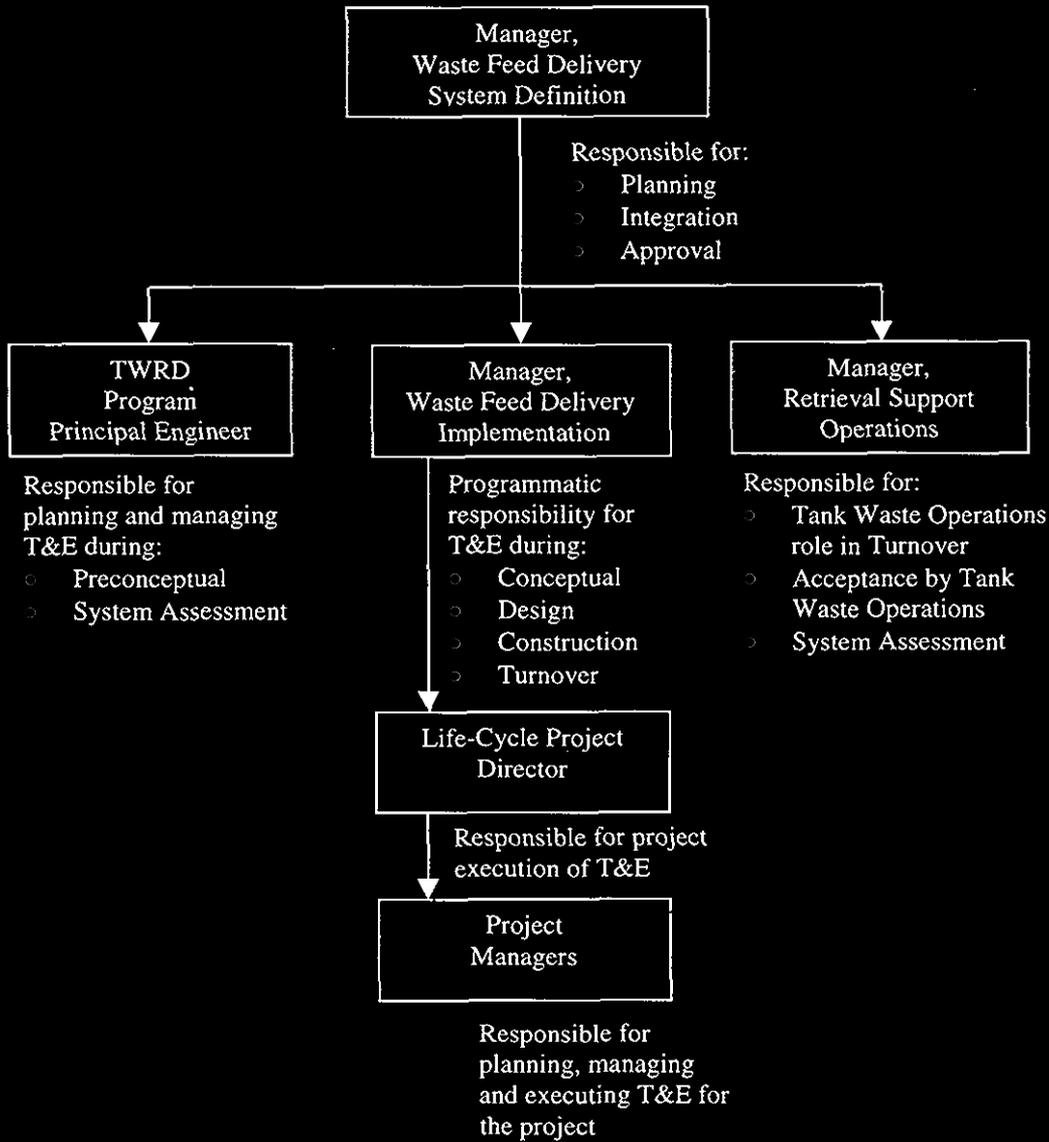
The Tank Waste Retrieval and Disposal (TWRD) Program Principal Engineer is responsible for planning and managing the T&E activities during the Preconceptual life cycle phase for WFD and other TWRD programs. The Principal Engineer is responsible to further analyze the top level system requirements and architecture to a level of detail sufficient to define projects to accomplish the necessary system and facility modifications/additions to accomplish the mission. This includes planning and managing system assessments to determine the capability of existing equipment to satisfy mission requirements.

The WFD Implementation Manager has programmatic responsibility for T&E activities performed by the projects during the Conceptual, Design, Construction and Turnover life cycle phases. The Implementation Manager will work with the Life-Cycle Projects Director to accomplish the required T&E activities.

The Life-Cycle Projects Director is responsible for the execution of the project level T&E activities through the Conceptual, Design, Construction and Turnover life-cycle phases. The individual project managers are responsible for planning and conducting the T&E activities for their respective projects during these life-cycle phases.

The Retrieval Support Operations Manager is responsible for the Tank Waste Operations role in system assessments and project turnover and acceptance.

Figure 1. Test and Evaluation Work Flow Responsibility.



8.0 TRAINING REQUIREMENTS

Initial WFD T&E planning results have not identified any specific training requirements. Any specific training or qualification requirements for analysts or test team members will be defined by the projects through the project test plans and test procedures.

9.0 CRITICAL OPERATIONAL ISSUES FOR TESTING AND EVALUATION

WFD critical operational requirements are related to the ability to deliver waste to the Privatization Contractor on time, at the specified quantity and within the specified envelopes (quality). Issues identified against these operational requirements will be captured in the WFD Risk List.

Risk analysis is used throughout the WFD T&E activities. Verification methods (described in Section 10) are selected based on a number of factors including risk. Risk is also considered during test planning to minimize equipment damage, test failures, etc. and maximize the test data collection. For example, the mission level requirements for a facility to perform failure analysis on contaminated WFD equipment are being analyzed to determine if the benefit is sufficient to justify the resource expenditure. Without the facility, equipment failure root cause will not be obtainable due to the expected dose rate from the contaminated equipment, thereby incurring program risk of additional failures.

10.0 TESTING AND EVALUATION APPROACH

The WFD T&E approach is sequential and iterative. WFD T&E planning receives inputs from the system definition, TWRS TEMP (Wilson 1999), risk management and technical performance measurement activities. T&E activities will be conducted to verify the requirements from the systems definition activity prior to start of design, designs prior to start of construction, and end products prior to turnover to operations. This "building block" verification approach will ensure the equipment is sufficient to complete the WFD mission. If T&E results are unacceptable, an evaluation will be conducted to determine if the failure was due to the T&E implementation or a problem with the requirement, design or end product. Corrective action will be taken as necessary to correct the problem and the T&E activity repeated as necessary until the results are satisfactory.

Test and evaluation planning at the program and project level is ongoing. Program level planning will examine the need for an integrated cold test capability for equipment early in the program life cycle to minimize the overall risk to the program.

Figure 2 describes the overall WFD T&E activities by phase. The initial activities are T&E planning and requirements validation as part of system definition during the Preconceptual phase. Existing systems will be evaluated as part of the system assessment activity to determine their viability of satisfying the WFD mission requirements. New systems and systems requiring modification will be developed by a project. New and existing projects will perform T&E planning and execution for their respective scope. Project activities include design verification, end product verification and accomplishment of the Acceptance for Beneficial Use (ABU) process with Tank Waste Operations.

The projects will perform T&E activities against the Level 2 Specifications or their existing requirements documents allocated to the project scope through the Project Definition Criteria. The results of the project level T&E will be rolled up by the program as part of the program level activity to verify the system level requirements. The existing project baselines captured in Functional Design Criteria (FDC), Design Requirements Documents (DRD), or Project Development Specifications (PDS) will be reviewed against the Level 2 specifications generated by the WFD Program. If differences are found, a risk based decision will be made to modify the project baseline or accept the project requirements in their current state. Modification to the project baseline will be formally transmitted by revision of the FDC, DRD, or PDS.

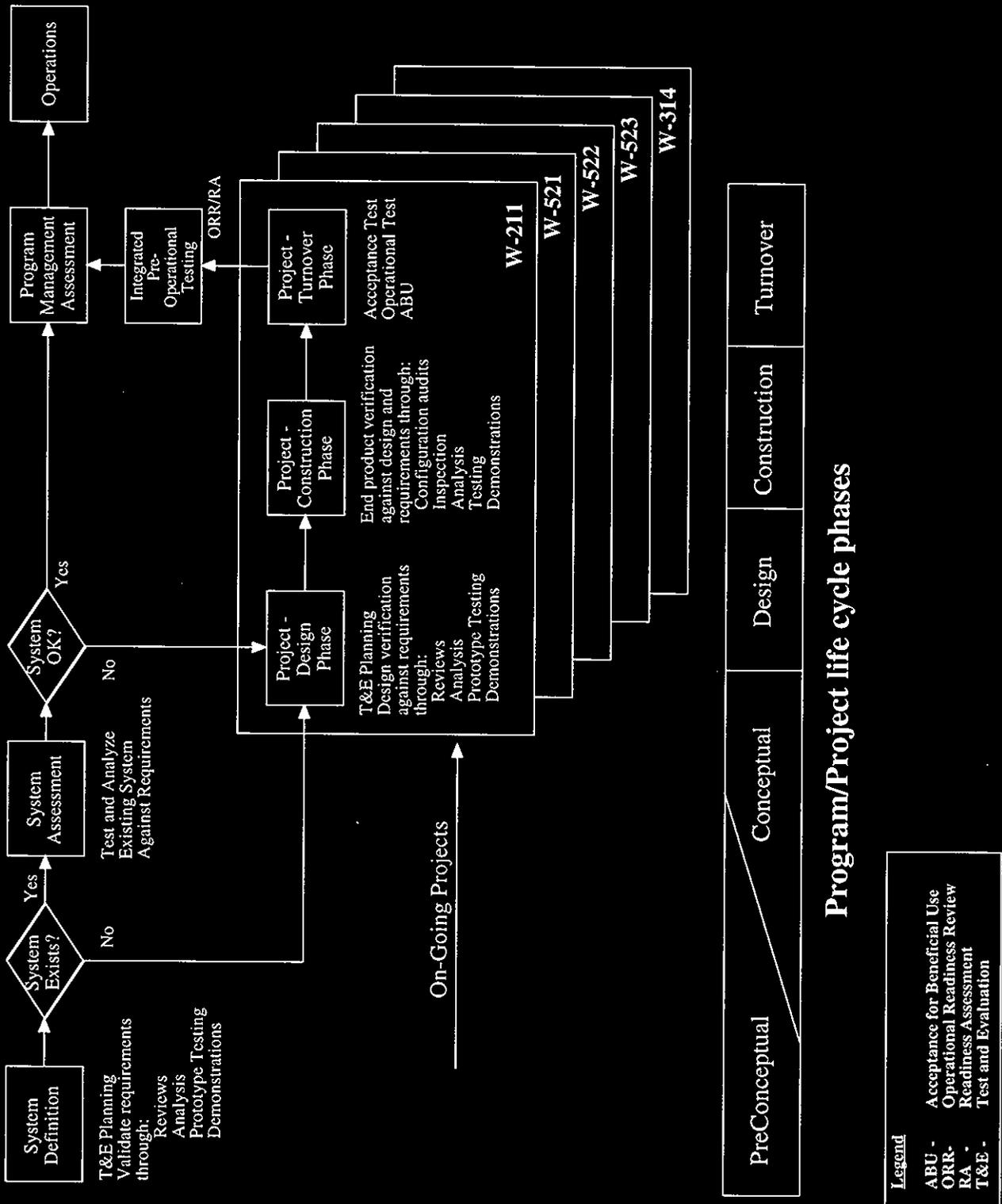
WFD Program will perform integrated pre-operational testing to ensure the system is ready to provide the necessary quality and quantity of feed is delivered on schedule. WFD will develop an integrated pre-operational test plan to document the approach, schedule, required resources and other pertinent data.

As a final integration and verification check, WFD will perform a program level Management Assessment on the system required to deliver High Level Waste and Low Activity Waste feed. This will ensure the separate projects; activities, etc have been integrated, have the necessary operability and sustainability characteristics and are ready to perform the activities.

The WFD T&E approach will implement the range of T&E verification methodologies through design and end product verification, including the following:

- Reviews
- Inspection
- Analysis
- Testing
- Demonstration
- Configuration audits.

Figure 2. Waste Feed Delivery Test and Evaluation Activities by Phase.



Verification methods are selected based on the following considerations:

- The method that can be applied as early as possible in the project life-cycle to demonstrate compliance
- The method or combination of methods most effective for demonstrating compliance
- The method that is representative and repeatable
- The method that most effectively reduces risk.

Reviews will be performed by a qualified individual or a qualified group of individuals by evaluating the documentation to verify the requirements or design satisfies the criteria. The *WFD Program Systems Engineering Implementation Plan* (O'Toole 1998) defines the roles and responsibilities for reviews.

Inspection will be used where physical examination of the design or the article is sufficient to determine whether the design or end product complies with the requirement.

WFD will use analysis extensively to verify the system will be able to complete the mission. Modeling and simulation will be used to perform many of these system analyses. Models include the Hanford Tank Waste Operations Simulator (HTWOS) and the Environmental Simulation Program. WFD will validate models used as a T&E method to ensure the models are accurate and complete. WFD plans to validate the operational waste volume projection portion of the HTWOS model during FY 1999. The balance of the model will be validated later. Other models will be validated using a graded approach. Grading factors include the model's importance to the program and model complexity.

WFD will perform testing and conduct demonstrations to resolve specific issues and verify specific requirements. One example is the planned dilution/dissolution testing to verify the waste properties. Testing will also be performed to prove out equipment capabilities in new environments. One example is testing to determine the tank waste sludge mobilization performance by 241-AZ-101 Process Test.

Configuration audits will be used to verify the documentation and end products match the approved design media.

In addition to system verification, the WFD T&E approach will use the results from tests and analyses to support risk analysis as described in Section 9.0. For example, the *Tank Waste Remediation System Operations and Utilization Plan* (TWRSO&UP) (Kirkbride et al. 1999) and supporting HTWOS modeling activities will be used to verify the time dependent availability of High-Level Waste (HLW) feed as part of a risk mitigation action. The 241-AZ-101 Process Test results will be used in risk mitigation. The primary Low-Activity Waste (LAW) feed delivery functions will be tested on the first salt slurry source tank, AN-104.

Table 1 is an initial listing of the currently planned WFD T&E activities and the associated Technical Basis Review (TBR).

Table 1. Waste Feed Delivery Test and Evaluation Activities.

T&E Activity	TBR Title	TBR Number
Program management assessment	Perform RPP management assessment of overall readiness to proceed for supplying HLW feed to BNFL	160.A18
Program management assessment	Perform RPP management assessment of overall readiness to proceed for supplying LAW feed to BNFL	130.B65
HTWOS validation	Maintain RPP Operations and Utilization Plan	150.B22
Waste dilution/dissolution testing	Establish dilution requirements and dissolution behavior for 241-AN-107	120.K10
Waste dilution/dissolution testing	Establish dilution requirements and dissolution behavior for 241-AW-101	120.G10
Mixer pump performance	241-AZ-101 Process Test	110.070
First salt slurry tank source tank waste feed functionality test	Degas 241-AN-104	130.E10

HTWOS = Hanford Tank Waste Operations Simulator
RPP = River Protection Project
T&E = Test and Evaluation
TBR = Technical Basis Review.

11.0 PERFORMANCE REQUIREMENTS

The technical and operational performance requirements for the WFD system are defined by the *System Specification for the Double-Shell Tank System* (Grenard 1998). As the DST Specification is updated, this document will be revised to maintain consistency of requirements. A subset of these requirements has been identified as key measures for the Technical Performance Measurement (TPM) activity. The TPM process uses these measures to trend system performance over time, providing management insight into the progress of system development. Selected key performance requirements include:

- The system shall be capable of producing and delivering at least 1100 units of Low Activity Waste in any given year during Phase 1. (DST Specification reference 3.2.1.3.e)

- The system shall be capable of producing and delivering enough HLW feed to fill 120 canisters per year, as defined by Specification 12, *Number of HLW canisters per batch of Envelope D* (see DE-RP06-96RL13308, A00)(DST Specification reference 3.2.1.4.e)
- Ability to meet Envelope A, B, C & D waste constituents (DST Specification reference 3.2.1.3.a and 3.2.1.4.a)(Chemical composition tables omitted-see the specification)
- The integrated schedule risk associated with reliability, availability, and maintainability of the total hardware and operating and maintenance system used to accomplish preparation and transfer of feed batches shall not exceed 2 days per batch (To be refined) (DST Specification reference 3.2.5.1)

The T&E matrix (see Appendix B) contains a complete list of the DST requirements.

12.0 ACCEPTANCE CRITERIA

The acceptance criteria for each performance criterion will be specified in the specific test procedures for the item being verified.

13.0 DATA MANAGEMENT

The data management strategy for the WFD T&E program, including how data will be collected, recorded, and controlled will follow the TWRS configuration management procedures and the Hanford document control system. TPM will be used to provide trend information to WFD management for key parameters relating to timeliness, quantity and quality of delivered waste feed.

14.0 TESTING AND EVALUATION MATRIX

The T&E matrix included as Appendix B maps the requirements from *System Specification for the Double-Shell Tank System* (Grenard 1998) to the selected design verification method. Future revisions of the WFD T&E matrix will include information on the:

- Design verification method TBR reference
- Design verification test procedure reference

- End product verification method
- End product TBR reference
- End product test procedure reference.

The Phase 1 Single-Shell Tank specification requirements applicable to WFD will be included in future revisions of this document.

The *System Specification for the Double-Shell Tank System* (Grenard 1998) requirement set was included in its entirety, but those requirements which are the responsibility of Tank Waste Operations are “grayed” out and the verification method noted as Not Applicable – Operations (N/A-Ops). This separation of responsibility for the DST requirements between WFD and Tank Waste Operations is not finalized. Future revisions of this document will include updates to the matrix.

15.0 REFERENCES

- Gibson, E. R., 1999, *TWRS Administrative Manual*, HNF-IP-0842, Fluor Daniel Hanford, Inc., Richland Washington
- Grenard, C. E., 1998, *System Specification for the Double-Shell Tank System*, HNF-SD-WM-TRD-007 Rev. E, Lockheed Martin Hanford Company, Richland, Washington
- Kirkbride, R. A., 1999, G. K. Allen, R. M. Orme, R. S. Wittman, J. H. Baldwin, T. W. Crawford, J. Jo, L. J. Fegestrom, T. M. Hohl, and D. L. Penwell, *Tank Waste Remediation System Operations and Utilization Plan*, HNF-SD-WM-SP-012, Rev. 1, Numatec Hanford Corporation, Richland, Washington
- O'Toole, S. M., and B. J. Hendel, 1998, *Waste Feed Delivery Program Systems Engineering Implementation Plan*, HNF-3384, Rev. 0, Lockheed Martin Hanford Corporation, Richland, Washington.
- Skriba, M. C., 1999, *Project Hanford Management Contract Engineering Requirements*, HNF-PRO-1819, Fluor Daniel Hanford, Inc., Richland, Washington.
- Wilson, C. E., 1999, *Tank Waste Remediation System Testing and Evaluation Management Plan*, HNF-2029, Rev. 0, Fluor Daniel Hanford, Inc., Richland, Washington.

APPENDIX A
WASTE FEED DELIVERY MILESTONE SCHEDULE

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Waste Feed Delivery Test and Evaluation Top Level Milestone Schedule.

ID	TASK NAME	1999				2000				2003				2004				2005				2007			
		1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
1	WFD TEP Revision 1				◆																				
2	Integrated Pre-operational Test Plan Revision 0				◆																				
3	AZ-101 Process Test								◆																
4	W-314 Phase 1 Transfer System Upgrades Complete												◆												
5	W-211 First Tank System Complete												◆												
6	HLW Management Assessment Complete																◆								
7	First HLW Feed																								
8	W-521 First Tank System Complete																								
9	LAW Management Assessment Complete																								
10	First LAW Feed																								
11	W-314 Phase 2 Upgrades Complete																								◆

Schedule based on Feed Delivery, Storage, and Disposal Mission Summary for Case 3, Project Planning Phase 1B.

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APPENDIX B
TEST AND EVALUATION MATRIX

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DST Spec Paragraph Number	REQUIREMENT NAME	Design Verification Method ¹
3.2.1.1	Maintain Safe and Compliant Waste within the Double-Shell Tank System	N/A
3.2.1.1.a	Double-Shell Tank System Storage Capacity, Phase 1	N/A- Ops
3.2.1.1.b	Storage Space for Pretreated LAW Received from the LAW/HLW Plant	N/A- Ops
3.2.1.1.c	Evaporator Feed Volume, Phase 1	N/A- Ops
3.2.1.1.1	Store Waste in West Area Double-Shell Tanks	N/A- Ops
3.2.1.1.1.a	West Double-Shell Tank System Storage Capacity, Phase 1	N/A- Ops
3.2.1.1.2	Store Waste in East Area Double-Shell Tanks	N/A
3.2.1.1.2.a	East Double-Shell Tank System Storage Capacity, Phase 1	N/A- Ops
3.2.1.1.2.b	Storage Space for Pretreated LAW Received from the LAW/HLW Plant	N/A- Ops
3.2.1.1.3	Transfer Waste From 204-AR Waste Unloading Facility to East Area Double-Shell Tanks	N/A
3.2.1.1.3.a	204-AR Annual Capacity	N/A- Ops
3.2.1.1.3.b	204-AR Batch Transfer	N/A- Ops
3.2.1.1.3.c	204-AR Transferred Waste Properties	N/A- Ops
3.2.1.1.3.d	Waste Pumpability	N/A- Ops
3.2.1.1.4	Receive New Liquid Waste Into West Area Double-Shell Tanks	N/A
3.2.1.1.4.a	West Area Liquid Waste Annual Capacity	N/A- Ops
3.2.1.1.4.b	Waste Batch Size—West Area	N/A- Ops
3.2.1.1.5	Receive New Liquid Waste into East Area Double-Shell Tanks	N/A
3.2.1.1.5.a	East Area Liquid Waste Annual Capacity	N/A- Ops
3.2.1.1.5.b	Waste Batch Size—East Area	N/A- Ops
3.2.1.1.6	Receive Concentrated Waste from Evaporator	N/A
3.2.1.1.6.a	Annual Volume of Concentrated Waste	N/A- Ops
3.2.1.1.7	Receive Emergency Purge from Evaporator	N/A
3.2.1.1.8	Receive Waste Products from Low-Activity Waste/High-Level Waste and Low-Activity Treatment	N/A
3.2.1.1.9	Receive Pretreated Waste from LAW/HLW Plant, Phase 1	N/A
3.2.1.1.10	Transfer Waste for Concentration	N/A
3.2.1.1.10.a	Evaporator Feed Annual Volume	N/A- Ops
3.2.1.1.10.b	Evaporator Feed Rate	N/A- Ops
3.2.1.1.10.c	Evaporator Feed Requirements	N/A- Ops
3.2.1.1.10.d	Waste Pumpability	N/A- Ops
3.2.1.2	Remove Waste from Double-Shell Tanks, Phase 1	N/A
3.2.1.2.a	Low-Activity Waste Staging Quantity, Phase 1	Anly
3.2.1.2.b	Space Management Annual Waste Volume, Phase 1	N/A- Ops
3.2.1.2.c	Unretrieved Waste Properties	Test
3.2.1.2.1	Prepare Waste in West Area Double-Shell Tanks	N/A
3.2.1.2.1.a	Supernatant Preparation—West Area	Anly
3.2.1.2.1.b	Soluble Waste Preparation—West Area	Test/Anly
3.2.1.2.1.c	Insoluble Waste Preparation—West Area	Test/Anly
3.2.1.2.2	Transfer Waste Between West Area Double-Shell Tanks	N/A
3.2.1.2.2.a	200 West Area Waste Batch Transfer	N/A- Ops
3.2.1.2.2.b	Waste Pumpability	N/A- Ops
3.2.1.2.3	Transfer Waste Cross-Site	N/A

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DST Spec Paragraph Number	REQUIREMENT NAME	Design Verification Method ¹
3.2.1.2.3.a	Cross-Site Waste Transfer Volume	N/A- Ops
3.2.1.2.3.b	Waste Pumpability	N/A- Ops
3.2.1.2.4	Prepare Waste in East Area Double-Shell Tanks	N/A
3.2.1.2.4.a	Supernatant Preparation—East Area	Anly
3.2.1.2.4.b	Soluble Waste Preparation—East Area	Test/Anly
3.2.1.2.4.c	Insoluble Waste Preparation—East Area	Test/Anly
3.2.1.2.5	Transfer Waste Between East Area Double-Shell Tanks	N/A
3.2.1.2.5.a	200 East Area Waste Batch Transfer	N/A- Ops
3.2.1.2.5.b	Waste Pumpability	N/A- Ops
3.2.1.2.6	Transfer Waste to Low-Activity Waste Staging Tanks	N/A
3.2.1.2.6.a	Low-Activity Waste Staging Batch Volumes	Anly
3.2.1.2.6.b	Waste Pumpability	Anly
3.2.1.3	Prepare Low-Activity Waste Feed for Phase 1 Treatment	N/A
3.2.1.3.a	Low-Activity Waste Feed Composition, Phase 1	Anly
3.2.1.3.b	Waste Compatibility	Anly
3.2.1.3.c	Waste Feed Visible Separate Organic Phase	TBD
3.2.1.3.d	Low-Activity Waste Feed, Production Quantities, Phase 1	Anly
3.2.1.3.e	Maximum Annual LAW Feed Delivery	TBD
3.2.1.3.f	Maximum Cumulative LAW Processing Rate	TBD
3.2.1.3.g	Low-Activity Waste Feed Frequency, Phase 1	Anly
3.2.1.3.1	Blend Low-Activity Waste in Low-Activity Waste Staging Tanks	N/A
3.2.1.3.1.a	Low-Activity Waste Staging Batch Size, Phase 1	Anly
3.2.1.3.2	Transfer Low-Activity Waste Supernatants to Vendor Feed Storage	N/A
3.2.1.3.2.a	Low-Activity Waste Feed Batches, Phase 1	Anly
3.2.1.3.2.b	Waste Pumpability	Anly
3.2.1.4	Prepare High-Level Waste Feed for Phase 1 Treatment	N/A
3.2.1.4.a	High-Level Waste Feed Composition, Phase 1	Anly
3.2.1.4.b	Waste Compatibility	Anly
3.2.1.4.c	Waste Feed Visible Separate Organic Phase	TBD
3.2.1.4.d	High-Level Waste Feed, Production Quantities, Phase 1	Anly
3.2.1.4.e	Maximum Annual HLW Feed Delivery	TBD
3.2.1.4.f	Maximum Cumulative HLW Canister Processing Rate	TBD
3.2.1.4.g	High-Level Waste Feed Frequency, Phase 1	Anly
3.2.1.4.1	Prepare High-Level Waste Solids	N/A
3.2.1.4.1.a	High-Level Waste Feed Batch Size, Phase 1	Test/Anly
3.2.1.4.1.b	High-Level Waste Feed Preparation, Phase 1	Test/Anly
3.2.1.4.2	Transfer High-Level Waste Sludge to Low-Activity Waste/High-Level Waste Plant	N/A
3.2.1.4.2.a	High-Level Waste Feed Batch Transfer Volume	Anly
3.2.1.4.2.b	Waste Pumpability	Anly
3.2.3.1	External Waste Generators Using Surface Transport	N/A
3.2.3.1.a	204-AR Waste Receipt Properties	N/A- Ops
3.2.3.1.b	Properties of Waste for Direct Tank Input	N/A- Ops
3.2.3.2	Plutonium Finishing Plant (PFP)	N/A
3.2.3.2.a	Plutonium finishing Plant Waste Annual Volume	N/A- Ops
3.2.3.2.b	Waste Properties	N/A- Ops
3.2.3.3	S Plant	N/A
3.2.3.3.a	S Plant Waste Volume	N/A- Ops
3.2.3.3.b	Waste Properties	N/A- Ops

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3.2.3.4	Waste Encapsulation and Storage Facility (WESF)	N/A
3.2.3.4.a	Waste Encapsulation and Storage Facility Waste Volume	N/A- Ops
3.2.3.4.b	Waste Properties	N/A- Ops
3.2.3.5	Single-Shell Tank System	N/A
3.2.3.5.a	West Single-Shell Tank Salt Well Liquid Waste Volume	N/A- Ops
3.2.3.5.b	East Single-Shell Tank Salt Well Liquid Waste Volume	N/A- Ops
3.2.3.5.c	Waste Properties	N/A- Ops
3.2.3.5.d	Single-Shell Tank Waste Retrieval Volume, Phase 1	N/A- Ops
3.2.3.6	Evaporator	N/A
3.2.3.6.a	Concentrated Waste Receipt Rate	N/A- Ops
3.2.3.6.b	Concentrated Waste Composition	N/A- Ops
3.2.3.6.c	Emergency Transfer Volume from Evaporator	N/A- Ops
3.2.3.7	Phase 1 Low-Activity Waste/High-Level Waste Plant	N/A
3.2.3.7.a	Entrained Solids Total Volume	Anly
3.2.3.7.b	Entrained Solids Batch Volume Requirements	Anly
3.2.3.7.c	Entrained Solids Technetium-99 Content	Anly
3.2.3.7.d	Waste Product Sodium Content	Anly
3.2.3.7.e	Entrained Solids Cesium-137 Content	Anly
3.2.3.7.f	Stability Prevention of Exothermic Reaction	Anly
3.2.3.7.g	Plutonium Content	Anly
3.2.3.7.h	Separable Organics	Anly
3.2.3.7.i	Waste Pumpability	Anly
3.2.3.7.j	Pretreated LAW Radionuclide Concentration Limits	TBD
3.2.3.7.k	Pretreated LAW Sodium Concentration Limits	TBD
3.2.3.7.l	Pretreated LAW Solids Content	TBD
3.2.3.7.m	Radioactive Material Concentration Limits	TBD
3.2.3.8	Central Plateau Electrical System	N/A
3.2.3.8.a	Electrical Power	Anly
3.2.3.9	Central Plateau Water System	N/A
3.2.3.9.a	Water—Phase 1	N/A- Ops
3.2.5.1	Reliability, Availability, Maintainability	Anly
3.2.5.2.1	Design Life	Anly
3.2.6.1	Natural Environments	Anly
3.2.6.2.1	Chemical	Anly
3.2.6.2.2	Radiation	Anly
3.2.7	Transportability	Demo/Anly
3.2.8	Flexibility and Expansion	N/A
3.3	DESIGN AND CONSTRUCTION	Test/Anly
3.3.1.1	Toxic Products and Formulations	Exam
3.3.1.2	Dangerous Waste	Exam
3.3.1.3	Decontamination and Decommissioning	Anly
3.3.1.4	Excess Storage Capacity	N/A- Ops
3.3.2	Electromagnetic Radiation	Exam/Anly
3.3.3	Nameplates and Product Markings	Exam
3.3.5	Interchangeability	Exam/Anly
3.3.6.1.1	Occupational Radiological Protection	Anly
3.3.6.1.2	Occupational Safety and Health Administration (OSHA) Standards	Exam/Anly
3.3.6.2.1	Corrosion Prevention and Control	Anly
3.3.6.2.1.1	Allowable DST Corrosion	Anly
3.3.6.2.2	Tank Temperature Limits	Anly

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DST Spec Paragraph Number	REQUIREMENT NAME	Design Verification Method ¹
3.3.6.2.3	DST Pressure Limits	Anly
3.3.6.2.4	Dome Loading	Anly
3.3.6.2.5	Tank Hydrostatic Load	N/A- Ops
3.3.6.2.6	Fire Protection	TBD
3.3.6.3.1	Secondary Containment and Leak Detection	Exam/Demo Anly
3.3.6.3.2	Spill Prevention and Controls	Anly
3.3.6.3.3	Nonradioactive Airborne Emissions	Demo/Anly
3.3.6.3.4	Radioactive Airborne Emissions	Demo/Anly
3.3.6.3.5	Monitoring of Liquid Effluent Discharges to the Environment	Demo/Anly
3.3.6.3.6	Radiation Protection Of The Public and Environment	Anly
3.3.6.3.7	Flammable Gas Design Requirements	Anly
3.3.7	Human Engineering	Exam/Anly
3.3.8.1	Criticality Safety	Anly
3.3.8.2	Nuclear Safety Classification	Anly
3.3.9.1	General System and Information Security	Exam
3.3.9.2	Radiation Area Security	Exam
3.4	DOCUMENTATION	Exam
3.5.1	Maintenance and Operation	Anly
3.5.1.1	Calibration	Exam
3.5.2	Transportation of Hazardous Materials	Exam
3.5.3.1	Solid Waste Acceptance Criteria	Anly
3.5.4.1	Liquid Effluent Discharges to the Effluent Treatment Facility (ETF)	Anly
3.6	PERSONNEL AND TRAINING	N/A
3.9	QUALIFICATION	N/A

Anly = Analysis

Demo = Demonstration

Exam = Examination

N/A = Not applicable

N/A-Ops = Not applicable-Operations (see Section 14 for explanation)

TBD = To be determined.

¹ Cells with TBDs will be resolved in future revisions of this document as the WFD T&E planning matures.

DISTRIBUTION SHEET

To Distribution	From S. M. O'Toole, LMHC	Page 1 of 1
Project Title/Work Order Waste Feed Delivery Test and Evaluation Plan, HNF-4599, Revision 0		Date 8/5/99
		EDT No. 623496
		ECN No.

Name	MSIN	Text With All Attach.	Text Only	Attach./Appendix Only	EDT/ECN Only
Central File	B1-07	x			
DOE Reading Room	H2-53	x			
DIMC	H7-15	x			
S. K. Baker	R3-73	x			
J. F. Bores	R2-89	x			
H. L. Boston	R2-53	x			
C. B. Bryan	R2-58	x			
A. B. Carlson	R3-73	x			
P. J. Certa	R3-73	x			
A. F. Choho	R3-47	x			
T. J. Conrads	H5-25	x			
R. A. Dodd	R3-72	x			
J. S. Garfield	R3-73	x			
C. E. Grenard	R3-74	x			
P. A. Haine	R3-47	x			
D. M. Hammond	R1-44	x			
B. J. Hendel	B1-45	x			
J. L. Homan	R3-72	x			
F. A. Jensen	R3-75	x			
J. W. Lentsch	R3-25	x			
M. J. O'Neill	R3-75	x			
S. M. O'Toole	R2-89	x			
L. G. Peck	H7-06	x			
R. D. Potter	R3-73	x			
R. W. Powell	R3-75	x			
W. T. Thompson	R3-73	x			
R. L. Treat	R3-75	x			
J. E. Van Beek	S2-48	x			
J. M. Vann	H6-37	x			
C. E. Wilson III	H7-06	x			