



U.S. Department of Energy
Office of River Protection

0057142

P.O. Box 450
Richland, Washington 99352

02-REQ-024

MAY 06 2002

Mr. Michael A. Wilson, Program Manager
Nuclear Waste Program
State of Washington
Department of Ecology
1315 W. Fourth Avenue
Kennewick, Washington 99336

RECEIVED
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EDMC

Dear Mr. Wilson:

FEDERAL FACILITY AGREEMENT AND CONSENT ORDER INTERIM MILESTONES M-46-00I, ASSUMPTIONS REQUESTED FOR THE STATE OF WASHINGTON DEPARTMENT OF ECOLOGY (ECOLOGY) WASTE VOLUME PROJECTION CASE, RESPONSE DUE BY: MAY 17, 2002

Milestone M-46-00 states, "A tank volume projection report shall be submitted on an annual basis to Ecology and EPA. This report shall include discussions covering all assumptions that form the basis of the projection." This report is due by September 30 of each year. The tank volume projection report historically includes three projection cases meant to present a range of projected tank needs, which is used to generate recommendations regarding site activities, waste management activities, facility requirements, and the need to build additional Double-Shell Tanks. The 2001 submittal combined M-46-00 deliverable with the M-45-02 Single-Shell Tank Retrieval Sequence deliverable. The U.S. Department of Energy, Office of River Protection (ORP) intends to continue this approach.

For the past several years, ORP established the assumptions to be used for two of the projection cases and Ecology has been requested to supply assumptions for the third projection case. The purpose of this protocol is to receive input from Ecology on one of the projection cases so that the completed document is more meaningful to both agencies. In order to meet the 2002 milestone, ORP requests Ecology to supply assumptions for the third projection case by May 17, 2002. The attachment lists the assumptions used for the 2001 Ecology Case and includes a blank column that can be used to enter assumptions for the 2002 Ecology Case.

Written responses, as well as any questions on the information requested, should be directed to Joe Cruz, Requirements Division, (509)-372-2606.

Sincerely,

James E. Rasmussen, Director
Environmental Management Division

REQ: EJC

Attachment

cc: See page 2

15200
Mr. Michael A. Wilson
02-REQ-024

-2-

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cc w/attach:

P. Peistrup, BNI
K. B. Adamson, CHG
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TPA Administrative Record

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**A1.0 Assumption Matrix For the 2001 Single-Shell Tank Retrieval Sequence
and Double-Shell Tank Space Evaluation**

Assumption	2001 Ecology Case	2002 Ecology Case
Brief Description	<p><u>Risk-based SST Retrieval Completion by 2018 (Ecology Case)</u> SST Retrieval Sequence FY 2001 Update complies with M-45-00B milestone to retrieve high risk tanks early. SST retrieval completed per M-45-05. M-45-05-T05 through M-45-05-T09 not constraining.</p> <p>Waste treatment complete in 2028; Balance of Mission starts 10/1/2017. Tank space options save 3 million gallons of space by 2011. All retrieved SST wastes are concentrated. Salt well liquid pumping complete 2004 to meet Consent Decree milestones.</p>	
Date that BBI Quarterly Update was issued	September 30, 2000 with adjustments for historical transfers through 5/31/2001	
Mission Summary Diagram -Schedule float -Transfer window	None modeled explicitly Two months	
<u>Total Limit</u>	20-52 Kgal/year	
<u>PUREX</u> Yearly Rate	5 Kgal/year	
<u>B Plant</u> Yearly Rate	No wastes anticipated	
<u>WESF</u> Yearly Rate	No wastes anticipated	
<u>222-S Laboratory</u> Yearly Rate Flush for misc. waste WVRF	10 Kgal/year 22% 99%	
<u>T Plant</u> Yearly Rate (FY 2001) Yearly Rate (FY 2002 on) Flush for misc. waste WVRF	19 Kgal/year 4 to 19 Kgal/year 22% 99%	
<u>300 Area</u> Yearly Rate Flush for misc. waste WVRF	1 to 28 Kgal/year 44% 94%	
<u>400 Area</u> Yearly Rate	No wastes anticipated	

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Assumption	2001 Ecology Case	2002 Ecology Case
<u>WSCF</u> Yearly Rate	No wastes anticipated	
<u>PFP Stabilization</u> Not calculated in Yearly Avg. Dates Total volume Flush WVRF	2001-2005 35 Kgal total 22% 81%	
<u>100 Area</u> 100-N Volume, Kgal ----- 100-K Basin Cleanout Volume, Kgal ----- 105-F & 105-H Basin Volume, Kgal	No wastes anticipated ----- No wastes anticipated ----- No wastes anticipated	
<u>Tank Farms</u> Yearly Rate WVRF	120 Kgal/year 99%	
<u>IMUST Wastes</u> Total Volume (2011-15)	500 Kgal total	
<u>Caustic Addition, Kgal</u> Tank AY-101 (FY 2001) Tank AY-102 (FY 2001) Tank AN-102 (FY 2001) Tank AN-107 (FY 2001)	45 (8 M NaOH) + flush 72 (8 M NaOH) + flush 19 (19 M NaOH) + flush 60 (19 M NaOH) + flush	
<u>SST Interim Stabilization</u> Volume remaining on 9/30/2000 Volume remaining on 6/24/2001 West Area Receiver Pumping Completion, FY Porosity saltcake/sludge Dilution/Flush for Pumping WVRF, non-complexed WVRF, complexed	~2.6 Mgal ~2.3 Mgal Tank SY-102 2004 25%/15% 28-275% 47% 10%	
<u>Evaporator</u> 242-A Shutdown New Evaporator Available Next Outage Date Training Vol. (bi-yearly) Average Evaporation Rate Evaporation Limit (g/ml) LERF capacity Gal. Condensate/gal. WVR Interval between campaigns Yearly evaporation of dilute waste	After all SST wastes are evaporated Balance of mission 6 month Outage each year in 2002 - 2004 50 Kgal 500 Kgal/month 1.41 g/ml 7.8 Mgal 1.15 4 months minimum Yes	
<u>Effluent Treatment Facility</u> Total treatment capacity Rate for evaporator condensate	24 Mgal/year 5 Mgal/year	

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Assumption	2001 Ecology Case	2002 Ecology Case
<u>Emergency Space/LAW or HLW Waste Return Space</u> Emergency Space LAW or HLW Return Space Contingency space	1.14 Mgal 1.14 Mgal None	
<u>Waste Segregation/DST Solids</u> Total DST solids Store DSSF on NCRW solids Store DSSF on NCAW solids Segregate Complexed wastes	~4 Mgal Yes No If Possible	
<u>Loss of DST Space</u> Number tanks removed from service through the Initial Quantity Number tanks removed from service in balance of mission	None No DST failures or replacements assumed	
<u>Tank Space Options Incorporated (M-45-12-T01 options)</u>	Tank space options save 3 million gallons of space to accelerate SST retrieval. Options used --increase tank fill limits, decrease dedicated operational space, and evaporation of some DST and all retrieved SST wastes to a specific gravity of 1.4.	
AW-B Pit work (W-314), start date - operational date	4/2001 - 12/2001	
AW-A Pit work (W-314)	6/30/2001 - 10/1/2002	
AN-101-01A and AN-104-04A Pit work (W-314)	6/2001 - 10/2002	
241-A-A Pit work outage (W-314)	3/2004 - 2/2005	
AN Farm Outage (W-314)	10/1/2001 - 7/2003	
AP Farm Outage (W-314)	10/2002 - 6/2004	
Cross-site line outage connects cross-site to AN farm (W-314)	2/1/2003 - 1/1/2004	
Cross-site to AP farm (W-211)	7/1/2002-6/30/2005	
AW Farm Outage (W-314)	10/2003 - 2/2005	
SY Farm Outage (W-314)	11/2003 - 9/2004	
244-S Outage (W-314) - 222-S direct routed to SY farm after 6/30/2005 - PFP can no longer use 244-S after 6/30/2005	6/2004 - 6/2005	
LAW Feed Delivery Sequence and Envelope Designation	<u>Source Tank (Envelope)</u> AP-101 (A) AZ-101 (B) AZ-102 (B) AN-102 (C) AN-104 (A) AN-107 (C) AN-105 (A) SY-101 (A) AN-103 (A) AW-101 (A) AW-103 (A) (liquid portion of AW-103 is	

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Assumption	2001 Ecology Case backup)	2002 Ecology Case
Initiate LAW Hot Commissioning	12/31/2007	
Initial Quantity Certification Sampling	<ul style="list-style-type: none"> • 270 days to certify a feed batch (HTWOS will adjust to maintain WTP operation) • Cannot complete certification more than 720 days before delivery. • Backup tanks do not need to be recertified after 720 days if contents have not changed. 	
Ready to deliver first batch	9/1/2005	
First LAW Delivery	Start date - Finish date 11/1/2007 - 12/31/2007	Start date - Finish date
LAW staging dates Source 1 Source 2 Source 3 Source 4 Source 5	AP-101(11/1/2007) NCAW Supernate (12/2007) AN-102 (4/2011) AN-104 (10/2013) AN-107 (10/2014)	
Backup Feed Strategy	Identify one tank as backup. No rolling backup required.	
Intermediate Feed Staging Tanks	AN-101, AN-102, AN-105, AP-104, AP-101	
WTP Feed Tanks	WTP provides space	
Pretreated NCAW Receipt Tanks	WTP provides space	
Entrained Solid Receipt Tanks	WTP provides space	
Proposed Waste Staging Actions	<ul style="list-style-type: none"> - Transfer SY-103 to AN-104 after delivery of LAW Batch 6 (the dissolved solids batch in AN-104) - Transfer SY-101 to AP-102 in late 10/02 	
Pretreatment Durations	<ul style="list-style-type: none"> • The difference between delivery date and facility ramp up date for first LAW batch and first two HLW batches. • One month for remainder of batches. 	
LAW Process Annual Capacity	1,100 Units per year average processing rate	
LAW Melter Design Capacity	To be determined from analysis of results.	
LAW Process TOE	60% TOE.	
Target LAW Pretreatment Hot Commissioning Schedule	Included in Ramp Up	
Target LAW Vit. Hot	Included in Ramp Up	

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Assumption	2001 Ecology Case	2002 Ecology Case														
Commissioning Schedule																
LAW Hot Commissioning Production	Included in Ramp Up															
LAW Treatment Ramp Up	<u>From - To</u> <u>Units LAW</u> 12/31/07-12/31/09 300 total 12/31/09-2/28/18 1,100/year Rate for Balance of Mission to be determined by projection.	<u>From - To</u> <u>Units LAW</u>														
WTP Sulfate Removal	None															
ILAW Na ₂ O Loading	[wt% Na ₂ O][wt% SO ₃] < 5 and Na ₂ O < 20 wt%															
LAW Feed Receipt Tank Usage	1.5 Mgal Total Capacity; be capable of receiving 1 Mgal without interruption while feeding out of the remaining 0.5 Mgal															
HLW Feed Delivery Sequence and Retrieval Efficiency	<table border="0"> <thead> <tr> <th><u>Source Tank</u></th> <th><u>Retrieval Efficiency</u></th> </tr> </thead> <tbody> <tr> <td>AZ-101</td> <td>90%</td> </tr> <tr> <td>AZ-102</td> <td>80%</td> </tr> <tr> <td>AY-102</td> <td>90%</td> </tr> <tr> <td>C-104/AY-101</td> <td>85%/95%</td> </tr> <tr> <td>SY-102</td> <td>80%</td> </tr> </tbody> </table> Proposed Post-Initial Quantity Feeds C-107/ Portion of AW-103 AW-104/ Portion of AW-103	<u>Source Tank</u>	<u>Retrieval Efficiency</u>	AZ-101	90%	AZ-102	80%	AY-102	90%	C-104/AY-101	85%/95%	SY-102	80%	<table border="0"> <thead> <tr> <th><u>Source Tank</u></th> <th><u>Retrieval Efficiency</u></th> </tr> </thead> <tbody> </tbody> </table>	<u>Source Tank</u>	<u>Retrieval Efficiency</u>
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AZ-102	80%															
AY-102	90%															
C-104/AY-101	85%/95%															
SY-102	80%															
<u>Source Tank</u>	<u>Retrieval Efficiency</u>															
Ready to Deliver First Batch	4/1/2006															
First HLW Delivery	Start date - Finish date 11/1/2007 - 12/31/2007	Start date - Finish date														
Contingency Feed	Identify sufficient feed sources to provide 20% extra.															
Backup Feed Strategy	Identify one tank as backup. No rolling backup required.															
Initiate HLW Vitrification Services (full capacity)	12/31/2009															
HLW Process Annual Capacity	120 canisters/yr															
HLW Melter Design Capacity	1.5 MT glass/d															
HLW Process TOE (implied)	67%															
HLW Treatment Ramp Up	<u>From - To</u> <u>Cans HLW</u> 12/31/07-12/31/09 60 cans total 12/31/09-2/28/18 120 cans/yr Rate for Balance of Mission to be determined by projection.	<u>From - To</u> <u>Cans HLW</u>														
Method for Estimating HLW Waste Oxide Loading	Glass Properties Model															
HLW Feed Receipt Tank Usage	Sufficient space to hold feed for 60 days of operation and receive 600 m ³ without interruption															

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Assumption	2001 Ecology Case	2002 Ecology Case
Number of SSTs Retrieved	149	
Retrievable Sludge Volume	12.2 Mgal	
Retrievable Saltcake Volume	23.4 Mgal	
Early Retrieval Sequence and Durations	<p>C-106: Completed FY 1999.</p> <p>U-107 Saltcake Dissolution Proof of Concept: Start: approximately 7/27/01, 49 d (approximately 105 kgal total will be retrieved into the DST system)</p> <p>S-112: Start: 10/1/04, 196 d</p> <p>S-102: Start: 1/3/06, 69 d</p> <p>C-104: Start: 1/16/08, 185d</p> <p>Continues risk based sequence.</p>	
SST TPA Milestone Dates	<p>M-45-03C: Complete retrieval technology demonstration of S-112, 9/30/05.</p> <p>M-45-05A: Complete initial waste retrieval of S-102, 9/30/06.</p> <p>M-45-03F: Complete retrieval technology demonstration of C-104, TBE by 2/28/2004.</p> <p>M-45-05: Retrieve waste from all remaining single-shell tanks, 9/30/2018. Meets all TPA milestones except for M-45-05-T05 through T09.</p>	
Basis for Rest of SST Retrieval Sequence	<p>Risk based sequencing using groundwater and airborne risk measures to prioritize retrievals. Use the requirement to keep the processing plants operating to balance between the groundwater risk measure and the airborne risk measure.</p>	
Problematic Tanks Requiring a Specific Disposition Strategy	A-105, A-104, AX-104, SX-115, C-202	
Tanks to be moved to the Residuals Group in closure Program	U-101, T-103, BX-108, TY-106, T-106, B-201, B-202, T-201, T-202, U-201, U-202, U-203, U-204, C-201, C-203, C-204	
High sulfate content	BY-102, BY-109, BY-111, TX-112, TX-113 are retrieved at end of SST sequence.	
WRF Availability Dates	WRF need dates will be accelerated to meet waste retrieval requirements.	
Availability Dates for Tank Farms Upgrades	Tank farm upgrades will be accelerated as required to allow completion of retrieval by the 2018 deadline.	
Simultaneous retrieval	Number of simultaneous retrievals required will be determined during the projection but could exceed the number required for	

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Assumption	2001 Ecology Case	2002 Ecology Case
	Case 2.	
Complete Waste Treatment	By end of 2028	
Balance of Mission Annual Design Capacities	120 MT LAW glass/d 12 MT HLW glass/d (as necessary to complete processing by 2028)	MT LAW glass/d MT HLW glass/d
Balance of Mission TOE (implied)	LAW = 85%, HLW = 85%	
Balance of Mission Annual Average Capacities	102 MT LAW glass/d (design*TOE) 10.2 MT HLW glass/d	MT LAW glass/d (design*TOE)
Balance of Mission Pretreatment Start Date	10/1/17	
Balance of Mission LAW Vitrification Start Date	3/1/18	
Balance of Mission HLW Vitrification Start Date	3/1/18	
Method for Estimating HLW Glass Waste Oxide Loading	Glass Properties Model	
ILAW Na ₂ O Loading	20 wt%Na ₂ O	
Sulfate Removal	None	
Cs and Sr Capsule Processing Start Date	March 2018	
Duration to Process Cs and Sr Capsules	5 years (the first five years of Balance of Mission)	
Slurry Transfer Limitations	Stage solids through AZ, AY, and AN farms. After retrieving HLW solids from AP and AW farms, no HLW solids will be staged in AP or AW farm tanks.	
ILAW Package Assumptions	1.22 m dia. X 2.28 m	
ILAW Glass Density	2.66 MT/m ³	
ILAW Package Net Mass	6.0 MT	
ILAW Facility Availability Dates (Project W-520)	1/31/07	
ILAW Product Shipment Starts When WTP Storage is X% Full	50	
Design Capacity for Interim ILAW Storage, Packages	450	
IHLW Canister Assumptions	0.61 m diameter X 4.5 m	
IHLW Glass Density	2.66 MT/m ³	
IHLW Canister Net Mass	3.06 MT	
IHLW Facility Availability Dates (Project W-464)	2/01/07	
IHLW Product Shipment Starts When WTP Storage is X% Full	50	
Design Capacity for Interim IHLW Storage, Canisters	45	

Assumption	2001 Ecology Case	2002 Ecology Case
<p>Notes:</p> <ul style="list-style-type: none">BBI = Best Basis InventoryBalance of Mission--period following Initial Quantity processingDST = double-shell tankHLW = high-level wasteIHLW = immobilized high-level wasteILAW = immobilized low-activity wasteIMUST = inactive miscellaneous underground storage tanksLAW = low-activity wasteLERF = Liquid Effluent Retention FacilityNCAW = neutralized current acid waste		