S

ENGINEERING CHANGE NOTICE

Page 1 of 2

1. ECN 670909

Proj. ECN

2. ECN Category (mark one)	3. Originator's Name, Organization, MSIN, and Telephone No.	4. USQ Required?	5. Date
Supplemental ☐ Direct Revision ☒ Change ECN ☐ Temporary ☐ Standby ☐ Supersedure ☐ Cancel/Void ☐	Leela M. Sasaki, Data Development and Interpretation, R2-12, 373-1027	☐ Yes ☒ No	10/19/01
	6. Project Title/No./Work Order No. Accelerated Best-Basis Inventory Baselining Task	7. Bldg./Sys./Fac. No. N/A	8. Approval Designator N/A
	9. Document Numbers Changed by this ECN (includes sheet no. and rev.) RPP-7625, Rev. 1	10. Related ECN No(s). N/A	11. Related PO No. N/A

12a. Modification Work	12b. Work Package No.	12c. Modification Work Completed	12d. Restored to Original Condition (Temp. or Standby ECNs only)
☐ Yes (fill out Blk. 12b) ☒ 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 ☒ No

This ECN is removes section 4, 5, and 6 from Rev. 1 and modifies Section 7 (now section 4).

14a. Justification (mark one)	14b. Justification Details
Criteria Change ☒ Design Improvement ☐ Environmental ☐ Facility Deactivation ☐ As-Found ☐ Facilitate Const. ☐ Const. Error/Omission ☐ Design Error/Omission ☐	These changes are required to update the document and incorporate changes and clarifications to the BBI creation rules.

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

See Attached Distribution.

RELEASE STAMP

DATE: OCT 19 2001 HANFORD RELEASE STA: 4 ID: 2

A-7900-013-1

A-7900-013-2 (10/97)

ENGINEERING CHANGE NOTICE

1. ECN (use no. from pg. 1): ECN-670909

16. Design Verification Required	17. Cost Impact				18. Schedule Impact (days)	
	ENGINEERING		CONSTRUCTION			
☐ Yes	Additional ☐	$	Additional ☐	$	Improvement ☐	
☒ 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	☐		☐

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.	L. M. Sasaki L M Sasaki	10/19/01	PE		
Cog. Mgr.	J. G. Field J G Field	10/19/01	QA		
QA			Safety		
Safety			Design		
Environ.			Environ.		
Other			Other		

DEPARTMENT OF ENERGY

Signature or a Control Number that tracks the Approval Signature

ADDITIONAL

DISTRIBUTION SHEET

To	From	Page 1 of 2
Distribution	Data Development & Interpretation	Date 10/19/2001
Project Title/Work Order		EDT No. N/A
RPP-7625, Rev. 2, "Accelerated Best-Basis Inventory Baselining Task"		ECN No. ECN-670909

Name	MSIN	Text With All Attach.	Text Only	Attach./ Appendix Only	EDT/ECN Only
CH2M HILL Hanford Group, Inc.					
M. R. Adams	R2-12	X			
J. N. Appel	R2-12	X			
K. M. Bowen	R2-12	X			
J. M. Conner	R2-11	X			
J. G. Douglas	R2-12	X			
E. J. Farris	R2-12	X			
J. G. Field	R2-12	X			
L. A. Fort	R2-11	X			
D. C. Hedengren	R3-73	X			
N. L. Hulse	R2-12	X			
J. W. Hunt	R2-12	X			
L. Jensen	R2-12	X			
T. L. Lauricella	R2-12	X			
S. G. McKinney	T6-12	X			
A. N. Naiknimbalkar	R2-12	X			
D. M. Nguyen	R2-12	X			
J. H. Rasmussen	R2-12	X			
L. M. Sasaki	R2-12	X			
A. M. Templeton	R2-12	X			
S. R. Wilmarth	R2-12	X			
T.C.S.R.C.	R1-10	H X			
Los Alamos Technical Associates					
B. J. Cook	R2-12	X			
J. A. Edwards	R2-12	X			
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J. Stults	R2-12	X			
Lockheed Martin Services, Inc.					
Central Files	B1-07	X			

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Name	MSIN	Text With All Attach.	Text Only	Attach./ Appendix Only	EDT/ECN Only
Numatec Hanford Corp.					
B. A. Higley	R3-73	X			
S. L. Lambert	R3-73	X			
D. E. Place	R3-73	X			
Office of River Protection					
DOE Reading Room	H2-53	X			
Pacific Northwest National Laboratory					
S. F. Bobrowski	K7-28	X			

Accelerated Best-Basis Inventory Baselining Task

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U.S. Department of Energy Contract DE-AC27-99RL14047

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RECORD OF REVISION	(1) Document Number RPP-7625	Page 1

(2) Title

Accelerated Best-Basis Inventory Baselining Task

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RPP-7625
Revision 2

ACCELERATED BEST-BASIS INVENTORY BASELINING TASK

L. M. Sasaki
CH2M HILL Hanford Group, Inc.

Date Published
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APPENDIX B: BBI BASELINING FORMAT/PROTOCOL REVIEWER CHECKLIST B-1

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LIST OF TERMS

AMU	atomic mass unit
BBI	Best-Basis Inventory
BBIM	Best-Basis Inventory Maintenance tool
cm^2	square centimeter
DST	double-shell tank
g/mL	grams per milliliter
GEA	gamma energy analysis
HDW	Hanford Defined Waste
ICP	inductively coupled plasma
ICP/AES	inductively coupled plasma/atomic emission spectroscopy
ICP/MS	inductively coupled plasma/mass spectrometry
ID	identification
kg	kilogram
kgal	kilogallon
kL	kiloliter
ppm	parts per million
QC	quality control
SACS	Surveillance Analysis Computer System
SST	single-shell tank
TCD	Tank Characterization Database
TCR	Tank Characterization Report
TIC	total inorganic carbon
TIR	Tank Interpretative Report
TOC	total organic carbon
TWINS	Tank Waste Information Network System
vs.	versus
vol%	volume percent
wt%	weight percent
%	percent

LIST OF TERMS, Continued

µCi/g	microcuries per gram
µCi/L	microcuries per liter
µg/g	microgram per gram
µg/L	microgram per liter

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ACCELERATED BEST-BASIS INVENTORY BASELINING TASK PLAN

1.0 BACKGROUND

The baselining effort was recently proposed to bring the Best-Basis Inventory (BBI) and Question #8 of the Tank Interpretive Report (TIR) for all 177 tanks to the current standards and protocols and to prepare a TIR Question #8 if one is not already available. This plan outlines the objectives and methodology of the accelerated BBI baselining task.

BBI baselining meetings held during December 2000 resulted in a revised BBI methodology and an initial set of BBI creation rules to be used in the baselining effort.

2.0 OBJECTIVES

The objectives of the BBI baselining effort are to:

- Provide inventories that are consistent with the revised BBI methodology and new BBI creation rules.
- Split the total tank waste in each tank into six waste phases, as appropriate (supernatant, saltcake solids, saltcake liquid, sludge solids, sludge liquid, and retained gas). In some tanks, the solids and liquid portions of the sludge and/or saltcake may be combined into a single sludge or saltcake phase.
- Identify sampling events that are to be used for calculating the BBIs.
- Update waste volumes for subsequent reconciliation with the Hanlon (2001) waste tank summary.
- Implement new waste type templates.
- Include any sample data that might have been unintentionally omitted in the previous BBI and remove any sample data that should not have been included. Sample data to be used in the BBI must be available on TWINS.
- Ensure that an inventory value for each standard BBI analyte is provided for each waste component. Sample based inventories for supplemental BBI analytes will be included when available.
- Provide new means and confidence interval reports if one is not already available and include uncertainties in reporting inventory values.

3.0 DELIVERABLES

Products of the Accelerated BBI Baselining task will be:

- Baselined BBI inventories updated to January 1, 2001 or later and revised TIR Question #8 for all 177 tanks.
- Review and resolution of sample data (TWINS data that, based upon the BBI creation rules, are to be evaluated and either rejected or accepted for the BBI by the tank coordinator or author).
- For liquid samples that gelled or precipitated solids and required reconstitution for use in the BBI, reconstituted sample concentrations.
- For solid samples that required reconstitution from liquid and solid sample analysis, the weight fractions of liquids and solids required for the calculation (also specific gravities and densities if not in TWINS).
- Documentation of new or revised BBI creation rules, including tank specific rules.

4.0 METHODOLOGY

The guidelines for preparing TIR Question #8 and the review checklists (all available on \\AP001\Stdinv and \\AP007\Chardocs) are tools that should be used in the baselining effort. These guidelines and protocols have been discussed during various BBI team meetings and training sessions beginning in fiscal year 1999. The independent review checklist and format/protocol reviewer checklist are also provided in Appendix A and Appendix B, respectively. An outline of the BBI baselining process is provided in Appendix C. Appendix D contains instructions for performing data queries for data review and a checklist for use in reviewing sample analysis results. In addition to these guidelines, several tips on how to prepare BBIs and TIR Question #8 are listed below.

Total Waste Volume Checks

The volumes will be updated to January 1, 2001 or later, if waste transfers to or from the tank have occurred between January 1, 2001 and the time the BBI is prepared. The level readings should be evaluated against other data to confirm that it is the best estimate. In some cases the level reading will not provide the best waste volume estimate due to saltcake ledges, irregular surfaces, waste outside of liner, etc. Sources to consider are:

- Swaney (1993) - discrepancies between Hanlon (2001) and waste level readings
- Hanford Defined Waste (HDW) Model Rev. 4 (Agnew et al. 1997a), page C-74 - Hanlon-Welty Level Discrepancies
- Photographs - available through TWINS3
- Waste Status and Transaction Record Summary (WSTRS) (Agnew et al. 1997b)
- History of the 200 Area Tank Farms (WHC-MR-0132) (Anderson 1990)
- BBI write-ups (TIR Question #8 or Appendix D of the hardcopy TCR)

Waste Phases

Up to six phases are allowed: supernatant, sludge solids, sludge liquid, saltcake solids, saltcake liquid, and retained gas. For some tanks, sludge solids and sludge liquids may be combined into a total sludge phase and saltcake solids and saltcake liquids may be combined into a saltcake phase.

Waste Types

- Only HDW waste types (Agnew et al. 1997a) should be used. The correct text formats are listed in the solids and liquid template files on stdinv.
- The designation of waste types is needed for the generation/selection of non-sample based (E based) concentrations.
- The waste types in the previous BBI do not need to be changed unless there is an obvious error.
- All vectors will be created and radiobutton selections will be done at the waste type level. A waste phase may contain more than one waste type.
- If the HDW waste types no longer apply to a tank (e.g., the supernatant is a mixture of waste from several sources), the waste type field should be left blank. The waste type designations (e.g., DN, DC) from the Waste Tank Summary Report (Hanlon 2000) should not be used.

Interstitial Liquid

- Unless a measured porosity is available from Fort and Ubay (2000), Field (2000), or a stabilization letter, the following average porosities will be assumed: 15 vol% for sludge, 25 vol% for saltcake. Core sample recovery information will not be used for estimating porosity.
- When available, use neutron or gamma monitor data to determine how much of the waste is applicable to the porosity.
- Use the interim stabilization letter for tanks that have been recently saltwell pumped.
- Consult Swaney (2001) for older interim stabilization records.
- For double-shell tanks (DSTs), both sludge and saltcake waste phases will represent the combined liquids and solids unless sample data for the interstitial liquid are available. If sample data are available, the sludge and/or saltcake should be split to the liquids and solids.
- For single-shell tanks (SSTs), treatment of interstitial liquid in sludges will be different from that in saltcakes. The interstitial liquid component will not be separated from the solid component in the sludges. Instead, calculate the interstitial liquid volume using the 15% porosity value and include this volume

only in the text of TIR Question #8. Table 8-1 of TIR Question #8 will show the total sludge volumes.

Means and Confidence Interval Reports

- New means and confidence intervals must be calculated if the original means and confidence intervals were calculated using an older statistical model.

Miscellaneous Tips

- The text of Question #8 should also include the standard verbiage regarding mercury (Higley 2000), if applicable.

4.1 WASTE VOLUME DETERMINATION STEPS

The following provides guidance for the determination of waste volumes in a tank. Waste volume estimates from various sources have been collected and placed in an Excel spreadsheet file for each tank. The files are located at \\AP007\Chardocs\Accelerated BBI Baselining Task\DST Information and \\AP007\Chardocs\Accelerated BBI Baselining Task\SST Information. Table 4-1 provides a list of waste volume information sources.

Steps to determine volumes for tanks, which have been stabilized.

(1) Using the stabilization letter, determine the total solid and liquid volumes. Note the porosity used and the source of this information.

(2) Divide the total solids volume into saltcake and sludge using the relative amounts of each in the below references.

(3) Use the distribution of sludge versus saltcake based on the calculated ratio of analytes and 2.5 cut off as guidance (see also Define Saltcake/Sludge/Composite rules in Section 7.2). This information is available in files located at \\AP007\Chardocs\Accelerated BBI Baselining Task\DST Information\DST Sludge Saltcake Designation based on calc ratio.xls and \\AP007\Chardocs\Accelerated BBI Baselining Task\SST Information\SST Sludge Saltcake Designation based on calc ratio.xls.

(4) For single-shell tanks, Field (2000)

(5) Current BBI

(6) Agnew et al. (1997a)

(7) Anderson (1990)

(8) Apply porosities reported in Fort and Ubay (2000). If the tank is not listed in Fort and Ubay (2000), use Field (2000). Report solid and liquid volumes for each saltcake and sludge.

(9) Verify that the total solid and liquid volumes match the stabilization letter. Resolve any discrepancy.

(10) Divide the solid volumes from Step 3 into saltcake and/or sludge waste types (i.e., S1-SltCk, R1, MW, etc.) using Agnew et al. (1997a), the current BBI, Anderson (1990), etc.

Steps to determine volumes for tanks, which have not been stabilized.

(1) Calculate the total tank waste volume using the most current PCSACS levels (and taking into account the tank bottom shape, i.e., flat versus dish).

   (a) Use Agnew et al. (1997a) and in-tank photos, videotapes, and Swaney (1993) to determine if the surface of the waste may be irregular.

(2) Separate the total solid volume from any supernatant:

(a) Use sludge weight measurements, densitometer readings, and/or core recoveries to determine the level at which solid material was found in the tank.

(b) Use PCSACS and/or the zipcord readings to determine the liquid level in the tank.

(c) Calculate the amount of supernatant as the difference in the two levels (a and b).

(d) For single-shell tanks (SSTs), check Fort and Ubay (2000) and Field (2000)

(e) Check current BBI

(f) Check Agnew et al. (1997a)

(3) Check Mahoney et al. (1999) for the volume of retained gas, if any. If tank is being saltwell pumped, adjust estimate of retained gas volume to account for changes in total saltcake and sludge volume.

(4) Divide the total solids volume (which at this point includes interstitial liquids) into saltcake and sludge using each of the below in order of preference.

(a) Use the distribution of sludge versus saltcake based on the calculated ratio of analytes and 2.5 cut off as guidance (see also Define Saltcake/Sludge/Composite rules in Section 7.2). This information is available in files located at \\AP007\Chardocs\Accelerated BBI Baselining Task\DST Information\DST Sludge Saltcake Designation based on calc ratio.xls and \\AP007\Chardocs\Accelerated BBI Baselining Task\SST Information\SST Sludge Saltcake Designation based on calc ratio.xls.

(b) For SSTs, Fort and Ubay (2000) or Fort (2001 draft)

(c) Current BBI

(d) Agnew et al. (1997a)

(e) Anderson (1990)

(5) If the tank is an SST, apply porosities reported in Fort (2000) or Field (2000). If the tank is not listed in Fort (2000) or Field (2000), use 25% porosity for saltcake and 15% porosity for sludge. Report solid and liquid volumes for each saltcake and sludge. For DSTs, the sludge and saltcake will not be split into solid and liquid fractions.

(6) Divide the solid volumes from Step 4 into saltcake and/or sludge waste types (i.e., S1-SltCk, R1, MW, etc.) using Agnew et al. (1997a) and the current BBI. For tanks that have been sluiced, Rodenhizer (1987) and Anderson (1990) may be used to correct the waste designations of Agnew et al. (1997a).

Table 4-1. Waste Volume Data Types Available By Source

Data Source	Type of Information
Agnew, S. F., J. Boyer, R. A. Corbin, T. B. Duran, J. R. Fitzpatrick, K. A. Jurgensen, T. P. Ortiz, and B. L. Young, 1997, *Hanford Tank Chemical and Radionuclide Inventories: HDW Model Rev. 4*, LA-UR-96-3860, Los Alamos National Laboratory, Los Alamos, New Mexico.	Total Sludge Volume Total Saltcake Volume Waste Types
Analytical Data calculation (Sludge vs. Saltcake)	Total Sludge Volume Total Saltcake Volume
Anderson, J. D., 1990, *The History of the 200 Area Tank Farms*, WHC-MR-0132, Westinghouse Hanford Company, Richland, Washington.	Total Waste Volume Total Solid Volume Supernatant Volume
Core Recoveries	Total Solid Volume
Current BBI (TIR Question 8)	Total Waste Volume Sludge Solids Volume Saltcake Solids Volume Interstitial Liquid Volume Supernatant Volume Waste Types
Field, J. G., 2000, *Updated Drainable Interstitial Liquid Volume Estimates for 119 Single-Shell Tanks Declared Stabilized*, RPP-5556, Rev. 0, CH2M HILL Hanford Group, Inc., Richland, Washington.	Sludge Solids Volume Saltcake Solids Volume Interstitial Liquid Volume Supernatant Volume
Fort, L. A., and C. G. Ubay, 2000, *Updated Pumpable Liquid Volumes Estimates and Jet Pump Durations for Interim Stabilization of Remaining Single-Shell Tanks*, HNF-2978, Rev. 2, CH2M HILL Hanford Group, Inc., Richland, Washington.	Sludge Solids Volume Saltcake Solids Volume Interstitial Liquids Volume Supernatant Volume
Hanlon, B. M., 2001, *Waste Tank Summary Report for Month Ending XXXX*, HNF-EP-0182, Rev. XXX, CH2M HILL Hanford Group, Inc., Richland, Washington.	Total Waste Volume Total Sludge Volume Total Saltcake Volume Drainable Liquid Volume Supernatant Volume
In tank photos and/or video (check to see if a letter detailing an evaluation of these has been written)	Presence of supernatant Surface variations information
Interim Stabilization letter	Total Solid Volume Total Interstitial Liquid Volume
Mahoney. L. A., Z. I. Antoniak, J. M. Bates, and M. E. Dahl, 1999, *Retained Gas Sampling Results for the Flammable Gas Program*, PNNL-13000, Pacific Northwest National Laboratory, Richland, Washington.	Retained Gas Volume
PCSACS surface levels (ENRAF™)	Total Waste Volume
PCSACS surface levels (Neutron)	Total Waste Volume Interstitial Liquid Height
PCSACS surface levels (Gamma)	Total Waste Volume Interstitial Liquid Height
Rodenhizer, D. G., 1987, *Hanford Waste Tank Sluicing History*, SD-WM-TI-302, Rev. 0, Westinghouse Hanford Company, Richland, Washington.	Sluicing information used to correct Agnew et al. (1997a) in some cases
Zipcord reading, sludge weight reading	Total Waste Volume Total Solid Volume
Barker, S. A., W. B. Barton, D. R. Bratzel, M. Epstein, P. A. Gauglitz, G. D. Johnson, S. N. Marrvada, C. E. Olson, M. L. Sauer, S. E. Slezak, C. W. Stewart, and J. Young, 1999, *Flammable Gas Safety Analysis Data Review*, SNL-000198, Sandia National Laboratory, Albuquerque, New Mexico.	

4.2 SAMPLE BASED INVENTORY CREATION RULES

The following rules will be used to evaluate data and develop the BBI for each tank. New rules, including tank-specific rules, are expected to be identified and implemented during the BBI baselining process.

Basic Principles

- E based inventories may be based on altered data, data from the TWINS historical section, or other data not available from the TWINS tank characterization database (TCD).
- Sample based data selection is not limited to the most recent sample data.
- The waste phase inventories to be reported for each tank are: supernatant, saltcake solid, saltcake liquid, sludge solid, sludge liquid, and retained gas. In some cases, sludge liquids and sludge solids may be combined and saltcake liquids and saltcake solids may be combined.

Select Data

- Sample based characterization concentration data shall be drawn from the "unaltered" section or "treatment plant unaltered" section (also known as "Privatization baseline" in the "altered" section) of TWINS.
- Sludge liquid, saltcake liquid, and supernatant sample based concentration numbers are the same for any given constituent in any given tank. (Tanks 241-AW-104 and 241-AY-101 are exceptions and will have tank-specific rules.)
- ^{93}AMU should be treated (labeled) as ^{93}Zr.
- ^{238}AMU should be treated (labeled) as ^{238}U.
- ^{242}AMU should be treated (labeled) as ^{242}Pu.
- ^{243}AMU should be treated (labeled) as ^{243}Am.
- ^{244}AMU should be treated (labeled) as ^{244}Cm.

Reject Data

The following results should be excluded from averaging for purposes of inventory calculation, but not deleted from TWINS. These data should be flagged in TCD with the review status "Data suspect: see comment."

- Analytical concentrations greater than concentrations allowed by assuming a pure compound (see Table 4-2):

Table 4-2. Analyte Limiting Concentrations

Analyte	Limiting Species (dry)	MW	Reject Limit µg/g
Al	Al_2O_3-H_2O (boemite)	120.0	4.50E+05
Bi	Bi_2O_3	496.0	8.43E+05
Ca	$CaCO_3$	100.1	4.00E+05
Cl	NaCl	58.4	6.07E+05
TIC as CO_3	Na_2CO_3-H_2O	124.0	4.84E+05
Cr	Cr_2O_3	152.0	6.84E+05
F	NaF	42.0	4.52E+05
Fe	FeO(OH)	88.9	6.29E+05
Hg	HgO	216.6	9.26E+05
K	KNO_3	101.0	3.87E+05
La	$La(OH)_3$	189.9	7.31E+05
Mn	MnO_2	86.9	6.32E+05
Na	NaOH	40	5.75E+05
Ni	$Ni(OH)_2$	92.7	6.33E+05
NO_2	$NaNO_2$	69	6.67E+05
NO_3	$NaNO_3$	84.99	7.30E+05
OH	NaOH	40	4.25E+05
Pb	$Pb(OH)_2$	241	8.60E+05
PO_4	Na_3PO_4	163.9	5.79E+05
Si	$NaHSiO_3$	100.1	2.81E+05
SO_4	Na_2SO_4	142.0	6.76E+05
Sr	$SrCO_3$	147.6	5.94E+05
TOC	$NaHCO_2$	68.0	1.77E+05
UTOTAL	$Na_2U_2O_7$	634	7.51E+05
Zr	ZrO_2	123.2	7.40E+05

Notes:

MW = molecular weight

- ICP/MS results for ^{137}AMU (^{137}Cs)
- GEA results for Pu
- Results for samples where hydrostatic head fluid/LiBr solution intrusion contributes > 50% of wt % water in sample.
- For liquids, specific gravity and density values < 0.9 or > 1.6.
- For solids, density and specific gravity values ≤ 1.0 or > 2.0.
- Data already flagged "Data suspect: see comment" in the TCD.
- Any analyte concentration > 100% by mass (>1E+06 ppm).

- Ammonia results when time between sampling and analysis is equal to or greater than 180 days or if holding time cannot be determined.

Resolve Data

The following results shall be evaluated before being included in means or being excluded from the means. If included in the means, the results should be flagged in TCD as "Reviewed" or "Reviewed: see comment." If not included in the means, the results should be flagged as "Data suspect: see comment" or "Not used for inventory: see comment."

- ICP: fusion results for Zr, if a suffix z is found on the laboratory sample ID. (Resolution criteria: Was Zr crucible used? Did the use of the crucible elevate results? Compare acid and fusion results.)
- ICP: fusion results for Ni if a suffix f is found on the laboratory sample ID. (Resolution criteria: Was Ni crucible used? Did the use of the crucible elevate results? Compare acid and fusion results.)
- TOC equivalent of oxalate results > TOC. (Resolution criteria: Are quality control (QC) results within acceptable limits? Were other analytes for the same sample and method accepted?)
- Calculated free OH (calculated from pH) and measured free OH differ by a factor of 2 or more. (Resolution criteria: Is the pH greater than 12.5? Does the titration curve show multiple breaks (steps) indicating buffer points? Use the table below for guidance.)

pH	OH	Actions/Resolution
<12	>1.0 M	If Al is also high (>0.5 M), then OH is the preferred analysis; high Al will not be solution when OH is low. Sodium ion interference may cause invalid pH result. If Al is not high, check OH titration curve. If the curve is clear and indicates that OH was being titrated (pH starts at 11 to 12 and first break occurs at pH 10 or greater), then OH is the preferred analysis.
<12	<0.02	If Al is also low, the pH is probably the preferred analysis. The OH result may be biased from misinterpretation of end point; check OH titration curve (use same titration curve criteria as above).
12.5 to 13	<0.1 M	Check the OH tritration curve (use same titration curve criteria as above).
12.5 to 13	>1.0 M	Use OH results.
None of the above		Check the OH titration curve (use same titration curve criteria as above).

- Density results for solids between 1.0 and 1.3 or between 1.9 and 2.0.

- ^{154}Eu and ^{155}Eu results differing by more than a factor of ten. (Resolution criteria: ^{155}Eu detection limits can be ten times as high as $^{154}Eu^{155}Eu$ detection limits. If ^{155}Eu is reported as a less than and if a better upper bounding concentration for ^{155}Eu can be calculated by using ^{155}Eu and isotopic ratios, the ^{155}Eu analytical result should not be used for the inventory calculation and the calculated value should be used.)
- Standard recoveries <50% or >150%. (Resolution criteria: Are data consistent with other results, which had standard recoveries within the 50% to 150% range? If so, the data should be considered usable.)
- Results exceeding the concentrations listed in Table 4-3 (potential outliers). The concentrations in Table 4-3 were derived from an algorithm applied to results currently in TCD.

Table 4-3. Concentration Limits for Resolution File. (7 Sheets)

Constituent	Liquid	Units	Solid	Units
Acetate	none	N/A	3.11E+03	µg/g
Actinium-228	4.84E+02	µCi/L	none	N/A
Aluminum	6.33E+07	µg/L	1.45E+05	µg/g
Americium-241	1.93E+03	µCi/L	7.55E+01	µCi/g
Americium-243	7.68E+02	µCi/L	4.33E+00	µCi/g
Ammonia	1.43E+06	µg/L	1.49E+04	µg/g
Ammonia (Nitrogen)	none	N/A	6.82E+01	µg/g
Ammonium	2.02E+06	µg/L	9.11E+03	µg/g
Ammonium Ion by IC	6.65E+05	µg/L	4.79E+02	µg/g
Antimony	7.21E+04	µg/L	1.37E+03	µg/g
Antimony-125	1.57E+03	µCi/L	2.16E+01	µCi/g
Aroclor 1016	6.00E+01	µg/L	9.96E-01	µg/g
Aroclor 1221	1.20E+02	µg/L	1.32E+00	µg/g
Aroclor 1232	6.00E+01	µg/L	9.96E-01	µg/g
Aroclor 1242	6.00E+01	µg/L	9.96E-01	µg/g
Aroclor 1248	6.00E+01	µg/L	9.96E-01	µg/g
Aroclor 1254	6.00E+01	µg/L	9.96E-01	µg/g
Aroclor 1260	6.00E+01	µg/L	9.96E-01	µg/g
Arsenic	1.20E+05	µg/L	2.18E+03	µg/g
Atomic Mass Unit 90	2.13E+05	µg/L	2.86E+04	µg/g
Atomic Mass Unit 93	none	N/A	3.41E+02	µg/g
Atomic Mass Unit 137	9.10E+03	µg/L	2.56E+02	µg/g
Atomic Mass Unit 151	3.49E+02	µg/L	3.63E+01	µg/g
Atomic Mass Unit 232	5.69E+03	µg/L	1.18E+03	µg/g
Atomic Mass Unit 238	4.04E+04	µg/L	4.20E+04	µg/g

Table 4-3. Concentration Limits for Resolution File. (7 Sheets)

Constituent	Liquid	Units	Solid	Units
Atomic Mass Unit 241	6.25E+03	µg/L	2.74E+01	µg/g
Atomic Mass Unit 242	5.49E+03	µg/L	1.13E+01	µg/g
Atomic Mass Unit 243	5.13E+03	µg/L	1.54E+01	µg/g
Atomic Mass Unit 244	4.46E+03	µg/L	1.43E+01	µg/g
Barium	6.01E+04	µg/L	1.14E+03	µg/g
Beryllium	6.00E+03	µg/L	1.10E+02	µg/g
Bismuth	1.21E+05	µg/L	5.44E+04	µg/g
Bismuth-212	1.44E+04	µCi/L	1.06E+01	µCi/g
Bismuth-214	7.12E+02	µCi/L	3.04E+00	µCi/g
Boron	1.03E+05	µg/L	1.12E+03	µg/g
Bromide	1.40E+07	µg/L	3.00E+03	µg/g
Bulk density	1.59E+00	g/mL	1.92E+00	g/mL
Cadmium	1.58E+04	µg/L	5.76E+02	µg/g
Cadmium-109	9.23E+03	µCi/L	6.13E+02	µCi/g
Calcium	1.99E+05	µg/L	1.92E+04	µg/g
			2.05E-02	µCi/g
Carbon-14	1.54E+00	µCi/L	2.19E-11	Ci/ml
Carbonate	2.27E+07	µg/L	1.06E+05	µg/g
Centrifuged solids density	N/A	N/A	2.02E+00	g/mL
Cerium	1.20E+05	µg/L	2.21E+03	µg/g
Cerium/Praseodymium-144	3.96E+03	µCi/L	2.00E+01	µCi/g
Cerium-144	9.04E+00	µCi/L	3.29E+01	µCi/g
Cesium	none	N/A	1.00E+03	µg/g
Cesium-133	3.83E+04	µg/L	none	N/A
Cesium-134	1.56E+03	µCi/L	1.81E+00	µCi/g
Cesium-135	1.33E+04	µg/L	none	N/A
Cesium-137	1.79E+06	µCi/L	6.88E+02	µCi/g
Cesium-137	2.70E+04	µg/L	1.84E+02	µg/g
Chloride	1.36E+07	µg/L	9.63E+03	µg/g
Chromium	6.70E+06	µg/L	1.32E+04	µg/g
Citrate	1.02E+07	µg/L	2.73E+04	µg/g
Citric acid	8.01E+05	µg/L	none	N/A
Cobalt	2.40E+04	µg/L	4.51E+02	µg/g
Cobalt-56	1.48E+02	µCi/L	6.86E-01	µCi/g
Cobalt-57	2.93E+02	µCi/L	2.37E+01	µCi/g
Cobalt-60	1.19E+02	µCi/L	2.29E+00	µCi/g
Copper	2.42E+04	µg/L	2.55E+02	µg/g

Table 4-3. Concentration Limits for Resolution File. (7 Sheets)

Constituent	Liquid	Units	Solid	Units
Curium-242	none	N/A	9.64E-02	µCi/g
Curium-243/244	1.08E+01	µCi/L	1.04E+01	µCi/g
Cyanide	5.24E+05	µg/L	5.83E+03	µg/g
Density	1.33E+00	g/mL	2.00E+00	g/mL
Density after centrifuging	none	N/A	1.80E+00	g/mL
Dysprosium	2.40E+03	µg/L	2.00E+02	µg/g
Europium	2.01E+04	µg/L	9.99E+02	µg/g
Europium-152	8.85E+02	µCi/L	5.23E+00	µCi/g
Europium-154	2.29E+02	µCi/L	1.35E+01	µCi/g
Europium-154/155	3.18E+01	µCi/L	none	N/A
Europium-155	9.90E+02	µCi/L	9.86E+00	µCi/g
Fluoride	9.78E+06	µg/L	7.22E+04	µg/g
Formate	4.91E+06	µg/L	8.02E+03	µg/g
Gadolinium	none	N/A	5.57E+03	µg/g
Gadolinium-153	none	N/A	5.39E-02	µCi/g
Glycolate	3.45E+06	µg/L	4.67E+03	µg/g
Gross alpha	8.19E+02	µCi/L	3.90E+01	µCi/g
Gross beta	1.67E+06	µCi/L	1.86E+04	µCi/g
Hexavalent Chromium	none	N/A	8.56E+02	µg/g
Hydroxide	8.93E+07	µg/L	4.17E+04	µg/g
Iodide	1.03E+06	µg/L	1.23E+01	µg/g
	3.48E-01	µCi/L	2.25E-01	µCi/g
Iodine-129	4.86E+03	µg/L	4.98E+02	µg/g
Iodine-131	4.62E+02	µCi/L	1.86E+00	µCi/g
Iron	9.86E+04	µg/L	6.88E+04	µg/g
Lanthanum	6.01E+04	µg/L	1.37E+04	µg/g
Lead	2.10E+05	µg/L	3.96E+03	µg/g
Lead-212	1.97E+03	µCi/L	2.88E+00	µCi/g
Lead-214	4.26E+03	µCi/L	1.63E+01	µCi/g
Liquid density	1.75E+00	g/mL	1.64E+00	g/mL
Lithium	7.51E+05	µg/L	3.13E+02	µg/g
Magnesium	1.20E+05	µg/L	2.25E+03	µg/g
Manganese	2.46E+04	µg/L	1.91E+04	µg/g
Mercury	1.45E+04	µg/L	1.27E+03	µg/g
Mercury-203	3.81E+02	µCi/L	1.59E+00	µCi/g
Molybdenum	1.42E+05	µg/L	1.10E+03	µg/g
Neodymium	1.20E+05	µg/L	2.22E+03	µg/g

Table 4-3. Concentration Limits for Resolution File. (7 Sheets)

Constituent	Liquid	Units	Solid	Units
	2.69E+03	µCi/L	1.18E+02	µCi/g
Neptunium-237	8.42E+03	µg/L	6.19E+01	µg/g
Neptunium-239	1.18E+03	µCi/L	7.54E+00	µCi/g
Nickel	2.08E+05	µg/L	2.85E+04	µg/g
Nickel-59	none	N/A	2.90E-04	µCi/g
Nickel-63	none	N/A	1.19E+00	µCi/g
Niobium-93 metastable	none	N/A	1.29E-02	µCi/g
Niobium-94	1.21E+02	µCi/L	1.80E+00	µCi/g
Niobium-95	8.24E+00	µCi/L	none	N/A
Nitrate	3.50E+08	µg/L	6.39E+05	µg/g
Nitrite	1.72E+08	µg/L	1.20E+05	µg/g
Oxalate	5.18E+06	µg/L	5.42E+04	µg/g
Palladium	4.01E+05	µg/L	2.06E+04	µg/g
Particle Size Number Density Mean	N/A	N/A	2.49E+00	microns
Particle Size Number Density Median	N/A	N/A	1.25E+00	microns
Particle Size Number Density Mode	N/A	N/A	1.25E+00	microns
Particle Size Sauter Mean	N/A	N/A	1.51E+01	microns
Particle Size Sauter Mean 2	N/A	N/A	1.79E+01	microns
Particle Size Volume Density Mean	N/A	N/A	1.18E+02	microns
Particle Size Volume Density Median	N/A	N/A	1.19E+02	microns
Particle Size Volume Density Mode	N/A	N/A	1.69E+02	microns
PCB	none	N/A	0.00E+00	µg/g
Percent Water	9.87E+01	%	7.96E+01	%
pH Measurement	1.39E+01	unitless	1.35E+01	unitless
Phosphate	1.29E+07	µg/L	1.50E+05	µg/g
Phosphorus	3.17E+06	µg/L	4.58E+04	µg/g
Plutonium-238	9.62E+01	µCi/L	4.21E+00	µCi/g
	6.71E+03	µg/L	9.67E+01	µg/g
Plutonium-239	3.86E+06	µCi/L	1.91E+04	µCi/g
Plutonium-239/40	4.78E+02	µCi/L	1.93E+01	µCi/g
			1.52E+01	µg/g
Plutonium-240	9.26E+03	µg/L	9.70E-01	µCi/g

Table 4-3. Concentration Limits for Resolution File. (7 Sheets)

Constituent	Liquid	Units	Solid	Units
Plutonium-241	none	N/A	3.70E+01	µCi/g
Plutonium-242	2.78E+03	µg/L	1.08E+01	µg/g
Potassium	3.85E+07	µg/L	7.37E+06	µg/g
Potassium-40	1.24E+03	µCi/L	1.24E+01	µCi/g
Praseodymium	2.01E+05	µg/L	1.03E+04	µg/g
Protactinium-231	5.15E+03	µg/L	2.61E+01	µg/g
Protactinium-233	8.49E+02	µCi/L	3.47E+00	µCi/g
Protactinium-234	1.84E+04	µCi/L	1.33E+02	µCi/g
Radium-224	7.42E+03	µCi/L	3.17E+01	µCi/g
Radium-226	7.96E+03	µCi/L	5.21E+01	µCi/g
Rhenium	3.00E+02	µg/L	1.25E+02	µg/g
Rhodium	4.01E+05	µg/L	1.95E+04	µg/g
Rubidium	8.02E+05	µg/L	4.12E+04	µg/g
Ruthenium	8.02E+05	µg/L	3.91E+04	µg/g
Ruthenium/Rhodium-106	6.06E+03	µCi/L	3.99E+01	µCi/g
Ruthenium-103	4.71E+02	µCi/L	1.62E+00	µCi/g
Ruthenium-106	1.68E+03	µCi/L	1.67E+01	µCi/g
Samarium	1.20E+05	µg/L	2.21E+03	µg/g
Selenium	1.20E+05	µg/L	2.18E+03	µg/g
Selenium-75	5.18E+02	µCi/L	2.14E+00	µCi/g
Selenium-79	1.41E+00	µCi/L	8.24E-03	µCi/g
Settled solids density	N/A	N/A	1.64E+00	g/mL
Shear strength	N/A	N/A	1.19E+05	dynes/cm^2
Silicon	4.76E+05	µg/L	1.13E+04	µg/g
Silver	3.33E+04	µg/L	5.92E+02	µg/g
Sodium	2.73E+08	µg/L	2.99E+05	µg/g
Sodium-22	8.48E+01	µCi/L	1.77E+01	µCi/g
Sodium-24	3.51E+01	µCi/L	5.31E-01	µCi/g
Specific gravity	1.51E+00	unitless	2.53E+00	unitless
Strontium	1.20E+04	µg/L	2.02E+03	µg/g
Strontium-85	4.24E+02	µCi/L	1.65E+00	µCi/g
Strontium-89/90	6.60E+04	µCi/L	8.77E+03	µCi/g
Strontium-90	2.05E+03	µCi/L	4.31E+03	µCi/g
Sulfate	1.95E+07	µg/L	9.86E+04	µg/g
Sulfur	6.05E+06	µg/L	2.35E+04	µg/g
Tantalum	2.01E+05	µg/L	1.03E+04	µg/g
Technetium-99	3.70E+02	µCi/L	8.95E-01	µCi/g

Table 4-3. Concentration Limits for Resolution File. (7 Sheets)

Constituent	Liquid	Units	Solid	Units
	2.36E+04	µg/L	3.60E+01	µg/g
Tellurium	2.01E+05	µg/L	9.77E+03	µg/g
Thallium	2.40E+05	µg/L	4.44E+03	µg/g
Thallium-208	4.90E+03	µCi/L	2.02E+01	µCi/g
Thorium	9.54E+04	µg/L	4.40E+03	µg/g
Thorium-228	2.83E+04	µCi/L	1.53E+02	µCi/g
	9.40E+03	µg/L	1.88E+01	µg/g
Thorium-229	1.34E+03	µCi/L	7.70E+00	µCi/g
Thorium-230	4.88E+03	µg/L	1.51E+01	µg/g
Thorium-232	1.10E+05	µg/L	1.05E+03	µg/g
Thorium-234	1.93E+04	µCi/L	1.03E+02	µCi/g
Tin	2.01E+05	µg/L	9.77E+03	µg/g
Tin-113	6.33E+02	µCi/L	2.50E+00	µCi/g
Tin-117	1.30E+05	µg/L	6.14E+02	µg/g
Tin-126	6.08E+03	µg/L	6.14E+02	µg/g
Titanium	1.20E+04	µg/L	2.37E+02	µg/g
Total alpha energy emitted from Pu-238,Pu-239,Pu-240,Pu-241	none	N/A	1.46E+00	µCi/g
Total carbon	2.58E+07	µg/L	3.61E+04	µg/g
Total inorganic carbon	1.50E+07	µg/L	5.00E+04	µg/g
Total organic carbon	4.12E+07	µg/L	2.60E+04	µg/g
Tributyl phosphate	none	N/A	4.59E+02	µg/g
Tritium	4.44E+01	µCi/L	4.19E-02	µCi/g
Tungsten	5.25E+05	µg/L	1.04E+04	µg/g
Uranium	6.52E+05	µg/L	3.87E+04	µg/g
Uranium/Thorium-233	2.67E+05	µCi/L	1.13E+03	µCi/g
			4.91E+01	µg/g
Uranium-233	6.29E+03	µg/L	2.10E+02	µCi/g
Uranium-234	6.34E+03	µg/L	4.91E+01	µg/g
Uranium-235	6.56E+03	µg/L	2.72E+02	µg/g
Uranium-235	4.84E+02	µCi/L	2.09E+00	µCi/g
Uranium-236	7.57E+03	µg/L	6.55E+01	µg/g
	8.30E+05	µg/L	1.03E+04	µg/g
Uranium-238	2.04E-01	µCi/L	1.10E-02	µCi/g
Vanadium	6.01E+04	µg/L	1.10E+03	µg/g
Viscosity	1.45E-01	P	5.79E-01	P

Table 4-3. Concentration Limits for Resolution File. (7 Sheets)

Constituent	Liquid	Units	Solid	Units
Weight percent oxide based on dry weight solids	6.01E+01	%	7.92E+01	%
Weight percent oxide based on wet weight solids	1.12E+01	%	5.55E+01	%
Weight percent oxides	none	N/A	6.49E+01	%
Weight percent solids	5.69E+01	%	8.20E+01	%
Yield Stress	N/A	N/A	4.50E+02	dynes/cm2
Yttrium	5.25E+04	µg/L	4.03E+02	µg/g
Yttrium-88	2.67E+01	µCi/L	5.06E-01	µCi/g
Zinc	1.38E+05	µg/L	7.43E+02	µg/g
Zirconium	1.67E+05	µg/L	9.57E+04	µg/g
Zirconium/Niobium-95	7.66E+02	µCi/L	4.76E+01	µCi/g

Notes:

N/A = not applicable

Reconstitute Samples as Needed

Some sample data in TWINS cannot be used directly but must be reconstituted.

- Liquid samples that gel or precipitate following removal from a tank must be mathematically reconstituted by combining the liquid and solid fractions that were analyzed to arrive at the original liquid concentrations in the tank. The reconstitution formula is applied at the segment level. There are at least three tanks that are in this category: tanks 241-AN-103, 241-A-101, and 241-AX-101. Concentration values for these tanks must be created offline (manually) and a table generated as part of the baselining effort because the necessary data does not reside in TWINS.
- Samples that were separated by centrifugation prior to analyses must be reconstituted by combining the liquid and solid fractions in appropriate ratios to give the concentration of saltcakes and sludges as they exist in the tank. The wt% solids can be calculated from the vol% centrifuged solids providing that the density of the centrifuged solids is recorded. The solid concentration is reconstituted at the level the sample was centrifuged. The necessary reconstitution data does not necessarily exist in TWINS at present. However, future tank sampling and analysis plans (TSAPs) should require the necessary data. As part of the BBI baselining effort, a table of weight solid fractions will be generated to enable automation of this calculation. The sample portion field in TWINS identifies the centrifuged samples.

Define Saltcake/Sludge/Composite

- Solid state analytical results will be designated saltcake, sludge, or composite in a phase column in TWINS. The saltcake/ sludge distinction will be made by

calculating the ratio of key soluble analytes to key insoluble analytes. The formula is (K + Na)/ (Al + Bi + Fe + Ca + Mn + La + Ni + Si + U + Zr). The concentrations of analytes listed in the formula will be the average of primary, duplicate, and triplicate to the extent available. Ratios below 2.5 will be designated sludge, and ratios above 2.5 will be designated saltcake. (If value is a less than number, do not use in calculation. Sodium result must be reported and a detect.) This information is available in files located at \\AP007\Chardocs\Accelerated BBI Baselining Task\DST Information\DST Sludge Saltcake Designation based on calc ratio.xls and \\AP007\Chardocs\Accelerated BBI Baselining Task\SST Information\SST Sludge Saltcake Designation based on calc ratio.xls. The saltcake and sludge designations made by the calculation above are to be reviewed by the BBI author and modified as needed using the guidance below:

- When concentration analytical records of a given segment have a different ratio leading to a different designation of saltcake or sludge compared to the segments above and below, then assign the same waste type to the records as in the segments above and below.
- If segment immediately above or below is not available, use next segment.

- Changes to the saltcake or sludge designation should be made when process knowledge (e.g., waste transfer history) and/or concentrations of key analytes indicate that the designation per these rules is not correct. Note that the sample descriptions (e.g., wet sludge, moist salt, etc.) in the core profile diagrams are based only on visual examination of the samples and may not indicate the actual waste phase.

Calculate Means and Uncertainties

- Averaging of sample based concentration numbers must occur at the same aggregation level.
- When data are available, supplemental BBI analytes (analytes that are in the BBIM tool, but not one of the standard 25 chemical and 46 radiochemical constituents) should be included in the sample and process knowledge vectors that are created.
- For tanks with multiple sample events, individual analytical concentration results will be averaged separately for each sample event, device type (auger, grab, core), and waste phase in each tank. If a waste phase consists of more than one waste type, separate means will generally not be calculated for the different waste types.

Apply Analytical Hierarchy Rules

- For low concentrations of U (< 1,000 ppm), phosphorescence method is selected over ICP.
- For large concentrations of U (> 1,000 ppm or ten times the detection limit), ICP is selected over phosphorescence.

- For ^{238}U, ICP/MS results are selected over ICP/AES. If all U isotopes are present in the ICP/MS results, sum the isotopes and select over ICP/AES. If all U isotopes are not present (some are less thans), divide ^{238}U result by 0.993 to calculate total U. Compare the calculated total U to the measured ICP/AES and/or phosphorescence total U for consistency. If consistent, select the measured total U.
- For ICP/AES, acid digest results should be used for the sample vectors, especially for saltcakes. Compare fusion and acid results and if the fusion results are consistently and significantly higher than the acid results (> 10% higher), consider using the fusion results, but look at the results to see if they appear reasonable. A possible analytical bias has been reported for Na analysis of saltcakes by ICP:F; acid digest should be used for Na in saltcakes. Exceptions: the fusion digestion is preferred for Si and may be preferred for Al, Ce, Mn, and Zr, as the acid digestion may not completely dissolve refractory oxides. Fusion digests generally involve higher dilutions (resulting in higher detection limits) than acid digests. Therefore, acid digestion is generally preferred for analytes that have concentrations below or near the detection limit of the fusion digest
- If results from two data sets are less than values, select the smaller less than value.
- For S vs. SO_4, the following order of analysis preference is to be used for solid samples: ICP:A, ICP:F, ICP:W, IC:W.
- For PO_4 vs. P, the following order of analysis preference is to be used for solid samples: ICP: A, ICP:F. ICP:W and IC:W results should not be used because of the presence of non-water soluble PO_4.
- For PO_4 vs. P and S vs. SO_4, the following order of analysis preference is to be used for liquid samples: ICP, ICP:A, IC.
- $^{239/240}Pu$ results from alpha spec. are selected over ^{239}Pu results from ICP/MS.
- The hierarchical sequence for alpha emitters is:
  - Sum Am and Pu isotope concentrations and compare to the total alpha concentration.
  - If Am, Pu, and total alpha are all less than numbers, use either the sum of Am and Pu or total alpha, whichever is smaller and use the BBIM tool to calculate the remaining alpha emitting isotopes.
  - If the sum of Am and Pu > total alpha, then send to resolution file.
  - If the sum of Am and Pu < total alpha, and neither the Am or Pu values are less than numbers, then chose the individual isotope values and allow the BBIM to calculate the remaining alpha emitting isotopes.
  - If the sum of Am and Pu < total alpha, and both the Am or Pu values are less than numbers, then chose total alpha value (as long as it is not also a less than) and allow the BBIM to calculate the remaining alpha emitting isotopes.
  - If the sum of Am and Pu < total alpha, and either the Am or the Pu value is a less than value, choose the total alpha and the non-less than value from a, and let the tool calculate the remaining alpha emitting isotope concentrations.

- Supplemental analytes (Ag, As, B, Ba, Be, Cd, Ce, CN, Co, Cs, Cu, Li, Mg, Mo, Nd, NH_3, oxalate, Pd, Pr, Pu, Rb, Rh, Ru, Sb, Se, Ta, Te, Th, Ti, Tl, V, W, Y, and Zn) should be included in the sample vectors when sample data are available.

Select/Create Engineering Based Vectors

- Engineering based vectors may be created from sample data that are not in TCD, data from tanks containing similar waste, and process knowledge.
- HDW based vectors may be used only if template vectors are not applicable.

Apply Hierarchy Rules on Means

- For the purpose of determining concentration values by phase and by tank, transfer calculations will overrule sampling results taken prior to an incoming transfer. New sample results from samples taken since a transfer will overrule concentrations revised as a result of a transfer. More specifically:
  - For non transferred tanks, the priority is:
    - For solids, core segment data have the highest priority, followed by grab data, core composite data, then auger data. After that, the sample priority is from most recent to oldest data.
    - For liquids, the most recent data have the highest priority. After that, the priority is grab data, core segment data, core composite data.
  - For transferred tanks, the order of priority from highest to lowest is:
    - Samples obtained after the most recent transfer have the highest priority. The rule for non transferred tanks applies.
    - Lower in priority are: core sample data prior to transfer (the most recent cores being preferred), grab sample data prior to transfer (the most recent grab samples being preferred), core composite data prior to transfer (with most recent core being preferred), auger sample data prior to transfer (with most recent being preferred).

- Following application of the rule above to determine priority of data (rule 1), the following rules are applied to the handling of mean less than values:
  - If the preferred data set (selected by rule 1) has a detected result for a given analyte, use the detected result.
  - If the preferred data set per rule 1 has a less than value, use this as an upper limit on the analyte concentration and evaluate the means from the other data sets in order of priority.
    - If the data set that is next in priority has a detected value that is below the upper, select the detected value from this data set.

  - If the data set that is next in priority has a less than value that is less than the upper limit, use this lower less than value as the new upper limit and look at the next data set lower in priority.
  - If there are no data sets with detected values lower than the upper limit, select the lowest less than value consistent with the upper limit.

- NH_3 grab sample data are preferred over core sample data, because grab samples have been observed generally have higher NH_3 results than core samples.
- Do not select hydroxide from templates. Hydroxide should only be selected when the selection is a sample result or is calculated from sample results (as is often the case with process knowledge vectors). Hydroxide concentrations in the vectors may be based on hydroxide analysis or on pH analysis results converted to hydroxide, when data review has concluded that the pH is more indicative of the actual hydroxide concentration.
- If data for a supplemental analyte are available for all waste types and waste phases in the tank, and the all results for the analyte are either detected values or less than values below 100 μg/g or 100 μg/mL (500 μg/g or 500 μg/mL for oxalate), radiobutton selections should be made (all waste types and waste phases) for that analyte. Otherwise no radiobutton selections should be made for that analyte. Exceptions include:
  - If information for a supplemental analyte is not available for one or more solid waste types and the volumes of this waste type/these waste types totals no more than 10 percent of the total solids volume, select the analyte.
  - If the analyte is expected only in waste types for which sample information is available (CN in a ferrocyanide waste, for example), select the analyte.
  - If significant concentrations (100s of parts per million or greater) are encountered in solid samples, but the liquid concentrations for a generally insoluble species are unavailable (or have a high less than value), and the inventory would not change more than 10 percent if the analyte were present in the liquid at 100 μg/mL (or at the high less than value)

Calculate Inventories

- Sample based densities will be multiplied by sample based concentrations and by volume allocations from the volume allocation table to arrive at inventories.

Derive Inventories

The following inventories are derived by comparison with other inventories:

- The ^{137m}Ba inventory should be calculated from the ^{137}Cs inventory by ^{137m}Ba inventory = 0.946 x ^{137}Cs inventory using BBIM tool.
- The ^{243}Cm inventory = 0.04 x $^{243/244}Cm$ and ^{244}Cm inventory = 0.96 x $^{243/244}Cm$ using BBIM tool.
- The ^{90}Y inventory = ^{90}Sr inventory using BBIM tool.

- For daughter products, use algorithms already programmed in BBIM.
- For U isotopes, use ICP/MS results if they are available for all isotopes. Otherwise, calculate inventories using the sample based ^{238}U or U_{total} and E based U isotope distribution and BBIM tool.
- For alpha emitters, use sample based Pu, Am, and/or total alpha results as outlined in Apply Analytical Hierarchy Rules above and calculate remaining inventories using the E based isotope distribution and BBIM tool.

Decay Inventories

- Decay all radionuclide inventories to January 1, 2001.
- Calculate a start date by taking the mean "Analysis.Date.Time" of the fast decaying analytes of ^{60}Co, ^{154}Eu, ^{155}Eu, ^{137}Cs, and ^{90}Sr.
- If none of the above analytes have "Analysis.Date.Time," then check the data report to determine the analysis date and document the source.

Baseline Volume Hierarchy

- See volume determination steps.

4.3 CONTENT OF TIR QUESTION #8

If TIR Question #8 already exists for a tank, it is to be revised during this BBI baselining effort. A TIR Question #8 will be prepared for tanks that do not already have a TIR Question #8. At a minimum, TIR Question #8 will include the following:

Table 8-1

Table 8-1 will include:

- Up to six waste phases (as applicable): supernatant, saltcake solids, saltcake liquid, sludge solids, sludge liquid, and retained gas.
- Waste type(s) (e.g., MW, R1, 224) for each liquid and solid waste phase; all liquids in a tank should have the same waste type.
- Volume by waste phase and type.
- Vectors and vector handles.
- Densities.
- Multipliers.

Waste volume determination

List sources of waste volume information used and describe process of determining the waste phase and waste type volumes.

Source of sample data

- List sample events used for the BBI and reasons these were selected.
- Describe any sample reconstitution performed before means were calculated. Identify densities and weight and/or volume percent solids and liquid used in the calculations.

Data evaluation

- Identify any tank-specific rules used for this BBI.
- Identify any new general rules used for this BBI (rules added since the issuance of this document).
- Identify any data not in TWINS that were needed for this BBI (e.g., volume percent settled or centrifuged solids, densities).

5.0 REFERENCES

Agnew, S. F., J. Boyer, R. A. Corbin, T. B. Duran, J. R. Fitzpatrick, K. A. Jurgensen, T. P. Ortiz, and B. L. Young, 1997a, *Hanford Tank Chemical and Radionuclide Inventories: HDW Model Rev. 4*, LA-UR-96-3860, Los Alamos National Laboratory, Los Alamos, New Mexico.

Agnew, S. F., R. A. Corbin, T. B. Duran, K. A. Jurgensen, T. P. Ortiz, and B. L. Young, 1997b, *Waste Status and Transaction Record Summary (WSTRS)*, LA-UR-97-311, Los Alamos National Laboratory, Los Alamos, New Mexico.

Anderson, J. D., 1990, *A History of the 200 Area Tank Farms*, WHC-MR-0132, Westinghouse Hanford Company, Richland, Washington.

Field, J. G., 2000, *Updated Drainable Interstitial Liquid Volume Estimates for 119 Single-Shell Tanks Declared Stabilized*, RPP-5556, Rev. 0, CH2M HILL Hanford Group, Inc., Richland, Washington.

Fort, L. A., and C. G. Ubay, 2000, *Updated Pumpable Liquid Volume Estimates and Jet Pump Durations for Interim Stabilization of Remaining Single-Shell Tanks*, HNF-2978, Rev. 2, CH2M HILL Hanford Group, Inc., Richland, Washington.

Fort, L. A., 2001, draft, Excel spreadsheet, *120tanks.xls*, CH2M HILL Hanford Group, Inc., Richland, Washington.

Hanlon, B. M., 2001, *Waste Tank Summary Report for Month Ending July 31, 2001*, HNF-EP-0182, Rev. 160, CH2M HILL Hanford Group, Inc., Richland, Washington.

Higley, B. A., 2000, "Reconciliation of Process Knowledge and Sample Based Mercury Inventories of Underground Storage Tanks," (internal memorandum 6N100-00-051 to T. T. Tran, April 27), CH2M HILL Hanford Group, Inc., Richland, Washington.

Mahoney, L. A., Z. I. Antoniak, J. M. Bates, and M. E. Dahl, 1999, *Retained Gas Sampling Results for the Flammable Gas Program*, PNNL-13000, Pacific Northwest National Laboratory, Richland, Washington.

Rodenhizer, D. G., 1987, *Hanford Waste Tank Sluicing History*, SD-WM-TI-302, Rev. 0, Westinghouse Hanford Company, Richland, Washington.

Swaney, S. L., 1993, "Waste Level Discrepancies Between Manual Level Readings and Current Waste Inventory for Single-Shell Tanks," (internal memorandum 7C242-93-038 to G. T. Frater, December 10), Westinghouse Hanford Company, Richland, Washington.

Swaney, S. L., 2001, *Single-Shell Tank Leak Stabilization Record*, HNF-SD-RE-TI-178, Rev. 7, CH2M HILL Hanford Group, Inc., Richland, Washington.

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APPENDIX A

BBI BASELINING INDEPENDENT REVIEW CHECKLIST

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INDEPENDENT REVIEW CHECKLIST FOR TANK 241-___-____

Reviewed by	Date	Comments

Files required in order to do review:

- Table 8-1
- Concentration vector spreadsheets
- U and Pu distribution spreadsheets if used
- Vector comparison spreadsheets (in some cases these may have to come later; however, an independent review should still be done when they are available)
- *Means and Confidence Intervals* Standard Report (reviewer should run their own from AutoTCR)

A. Concentration Vector Spreadsheets

____ (1) CHECKING SOURCE DATA: Ensure that the proper data set was copied into each of the concentration vector spreadsheets by spot checking data versus the *Means and Confidence Intervals* Standard Report. Spot check at least 7 numbers per vector.

____ (2) For **each** analyte in the concentration vector spreadsheets, check to ensure that the associated analytical value is correct (incorrect value likely a result of the wrong cell being referenced in the "selected value" column). [NOTE: *This step requires checking of all concentration values in the vector rather than spot checking as in Step 1.*]

- For analytes with results from more than one digestion method or analytical method, ensure that the correct analytical method was selected.
  - ____ For S vs. SO_4 in solids, the hierarchy is ICP:A, ICP:F, ICP:W, IC:W.
  - ____ For P vs. PO_4 in solids, the hierarchy is ICP:A, ICP:F.
  - ____ For S vs. SO_4 and P vs. PO_4 in liquid, the hierarchy is ICP, ICP:A, IC.
  - ____ If U_{TOTAL}< 1,000 ppm, select phosphorescence method. If U_{TOTAL}>1,000 ppm, select ICP method.
  - ____ For ^{238}U, the hierarchy is ICP/MS, ICP/AES.
  - ____ $^{239/240}Pu$ results from alpha spec. are selected over ^{239}Pu ICP/MS results.
  - ____ ICP:F results for Zr and Ni should be reviewed carefully before incorporating into the vector spreadsheet, to ensure no sample contamination occurred during analysis.
- Ensure GEA results for Pu, and ICP/MS results for ^{137}AMU (^{137}Cs) are not included in vector spreadsheet.

- Ensure oxalate results < TOC results. If oxalate > TOC, author needs to evaluate.
- Ensure that analyte concentrations that exceed limits given in Table 7.2-1 of Sasaki (2001) are not included in the means.
- Compare measured free hydroxide values with free hydroxide values calculated from pH, if the values differ by a factor of two or more, author needs to evaluate.
- Liquid densities or SpG should be between 0.9 and 1.5, solid densities should be between 1.0 and 1.9. If the solid density is between 1.0 and 1.3, the author needs to evaluate the measurements.
- AMU-93, AMU-238, AMU-242, AMU-243, and AMU-244 are treated as (labeled) ^{93}Zr, ^{238}U, ^{242}Pu, ^{243}Am, and ^{244}Cm, respectively.
- Be careful when both of the values are reported as detected values, but one or more are flagged with an asterisk (meaning that some less-than values were used in mean calculation). Determine the number of less-than values that went into the calculation of the detected mean (Note: Author should provide the total number of observations and the number of less-thans for that analyte).
- If results from two analytical methods are less-than values, ensure the smaller less-than value was selected.

____ (3) Verify that the proper units are shown.

____ (4) Check the metadata at the top of the concentration vector spreadsheets.

- Confirm that the waste phases, waste types, volumes, vector names, and densities match Table 8-1.
- Confirm remaining data, including checking the sample date and reference table name against the *Means and Confidence Intervals* Standard Report table titles.

B. Table 8-1

____ (1) Check the contents of Table 8-1 for completeness, accuracy, and consistency

- Ensure that the waste phases are limited to supernatant, saltcake liquid, saltcake solid, sludge liquid, sludge solid, and retained gas.
- Ensure the solid state analytical results used for the saltcake solid and sludge solid waste phases follow the designation per the key soluble/insoluble analyte calculation (see file on Chardocs/accelerated BBI baselining task), or note reason for not using the calculation.
- Ensure that only HDW waste types are used, or the waste type field is blank.
- Ensure phase volumes add up to the total volume.
- Check conversion between kgal and kL using 3.785 as conversion factor.

C. U and Pu Distribution Spreadsheets

____ (1) [Only required when doing a total alpha distribution by phase] Verify that calculations were done correctly by checking entered values and ensuring that the correct tank number was input.

(2) If the process knowledge distribution spreadsheet (PK Vector Conc U&PUDS8.xls) is being used, ensure that the process knowledge concentrations are entered correctly in addition to the sample data.

D. Vector Comparison Spreadsheets

____ (1) Confirm that correct data sets were copied into spreadsheet

____ (2) For templates, check:

- That data from correct template was used
- The calculation of the multiplier
- That multiplier was applied to the template data before comparisons were made
- That the template handle and the multiplier are included in the heading of the template data column

____ (3) Check that values were selected (and selections appropriately highlighted) according to best-basis conventions. Following are the general data selection rules (assuming a two-vector comparison; rules are same for more than two vectors):

- The priority for solids is from core segment data, grab data, core composite data, then auger data. After that, the sample priority is from most recent to oldest data.
- The priority for liquids is from most recent to oldest data. After that, the sample priority is grab data, core segment data, then core composite data.
- The supernatant, saltcake liquid, and sludge liquid sample based concentration numbers are the same for any given analyte. (Exceptions: tanks 241-AW-104 and 241-AY-101).
- For a particular analyte, if the result for the first choice in the data hierarchy is detected, select result.
- If the result for the first choice in the data hierarchy is a less than value, and there are sample based values that fall between the upper and lower limits as defined in Sasaki (2001), select the value from the data set with the highest priority.
- If results from all sample data sets are less-than values, select the lowest less-than value that falls between the upper and lower limits as defined in Sasaki (2001), or the E-based value (if the E-based value falls between the limits), whichever is lower.
- If no sample values (detect or non-detect) fall between the upper and lower limits, but the E-based value does fall between the limits, use the E-based value.

- If no result from the other data sets fall between the upper and lower limits, select the less-than from the preferred data set.

REFERENCES

Higley, B. A., 2000, "Reconciliation of Process Knowledge and Sample Based Mercury Inventories of Underground Storage Tanks," (internal memorandum 6N100-00-051 to T. T. Tran, April 27), CH2M HILL Hanford Group, Inc., Richland, Washington.

Sasaki, L. M., 2001, *Accelerated Best-Basis Inventory Baselining Task*, RPP-7625, Rev. 2, CH2M HILL Hanford Group, Inc., Richland, Washington.

APPENDIX B

BBI BASELINING FORMAT/PROTOCOL REVIEWER CHECKLIST

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BBI BASELINING TASK
FORMAT/PROTOCOL REVIEWER CHECKLIST FOR TANK 241-___-____

REVIEWED BY	DATE	COMMENTS

CHECKLIST

_____ (1) Check that the following **introductory text** is used:

What is the source data used to derive this tank's Best-Basis inventories by mass (kg) and activity (Ci) for the standard list of 25 chemicals and 46 radionuclides?

1st paragraph:

The Best-Basis Inventory (BBI) effort involves developing and maintaining waste tank inventories comprising 25 chemical and 46 radionuclide components in the 177 Hanford Site underground storage tanks. These best-basis inventories provide waste composition data necessary as part of the River Protection Project (RPP) process flowsheet modeling work, safety analyses, risk assessments, and system design for waste retrieval, treatment, and disposal operations.

2nd paragraph:

This BBI is part of the BBI Baselining effort that will update all BBIs to the current standards and protocols and establish consistent BBI documentation for all tanks. An evaluation of the BBI for tank 241-XX-XXX, as of January 1, 2001, was performed and is documented in the following text. The following information was used in this evaluation:

•

_____ (2) Confirm that the sampling events used in the BBI are listed in response to TIR Question #8.

_____ (3) Check the contents of Table 8-1 for completeness, accuracy, and consistency (e.g., phase volumes should add to total volume; correct conversion between kgal and kL using 3.785). Verify that Table 8-1 contains the following:

- Correct waste phases (supernatant, saltcake solids, saltcake liquid, sludge solids, sludge liquid, and/or retained gas)
- Waste types (e.g., MW, R1, 224) for each liquid and solid waste phase with all liquids having the same waste type; use N/A for retained gas.
- Volume by waste phase and type.
- Vector and vector handles.
- Densities.
- Multipliers.

_____ (4) Confirm consistency between Table 8-1 and the BBIM Tool **Summary Report** for:

- Waste Phases
- Waste Types
- Concentration Data (including vector name and handle)
- Densities (reported to three significant figures)
- Volumes

_____ (5) Verify that the response to TIR Question #8 contains the following:

- An explanation of how the total tank volume and phase volumes were determined
- For DSTs, a the following text should be included:

  Because a separate drainable interstitial liquid inventory is not needed for DSTs and because drainable liquid is not generally observed in DST samples, a separate interstitial liquid inventory is not determined for DSTs. It is assumed that the sample analyzed represented both solids and drainable interstitial liquids in the tank. Lower laboratory temperatures, sample size boundary effects, and compaction of samples may account for differences between laboratory observations and in-tank conditions. Assuming an average in-tank saltcake drainable porosity of 0.25 and an average sludge drainable porosity of 0.15 (Fort and Ubay 2000) the volume of drainable interstitial liquid present in the tank is estimated to be _____. The concentrations and volumes provided for the sludge and/or saltcake represent both solids and interstitial liquids.
- The correct interstitial liquid volumes.
- A discussion of excluded tank volumes (i.e., retained gas) where appropriate
- A discussion of the concentration data used
- Discussion of any reconstituted samples used in the BBI. Densities and weight and/or volume percent solids and liquid used in the calculations are identified.
- An explanation of the source of the density values and an explanation if the densities do not correspond directly to the concentration data.
- A discussion of unique data treatments of specific analytes. This discussion generally appears at the end of Question #7 but may also appear in the discussion of concentration data. Examples include:
  - Mercury inventory determination, if Higley (2000) is used.
  - Calculation of uranium isotopes and/or alpha emitters.

- A discussion of template vectors, if used. The generic description follows. In addition, if template vectors were adjusted to sample vectors, the % water and density values used and their sources should be stated.

  Templates are based on sampling data from tanks that contain the same waste type as tank 241-XX-XXX, supplemented with Hanford Defined Waste (HDW) model data. A multiplier is used to scale the template vector to the sample data using the sample weight percent H_2O and density. A more detailed description of template data is found in Tran (1999).

- The following text regarding the rules:

  The sample-based inventories in this BBI were developed in accordance with the BBI creation rules documented in Sasaki (2001).

- Exceptions to the rules in Sasaki (2001) are documented.

_____ (6) Confirm that the data hierarchy is consistent with the rules and is consistently applied in the BBIM Tool. This is done by reviewing the selections in the radio button reports. Confirm that any exceptions to the rules (tank specific exceptions, new rules) are clearly documented or referenced in TIR Question #8.

_____ (7) Confirm that the Calculation Detail Report provides an inventory by analyte for each of the waste phases defined in Table 8-1.

_____ (8) Verify reference to the Best-Basis Inventory Auto-TCR Standard Reports:

All calculations were performed using the Best-Basis Inventory Maintenance (BBIM) Tool. The updated Best-Basis inventory values for tank 241-XX-XXX are shown in the *Best-Basis Inventory (Non-Radionuclides)* and *Best Basis Inventory (Radionuclides)* standard reports.

_____(9) Verify that all documents referenced are correctly listed in the Reference list.

REFERENCES

Higley, B. A., 2000, "Reconciliation of Process Knowledge and Sample Based Mercury Inventories of Underground Storage Tanks," (internal memorandum 6N100-00-051 to T. T. Tran, April 27), CH2M HILL Hanford Group, Inc., Richland, Washington.

Sasaki, L. M., 2001, *Accelerated Best-Basis Inventory Baselining Task*, RPP-7625, Rev. 2, CH2M HILL Hanford Group, Inc., Richland, Washington.

Tran, T. T., 1999, "Review and Approval of Fiscal Year 2000 Waste Type Templates for Deriving Best-Basis Inventories," (Internal Memorandum 74B20-99-044 to J. G. Field, November 22), Lockheed Martin Hanford Corp. for Fluor Daniel Hanford, Inc., Richland, Washington.

APPENDIX C

BBI BASELINING PROCESS

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Responsibility	Action
Author	Provide a list of the sampling events to be used for BBI to the Data Reviewers and Statistician.
Data Reviewer	1. Identify rejected data per rules. 2. Identify resolution file data per rules. 3. Determine data resolution. 4. Use Resolve tool or prepare data deficiency form to apply data resolution to TCD data. 5. Notify author and statistician that data resolution is complete.
Author	1. Determine waste volumes 2. Select/Create non sample based vectors 3. Verify/Resolve saltcake/sludge designation of samples. 4. Notify data reviewer of any data to be rejected (tank specific rule). 5. Provide statistician with information regarding sample events, sample reconstitution, changes to saltcake/sludge designation. 6. Provide BBIM tool operator with information on waste volumes, non sample based vectors.
Statistician	Calculate sample based means using Approved Data spreadsheet from data reviewer and author and input to auto vector
Author	1. Complete autovector 2. Provide process knowledge vectors, multiplier (density and percent water) information to BBIM Tool Operator.
BBIM Tool Operator	1. Input volume and non sample based vector information from author 2. Input sample based vectors via autovector tool.
Author	1. Make radiobutton selections and provide to BBIM tool operator 2. Complete TIR Q#8 and send to senior reviewers and format/protocol reviewers
BBIM Tool Operator	Input radiobutton selections
Senior Reviewer	Review BBI using independent review checklist.
Format/Protocol Reviewer	Review BBI using format/protocol checklist.
Author	Revise BBI as necessary and send to senior reviewer, format/protocol reviewer, and Data Development and Interpretation manager.
DD&I Manager	Approves BBI for publication
BBIM Tool Operator	Publishes BBI

Note:
Author should send any proposed new rules to the senior reviewer and to the format/protocol reviewers as soon as possible for approval.

APPENDIX D

DATA REVIEW/RESOLUTION

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TABLE OF CONTENTS

DATA REVIEW CHECKLIST D-5

INSTRUCTIONS FOR USING ACCESS TO QUERY TCD DATA FOR DATA REVIEWS AND RESOLUTION D-7

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DATA REVIEW CHECKLIST

Tank_____ **Reviewer**_____
Date_____

Reject Data

____ Analytical concentrations greater than concentrations allowed by assuming a pure compound (Outlier Query) (limits in Table 4-2 of RPP-7625)

____ ICP/MS results for ^{137}AMU (^{137}Cs) not used for BBI (should be labeled REVIEWED: NOT USED FOR INVENTORY CALCULATIONS)

____ GEA results for Pu not used for BBI

____ Results for samples where hydrostatic head fluid/LiBr solution intrusion contributes > 50% of wt % water in sample.

____ For liquids, specific gravity and density values < 0.9 or > 1.6.

____ For solids, density and specific gravity values ≤ 1.0 or > 2.0.

____ Data already flagged "See Caveat No Mod Planned" in the Tank Characterization Database (TCD).

____ Any analyte concentration > 100% by mass (>1E+06 ppm).

____ Ammonia results when time between sampling and analysis is equal to or greater than 6 months or if holding time cannot be determined.

Resolve Data

____ ICP: fusion results for Zr, if a suffix z is found on the laboratory sample ID. (Resolution criteria: Was Zr crucible used? Did the use of the crucible elevate results? Compare acid and fusion results.)

____ ICP: fusion results for Ni if a suffix f is found on the laboratory sample ID. (Resolution criteria: Was Ni crucible used? Did the use of the crucible elevate results? Compare acid and fusion results.)

____ Oxalate results > TOC. (Resolution criteria: Are quality control (QC) results within acceptable limits? Were other analytes for the same sample and method accepted?)

____ Calculated free OH (calculated from pH) and measured free OH differ by a factor of 2 or more. (Resolution criteria: Is the pH greater than 12.5? Does the titration curve show multiple breaks (steps) indicating buffer points?)

____ Density results for solids between 1.0 and 1.3 or between 1.9 and 2.0.

____ ^{154}Eu and ^{155}Eu results differing by more than a factor of ten.

____ Standard recoveries <50% or >150%. (Resolution criteria: Are data consistent with other results that had better QC recoveries?)

____ Results exceeding the concentrations listed in Table 4-3 of RPP-7625 (potential outliers). The concentrations in Table 4-3 were derived from an algorithm applied to results currently in TCD.

Notes:

INSTRUCTIONS FOR USING ACCESS TO QUERY TCD DATA FOR DATA REVIEW AND RESOLUTION

FOR UNALTERED TCD DATA
Warning: Databases are to be used in ACCESS 97 only.

If Tank Characterization Database (TCD) data for the tank of interest have not been previously downloaded from TCD, you should do so using the "show QA" query, then save the data as an Excel file. The following instructions apply only to unaltered data in TCD.

Make a working copy of the Baselining database.

(a) Locate the file Chardocs/Accelerated BBI Baselining Task/Tank Data/Baselining Rev. 7.mdb

(b) Copy this file to another location as your working copy, DO NOT work directly in the original copy.

Using your working copy of the Baselining database

(1) Click on the Tables tab if the database does not automatically open to this tab.

(2) If you are starting with a new tank of interest, make sure that there are no tables named **HCDE3S** (this is the nomenclature that is needed to run all queries). If there is one and it is not for your tank of interest, please delete it from the Access database.

(3) Link the Excel file for your tank of interest using the following steps.

(a) With the cursor over the white area within the Tables Tab window, click the right mouse button and drag down to select Link Tables option.

(b) Change the File Type at the bottom of this window to (Microsoft Excel *.xls)

(c) Locate the file you want to link (the Excel file containing data downloaded from TCD) following the screen on your computer that you just opened.

(d) Highlight your selection and click on the Link button on the top right of the Access Link Window.

(e) A window titled Link Spreadsheet Wizard will appear. Follow the steps below using this window.

(i) If you have more than one spreadsheet in the Excel file you are linking, you will need to choose which spreadsheet you want to link by highlighting its name in the Show Worksheet selection box.

(ii) Click on Next button

(iii) Make sure the box marked First Row Contains Column Heading is checked.

(iv) Click on Next button

(v) The next window is where you will name your linked file. The only name that can be used for the queries to run is **HCDE3S**. If you have done a direct data dump from TCD to make your Excel file, this name will appear with a ' mark in front of it. The ' mark must be deleted for the link to work with the queries.

(vi) Click on Finish button

(vii) Click on OK button

(4) Open the table titled "Oxalate Temp Table" and delete the existing data by highlighting the rows and deleting them. DO NOT delete the table itself.

(5) Repeat step 4 for the table titled "PH Temp Table."

(6) Using the tabs at the top of the Access window select the **MACROS** tab.

(7) Select from the five macros which one you want (each should be used).

(a) ***Suspect Data (QC 50 – 150 Limit Comparison):*** This runs a series of queries which will give you a table of the samples which have associated standard recoveries outside of the 50-150% range.

(b) ***Suspect Data (Table 7-2 Comparison):*** This runs a query that compares the solid sample results in the linked Excel table to those listed in Table 4-2, Analytical Limiting Concentrations.

(c) ***Suspect Data (Table 7-3 Comparison):*** This runs a query that compares the solid sample results in the linked Excel table to those listed in Table 4-3, Concentration Limits for Resolution File.

(d) ***Oxalate Conversion to TOC:*** This runs a series of queries that takes oxalate results, averages them and converts then into the units of μg Carbon/mL or μg Carbon/g for comparison against Total Organic Carbon (TOC) results.

While Running this MACRO, the reviewer will be asked each of the questions below. For the queries to work, you must click YES each time.

(1) ***You are about to run an append query that will modify data in your table.***

(2) ***You are about to append XXX rows***

(3) ***You are about to run an append query that will modify data in your table.***

(4) ***You are about to update XXX rows***

The reviewer can use this table to compare TOC results to the converted results (Be careful; the TOC results and Oxalate results do not generally have the same "Lab Sample ID" and must be matched using "Sample Breakdown Diagrams."

(e) ***Europium 154/155 Comparison Rule:*** This runs a query that matches the europium 154 and 155 results for each sample based on result type for easy comparison.

(f) ***pH Conversion to Hydroxide:*** This runs a series of queries that takes pH measurement results, averages them and converts the average for each Lab Sample ID into the units of µg/mL or µg/g for comparison against Hydroxide results.

While Running this MACRO, the reviewer will be asked each of the questions below. For the queries to work, you must click YES each time.

(1) ***You are about to run an append query that will modify data in your table.***

(2) ***You are about to append XXX rows***

(3) ***You are about to run an append query that will modify data in your table.***

(4) ***You are about to update XXX rows***

At the end of the macro run a table will open which can be copied. The reviewer can use this table to compare the converted results to the hydroxide and aluminum measured values per the rules. (Be careful; the pH results, hydroxide results, and aluminum results do not always have the same "Lab Sample ID" and may require using the "Sample Breakdown Diagrams.")

(8) Once the macro is run, you can highlight the resulting spreadsheet and copy it into an Excel file as needed or review the data within this window. Please note that if you do not copy this into an Excel file and then proceed to link a new tank's TCD data file, you will lose this information and will need to start over to recover it.

Final Data file: While doing data reviews, the reviewer should work in the format the reviewer is most comfortable with. The resulting Excel file containing the reviewed data shall consist of two worksheets: (1)"All BBI Data" containing updated data review information and (2)"Resolution" containing those results that failed to pass a rule and either required resolution or were rejected based on the application of all the data review rules. This file should be titled "241-XX-XXX Reviewed Data.xls and placed in the out on \\AP007\Chardocs\Accelerated BBI Baselining Task\DST Information or \\AP007\Chardocs\Accelerated BBI Baselining Task\SST Information. The Data Reviewer should notify the Statistician that the data has been reviewed and is ready for use.