

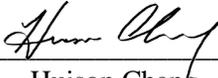


**Data Validation Report
SDG 160-18504-1**

**Characterization of Structures, Items, Solutions, and Soil at the
Proposed Outfall 200 Treatment System Sites
Y-12 National Security Complex**

Revision 0

ALLIANT CORPORATION
320 N CEDAR BLUFF ROAD
KNOXVILLE, TN 37923

Validated by: 
Huison Chang

Date: 10/14/2016

SCOPE

This report contains Level 3 data validation results for analytical data for SDG 160-18504 for four sediment samples collected at the Proposed Outfall 200 Mercury Treatment Facility located at the Y-12 National Security Complex, Oak Ridge, Tennessee. The evaluation covers analyses for TCLP volatiles, TCLP semivolatiles, TCLP Herbicides, TCLP Metals, PCBs and radionuclides (isotopic neptunium, isotopic americium 241, isotopic plutonium, isotopic uranium, isotopic thorium, tritium, total beta strontium, and technetium-99).

METHOD

The analytical data were validated using the following guidelines:

- Sampling and Analysis Plan / Quality Assurance Project Plan for Geotechnical and Waste Characterization of the Outfall 200 Mercury Treatment Facility Area at the Y-12 National Security Complex, Oak Ridge, Tennessee (November, 2015)
- *Guidance on Environmental Data Verification and Data Validation - EPA QA/G-8, EP A/240/R-02/004*, United States Environmental Protection Agency, Washington D.C
- National Functional Guidelines for Superfund Organic Methods Data Review (August 2014)
- National Functional Guidelines for Inorganic Superfund Data Review (August 2014)
- Verification and Validation of Radiological Data for Use in Waste Management and Environmental Remediation. ANSI/ANS-41.5-2012. (February, 2012)
- Multi-Agency Radiological Laboratory Analytical Protocols Manual (July, 2004)

VERIFICATION AND VALIDATION RESULTS

Completeness

Results for four sediment samples were evaluated. All analyses were performed by TestAmerica in Earth City, Missouri (TA-St. Louis), with the exception of Carbon-14 analysis by Liquid Scintillation Counter which is performed by TestAmerica in Richland, Washington (TA-RL), Washington. The following lists analytical methods and sample numbers for reported results.

Project Sample ID	Laboratory Sample ID	Analysis
YMTFA39-SE001	160-18504-1 (Sub J6H150411-1)	TCLP VOCs TCLP SVOCs TCLP Herbicides PCBs TCLP Metals/mercury Radionuclides
YMTFA40-SE001	160-18504-2 (Sub J6H150411-2)	TCLP VOCs TCLP SVOCs TCLP Herbicides PCBs TCLP Metals/mercury Radionuclides
YMTFA41-SE001	160-18504-3 (Sub J6H150411-3)	TCLP VOCs TCLP SVOCs TCLP Herbicides PCBs TCLP Metals/mercury Radionuclides

Project Sample ID	Laboratory Sample ID	Analysis
YMTFA73-SE001	160-18504-4 (Sub J6H150411-4)	TCLP VOCs TCLP SVOCs TCLP Herbicides PCBs TCLP Metals/mercury Radionuclides

Holding times

Based on evaluation of the date of sample collection (08/04/16) and date of sample analyses, all recommended holding times per the analytical methods were met.

Preservation and Laboratory Sample Receipt

All samples arrived at TA-St. Louis and TA-RL intact and in good condition under valid chain of custody (COC). The COC was signed indicating the samples were appropriately relinquished by the field personnel and accepted by the analytical laboratory.

The samples arrived at TA-St. Louis facility at cooler temperature of 0.6 °C. No cooler temperature was noted at TA-RL facility.

Analytical Methods, Reporting Units, and Detection Limits

All analytical methods specified (or equivalent to those specified) on the COC (COC No. 160-4416-2171.1) were utilized for the analyses. All results were reported in appropriate units. The detection limits were appropriate for all methods.

Trip Blank

Not Applicable.

Equipment Blanks (EB)

Not applicable.

Field Blank (FB)

Not applicable.

Field Duplicates

Not applicable.

Laboratory Case Narratives

The following issues were noted in the case narratives:

TCLP VOCs:

- 2-Butanone did not meet the minimum RRF limit in the CCVs. A low level LOQV was analyzed at the reporting limit and the affected analyte was detected.

TCLP SVOCs:

- Surrogate recovery was above the control limit in a method blank. The samples did not contain any target analytes; therefore re-extraction/re-analysis was not performed.
- The LCS and MS recovered outside control limit for hexachlorobenzene. The analyte was biased high in the LCS and MS and was not detected in the associated samples.

PCBs:

- Surrogate recovery for a sample was outside control limits for the confirmation column; however was within QC limit for the primary column. Evidence of matrix interference is present; therefore, the primary analysis was reported.
- The MS/MSD recoveries were outside control limits for PCB-1016 from the primary column. The confirmation column analyses which were within the QC limits are reported.
- RPDs between primary and confirmation column exceeded limit for DCB(surrogate) in the MS and PCB-1016 in the MS and MSD samples. PCB-1016 recoveries were within QC limits; therefore, re-analysis was not performed.
- The MS/MSD contained PCB-1254 with co-elution of PCB-1016 and PCB-1260 to quantify individually. The PCBs present are quantified as the predominant Aroclor.
- Due to presence of multiple PCBs, less than 5 peaks were used for quantitation.

TCLP Herbicides:

- The CCV recovery for 2,4-D is above the QC limit on the confirmation column, but is within the acceptable QC limits on the primary column. There were no detects above the RL on the primary column; thus confirmation was not needed. The results from primary column are reported.

TCLP Metals (ICP) and Mercury:

- No analytical or quality issues were noted.

Radionuclides:

- The samples could not be thoroughly homogenized before sub-sampling due to sample matrix. Samples contained rocks.
- Thorium-229 tracer recovery for sample YMTFA73SE001 (160-18504-4). Thorium results were qualified as estimated (J).
- MS recovery for tritium was below the QC limit.
- Sample YMTFA41SE001 precipitated nothing during final clean-up for total beta strontium analysis and was seeded with Ba carrier.
- Samples YMTFA38SE001 and YMTFA73SE001 had discoloration after the resin extraction that may cause quenching for Technetium-99 LSC.

Verification/Validation Checklists, Data Qualifiers, and Qualifier Definitions

Verification and validation checklists are presented in Appendix A and Appendix B. Applicable validation qualifier codes are defined in the table below.

Qualifier	Definition
U	analyte is not detected at or above the stated reporting limit

Qualifier	Definition
UJ	analyte is not detected but there is uncertainty about the reporting limits.
J	result is estimated
R	result is rejected

TCLP Extractions

Four sediment samples were extracted by SW-846 Method 1311 with appropriate batch QCs. There were no problems noted during the extraction.

Volatiles by GC/MS

TCLP extracts of four sediment samples were analyzed for volatile organic compounds (VOCs) by GC/MS after TCLP extraction. Holding times, initial and continual calibrations, batch QCs (blank, LCS, MS/MSD) and sample specific QCs (internal standards, surrogates) were acceptable. Although the case narrative noted low RRF for 2-butanone in CCVs, the RRFs were greater than 0.05 and no qualification of data was required.

Semivolatiles by GC/MS

TCLP extracts of four samples were extracted and analyzed for SVOCs by SW-846 Method 8270D. Holding times, initial and continual calibrations, batch QCs (blank, LCS, MS/MSD) and sample specific QCs (internal standards, surrogates) were acceptable except for high bias noted for hexachlorobenze in the LCS and MS analyses. Since this analyte was not detected in the affected samples, no qualification of data was required.

Polychlorinated Biphenyl by GC

Four samples were extracted and analyzed for PCBs by SW-846 Method 8082A. Holding times, initial and continual calibrations, batch QCs (blank, LCS, MS/MSD) and sample specific QCs (internal standards, surrogates) were acceptable. RPDs between primary and confirmation columns were outside the QC limit for a surrogate in the MS and PCB-1016 in the MA and MSD analyses. Since the RPDs in the samples were acceptable, no qualification of data was required.

Herbicides by GC

TCLP extracts of four samples were prepared and analyzed for chlorinated herbicides by SW-846 Method 8151A. Holding times, initial and continual calibrations, batch QCs (blank, LCS, MS/MSD) and sample specific QCs (surrogates) were acceptable. No qualification of data was required.

TCLP Metals(ICP) and Mercury

TCLP extracts of four samples were extracted and analyzed for Metals(ICP) and mercury by SW-846 Method 6010C and 7470A. Holding times, initial and continual calibrations, batch QCs (blank, LCS, MS/MSD) were acceptable. No qualification of data was required.

Radionuclides

Four samples were analyzed for the following radionuclides: isotopic neptunium, isotopic americium 241, isotopic plutonium, isotopic uranium, isotopic thorium tritium, total beta strontium, and technetium-99. Holding times, applicable instrument calibrations, and sample and batch QCs were acceptable for all methods. Traceable standard certificates were acceptable.

Alpha Spectroscopy

Isotopic Americium (Am-241), isotopic neptunium (Np-237 and Np-239), isotopic plutonium (Pu-238 and Pu-239/240), isotopic thorium (Th-228, Th-230, Th-232) and isotopic uranium (U-233/234, U-235/235, U-238) analyses were performed by Alpha Spectroscopy. The Laboratory Control Sample (LCS) and matrix spike (MS) had acceptable percent recoveries. The laboratory duplicate analyses had acceptable relative percent difference (RPD) and duplicate error ratio (DER) results. Chemical recoveries and yields were within acceptable limits with the following exception: Thorium-229 tracer recovery was below the QC limit in sample UMTFA73SE001. All thorium isotopes were qualified as estimated (J) in this sample. Method blank results were less than the MDAs. No other qualification of data was required.

Gas Flow Proportional Counter

Total beta strontium analysis was performed by gas flow proportional counter. The Laboratory Control Sample (LCS) and matrix spike (MS) had acceptable percent recoveries. The laboratory duplicate analyses had acceptable relative percent difference (RPD) and duplicate error ratio (DER) results. Chemical recoveries and yields were within acceptable limits. Method blank results were less than the MDAs. No qualification of data was required.

Liquid Scintillation Counter

Tritium, technetium (Tc-99) and carbon-14 were analyzed by liquid Scintillation counter. The Laboratory Control Sample (LCS) and matrix spike (MS) had acceptable percent recoveries except for the following: MS recovery for tritium was below the QC limit and was qualified as estimated nondetect (UJ) in all samples. The laboratory duplicate analyses had acceptable relative percent difference (RPD) and duplicate error ratio (DER) results. Chemical recoveries and yields were within acceptable limits. Method blank results were less than the MDAs.

Summary

- Thorium-229 tracer recovery was below the QC limit in sample UMTFA73SE001. All thorium isotopes were qualified as estimated (J) in this sample.
- Tritium was below the QC limit and was qualified as estimated nondetect (UJ) in all samples

Summary of Result Qualifiers

Sample No.	Parameter	Laboratory Result	Qualified Result	Units	Laboratory Qualifier	Validation Qualifier
YMTFA73SE001	Thorium-228	1.01	1.01	pCi/g		J
YMTFA73SE001	Thorium-230	0.772	0.772	pCi/g		J
YMTFA73SE001	Thorium-232	0.972	0.972	pCi/g		J
YMTFA39SE001	Tritium	0.168	0.354	pCi/g	U	UJ
YMTFA40SE001	Tritium	0.128	0.348	pCi/g	U	UJ
YMTFA41SE001	Tritium	0.104	0.380	pCi/g	U	UJ
YMTFA73SE001	Tritium	0.0547	0.355	pCi/g	U	UJ

Appendix A
Verification Summary Tables

Data Verification	Y	N	N/A	Comment
Custody of Samples				
Are samples traceable through inspection of signature records on field and laboratory chains of custody (COCs)?	x			
Has contractual turn-around time been met for all samples?	x			
Have all samples been preserved correctly and pertinent documentation included?	x			
Is the laboratory log in sample receipt checklist present	x			
Are any sample receipt non-conformances noted?	x			
Standard Traceability				
Have certificate(s) been included for the LCS and MS?	x			
Standards have not exceeded the certificate expiration date	x			
Are chemical standards and reference materials traceable to a reliable source? (Reagent traceability summary)	x			
Analytical Completeness				
Are all COC samples and associated analytical results reported in the laboratory data package?	x			
Data Summaries				
The case narrative is present and summarizes the sample receipt and analysis information including any analytical anomalies for all methods reported in the data package.	x			
Other data summary forms are present as applicable (detection, sample results, surrogate, tracer/carrier, QC results and association, prep and analysis chronicle, method and sample summaries)	x			
Sample Data				
Is the Sample Data included for each COC requested analytical method?	x			
Is the calibration data included for each method? (ICAL, ICV, CCAL as required for each method)	x			
Are the QC summary forms included for each method? (MB, ICS/CCB, LCS/LCSD, MS/MSD, surrogates, internal standards, serial dilution as required and applicable for each method)	x			
Are the method run logs and/or bench sheets included for each method?	x			

Data Verification	Y	N	N/A	Comment
Are the method preparation/extraction logs included for each applicable method?	x			
Is the sample and QC raw data included for each method?	x			
Is the internal Laboratory Review documented by checklists and included in the data package?	x			

Appendix B
Validation Summary Tables

Data Verification	Y	N	N/A	Comment
Custody of Samples				
Are samples traceable through inspection of signature records on field and laboratory chains of custody (COCs)?	x			
Has contractual turn-around time been met for all samples?	x			
Have all samples been preserved correctly and pertinent documentation included?	x			
Is the laboratory log in sample receipt checklist present	x			
Are any sample receipt non-conformances noted?	x			
Standard Traceability				
Have certificate(s) been included for the LCS and MS?	x			
Standards have not exceeded the certificate expiration date	x			
Are chemical standards and reference materials traceable to a reliable source? (Reagent traceability summary)	x			
Analytical Completeness				
Are all COC samples and associated analytical results reported in the laboratory data package?	x			
Data Summaries				
The case narrative is present and summarizes the sample receipt and analysis information including any analytical anomalies for all methods reported in the data package.	x			
Other data summary forms are present as applicable (detection, sample results, surrogate, tracer/carrier, QC results and association, prep and analysis chronicle, method and sample summaries)	x			
Sample Data				
Is the Sample Data included for each COC requested analytical method?	x			
Is the calibration data included for each method? (ICAL, ICV, CCAL as required for each method)	x			
Are the QC summary forms included for each method? (MB, ICS/CCB, LCS/LCSD, MS/MSD, surrogates, internal standards, serial dilution as required and applicable for each method)	x			
Are the method run logs and/or bench sheets included for each method?	x			

Data Verification	Y	N	N/A	Comment
Are the method preparation/extraction logs included for each applicable method?	x			
Is the sample and QC raw data included for each method?	x			
Is the internal Laboratory Review documented by checklists and included in the data package?	x			

Volatile Organic Compounds by GC/MS (SW8260C)	Y	N	N/A	Qualifier	Comment or Reason Code
Preservation and Holding Times					
Were samples properly preserved?	x				
Have the samples been analyzed within holding times?	x				
Detection Limits					
Do all laboratory RLs <= recommended reporting limits in the SAP?	x				
GC/MS Instrument Performance Tuning					
Was BFB tune performed at the beginning of 12-hour analytical sequence?	x				
Did the BFB tunes meet instrument performance criteria?	x				
Initial Calibration					
Are minimum calibration curve with minimum 5 points analyzed prior to sample analysis?	x				
Are average RRFs greater than 0.05?	x				
Are %RSDs within the criteria?	x				
Calibration Verification					
Are calibration verification standard analyzed at the beginning of the analytical sequence immediately after BFB tuning?	x				
RRT within 0.006 of the average RRT of the initial calibration?		x			
Are RRFs greater than 0.05?	x				
Are %D (difference or drift) within appropriate control criteria?	x				
Method Blank					
Is the Method Blank analyzed for each analytical batch of up to 20 samples?	x				
Is the Method Blank Summary form present?	x				
Is the method blank the same matrix as the samples in the reporting batch?	x				
Is the blank at similar (low, medium, or trace) concentration level?	x				
Does the blank have any detects above MDL?		x			
Surrogate Recovery					
Are all samples and QCs spiked with surrogate compounds?	x				
Are percent recoveries within the method criteria results?	x				
LCS/LCSD					
Has at least one LCS been prepared for each preparation batch containing up to 20 samples?	x				

Volatile Organic Compounds by GC/MS (SW8260C)	Y	N	N/A	Qualifier	Comment or Reason Code
Is the LCS the same matrix as the samples in the reporting batch?	x				
Is the LCS spiked with all target analytes listed in the SAP?	x				
Are the LCS %RECs within the applicable QC criteria?	x				
Are the LCS/LCSD RPDs within the applicable QC criteria?			x		No LCSD prepared.
Matrix Spike/Matrix Spike Duplicate					
Has at least one MS/MSD pair been prepared for a batch with sample counts up to 20 samples?	x				
Are the MS/MSD spiked with all target analytes listed in the SAP?	x				
MS and MSD %RECs within the applicable QC limits?	x				
MS/MSD RPDs within the applicable QC limits?	x				
Internal Standards					
Were internal standards added to all samples and QCs?	x				
Are internal standard retention time within method criteria?	x				
Are internal standard area within method criteria?	x				
Target Analyte Identification					
Do the mass spectra of the positively identified compound meet the mass criteria?			x		
Are the RRTs of the positively identified target analytes within ± 0.06 of the same analyte in the associated opening CCV?			x		
Target Analyte Quantitation and Reported Quantitation Limit					
Are the results for all positively identified analytes are calculated correctly?			x		
Are the reporting limits calculated for the non-detects and reported correctly?			x		

Semivolatile Organic Compounds by GC/MS (SW8270D)	Y	N	N/A	Qualifier	Comment or Reason Code
Preservation and Holding Times					
Were samples properly preserved?	x				
Have the samples been analyzed within holding times?	x				
Target Analytes and Detection Limits					
Are all the SAP target analytes reported	x				
Do all laboratory RLs <= recommended reporting limits in the SAP?	x				
GC/MS Instrument Performance Tuning					
Was DFTPP tune performed at the beginning of 12-hour analytical sequence?	x				
Did the DFTPP tunes meet instrument performance criteria?	x				
Initial Calibration					
Are minimum calibration curve with minimum 5 points analyzed prior to sample analysis?	x				
Are average RRFs greater than 0.05?	x				
Are %RSDs within method criteria?	x				
Calibration Verification					
Are calibration verification standard analyzed at the beginning of the analytical sequence immediately after DFTPP tuning?	x				
RRT within 0.006 of the average RRT of the initial calibration?			x		
Are RRFs greater than 0.05?	x				
Are %D (difference or drift) within the appropriate control criteria?	x				
Method Blank					
Is the Method Blank extracted and analyzed for each analytical batch of up to 20 samples?	x				
Is the Method Blank Summary form present?	x				
Is the method blank the same matrix as the samples in the reporting batch?	x				
Is the blank at similar (low, medium, or trace) concentration level?	x				
Does the blank have any detects above MDL?		x			
Surrogate Recovery					
Are all samples and QCs spiked with surrogate compounds?	x				

Semivolatile Organic Compounds by GC/MS (SW8270D)	Y	N	N/A	Qualifier	Comment or Reason Code
Are percent recoveries within the method criteria results?		x			One surrogate was recovered above the QC limit in method blank. No qualification required.
LCS/LCSD					
Has at least one LCS been prepared for each preparation batch containing up to 20 samples?	x				
Is the LCS the same matrix as the samples in the reporting batch?	x				
Is the LCS spiked with all target analytes listed in the SAP?	x				
Are the LCS %RECs within the applicable QC criteria?		x			Hexachlorobenzene recovery was above the QC limit. No qualification required for nondetects.
Are the LCS/LCSD RPDs within the applicable QC criteria?			x		No LCSD prepared.
Matrix Spike/Matrix Spike Duplicate					
Has at least one MS/MSD pair been prepared for a batch with sample counts up to 20 samples?	x				
Are the MS/MSD spiked with all target analytes listed in the SAP?	x				
MS and MSD %RECs within the applicable QC limits?		x			Hexachlorobenzene recovery was above the QC limit. No qualification required for nondetects.
MS/MSD RPDs within the applicable QC limits?	x				
Internal Standards					
Were internal standards added to all samples and QCs?	x				
Are internal standard retention time within method criteria?	x				
Are internal standard area within method criteria?	x				
Target Analyte Identification					
Do the mass spectra of the positively identified compound meet the mass criteria?			x		

Semivolatile Organic Compounds by GC/MS (SW8270D)	Y	N	N/A	Qualifier	Comment or Reason Code
Are the RRTs of the positively identified target analytes within ± 0.06 of the same analyte in the associated opening CCV?			x		
Target Analyte Quantitation and Reported Quantitation Limit					
Are the results for all positively identified analytes are calculated correctly?			x		
Are the reporting limits calculated for the non-detects and reported correctly?			x		

Polychlorinated Biphenyls (SW8082A)	Y	N	N/A	Qualifier	Comment or Reason Code
Preservation and Holding Times					
Were samples properly preserved?	x				
Have the samples been analyzed within holding times?	x				
Target Analytes and Detection Limits					
Are all the SAP target analytes reported?	x				
Do all laboratory RLs <= SAP recommended reporting limits?	x				
Initial Calibration					
Are minimum calibration curve with minimum 5 points analyzed prior to sample analysis?		x			6 point for PCB1016/1260 and PCB1221/1254 mixtures analyzed. Single point used for all other PCBs.
Are %RSDs within method criteria?	x				For PCB1221/1254. Linear regression r-square above 0.990 for PCB1016/1260
Calibration Verification					
Are calibration verification standard analyzed at the appropriate frequency?	x				
RT within RT windows established by initial calibration?	x				
Are %D (difference or drift) within 20% of the average initial calibration?	x				No closing CCV analyzed after samples.
Method Blank					
Is the Method Blank extracted and analyzed for each analytical batch of up to 20 samples?	x				
Is the Method Blank Summary form present?	x				
Is the method blank the same matrix as the samples in the reporting batch?	x				
Is the blank at similar (low, medium, or trace) concentration level?	x				
Does the blank have any detects above MDL?		x			
Surrogate Recovery					
Are all samples and QCs spiked with surrogate compounds?	x				

Polychlorinated Biphenyls (SW8082A)	Y	N	N/A	Qualifier	Comment or Reason Code
Are percent recoveries within the method criteria results?	x				
Internal Standard					
Were internal standards added to all samples and QCs?	x				
Are internal standard retention times within method criteria?	x				
Are internal standard area within method criteria?	x				
LCS/LCSD					
Has at least one LCS been prepared for each preparation batch containing up to 20 samples?	x				
Is the LCS the same matrix as the samples in the reporting batch?	x				
Is the LCS spiked with all target analytes listed in the SAP?		x			PCB1016/1260 only.
Are the LCS %RECs within the applicable QC criteria?	x				
Are the LCS/LCSD RPDs within the applicable QC criteria?			x		No LCSD
Matrix Spike/Matrix Spike Duplicate					
Has at least one MS/MSD pair been prepared for a batch with sample counts up to 20 samples?	x				
Are the MS/MSD spiked with target analyte specified in the SAP?		x			PCB1016/1260 only.
MS and MSD %RECs within the applicable QC limits?	x				PCB1016 recoveries were outside QC limits on the primary column. The reported results were from confirmation column which were within QC limits.
MS/MSD RPDs within the applicable QC limits?	x				
Target Analyte Identification					
Do the positively identified compound meet the identification criteria?			x		
Are the RTs of the positively identified target analytes within RT window established by initial calibration standards?			x		

Polychlorinated Biphenyls (SW8082A)	Y	N	N/A	Qualifier	Comment or Reason Code
Target Analyte Quantitation and Reported Quantitation Limit					
Are the results for all positively identified analytes are calculated correctly?			x		
Are the reporting limits calculated for the non-detects and reported correctly?			x		
Are RPDs between primary and confirmation column results for detects within QC limit?	x				Although RPD outliers were noted for surrogate and MS/MSD samples, all reported sample detects had acceptable RPDs.

Chlorinated Herbicides (SW8151A)	Y	N	N/A	Qualifier	Comment or Reason Code
Preservation and Holding Times					
Were samples properly preserved?	x				
Have the samples been analyzed within holding times?	x				
Detection Limits					
Are all the SAP target analytes reported?	x				
Do all laboratory RLs <= SAP recommended reporting limits?	x				
Initial Calibration					
Are minimum calibration curve with minimum 5 points analyzed prior to sample analysis?	x				
Are %RSDs within method criteria?	x				
Calibration Verification					
Are calibration verification standard analyzed at the appropriate frequency?	x				
RT within RT windows established by initial calibration?	x				
Are %D (difference or drift) within 20% of the average initial calibration factors?	x				Although CCV outlier was noted on a secondary column, the results were reported from the primary column with acceptable %Ds.
Method Blank					
Is the Method Blank extracted and analyzed for each analytical batch of up to 20 samples?	x				
Is the Method Blank Summary form present?	x				
Is the method blank the same matrix as the samples in the reporting batch?	x				
Is the blank at similar (low, medium, or trace) concentration level?	x				
Does the blank have any detects above MDL?		x			
Surrogate Recovery					
Are all samples and QCs spiked with surrogate compounds?	x				
Are percent recoveries within the method criteria results?	x				
LCS/LCSD					
Has at least one LCS been prepared for each preparation batch containing up to 20 samples?	x				

Chlorinated Herbicides (SW8151A)	Y	N	N/A	Qualifier	Comment or Reason Code
Is the LCS the same matrix as the samples in the reporting batch?	x				
Is the LCS spiked with all target analytes listed in the SAP?	x				
Are the LCS %RECs within the applicable QC criteria?	x				
Are the LCS/LCSD RPDs within the applicable QC criteria?			x		No LCSD
Matrix Spike/Matrix Spike Duplicate					
Has at least one MS/MSD pair been prepared for a batch with sample counts up to 20 samples?	x				
Are the MS/MSD spiked with all target analytes specified in the SAP?	x				
MS and MSD %RECs within the applicable QC limits?	x				
MS/MSD RPDs within the applicable QC limits?	x				
Target Analyte Identification					
Do the positively identified compound meet the identification criteria?			x		
Are the RTs of the positively identified target analytes within RT window established by initial calibration standards?			x		
Target Analyte Quantitation and Reported Quantitation Limit					
Are the results for all positively identified analytes are calculated correctly?			x		
Are the reporting limits calculated for the non-detects and reported correctly?			x		

Metals by ICP (SW6010C) Mercury by CVAA (SW7470A)	Y	N	N/A	Qualifier	Comment or Reason Code
Preservation and Holding Times					
Were samples properly preserved?	x				
Are sample preparation sheets present and account for all extractions and digestions for reported samples?	x				
Have the samples been prepared and analyzed within holding times?	x				
Detection Limits and Target Analytes					
Do all samples show RLs <= the SAP Recommended Reporting Limits?	x				
Are all the SAP target analytes reported?	x				
Initial Calibration					
Was the Calibration within acceptance criteria?	x				
Calibration Verification					
Was a second source ICV analyzed after calibration with recoveries within acceptance criteria?	x				
Were CCVs analyzed at the required frequency with recoveries within acceptance criteria? For ICP, CCVs and low level CCVs (CCVL) as applicable.	x				
Are the ICV and CCV/CCVL Summary forms present?	x				
Was the ICP CRQL Check Standard analyzed with recoveries within acceptance criteria?	x				
Method Blank and ICB/CCBs					
Has at least one method blank been prepared For each batch of up to 20 samples?	x				
Is the method blank the same matrix as the samples in the reporting batch?	x				
Were target analytes detected in the method blank above the MDL?		x			
Were the ICB and CCBs analyzed at the required frequency with results within acceptance criteria?	x				
Are the Method Blank and ICB/CCB Summary forms present?	x				
ICP Interference Check Samples					
Were the ICP ICSA/ICSAB interference check standards analyzed as required with results within acceptance criteria?	x				
LCS/LCSD					
Has at least one LCS been prepared for each preparation batch containing up to 20 samples?	x				
Is the LCS the same matrix as the samples in the reporting batch?	x				
Is the LCS spiked with all target analytes listed in the SAP?	x				
Are the LCS %RECs within the applicable QC criteria?	x				

Metals by ICP (SW6010C) Mercury by CVAA (SW7470A)	Y	N	N/A	Qualifier	Comment or Reason Code
Are the LCS/LCSD RPDs within the applicable QC criteria?			x		No LCSD
Matrix Spike/Matrix Spike Duplicate					
Has at least one MS/MSD pair been prepared for a batch containing up to 20 samples?	x				
Are the MS/MSD spiked with all target analytes listed in the SAP?	x				
Are MS and MSD %RECs within the applicable QC limits?	x				
Are MS/MSD RPDs within the applicable QC limits?	x				
Duplicates					
Has a laboratory duplicate been prepared for a batch containing up to 20 samples? (If an MS/MSD pair has been prepared, the laboratory duplicate is not required.)		x			
If a laboratory duplicate was analyzed, were the RPDs within acceptance criteria?			x		
Was a field duplicate analyzed?		x			
If a field duplicate was analyzed, were the RPDs within the 50% acceptance criteria?			x		
Serial Dilution					
Was the Serial Dilution within acceptance limits?	x				
Sample Quantitation and Documentation					
Are reported sample concentrations within the instrument linear range?			x		
Have sample reporting limits and reported concentrations been adjusted for analytical dilutions?			x		
Are instrument runlogs present and account for all reported sample results?	x		x		
Have all Laboratory Case Narrative comments and findings been addressed in the data validation process?	x				

Radionuclide Analyses: Alpha Spectrometry Gas Flow Proportional Counting Liquid Scintillation Counting	Y	N	N/A	Qualifier	Comment or Reason Code

Radionuclide Analyses: Alpha Spectrometry Gas Flow Proportional Counting Liquid Scintillation Counting	Y	N	N/A	Qualifier	Comment or Reason Code
Preservation and Holding Times					
Were samples preserved correctly?	x				
Were samples analyzed within holding times?	x				
Standard Traceability					
Were all certificates included for the LCS and MS samples?	x				
Were all standards and reference materials traceable to reliable source material?	x				
Calibration Verification					
Are efficiencies within tolerance limits?	x				
Are energies within tolerance limits?	x				
Are background performance check count rates within tolerance limits?					
Are appropriate peak resolution within appropriate control criteria?	x				
LCS					
Has at least one LCS been prepared for up to 20 samples?	x				
Is the LCS the same matrix as the samples in the reporting batch?	x				
Are LCS %D (or %R) within QC acceptance limit?	x				
Laboratory Duplicate					
Has at least one laboratory duplicate been prepared for up to 20 samples?	x				
Are RPD and DER within QC acceptance limit?	x				
Matrix Spike					
Has at least one MS been prepared for up to 20 samples?	x				
Is MS %D (or %R) within QC acceptance limit?		x			MS recovery for tritium was below QC limit. All tritium result (< MDA) were qualified as estimated (UJ) at the reporting MDA.
Method Blank					
Has at least one method blank been prepared for up to 20 samples?	x				
Is the method blank the same matrix as the samples in the reporting batch?	x				
Are the results less than 1.65 * CSU or within control limits?	x				

Radionuclide Analyses: Alpha Spectrometry Gas Flow Proportional Counting Liquid Scintillation Counting	Y	N	N/A	Qualifier	Comment or Reason Code
Chemical Yield - Tracers and Carriers					
Is yield reported for all samples and QC samples in the reporting batch?	x				
Are percent recovery criteria satisfied for all yield results?		x			Thorium-229 tracer recovery was 28.7% below the QC limits but above 10% in sample YMTFA73SE001. All isotopic thorium results were qualified as estimated (J).

Analytical Data Review Verification Checklist

Laboratory:	TestAmerica	SOW or Contract No.:	Outfall 200
Verifier Name:	JD Milloway	Date Verified:	9/19/16
SDG No(s).	18504-1; 18504-2		

Item No.	Criteria	Acceptable?				Comments
		Yes	No	NA	NR	
1.	Case Narrative Present	X				
2.	Lab Qualifiers Present	X				
3.	Methods Specified in SAP or Equivalent Methods were Used	X				
4.	Data is Complete for All Requested Analytes with All Samples	X				
5.	Units are as Specified in SOW/Contract or Otherwise are Appropriate	X				
6.	Detection Limits Meet Contract Required Detection Limits or Other Project Defined Limits (e.g., regulatory limits)	X				
7.	Samples IDs and Analytes Agree with those on COCs	X				
8.	Samples IDs Agree Throughout Report	X				
9.	Raw Data Results Agree with Data Reports and Electronic Data	X				
10.	COCs – Samples Traceable	X				
11.	All Samples Preserved Correctly	X				
12.	Samples Arrived Intact	X				
13.	Custody Seals on Samples			X		COC Seals on coolers only
14.	Holding Times Met	X				
	-Metals other than Mercury ≤ 180 days			X		
	-Mercury ≤28 days			X		
	-TCLP Metals other than Mercury to TCLP Extraction ≤180 days	X				
	-TCLP Metals other than Mercury TCLP Extraction to Analysis ≤180 days	X				
	-TCLP Mercury to TCLP Extraction ≤28 days	X				
	-TCLP Mercury TCLP Extraction to Analysis ≤28 days	X				
	-VOAs to Extraction/Analysis ≤14 days			X		
	-SVOAs to Extraction ≤7 days (liquids),			X		

Analytical Data Review Verification Checklist

Laboratory:	TestAmerica	SOW or Contract No.:	Outfall 200
Verifier Name:	JD Milloway	Date Verified:	9/19/16
SDG No(s).	18504-1; 18504-2		

Item No.	Criteria	Acceptable?				Comments
		Yes	No	NA	NR	
	≤14 days (solids)					
	-SVOAs Extraction to Analysis ≤40 days			X		
	-Pesticides to Extraction ≤7 days (liquids), ≤14 days (solids)			X		
	-Pesticides Extraction to Analysis ≤40 days			X		
	-Herbicides to Extraction ≤7 days (liquids), ≤14 days (solids)			X		
	-Herbicides Extraction to Analysis ≤40 days			X		
	PCBs - none	X				
	-TCLP VOAs to TCLP Extraction ≤14 days	X				
	-TCLP VOAs TCLP Extraction to Analysis ≤14 days	X				
	-TCLP SVOAs to TCLP Extraction ≤14 days	X				
	-TCLP SVOAs TCLP Extraction to Prep Extraction ≤7 days	X				
	-TCLP SVOAs Prep Extraction to Analysis ≤40 days	X				
	-TCLP Pesticides to TCLP Extraction ≤14 days			X		
	-TCLP Pesticides TCLP Extraction to Prep Extraction ≤7 days			X		
	-TCLP Pesticides Prep Extraction to Analysis ≤40 days			X		
	-TCLP Herbicides to TCLP Extraction ≤14 days	X				
	-TCLP Herbicides TCLP Extraction to Prep Extraction ≤7 days	X				
	-TCLP Herbicides Prep Extraction to Analysis ≤40 days	X				
	TOC ≤28 days			X		
	-Hexane Extractable Material, Oil and Grease ≤28 days			X		

Analytical Data Review Verification Checklist

Laboratory:	TestAmerica	SOW or Contract No.:	Outfall 200
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SDG No(s).	18504-1; 18504-2		

		Acceptable?				Comments
Item No.	Criteria	Yes	No	NA	NR	
	-Chloride, Fluoride, Nitrate, Sulfate ≤28 days			X		
	-Cyanide ≤14 days			X		
	-Sulfide ≤7 days			X		
	-pH – immediately			X		
	-Specific Conductance - immediately			X		
	-Radionuclides 180 days (best practice)	X				