TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

ANALYTICAL REPORT

TestAmerica Laboratories, Inc.
TestAmerica St. Louis
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Tel: (314)298-8566

TestAmerica Job ID: 160-18639-1
Client Project/Site: ORNL Y-12 Outfall 200 Characterization

For:
Alliant Corporation
320 N Cedar Bluff Road
Suite 200
Knoxville, Tennessee 37923

Attn: Doug Milloway

Authorized for release by:
9/29/2016 11:04:47 AM

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LINKS

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Results relate only to the items tested and the sample(s) as received by the laboratory.

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Job ID: 160-18639-1

Laboratory: TestAmerica St. Louis

Narrative

CASE NARRATIVE

Client: Alliant Corporation

Project: ORNL Y-12 Outfall 200 Characterization

Report Number: 160-18639-1

With the exceptions noted as flags or footnotes, standard analytical protocols were followed in the analysis of the samples and no problems were encountered or anomalies observed. In addition all laboratory quality control samples were within established control limits, with any exceptions noted below. Each sample was analyzed to achieve the lowest possible reporting limit within the constraints of the method. In some cases, due to interference or analytes present at high concentrations, samples were diluted. For diluted samples, the reporting limits are adjusted relative to the dilution required.

TestAmerica St. Louis attests to the validity of the laboratory data generated by TestAmerica facilities reported herein. All analyses performed by TestAmerica facilities were done using established laboratory SOPs that incorporate QA/QC procedures described in the application methods. TestAmerica's operations groups have reviewed the data for compliance with the laboratory QA/QC plan, and data have been found to be compliant with laboratory protocols unless otherwise noted below.

The test results in this report meet all NELAP requirements for parameters for which accreditation is required or available. Any exceptions to NELAP requirements are noted in this report. Pursuant to NELAP, this report may not be reproduced, except in full, without the written approval of the laboratory.

Calculations are performed before rounding to avoid round-off errors in calculated results.

All holding times were met and proper preservation noted for the methods performed on these samples, unless otherwise detailed in the individual sections below.

All solid sample results for Chemistry analyses are reported on an "as received" basis unless otherwise indicated by the presence of a % solids value in the method header. All soil/sediment sample results for radiochemistry analyses are based upon sample as dried and disaggregated with the exception of tritium, carbon-14, and iodine-129 by gamma spectroscopy unless requested as wet weight by the client."

This laboratory report is confidential and is intended for the sole use of TestAmerica and its client.

RECEIPT

The samples were received on 8/16/2016 9:20 AM; the samples arrived in good condition, properly preserved and, where required, on ice. The temperature of the cooler at receipt was 3.0º C.

Receipt Exceptions

Limited volume received for sample YMTFA93 9404 - 8G.
Per client, total metals and Hg were logged in place of TCLP metals.

POLYCHLORINATED BIPHENYLS (PCBS)

Samples YMTFA81 9404 G (160-18639-1) and YMTFA93 9404-8G (160-18639-2) were analyzed for polychlorinated biphenyls (PCBs) in accordance with EPA SW-846 Method 8082. The samples were prepared on 08/24/2016 and analyzed on 08/26/2016.

Analytical Batch 160-266473

Elevated reporting limits are provided for the following sample due to limited sample volume available for preparation: YMTFA93 9404-8G (160-18639-2).

Job ID: 160-18639-1 (Continued)

Laboratory: TestAmerica St. Louis (Continued)

The CCV recoveries for Aroclor 1260 and DCB are outside the lower QC limits on the secondary column, but within acceptable QC limits on the primary column. There were no hits above the RL for Aroclor 1260 and the surrogate recoveries in the samples were within acceptable QC limits on the primary column; therefore confirmation is not needed. (CCV 160-266473/27) and (CCV 160-266473/39)

The internal standard eluted outside the retention time window for the following CCV: (CCVIS 160-266473/3). This retention time shift was taken into account when reviewing the sample(s) for target compounds.

Analytical Batch 160-267639
The following samples required a copper clean-up to reduce matrix interferences caused by sulfur: (LCS 160-266347/2-A) and (MB 160-266347/1-A).

The internal standard eluted outside the retention time window for the following samples: (CCV 160-267639/49), (CCV 160-267639/50) and (ICV 160-267639/14). This retention time shift was taken into account when reviewing the samples for target compounds.

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

TOTAL METALS (ICP)
Samples YMTFA81 9404 G (160-18639-1) and YMTFA93 9404-8G (160-18639-2) were analyzed for total metals (ICP) in accordance with EPA SW-846 Method 6010C. The samples were prepared on 08/18/2016 and analyzed on 08/29/2016.

The following sample(s) was diluted due to the nature of the sample matrix. Samples are high in salts: YMTFA81 9404 G (160-18639-1), YMTFA93 9404-8G (160-18639-2), (160-18639-B-1-B MS ^), (160-18639-B-1-C MSD) and (160-18639-B-1-A SD ^). Elevated reporting limits (RLs) are provided.

The matrix spike / matrix spike duplicate (MS/MSD) recovery for Barium and Lead and precision for Barium was outside control limits, indicating a matrix interference. The sample was a non-homogeneous mixture of soil. The LCS was within acceptable limits.

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

MERCURY
Samples YMTFA81 9404 G (160-18639-1) and YMTFA93 9404-8G (160-18639-2) were analyzed for mercury in accordance with EPA SW-846 Method 7471B. The samples were prepared on 08/19/2016 and analyzed on 08/22/2016 and 08/23/2016.

The following samples were diluted to bring the concentration of mercury within the calibration range: YMTFA93 9404-8G (160-18639-2). The elevated reporting limit (RL) is provided.

No analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

PERCENT SOLIDS
Samples YMTFA81 9404 G (160-18639-1) and YMTFA93 9404-8G (160-18639-2) were analyzed for percent solids in accordance with EPA Method 160.3 MOD. The samples were analyzed on 08/18/2016.

No analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

ISOTOPIC AMERICIUM 241 (ALPHA SPECTROMETRY)
Samples YMTFA81 9404 G (160-18639-1) and YMTFA93 9404-8G (160-18639-2) were analyzed for Isotopic Americium 241 (Alpha Spectrometry) in accordance with A-01-R. The samples were dried on 08/16/2016, prepared on 08/19/2016 and analyzed on 08/25/2016.

The following samples could not be thoroughly homogenized before sub-sampling was performed due to sample matrix: YMTFA81 9404 G (160-18639-1), YMTFA93 9404-8G (160-18639-2) and (160-18639-A-1-A DU). The samples contained rocks.

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

ISOTOPIC NEPTUNIUM (ALPHA SPECTROMETRY)

Job ID: 160-18639-1 (Continued)

Laboratory: TestAmerica St. Louis (Continued)

Samples YMTFA81 9404 G (160-18639-1) and YMTFA93 9404-8G (160-18639-2) were analyzed for Isotopic Neptunium (Alpha Spectrometry) in accordance with A-01-R. The samples were dried on 08/16/2016, prepared on 08/19/2016 and analyzed on 08/25/2016.

The following samples could not be thoroughly homogenized before sub-sampling was performed due to sample matrix: YMTFA81 9404 G (160-18639-1), YMTFA93 9404-8G (160-18639-2) and (160-18639-A-1-A DU). The samples contained rocks.

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

ISOTOPIC PLUTONIUM (ALPHA SPECTROMETRY)
Samples YMTFA81 9404 G (160-18639-1) and YMTFA93 9404-8G (160-18639-2) were analyzed for Isotopic Plutonium (Alpha Spectrometry) in accordance with A-01-R. The samples were dried on 08/16/2016, prepared on 08/19/2016 and analyzed on 08/24/2016 and 08/25/2016.

The following samples could not be thoroughly homogenized before sub-sampling was performed due to sample matrix: YMTFA81 9404 G (160-18639-1), YMTFA93 9404-8G (160-18639-2) and (160-18639-A-1-A DU). The samples contained rocks.

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

ISOTOPIC THORIUM (ALPHA SPECTROMETRY)
Samples YMTFA81 9404 G (160-18639-1) and YMTFA93 9404-8G (160-18639-2) were analyzed for Isotopic Thorium (Alpha Spectrometry) in accordance with DOE A01R_Th. The samples were dried on 08/16/2016, prepared on 08/19/2016 and analyzed on 08/25/2016.

The following samples could not be thoroughly homogenized before sub-sampling was performed due to sample matrix: YMTFA81 9404 G (160-18639-1), YMTFA93 9404-8G (160-18639-2) and (160-18639-A-1-A DU). The samples contained rocks.

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

ISOTOPIC URANIUM (ALPHA SPECTROMETRY)
Samples YMTFA81 9404 G (160-18639-1) and YMTFA93 9404-8G (160-18639-2) were analyzed for Isotopic Uranium (Alpha Spectrometry) in accordance with DOE. The samples were dried on 08/16/2016, prepared on 08/19/2016 and analyzed on 08/25/2016.

The following samples could not be thoroughly homogenized before sub-sampling was performed due to sample matrix: YMTFA81 9404 G (160-18639-1), YMTFA93 9404-8G (160-18639-2) and (160-18639-A-1-A DU). The samples contained rocks.

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

CARBON-14 BY LSC
Samples YMTFA81 9404 G (160-18639-1) and YMTFA93 9404-8G (160-18639-2) were analyzed for Carbon-14 by LSC in accordance with EERF C-01. The samples were prepared on 09/20/2016 and analyzed on 09/21/2016.

Carbon-14 failed the recovery criteria low for the MSD of sample 160-18700-1 in batch 160-270885. Carbon-14 exceeded the RPD limit.

The matrix spike / matrix spike duplicate (MS/MSD) precision is outside control limits (RER: 5.27, RPD: 128%). Because these samples are analyzed "as received", matrix interference and non-homogeneity is suspected.

The matrix spike duplicate (MSD) recovery (18%) was outside of the control limits (29-128%). Because the samples are analyzed as received, non-homogeneity and matrix interference is suspected because the associated laboratory control sample (LCS) recovery is within acceptance limits.

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

TRITIUM
Samples YMTFA81 9404 G (160-18639-1) and YMTFA93 9404-8G (160-18639-2) were analyzed for Tritium in accordance with DOE. The samples were prepared on 09/09/2016 and analyzed on 09/11/2016.

Job ID: 160-18639-1 (Continued)

Laboratory: TestAmerica St. Louis (Continued)

No analytical or quality issues were noted, other than those described in the Definitions/Glossary page.

RADIUM-226 BY ALPHA SPECTROMETRY
Samples YMTFA81 9404 G (160-18639-1) and YMTFA93 9404-8G (160-18639-2) were analyzed for Radium-226 by Alpha Spectrometry in accordance with ST-RC-0301. The samples were dried on 08/16/2016, prepared on 09/15/2016 and analyzed on 09/25/2016 and 09/26/2016.

The following samples could not be thoroughly homogenized before sub-sampling was performed due to sample matrix: YMTFA81 9404 G (160-18639-1), YMTFA93 9404-8G (160-18639-2) and (160-18639-A-1-A DU). The samples contained rocks.

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

TOTAL BETA STRONTIUM (GFPC)
Samples YMTFA81 9404 G (160-18639-1) and YMTFA93 9404-8G (160-18639-2) were analyzed for Total Beta Strontium (GFPC) in accordance with SR-03-RC. The samples were dried on 08/16/2016, prepared on 08/25/2016 and analyzed on 08/31/2016.

No analytical or quality issues were noted, other than those described in the Definitions/Glossary page.

TECHNETIUM-99 (LSC)
Samples YMTFA81 9404 G (160-18639-1) and YMTFA93 9404-8G (160-18639-2) were analyzed for Technetium-99 (LSC) in accordance with TC_02_RC. The samples were prepared on 08/23/2016 and analyzed on 08/27/2016.

No analytical or quality issues were noted, other than those described in the Definitions/Glossary page.

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
Phone (314) 298-8566 Fax (314) 298-8757

Chain of Custody Record

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Client Information	Sampler: N. Stout, B. Gilham, M. Hok	Lab PM: Gish, Erika K	Carrier Tracking No(s): Fed Ex	COC No: 160-4416-2171.2
Client Contact: Matt Frost	Phone: 865-255 5540	E-Mail: erika.gish@testamericainc.com		Page: Page 2 of 4
Company: Alliant Corporation				Job #:
Address: 320 N Cedar Bluff Road Suite 200	Due Date Requested:			
City: Knoxville	TAT Requested (days): by contract			
State, Zip: TN, 37923				
Phone:	PO #: 16-PO-001581			
Email: mfrost@alliantcorp.com	WO #: 4326			
Project Name: ORNL Y-12 Outfall 200 Characterization	Project #: 16005502			
Site:	SSOW#:			

Analysis Requested

Sample Identification	Sample Date	Sample Time	Sample Type (C=comp, G=grab)	Matrix (W=water, S=solid, O=waste/oil, BT=Tissue, A=Air)	Field Filtered Sample (Yes or No)	Perform MS/MSD (Yes or No)	A_01_R_Am_Cm, A01R_Np, A01R_Pu, A01R_Th, A01R_U, SR_03_RC_Tot_Sr, TC_02_RC	C_01_1, DOE_H3_04_RC	8260C - TCLP VOC	8151A - TCLP Herbicides	GA_01_R_Ra - Gamma - Radium-226/228	8082A - PCB	8270D - TCLP BNAs	6010C, 7470A	8082A - PCBs	Radionuclides	TCLP metals			Total Number of containers	Special Instructions/Note:
			Preservation Code:				N	N	N	N	N	N	N	N	N						
YMTFA81 9404 G	8-15-16	0830	C	S											X	X	X				Sludge (9404-7)
YMTFA93 9404-8G	8-15-16	1300	C	S											X	X	X				Sludge (9404-8)

160-18639 Chain of Custody

Preservation Codes:

A - HCL	M - Hexane
B - NaOH	N - None
C - Zn Acetate	O - AsNaO2
D - Nitric Acid	P - Na2O4S
E - NaHSO4	Q - Na2SO3
F - MeOH	R - Na2S2O3
G - Amchlor	S - H2SO4
H - Ascorbic Acid	T - TSP Dodecahydrate
I - Ice	U - Acetone
J - DI Water	V - MCAA
K - EDTA	W - ph 4-5
L - EDA	Z - other (specify)

Other:

Possible Hazard Identification
☒ Non-Hazard ☐ Flammable ☐ Skin Irritant ☐ Poison B ☐ Unknown ☐ Radiological

Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)
☐ Return To Client ☐ Disposal By Lab ☐ Archive For _____ Months

Deliverable Requested: I, II, III, IV, Other (specify)

Special Instructions/QC Requirements:

Empty Kit Relinquished by:	Date:	Time:	Method of Shipment:

Relinquished by	Date/Time	Company	Received by	Date/Time	Company
[signature]	8-15-16/1700		[signature]	8/16/16 0920	
Relinquished by:	Date/Time:	Company	Received by:	Date/Time:	Company
Relinquished by:	Date/Time:	Company	Received by:	Date/Time:	Company

Custody Seals Intact: ☐ Yes ☐ No
Custody Seal No.:
Cooler Temperature(s) °C and Other Remarks:

Login Sample Receipt Checklist

Client: Alliant Corporation

Job Number: 160-18639-1

Login Number: 18639
List Number: 1
Creator: Daniels, Brian J

List Source: TestAmerica St. Louis

Question	Answer	Comment
Radioactivity wasn't checked or is </= background as measured by a survey meter.	True	
The cooler's custody seal, if present, is intact.	True	
Sample custody seals, if present, are intact.	N/A	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	True	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time (excluding tests with immediate HTs)	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	True	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <6mm (1/4").	N/A	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	

Definitions/Glossary

Client: Alliant Corporation
Project/Site: ORNL Y-12 Outfall 200 Characterization

TestAmerica Job ID: 160-18639-1

Qualifiers

GC Semi VOA

Qualifier	Qualifier Description
U	Undetected at the Limit of Detection.
J	Estimated: The analyte was positively identified; the quantitation is an estimation
J	Estimated: The quantitation is an estimation due to discrepancies in meeting certain analyte-specific quality control criteria.

Metals

Qualifier	Qualifier Description
U	Undetected at the Limit of Detection.
N	MS, MSD: Spike recovery is outside acceptance limits.
*	MS/MSD RPD exceeded the control limit
J	Estimated: The analyte was positively identified; the quantitation is an estimation

Rad

Qualifier	Qualifier Description
U	Undetected at the Limit of Detection.
*	MS/MSD RPD exceeded the control limit
N	MS, MSD: Spike recovery is outside acceptance limits.

Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
¤	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CFL	Contains Free Liquid
CNF	Contains no Free Liquid
DER	Duplicate error ratio (normalized absolute difference)
Dil Fac	Dilution Factor
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision level concentration
MDA	Minimum detectable activity
EDL	Estimated Detection Limit
MDC	Minimum detectable concentration
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
NC	Not Calculated
ND	Not detected at the reporting limit (or MDL or EDL if shown)
PQL	Practical Quantitation Limit
QC	Quality Control
RER	Relative error ratio
RL	Reporting Limit or Requested Limit (Radiochemistry)
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)

Method Summary

Client: Alliant Corporation
Project/Site: ORNL Y-12 Outfall 200 Characterization

TestAmerica Job ID: 160-18639-1

Method	Method Description	Protocol	Laboratory
8082A	Polychlorinated Biphenyls (PCBs) by Gas Chromatography	SW846	TAL SL
6010C	Metals (ICP)	SW846	TAL SL
7471B	Mercury (CVAA)	SW846	TAL SL
Moisture	Percent Moisture	EPA	TAL SL
A-01-R	Isotopic Curium and/or Americium 241 (Alpha Spectrometry)	DOE	TAL SL
A-01-R	Isotopic Thorium (Alpha Spectrometry)	DOE	TAL SL
A-01-R	Isotopic Neptunium (Alpha Spectrometry)	DOE	TAL SL
A-01-R	Isotopic Plutonium (Alpha Spectrometry)	DOE	TAL SL
A-01-R	Isotopic Uranium (Alpha Spectrometry)	DOE	TAL SL
C-01-1	Carbon-14 (EERF C-01-1)	EERF	TAL SL
H3-04-RC	Tritium (LSC)	DOE	TAL SL
SR-03-RC	Total Beta Strontium (GFPC)	DOE	TAL SL
ST-RC-0301	Radium-226 (Alpha Spectrometry)	TAL-STL	TAL SL
TC-02-RC	Technetium-99 (LSC)	DOE	TAL SL

Protocol References:

DOE = U.S. Department of Energy
EERF = EERF
EPA = US Environmental Protection Agency
SW846 = "Test Methods For Evaluating Solid Waste, Physical/Chemical Methods", Third Edition, November 1986 And Its Updates.
TAL-STL = TestAmerica Laboratories, St. Louis, Facility Standard Operating Procedure.

Laboratory References:

TAL SL = TestAmerica St. Louis, 13715 Rider Trail North, Earth City, MO 63045, TEL (314)298-8566

Sample Summary

Client: Alliant Corporation
Project/Site: ORNL Y-12 Outfall 200 Characterization

TestAmerica Job ID: 160-18639-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
160-18639-1	YMTFA81 9404 G	Solid	08/15/16 08:30	08/16/16 09:20
160-18639-2	YMTFA93 9404-8G	Solid	08/15/16 13:00	08/16/16 09:20

Detection Summary

Client: Alliant Corporation
Project/Site: ORNL Y-12 Outfall 200 Characterization

TestAmerica Job ID: 160-18639-1

Client Sample ID: YMTFA81 9404 G — Lab Sample ID: 160-18639-1

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
PCB-1254	0.030	J	0.033	0.0080	mg/Kg	1		8082A	Total/NA
PCB-1260	0.024	J	0.033	0.0080	mg/Kg	1		8082A	Total/NA
Polychlorinated biphenyls, Total	0.054		0.033	0.0080	mg/Kg	1		8082A	Total/NA
Arsenic	21		5.8	1.4	mg/Kg	5	☼	6010C	Total/NA
Barium	560		29	8.7	mg/Kg	5	☼	6010C	Total/NA
Chromium	25		5.8	1.4	mg/Kg	5	☼	6010C	Total/NA
Lead	62		5.8	1.4	mg/Kg	5	☼	6010C	Total/NA
Mercury	0.11		0.037	0.012	mg/Kg	1	☼	7471B	Total/NA

Client Sample ID: YMTFA93 9404-8G — Lab Sample ID: 160-18639-2

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
PCB-1260	0.38		0.099	0.024	mg/Kg	1		8082A	Total/NA
Polychlorinated biphenyls, Total	0.38		0.099	0.024	mg/Kg	1		8082A	Total/NA
Arsenic	15		7.4	1.9	mg/Kg	5	☼	6010C	Total/NA
Barium	170		37	11	mg/Kg	5	☼	6010C	Total/NA
Cadmium	1.6	J	3.7	1.1	mg/Kg	5	☼	6010C	Total/NA
Chromium	29		7.4	1.9	mg/Kg	5	☼	6010C	Total/NA
Lead	68		7.4	1.9	mg/Kg	5	☼	6010C	Total/NA
Mercury	58		2.2	0.74	mg/Kg	50	☼	7471B	Total/NA

This Detection Summary does not include radiochemical test results.

Client Sample Results

Client: Alliant Corporation
Project/Site: ORNL Y-12 Outfall 200 Characterization

TestAmerica Job ID: 160-18639-1

Client Sample ID: YMTFA81 9404 G

Date Collected: 08/15/16 08:30
Date Received: 08/16/16 09:20

Lab Sample ID: 160-18639-1

Matrix: Solid

Method: 8082A - Polychlorinated Biphenyls (PCBs) by Gas Chromatography

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
PCB-1016	0.0096	U	0.033	0.0096	mg/Kg		08/24/16 10:11	08/26/16 06:43	1
PCB-1221	0.0096	U	0.033	0.0096	mg/Kg		08/24/16 10:11	08/26/16 06:43	1
PCB-1232	0.0096	U	0.033	0.0096	mg/Kg		08/24/16 10:11	08/26/16 06:43	1
PCB-1242	0.0096	U	0.033	0.0096	mg/Kg		08/24/16 10:11	08/26/16 06:43	1
PCB-1248	0.0096	U	0.033	0.0096	mg/Kg		08/24/16 10:11	08/26/16 06:43	1
PCB-1254	**0.030**	**J**	0.033	0.0080	mg/Kg		08/24/16 10:11	08/26/16 06:43	1
PCB-1260	**0.024**	**J**	0.033	0.0080	mg/Kg		08/24/16 10:11	08/26/16 06:43	1
PCB-1262	0.0080	U	0.033	0.0080	mg/Kg		08/24/16 10:11	08/26/16 06:43	1
Polychlorinated biphenyls, Total	**0.054**		0.033	0.0080	mg/Kg		08/24/16 10:11	08/26/16 06:43	1
PCB-1268	0.0080	U	0.033	0.0080	mg/Kg		08/24/16 10:11	08/26/16 06:43	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
DCB Decachlorobiphenyl (Surr)	*36*		*23 - 146*	*08/24/16 10:11*	*08/26/16 06:43*	*1*

Method: A-01-R - Isotopic Curium and/or Americium 241 (Alpha Spectrometry)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Americium-241	0.0225	U	0.0387	0.0387	1.00	0.0698	pCi/g	08/19/16 14:18	08/25/16 21:02	1

Tracer	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Americium-243	*96.8*		*30 - 110*	*08/19/16 14:18*	*08/25/16 21:02*	*1*

Method: A-01-R - Isotopic Neptunium (Alpha Spectrometry)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Neptunium-237	0.00366	U	0.0226	0.0226	1.00	0.0550	pCi/g	08/19/16 14:22	08/25/16 11:18	1

Tracer	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Neptunium-239	*102*		*30 - 110*	*08/19/16 14:22*	*08/25/16 11:18*	*1*

Method: A-01-R - Isotopic Plutonium (Alpha Spectrometry)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Plutonium-238	0.0216	U	0.0479	0.0480	1.00	0.0898	pCi/g	08/19/16 14:18	08/25/16 11:22	1
Plutonium-239/240	0.0138	U	0.0226	0.0226	1.00	0.0380	pCi/g	08/19/16 14:18	08/25/16 11:22	1

Tracer	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Pu-242 (T)	*91.9*		*30 - 110*	*08/19/16 14:18*	*08/25/16 11:22*	*1*

Method: A-01-R - Isotopic Thorium (Alpha Spectrometry)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Thorium-228	**1.28**		0.218	0.243	1.00	0.0965	pCi/g	08/19/16 14:22	08/25/16 11:21	1
Thorium-230	**1.17**		0.205	0.228	1.00	0.0501	pCi/g	08/19/16 14:22	08/25/16 11:21	1
Thorium-232	**1.22**		0.208	0.232	1.00	0.0267	pCi/g	08/19/16 14:22	08/25/16 11:21	1

Client Sample ID: YMTFA81 9404 G

Lab Sample ID: 160-18639-1
Date Collected: 08/15/16 08:30
Matrix: Solid
Date Received: 08/16/16 09:20

Tracer	%Yield	Qualifier	Limits	Prepared	Analyzed	Dil Fac
Thorium-229	87.4		30 - 110	08/19/16 14:22	08/25/16 11:21	1

Method: A-01-R - Isotopic Uranium (Alpha Spectrometry)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Uranium-233/234	**1.44**		0.222	0.253	1.00	0.0665	pCi/g	08/19/16 14:18	08/25/16 11:24	1
Uranium-235/236	0.0578	U	0.0520	0.0523	1.00	0.0589	pCi/g	08/19/16 14:18	08/25/16 11:24	1
Uranium-238	**1.06**		0.189	0.209	1.00	0.0408	pCi/g	08/19/16 14:18	08/25/16 11:24	1

Tracer	%Yield	Qualifier	Limits	Prepared	Analyzed	Dil Fac
Uranium-232	88.0		30 - 110	08/19/16 14:18	08/25/16 11:24	1

Method: C-01-1 - Carbon-14 (EERF C-01-1)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Carbon-14	-0.191	U *	0.848	0.849	5.00	1.51	pCi/g	09/20/16 14:18	09/21/16 00:11	1

Method: H3-04-RC - Tritium (LSC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Tritium	0.0912	U	0.222	0.222	1.00	0.385	pCi/g	09/09/16 11:13	09/11/16 22:39	1

Method: SR-03-RC - Total Beta Strontium (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Strontium 89/90	0.0545	U	0.119	0.119	3.00	0.204	pCi/g	08/25/16 18:10	08/31/16 07:19	1

Carrier	%Yield	Qualifier	Limits	Prepared	Analyzed	Dil Fac
Sr Carrier	83.5		40 - 110	08/25/16 18:10	08/31/16 07:19	1

Method: ST-RC-0301 - Radium-226 (Alpha Spectrometry)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-226	**1.68**		0.189	0.236	1.00	0.0852	pCi/g	09/15/16 18:51	09/25/16 16:32	1

Tracer	%Yield	Qualifier	Limits	Prepared	Analyzed	Dil Fac
At-217	75.9		30 - 110	09/15/16 18:51	09/25/16 16:32	1

Method: TC-02-RC - Technetium-99 (LSC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Technetium-99	0.251	U	0.264	0.265	1.00	0.433	pCi/g	08/23/16 10:56	08/27/16 02:29	1

Tracer	%Yield	Qualifier	Limits	Prepared	Analyzed	Dil Fac
Tc-99m	87.3		30 - 110	08/23/16 10:56	08/27/16 02:29	1

Client Sample Results

Client: Alliant Corporation
Project/Site: ORNL Y-12 Outfall 200 Characterization

TestAmerica Job ID: 160-18639-1

Client Sample ID: YMTFA81 9404 G

Lab Sample ID: 160-18639-1
Date Collected: 08/15/16 08:30
Matrix: Solid
Date Received: 08/16/16 09:20
Percent Solids: 81.1

Method: 6010C - Metals (ICP)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Silver	1.4	U	5.8	1.4	mg/Kg	☼	08/18/16 16:12	08/29/16 19:14	5
Arsenic	**21**		5.8	1.4	mg/Kg	☼	08/18/16 16:12	08/29/16 19:14	5
Barium	**560**		29	8.7	mg/Kg	☼	08/18/16 16:12	08/29/16 19:14	5
Cadmium	0.87	U	2.9	0.87	mg/Kg	☼	08/18/16 16:12	08/29/16 19:14	5
Chromium	**25**		5.8	1.4	mg/Kg	☼	08/18/16 16:12	08/29/16 19:14	5
Lead	**62**		5.8	1.4	mg/Kg	☼	08/18/16 16:12	08/29/16 19:14	5
Selenium	1.4	U	8.7	1.4	mg/Kg	☼	08/18/16 16:12	08/29/16 19:14	5

Method: 7471B - Mercury (CVAA)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	**0.11**		0.037	0.012	mg/Kg	☼	08/19/16 10:47	08/22/16 16:15	1

Client Sample ID: YMTFA93 9404-8G

Lab Sample ID: 160-18639-2
Date Collected: 08/15/16 13:00
Matrix: Solid
Date Received: 08/16/16 09:20

Method: 8082A - Polychlorinated Biphenyls (PCBs) by Gas Chromatography

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
PCB-1016	0.029	U	0.099	0.029	mg/Kg		08/24/16 10:11	08/26/16 07:05	1
PCB-1221	0.029	U	0.099	0.029	mg/Kg		08/24/16 10:11	08/26/16 07:05	1
PCB-1232	0.029	U	0.099	0.029	mg/Kg		08/24/16 10:11	08/26/16 07:05	1
PCB-1242	0.029	U	0.099	0.029	mg/Kg		08/24/16 10:11	08/26/16 07:05	1
PCB-1248	0.029	U	0.099	0.029	mg/Kg		08/24/16 10:11	08/26/16 07:05	1
PCB-1254	0.024	U	0.099	0.024	mg/Kg		08/24/16 10:11	08/26/16 07:05	1
PCB-1260	**0.38**		0.099	0.024	mg/Kg		08/24/16 10:11	08/26/16 07:05	1
PCB-1262	0.024	U	0.099	0.024	mg/Kg		08/24/16 10:11	08/26/16 07:05	1
Polychlorinated biphenyls, Total	**0.38**		0.099	0.024	mg/Kg		08/24/16 10:11	08/26/16 07:05	1
PCB-1268	0.024	U	0.099	0.024	mg/Kg		08/24/16 10:11	08/26/16 07:05	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
DCB Decachlorobiphenyl (Surr)	*61*		*23 - 146*	*08/24/16 10:11*	*08/26/16 07:05*	*1*

Method: A-01-R - Isotopic Curium and/or Americium 241 (Alpha Spectrometry)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Americium-241	0.00910	U	0.0369	0.0369	1.00	0.0863	pCi/g	08/19/16 14:18	08/25/16 21:02	1

Tracer	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Americium-243	*59.2*		*30 - 110*	*08/19/16 14:18*	*08/25/16 21:02*	*1*

Method: A-01-R - Isotopic Neptunium (Alpha Spectrometry)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Neptunium-237	-0.00193	U	0.0176	0.0176	1.00	0.0548	pCi/g	08/19/16 14:22	08/25/16 11:18	1

Tracer	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Neptunium-239	*95.5*		*30 - 110*	*08/19/16 14:22*	*08/25/16 11:18*	*1*

Client Sample Results

Client: Alliant Corporation
Project/Site: ORNL Y-12 Outfall 200 Characterization

TestAmerica Job ID: 160-18639-1

Client Sample ID: YMTFA93 9404-8G

Date Collected: 08/15/16 13:00
Date Received: 08/16/16 09:20

Lab Sample ID: 160-18639-2

Matrix: Solid

Method: A-01-R - Isotopic Plutonium (Alpha Spectrometry)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Plutonium-238	0.0135	U	0.0477	0.0477	1.00	0.0941	pCi/g	08/19/16 14:18	08/24/16 19:24	1
Plutonium-239/240	0.0348	U	0.0350	0.0351	1.00	0.0433	pCi/g	08/19/16 14:18	08/24/16 19:24	1

Tracer	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Pu-242 (T)	*96.8*		*30 - 110*	*08/19/16 14:18*	*08/24/16 19:24*	*1*

Method: A-01-R - Isotopic Thorium (Alpha Spectrometry)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Thorium-228	**0.118**		0.0718	0.0725	1.00	0.0864	pCi/g	08/19/16 14:22	08/25/16 20:46	1
Thorium-230	**0.313**		0.0999	0.103	1.00	0.0491	pCi/g	08/19/16 14:22	08/25/16 20:46	1
Thorium-232	**0.155**		0.0692	0.0704	1.00	0.0232	pCi/g	08/19/16 14:22	08/25/16 20:46	1

Tracer	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Thorium-229	*35.9*		*30 - 110*	*08/19/16 14:22*	*08/25/16 20:46*	*1*

Method: A-01-R - Isotopic Uranium (Alpha Spectrometry)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Uranium-233/234	**1.81**		0.242	0.286	1.00	0.0497	pCi/g	08/19/16 14:18	08/25/16 11:24	1
Uranium-235/236	**0.0775**		0.0568	0.0571	1.00	0.0484	pCi/g	08/19/16 14:18	08/25/16 11:24	1
Uranium-238	**1.12**		0.191	0.213	1.00	0.0496	pCi/g	08/19/16 14:18	08/25/16 11:24	1

Tracer	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Uranium-232	*89.8*		*30 - 110*	*08/19/16 14:18*	*08/25/16 11:24*	*1*

Method: C-01-1 - Carbon-14 (EERF C-01-1)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Carbon-14	0.0580	U *	0.838	0.838	5.00	1.46	pCi/g	09/20/16 14:18	09/21/16 00:34	1

Method: H3-04-RC - Tritium (LSC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Tritium	0.143	U	0.249	0.249	1.00	0.424	pCi/g	09/09/16 11:13	09/11/16 23:24	1

Method: SR-03-RC - Total Beta Strontium (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Strontium 89/90	**0.272**		0.141	0.142	3.00	0.207	pCi/g	08/25/16 18:10	08/31/16 07:19	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Sr Carrier	*78.3*		*40 - 110*	*08/25/16 18:10*	*08/31/16 07:19*	*1*

Client Sample Results

Client: Alliant Corporation
Project/Site: ORNL Y-12 Outfall 200 Characterization

TestAmerica Job ID: 160-18639-1

Client Sample ID: YMTFA93 9404-8G

Lab Sample ID: 160-18639-2
Date Collected: 08/15/16 13:00
Matrix: Solid
Date Received: 08/16/16 09:20

Method: ST-RC-0301 - Radium-226 (Alpha Spectrometry)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-226	1.83		0.257	0.299	1.00	0.0685	pCi/g	09/15/16 18:52	09/26/16 12:42	1

Tracer	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
At-217	*41.4*		*30 - 110*	*09/15/16 18:52*	*09/26/16 12:42*	*1*

Method: TC-02-RC - Technetium-99 (LSC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Technetium-99	0.0333	U	0.328	0.328	1.00	0.560	pCi/g	08/23/16 10:56	08/27/16 03:00	1

Tracer	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Tc-99m	*67.8*		*30 - 110*	*08/23/16 10:56*	*08/27/16 03:00*	*1*

Client Sample ID: YMTFA93 9404-8G

Lab Sample ID: 160-18639-2
Date Collected: 08/15/16 13:00
Matrix: Solid
Date Received: 08/16/16 09:20
Percent Solids: 65.3

Method: 6010C - Metals (ICP)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Silver	1.9	U	7.4	1.9	mg/Kg	☼	08/18/16 16:12	08/29/16 19:32	5
Arsenic	15		7.4	1.9	mg/Kg	☼	08/18/16 16:12	08/29/16 19:32	5
Barium	170		37	11	mg/Kg	☼	08/18/16 16:12	08/29/16 19:32	5
Cadmium	1.6	J	3.7	1.1	mg/Kg	☼	08/18/16 16:12	08/29/16 19:32	5
Chromium	29		7.4	1.9	mg/Kg	☼	08/18/16 16:12	08/29/16 19:32	5
Lead	68		7.4	1.9	mg/Kg	☼	08/18/16 16:12	08/29/16 19:32	5
Selenium	1.9	U	11	1.9	mg/Kg	☼	08/18/16 16:12	08/29/16 19:32	5

Method: 7471B - Mercury (CVAA)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	58		2.2	0.74	mg/Kg	☼	08/19/16 10:47	08/23/16 07:50	50

QC Sample Results

Client: Alliant Corporation
Project/Site: ORNL Y-12 Outfall 200 Characterization

TestAmerica Job ID: 160-18639-1

Method: 8082A - Polychlorinated Biphenyls (PCBs) by Gas Chromatography

Lab Sample ID: MB 160-266347/1-A
Matrix: Solid
Analysis Batch: 266473

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 266347

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
PCB-1016	0.0096	U	0.033	0.0096	mg/Kg		08/24/16 10:11	08/25/16 22:50	1
PCB-1221	0.0096	U	0.033	0.0096	mg/Kg		08/24/16 10:11	08/25/16 22:50	1
PCB-1232	0.0096	U	0.033	0.0096	mg/Kg		08/24/16 10:11	08/25/16 22:50	1
PCB-1242	0.0096	U	0.033	0.0096	mg/Kg		08/24/16 10:11	08/25/16 22:50	1
PCB-1248	0.0096	U	0.033	0.0096	mg/Kg		08/24/16 10:11	08/25/16 22:50	1
PCB-1254	0.0080	U	0.033	0.0080	mg/Kg		08/24/16 10:11	08/25/16 22:50	1
PCB-1260	0.0080	U	0.033	0.0080	mg/Kg		08/24/16 10:11	08/25/16 22:50	1
PCB-1262	0.0080	U	0.033	0.0080	mg/Kg		08/24/16 10:11	08/25/16 22:50	1
Polychlorinated biphenyls, Total	0.0080	U	0.033	0.0080	mg/Kg		08/24/16 10:11	08/25/16 22:50	1
PCB-1268	0.0080	U	0.033	0.0080	mg/Kg		08/24/16 10:11	08/25/16 22:50	1

Surrogate	*MB %Recovery*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
DCB Decachlorobiphenyl (Surr)	*79*		*23 - 146*	*08/24/16 10:11*	*08/25/16 22:50*	*1*

Lab Sample ID: LCS 160-266347/2-A
Matrix: Solid
Analysis Batch: 266473

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 266347

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
PCB-1016	0.167	0.129		mg/Kg		78	52 - 134
PCB-1260	0.167	0.119		mg/Kg		71	50 - 132

Surrogate	*LCS %Recovery*	*LCS Qualifier*	*Limits*
DCB Decachlorobiphenyl (Surr)	*74*		*23 - 146*

Lab Sample ID: 160-18632-A-1-K MS
Matrix: Solid
Analysis Batch: 266473

Client Sample ID: Matrix Spike
Prep Type: Total/NA
Prep Batch: 266347

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
PCB-1016	9.6	U	0.166	0.168		mg/Kg		101	23 - 140
PCB-1260	8.0	U	0.166	0.174		mg/Kg		105	20 - 131

Surrogate	*MS %Recovery*	*MS Qualifier*	*Limits*
DCB Decachlorobiphenyl (Surr)	*94*		*23 - 146*

Lab Sample ID: 160-18632-A-1-L MSD
Matrix: Solid
Analysis Batch: 266473

Client Sample ID: Matrix Spike Duplicate
Prep Type: Total/NA
Prep Batch: 266347

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
PCB-1016	9.6	U	0.166	0.163		mg/Kg		98	23 - 140	3	30
PCB-1260	8.0	U	0.166	0.162		mg/Kg		98	20 - 131	7	30

Surrogate	*MSD %Recovery*	*MSD Qualifier*	*Limits*
DCB Decachlorobiphenyl (Surr)	*88*		*23 - 146*

QC Sample Results

Client: Alliant Corporation
Project/Site: ORNL Y-12 Outfall 200 Characterization

TestAmerica Job ID: 160-18639-1

Method: 6010C - Metals (ICP)

Lab Sample ID: MB 160-265500/1-A — **Client Sample ID: Method Blank**
Matrix: Solid — **Prep Type: Total/NA**
Analysis Batch: 267251 — **Prep Batch: 265500**

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Silver	0.23	U	0.91	0.23	mg/Kg		08/18/16 16:12	08/29/16 19:05	1
Arsenic	0.23	U	0.91	0.23	mg/Kg		08/18/16 16:12	08/29/16 19:05	1
Barium	1.4	U	4.5	1.4	mg/Kg		08/18/16 16:12	08/29/16 19:05	1
Cadmium	0.14	U	0.45	0.14	mg/Kg		08/18/16 16:12	08/29/16 19:05	1
Chromium	0.23	U	0.91	0.23	mg/Kg		08/18/16 16:12	08/29/16 19:05	1
Lead	0.23	U	0.91	0.23	mg/Kg		08/18/16 16:12	08/29/16 19:05	1
Selenium	0.23	U	1.4	0.23	mg/Kg		08/18/16 16:12	08/29/16 19:05	1

Lab Sample ID: LCSSRM 160-265500/2-A — **Client Sample ID: Lab Control Sample**
Matrix: Solid — **Prep Type: Total/NA**
Analysis Batch: 267251 — **Prep Batch: 265500**

Analyte	Spike Added	LCSSRM Result	LCSSRM Qualifier	Unit	D	%Rec	%Rec. Limits
Silver	41.8	38.6		mg/Kg		92.2	66.3 - 134.0
Arsenic	114	108		mg/Kg		94.5	70.0 - 141.2
Barium	181	163		mg/Kg		89.9	72.9 - 127.1
Cadmium	93.2	88.7		mg/Kg		95.2	73.3 - 126.6
Chromium	109	101		mg/Kg		92.2	69.5 - 130.3
Lead	102	100		mg/Kg		98.2	70.8 - 128.4
Selenium	186	175		mg/Kg		94.2	68.3 - 131.7

Lab Sample ID: 160-18639-1 MS — **Client Sample ID: YMTFA81 9404 G**
Matrix: Solid — **Prep Type: Total/NA**
Analysis Batch: 267251 — **Prep Batch: 265500**

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Silver	1.4	U	23.3	22.8		mg/Kg	☼	98	75 - 125
Arsenic	21		116	128		mg/Kg	☼	107	75 - 125
Barium	560		116	263	N	mg/Kg	☼	130	75 - 125
Cadmium	0.87	U	116	112		mg/Kg	☼	96	75 - 125
Chromium	25		116	147		mg/Kg	☼	122	75 - 125
Lead	62		116	174	N	mg/Kg	☼	139	75 - 125
Selenium	1.4	U	58.2	53.7		mg/Kg	☼	92	75 - 125

Lab Sample ID: 160-18639-1 MSD — **Client Sample ID: YMTFA81 9404 G**
Matrix: Solid — **Prep Type: Total/NA**
Analysis Batch: 267251 — **Prep Batch: 265500**

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Silver	1.4	U	23.5	23.1		mg/Kg	☼	98	75 - 125	1	30
Arsenic	21		117	129		mg/Kg	☼	106	75 - 125	0	30
Barium	560		117	453	N *	mg/Kg	☼	291	75 - 125	53	30
Cadmium	0.87	U	117	114		mg/Kg	☼	97	75 - 125	2	30

Method: 6010C - Metals (ICP) (Continued)

Lab Sample ID: 160-18639-1 MSD — **Client Sample ID: YMTFA81 9404 G**
Matrix: Solid — **Prep Type: Total/NA**
Analysis Batch: 267251 — **Prep Batch: 265500**

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Chromium	25		117	141		mg/Kg	☼	115	75 - 125	4	30
Lead	62		117	185	N	mg/Kg	☼	147	75 - 125	6	30
Selenium	1.4	U	58.7	54.4		mg/Kg	☼	93	75 - 125	1	30

Method: 7471B - Mercury (CVAA)

Lab Sample ID: MB 160-265578/1-A — **Client Sample ID: Method Blank**
Matrix: Solid — **Prep Type: Total/NA**
Analysis Batch: 266091 — **Prep Batch: 265578**

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	0.0099	U	0.030	0.0099	mg/Kg		08/19/16 10:47	08/22/16 15:24	1

Lab Sample ID: LCSSRM 160-265578/2-A — **Client Sample ID: Lab Control Sample**
Matrix: Solid — **Prep Type: Total/NA**
Analysis Batch: 266091 — **Prep Batch: 265578**

Analyte	Spike Added	LCSSRM Result	LCSSRM Qualifier	Unit	D	%Rec	%Rec. Limits
Mercury	9.16	8.59		mg/Kg		93.8	51.3 - 148.5

Lab Sample ID: 160-18450-C-1-B MS — **Client Sample ID: Matrix Spike**
Matrix: Solid — **Prep Type: Total/NA**
Analysis Batch: 266091 — **Prep Batch: 265578**

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Mercury	0.011	U	0.757	0.745		mg/Kg	☼	99	80 - 120

Lab Sample ID: 160-18450-C-1-C MSD — **Client Sample ID: Matrix Spike Duplicate**
Matrix: Solid — **Prep Type: Total/NA**
Analysis Batch: 266091 — **Prep Batch: 265578**

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Mercury	0.011	U	0.763	0.734		mg/Kg	☼	96	80 - 120	2	30

Method: A-01-R - Isotopic Thorium (Alpha Spectrometry)

Lab Sample ID: MB 160-265705/1-A — **Client Sample ID: Method Blank**
Matrix: Solid — **Prep Type: Total/NA**
Analysis Batch: 266608 — **Prep Batch: 265705**

Analyte	MB Result	MB Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Thorium-228	0.008144	U	0.0476	0.0476	1.00	0.105	pCi/g	08/19/16 14:22	08/25/16 11:21	1
Thorium-230	0.1419		0.0785	0.0794	1.00	0.0326	pCi/g	08/19/16 14:22	08/25/16 11:21	1
Thorium-232	0.008108	U	0.0223	0.0223	1.00	0.0523	pCi/g	08/19/16 14:22	08/25/16 11:21	1

Tracer	*MB %Yield*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Thorium-229	*66.5*		*30 - 110*	*08/19/16 14:22*	*08/25/16 11:21*	*1*

QC Sample Results

Client: Alliant Corporation
Project/Site: ORNL Y-12 Outfall 200 Characterization

TestAmerica Job ID: 160-18639-1

Lab Sample ID: LCS 160-265705/2-A
Matrix: Solid
Analysis Batch: 266609

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 265705

Analyte			Spike Added	LCS Result	LCS Qual	Total Uncert. (2σ+/-)	RL	MDC	Unit	%Rec	%Rec. Limits		
Thorium-230			24.5	24.32		2.37	1.00	0.0725	pCi/g	99	81 - 118		

Tracer	*LCS %Yield*	*LCS Qualifier*	*Limits*
Thorium-229	*94.6*		*30 - 110*

Lab Sample ID: 160-18639-1 DU
Matrix: Solid
Analysis Batch: 266833

Client Sample ID: YMTFA81 9404 G
Prep Type: Total/NA
Prep Batch: 265705

Analyte	Sample Result	Sample Qual		DU Result	DU Qual	Total Uncert. (2σ+/-)	RL	MDC	Unit			RER	RER Limit
Thorium-228	1.28			1.364		0.245	1.00	0.0829	pCi/g			0.17	1
Thorium-230	1.17			1.518		0.260	1.00	0.0597	pCi/g			0.70	1
Thorium-232	1.22			1.107		0.214	1.00	0.0468	pCi/g			0.25	1

Tracer	*DU %Yield*	*DU Qualifier*	*Limits*
Thorium-229	*88.7*		*30 - 110*

Method: A-01-R - Isotopic Uranium (Alpha Spectrometry)

Lab Sample ID: MB 160-265710/1-A
Matrix: Solid
Analysis Batch: 266568

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 265710

Analyte	MB Result	MB Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Uranium-233/234	0.03040	U	0.0383	0.0384	1.00	0.0579	pCi/g	08/19/16 14:18	08/25/16 11:24	1
Uranium-235/236	-0.002910	U	0.00582	0.00583	1.00	0.0563	pCi/g	08/19/16 14:18	08/25/16 11:24	1
Uranium-238	0.0000	U	0.00467	0.00467	1.00	0.0280	pCi/g	08/19/16 14:18	08/25/16 11:24	1

Tracer	*MB %Yield*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Uranium-232	*83.7*		*30 - 110*	*08/19/16 14:18*	*08/25/16 11:24*	*1*

Lab Sample ID: LCS 160-265710/2-A
Matrix: Solid
Analysis Batch: 266569

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 265710

Analyte			Spike Added	LCS Result	LCS Qual	Total Uncert. (2σ+/-)	RL	MDC	Unit	%Rec	%Rec. Limits		
Uranium-233/234			6.37	7.325		0.823	1.00	0.0572	pCi/g	115	84 - 120		
Uranium-238			6.51	7.323		0.823	1.00	0.0493	pCi/g	112	82 - 122		

Tracer	*LCS %Yield*	*LCS Qualifier*	*Limits*
Uranium-232	*75.3*		*30 - 110*

Method: A-01-R - Isotopic Uranium (Alpha Spectrometry) (Continued)

Lab Sample ID: 160-18639-1 DU
Matrix: Solid
Analysis Batch: 266572

Client Sample ID: YMTFA81 9404 G
Prep Type: Total/NA
Prep Batch: 265710

Analyte	Sample Result	Sample Qual		DU Result	DU Qual	Total Uncert. (2σ+/-)	RL	MDC	Unit			RER	RER Limit
Uranium-233/234	1.44			1.329		0.242	1.00	0.0485	pCi/g			0.22	1
Uranium-235/236	0.0578	U		0.05386		0.0484	1.00	0.0323	pCi/g			0.04	1
Uranium-238	1.06			1.270		0.235	1.00	0.0259	pCi/g			0.47	1

Tracer	*DU %Yield*	*DU Qualifier*	*Limits*
Uranium-232	*81.7*		*30 - 110*

Method: A-01-R - Isotopic Neptunium (Alpha Spectrometry)

Lab Sample ID: MB 160-265707/1-A
Matrix: Solid
Analysis Batch: 266615

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 265707

Analyte	MB Result	MB Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Neptunium-237	0.01802	U	0.0255	0.0255	1.00	0.0270	pCi/g	08/19/16 14:22	08/25/16 11:18	1

Tracer	*MB %Yield*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Neptunium-239	*85.7*		*30 - 110*	*08/19/16 14:22*	*08/25/16 11:18*	*1*

Lab Sample ID: LCS 160-265707/2-A
Matrix: Solid
Analysis Batch: 266616

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 265707

Analyte			Spike Added	LCS Result	LCS Qual	Total Uncert. (2σ+/-)	RL	MDC	Unit	%Rec	%Rec. Limits		
Neptunium-237			7.75	7.972		0.966	1.00	0.0851	pCi/g	103	39 - 134		

Tracer	*LCS %Yield*	*LCS Qualifier*	*Limits*
Neptunium-239	*102*		*30 - 110*

Lab Sample ID: 160-18639-1 DU
Matrix: Solid
Analysis Batch: 266618

Client Sample ID: YMTFA81 9404 G
Prep Type: Total/NA
Prep Batch: 265707

Analyte	Sample Result	Sample Qual		DU Result	DU Qual	Total Uncert. (2σ+/-)	RL	MDC	Unit			RER	RER Limit
Neptunium-237	0.00366	U		-0.01288	U	0.0291	1.00	0.0849	pCi/g			0.32	1

Tracer	*DU %Yield*	*DU Qualifier*	*Limits*
Neptunium-239	*90.6*		*30 - 110*

QC Sample Results

Client: Alliant Corporation
Project/Site: ORNL Y-12 Outfall 200 Characterization

TestAmerica Job ID: 160-18639-1

Method: A-01-R - Isotopic Plutonium (Alpha Spectrometry)

Lab Sample ID: MB 160-265708/1-A — **Client Sample ID: Method Blank**
Matrix: Solid — **Prep Type: Total/NA**
Analysis Batch: 266595 — **Prep Batch: 265708**

Analyte	MB Result	MB Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Plutonium-238	0.07486	U	0.0594	0.0597	1.00	0.0779	pCi/g	08/19/16 14:18	08/25/16 11:22	1
Plutonium-239/240	0.008326	U	0.0250	0.0250	1.00	0.0556	pCi/g	08/19/16 14:18	08/25/16 11:22	1

Tracer	*MB %Yield*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Pu-242 (T)	*85.4*		*30 - 110*	*08/19/16 14:18*	*08/25/16 11:22*	*1*

Lab Sample ID: LCS 160-265708/2-A — **Client Sample ID: Lab Control Sample**
Matrix: Solid — **Prep Type: Total/NA**
Analysis Batch: 266596 — **Prep Batch: 265708**

Analyte	Spike Added	LCS Result	LCS Qual	Total Uncert. (2σ+/-)	RL	MDC	Unit	%Rec	%Rec. Limits
Plutonium-238	5.37	5.556		0.627	1.00	0.0859	pCi/g	103	80 - 127
Plutonium-239/240	6.60	7.020		0.753	1.00	0.0521	pCi/g	106	81 - 129

Tracer	*LCS %Yield*	*LCS Qualifier*	*Limits*
Pu-242 (T)	*98.6*		*30 - 110*

Lab Sample ID: 160-18639-1 DU — **Client Sample ID: YMTFA81 9404 G**
Matrix: Solid — **Prep Type: Total/NA**
Analysis Batch: 266598 — **Prep Batch: 265708**

Analyte	Sample Result	Sample Qual	DU Result	DU Qual	Total Uncert. (2σ+/-)	RL	MDC	Unit	RER	RER Limit
Plutonium-238	0.0216	U	0.02486	U	0.0431	1.00	0.0774	pCi/g	0.04	1
Plutonium-239/240	0.0138	U	-0.009571	U	0.00860	1.00	0.0545	pCi/g	0.75	1

Tracer	*DU %Yield*	*DU Qualifier*	*Limits*
Pu-242 (T)	*100*		*30 - 110*

Method: A-01-R - Isotopic Curium and/or Americium 241 (Alpha Spectrometry)

Lab Sample ID: MB 160-265703/1-A — **Client Sample ID: Method Blank**
Matrix: Solid — **Prep Type: Total/NA**
Analysis Batch: 266632 — **Prep Batch: 265703**

Analyte	MB Result	MB Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Americium-241	0.003829	U	0.0334	0.0334	1.00	0.0947	pCi/g	08/19/16 14:18	08/25/16 21:02	1

Tracer	*MB %Yield*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Americium-243	*47.3*		*30 - 110*	*08/19/16 14:18*	*08/25/16 21:02*	*1*

Method: A-01-R - Isotopic Curium and/or Americium 241 (Alpha Spectrometry) (Continued)

Lab Sample ID: LCS 160-265703/2-A — **Client Sample ID: Lab Control Sample**
Matrix: Solid — **Prep Type: Total/NA**
Analysis Batch: 266633 — **Prep Batch: 265703**

Analyte			Spike Added	LCS Result	LCS Qual	Total Uncert. (2σ+/-)	RL	MDC	Unit	%Rec	%Rec. Limits		
Americium-241			3.73	3.787		0.568	1.00	0.0552	pCi/g	101	67 - 120		

Tracer	*LCS %Yield*	*LCS Qualifier*	*Limits*
Americium-243	*68.9*		*30 - 110*

Lab Sample ID: 160-18639-1 DU — **Client Sample ID: YMTFA81 9404 G**
Matrix: Solid — **Prep Type: Total/NA**
Analysis Batch: 266635 — **Prep Batch: 265703**

Analyte	Sample Result	Sample Qual		DU Result	DU Qual	Total Uncert. (2σ+/-)	RL	MDC	Unit			RER	RER Limit
Americium-241	0.0225	U		-0.004312	U	0.00612	1.00	0.0483	pCi/g			0.60	1

Tracer	*DU %Yield*	*DU Qualifier*	*Limits*
Americium-243	*91.5*		*30 - 110*

Method: C-01-1 - Carbon-14 (EERF C-01-1)

Lab Sample ID: MB 160-270733/1-A — **Client Sample ID: Method Blank**
Matrix: Solid — **Prep Type: Total/NA**
Analysis Batch: 270865 — **Prep Batch: 270733**

Analyte	MB Result	MB Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Carbon-14	-0.2973	U	0.828	0.828	5.00	1.49	pCi/g	09/20/16 14:18	09/20/16 23:26	1

Lab Sample ID: LCS 160-270733/2-A — **Client Sample ID: Lab Control Sample**
Matrix: Solid — **Prep Type: Total/NA**
Analysis Batch: 270865 — **Prep Batch: 270733**

Analyte			Spike Added	LCS Result	LCS Qual	Total Uncert. (2σ+/-)	RL	MDC	Unit	%Rec	%Rec. Limits		
Carbon-14			84.4	85.73		9.85	5.00	1.52	pCi/g	102	67 - 124		

Lab Sample ID: 160-18700-A-1-G MS — **Client Sample ID: Matrix Spike**
Matrix: Solid — **Prep Type: Total/NA**
Analysis Batch: 270885 — **Prep Batch: 270733**

Analyte	Sample Result	Sample Qual	Spike Added	MS Result	MS Qual	Total Uncert. (2σ+/-)	RL	MDC	Unit	%Rec	%Rec. Limits		
Carbon-14	-0.731	U *	82.8	71.13		8.23	5.00	1.36	pCi/g	86	29 - 128		

Method: C-01-1 - Carbon-14 (EERF C-01-1) (Continued)

Lab Sample ID: 160-18700-A-1-H MSD — **Client Sample ID: Matrix Spike Duplicate**
Matrix: Solid — **Prep Type: Total/NA**
Analysis Batch: 270885 — **Prep Batch: 270733**

Analyte	Sample Result	Sample Qual	Spike Added	MSD Result	MSD Qual	Total Uncert. (2σ+/-)	RL	MDC	Unit	%Rec	%Rec. Limits	RER	RER Limit
Carbon-14	-0.731	U *	84.4	15.52	N *	2.31	5.00	1.42	pCi/g	18	29 - 128	5.27	1

Method: H3-04-RC - Tritium (LSC)

Lab Sample ID: MB 160-268821/1-A — **Client Sample ID: Method Blank**
Matrix: Solid — **Prep Type: Total/NA**
Analysis Batch: 269115 — **Prep Batch: 268821**

Analyte	MB Result	MB Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Tritium	-0.01261	U	0.187	0.187	1.00	0.345	pCi/g	09/09/16 11:13	09/11/16 21:54	1

Lab Sample ID: LCS 160-268821/2-A — **Client Sample ID: Lab Control Sample**
Matrix: Solid — **Prep Type: Total/NA**
Analysis Batch: 269115 — **Prep Batch: 268821**

Analyte			Spike Added	LCS Result	LCS Qual	Total Uncert. (2σ+/-)	RL	MDC	Unit	%Rec	%Rec. Limits		
Tritium			10.1	10.23		1.14	1.00	0.342	pCi/g	101	80 - 114		

Lab Sample ID: 160-18639-2 MS — **Client Sample ID: YMTFA93 9404-8G**
Matrix: Solid — **Prep Type: Total/NA**
Analysis Batch: 269115 — **Prep Batch: 268821**

Analyte	Sample Result	Sample Qual	Spike Added	MS Result	MS Qual	Total Uncert. (2σ+/-)	RL	MDC	Unit	%Rec	%Rec. Limits		
Tritium	0.143	U	10.1	9.248		1.11	1.00	0.432	pCi/g	92	78 - 122		

Lab Sample ID: 160-18639-1 DU — **Client Sample ID: YMTFA81 9404 G**
Matrix: Solid — **Prep Type: Total/NA**
Analysis Batch: 269115 — **Prep Batch: 268821**

Analyte	Sample Result	Sample Qual		DU Result	DU Qual	Total Uncert. (2σ+/-)	RL	MDC	Unit			RER	RER Limit
Tritium	0.0912	U		0.004110	U	0.205	1.00	0.370	pCi/g			0.20	1

Method: SR-03-RC - Total Beta Strontium (GFPC)

Lab Sample ID: MB 160-266721/1-A — **Client Sample ID: Method Blank**
Matrix: Solid — **Prep Type: Total/NA**
Analysis Batch: 267344 — **Prep Batch: 266721**

Analyte	MB Result	MB Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Strontium 89/90	-0.06641	U	0.125	0.125	3.00	0.234	pCi/g	08/25/16 18:10	08/30/16 21:42	1

Method: SR-03-RC - Total Beta Strontium (GFPC) (Continued)

Lab Sample ID: MB 160-266721/1-A
Matrix: Solid
Analysis Batch: 267344

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 266721

Carrier	MB %Yield	MB Qualifier	Limits	Prepared	Analyzed	Dil Fac
Sr Carrier	84.9		40 - 110	08/25/16 18:10	08/30/16 21:42	1

Lab Sample ID: LCS 160-266721/2-A
Matrix: Solid
Analysis Batch: 267344

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 266721

Analyte	Spike Added	LCS Result	LCS Qual	Total Uncert. (2σ+/-)	RL	MDC	Unit	%Rec	%Rec. Limits
Strontium 89/90	8.60	6.856		0.635	3.00	0.204	pCi/g	80	75 - 125

Carrier	LCS %Yield	LCS Qualifier	Limits
Sr Carrier	87.4		40 - 110

Lab Sample ID: 160-18646-A-4-J DU
Matrix: Solid
Analysis Batch: 267477

Client Sample ID: Duplicate
Prep Type: Total/NA
Prep Batch: 266721

Analyte	Sample Result	Sample Qual	DU Result	DU Qual	Total Uncert. (2σ+/-)	RL	MDC	Unit	RER	RER Limit
Strontium 89/90	0.129	U	0.03299	U	0.108	3.00	0.189	pCi/g	0.42	1

Carrier	DU %Yield	DU Qualifier	Limits
Sr Carrier	83.5		40 - 110

Method: ST-RC-0301 - Radium-226 (Alpha Spectrometry)

Lab Sample ID: MB 160-270099/1-A
Matrix: Solid
Analysis Batch: 271475

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 270099

Analyte	MB Result	MB Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-226	0.4325		0.137	0.142	1.00	0.106	pCi/g	09/15/16 18:49	09/24/16 16:18	1

Tracer	MB %Yield	MB Qualifier	Limits	Prepared	Analyzed	Dil Fac
At-217	38.1		30 - 110	09/15/16 18:49	09/24/16 16:18	1

Lab Sample ID: LCS 160-270099/2-A
Matrix: Solid
Analysis Batch: 271476

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 270099

Analyte	Spike Added	LCS Result	LCS Qual	Total Uncert. (2σ+/-)	RL	MDC	Unit	%Rec	%Rec. Limits
Radium-226	12.1	13.81		1.29	1.00	0.0560	pCi/g	115	70 - 130

Method: ST-RC-0301 - Radium-226 (Alpha Spectrometry) (Continued)

Lab Sample ID: LCS 160-270099/2-A
Matrix: Solid
Analysis Batch: 271476

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 270099

Tracer	*LCS %Yield*	*LCS Qualifier*	*Limits*
At-217	*63.3*		*30 - 110*

Lab Sample ID: 160-18615-A-6-E DU
Matrix: Solid
Analysis Batch: 271725

Client Sample ID: Duplicate
Prep Type: Total/NA
Prep Batch: 270099

Analyte	Sample Result	Sample Qual		DU Result	DU Qual	Total Uncert. (2σ+/-)	RL	MDC	Unit			RER	RER Limit
Radium-226	1.20			1.357		0.202	1.00	0.0481	pCi/g			0.40	1

Tracer	*DU %Yield*	*DU Qualifier*	*Limits*
At-217	*70.0*		*30 - 110*

Method: TC-02-RC - Technetium-99 (LSC)

Lab Sample ID: MB 160-266075/1-A
Matrix: Solid
Analysis Batch: 266901

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 266075

Analyte	MB Result	MB Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Technetium-99	-0.01997	U	0.193	0.193	1.00	0.331	pCi/g	08/23/16 10:56	08/26/16 21:19	1

Tracer	*MB %Yield*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Tc-99m	*96.7*		*30 - 110*	*08/23/16 10:56*	*08/26/16 21:19*	*1*

Lab Sample ID: LCS 160-266075/2-A
Matrix: Solid
Analysis Batch: 266901

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 266075

Analyte			Spike Added	LCS Result	LCS Qual	Total Uncert. (2σ+/-)	RL	MDC	Unit	%Rec	%Rec. Limits		
Technetium-99			29.0	30.09		3.00	1.00	0.354	pCi/g	104	75 - 125		

Tracer	*LCS %Yield*	*LCS Qualifier*	*Limits*
Tc-99m	*89.7*		*30 - 110*

Lab Sample ID: 160-18632-A-1-G DU
Matrix: Solid
Analysis Batch: 266901

Client Sample ID: Duplicate
Prep Type: Total/NA
Prep Batch: 266075

Analyte	Sample Result	Sample Qual		DU Result	DU Qual	Total Uncert. (2σ+/-)	RL	MDC	Unit			RER	RER Limit
Technetium-99	0.119	U		-0.02995	U	0.231	1.00	0.399	pCi/g			0.31	1

Method: TC-02-RC - Technetium-99 (LSC) (Continued)

Lab Sample ID: 160-18632-A-1-G DU
Matrix: Solid
Analysis Batch: 266901

Client Sample ID: Duplicate
Prep Type: Total/NA
Prep Batch: 266075

Tracer	*DU %Yield*	*DU Qualifier*	*Limits*
Tc-99m	*95.6*		*30 - 110*

QC Association Summary

Client: Alliant Corporation
Project/Site: ORNL Y-12 Outfall 200 Characterization

TestAmerica Job ID: 160-18639-1

GC Semi VOA

ISM Prep Batch: 265251

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-18632-A-1-K MS	Matrix Spike	Total/NA	Solid	Increment, Prep	
160-18632-A-1-L MSD	Matrix Spike Duplicate	Total/NA	Solid	Increment, Prep	

Prep Batch: 266347

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-18639-1	YMTFA81 9404 G	Total/NA	Solid	3550C	
160-18639-2	YMTFA93 9404-8G	Total/NA	Solid	3550C	
MB 160-266347/1-A	Method Blank	Total/NA	Solid	3550C	
LCS 160-266347/2-A	Lab Control Sample	Total/NA	Solid	3550C	
160-18632-A-1-K MS	Matrix Spike	Total/NA	Solid	3550C	265251
160-18632-A-1-L MSD	Matrix Spike Duplicate	Total/NA	Solid	3550C	265251

Analysis Batch: 266473

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-18639-1	YMTFA81 9404 G	Total/NA	Solid	8082A	266347
160-18639-2	YMTFA93 9404-8G	Total/NA	Solid	8082A	266347
MB 160-266347/1-A	Method Blank	Total/NA	Solid	8082A	266347
LCS 160-266347/2-A	Lab Control Sample	Total/NA	Solid	8082A	266347
160-18632-A-1-K MS	Matrix Spike	Total/NA	Solid	8082A	266347
160-18632-A-1-L MSD	Matrix Spike Duplicate	Total/NA	Solid	8082A	266347

Metals

Prep Batch: 265500

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-18639-1	YMTFA81 9404 G	Total/NA	Solid	3050B	
160-18639-2	YMTFA93 9404-8G	Total/NA	Solid	3050B	
MB 160-265500/1-A	Method Blank	Total/NA	Solid	3050B	
LCSSRM 160-265500/2-A	Lab Control Sample	Total/NA	Solid	3050B	
160-18639-1 MS	YMTFA81 9404 G	Total/NA	Solid	3050B	
160-18639-1 MSD	YMTFA81 9404 G	Total/NA	Solid	3050B	

Prep Batch: 265578

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-18639-1	YMTFA81 9404 G	Total/NA	Solid	7471B	
160-18639-2	YMTFA93 9404-8G	Total/NA	Solid	7471B	
MB 160-265578/1-A	Method Blank	Total/NA	Solid	7471B	
LCSSRM 160-265578/2-A	Lab Control Sample	Total/NA	Solid	7471B	
160-18450-C-1-B MS	Matrix Spike	Total/NA	Solid	7471B	
160-18450-C-1-C MSD	Matrix Spike Duplicate	Total/NA	Solid	7471B	

Analysis Batch: 266091

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-18639-1	YMTFA81 9404 G	Total/NA	Solid	7471B	265578
160-18639-2	YMTFA93 9404-8G	Total/NA	Solid	7471B	265578
MB 160-265578/1-A	Method Blank	Total/NA	Solid	7471B	265578
LCSSRM 160-265578/2-A	Lab Control Sample	Total/NA	Solid	7471B	265578
160-18450-C-1-B MS	Matrix Spike	Total/NA	Solid	7471B	265578
160-18450-C-1-C MSD	Matrix Spike Duplicate	Total/NA	Solid	7471B	265578

Metals (Continued)

Analysis Batch: 267251

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-18639-1	YMTFA81 9404 G	Total/NA	Solid	6010C	265500
160-18639-2	YMTFA93 9404-8G	Total/NA	Solid	6010C	265500
MB 160-265500/1-A	Method Blank	Total/NA	Solid	6010C	265500
LCSSRM 160-265500/2-A	Lab Control Sample	Total/NA	Solid	6010C	265500
160-18639-1 MS	YMTFA81 9404 G	Total/NA	Solid	6010C	265500
160-18639-1 MSD	YMTFA81 9404 G	Total/NA	Solid	6010C	265500

General Chemistry

Analysis Batch: 265418

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-18639-1	YMTFA81 9404 G	Total/NA	Solid	Moisture	
160-18639-2	YMTFA93 9404-8G	Total/NA	Solid	Moisture	
160-18570-B-1 DU	Duplicate	Total/NA	Solid	Moisture	

Rad

Leach Batch: 264657

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-18615-A-6-E DU	Duplicate	Total/NA	Solid	Dry and Grind	

Leach Batch: 265081

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-18639-1	YMTFA81 9404 G	Total/NA	Solid	Dry and Grind	
160-18639-2	YMTFA93 9404-8G	Total/NA	Solid	Dry and Grind	
160-18639-1 DU	YMTFA81 9404 G	Total/NA	Solid	Dry and Grind	

ISM Prep Batch: 265348

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-18646-A-4-J DU	Duplicate	Total/NA	Solid	Increment, Prep	

Prep Batch: 265703

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-18639-1	YMTFA81 9404 G	Total/NA	Solid	ExtChrom	265081
160-18639-2	YMTFA93 9404-8G	Total/NA	Solid	ExtChrom	265081
MB 160-265703/1-A	Method Blank	Total/NA	Solid	ExtChrom	
LCS 160-265703/2-A	Lab Control Sample	Total/NA	Solid	ExtChrom	
160-18639-1 DU	YMTFA81 9404 G	Total/NA	Solid	ExtChrom	265081

Prep Batch: 265705

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-18639-1	YMTFA81 9404 G	Total/NA	Solid	ExtChrom	265081
160-18639-2	YMTFA93 9404-8G	Total/NA	Solid	ExtChrom	265081
MB 160-265705/1-A	Method Blank	Total/NA	Solid	ExtChrom	
LCS 160-265705/2-A	Lab Control Sample	Total/NA	Solid	ExtChrom	
160-18639-1 DU	YMTFA81 9404 G	Total/NA	Solid	ExtChrom	265081

Prep Batch: 265707

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-18639-1	YMTFA81 9404 G	Total/NA	Solid	A-01-R	265081

Rad (Continued)

Prep Batch: 265707 (Continued)

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-18639-2	YMTFA93 9404-8G	Total/NA	Solid	A-01-R	265081
MB 160-265707/1-A	Method Blank	Total/NA	Solid	ExtChrom	
LCS 160-265707/2-A	Lab Control Sample	Total/NA	Solid	ExtChrom	
160-18639-1 DU	YMTFA81 9404 G	Total/NA	Solid	A-01-R	265081

Prep Batch: 265708

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-18639-1	YMTFA81 9404 G	Total/NA	Solid	ExtChrom	265081
160-18639-2	YMTFA93 9404-8G	Total/NA	Solid	ExtChrom	265081
MB 160-265708/1-A	Method Blank	Total/NA	Solid	ExtChrom	
LCS 160-265708/2-A	Lab Control Sample	Total/NA	Solid	ExtChrom	
160-18639-1 DU	YMTFA81 9404 G	Total/NA	Solid	ExtChrom	265081

Prep Batch: 265710

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-18639-1	YMTFA81 9404 G	Total/NA	Solid	ExtChrom	265081
160-18639-2	YMTFA93 9404-8G	Total/NA	Solid	ExtChrom	265081
MB 160-265710/1-A	Method Blank	Total/NA	Solid	ExtChrom	
LCS 160-265710/2-A	Lab Control Sample	Total/NA	Solid	ExtChrom	
160-18639-1 DU	YMTFA81 9404 G	Total/NA	Solid	ExtChrom	265081

Prep Batch: 266075

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-18639-1	YMTFA81 9404 G	Total/NA	Solid	Ext_Chrom_LSC	
160-18639-2	YMTFA93 9404-8G	Total/NA	Solid	Ext_Chrom_LSC	
MB 160-266075/1-A	Method Blank	Total/NA	Solid	Ext_Chrom_LSC	
LCS 160-266075/2-A	Lab Control Sample	Total/NA	Solid	Ext_Chrom_LSC	
160-18632-A-1-G DU	Duplicate	Total/NA	Solid	Ext_Chrom_LSC	

Prep Batch: 266721

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-18639-1	YMTFA81 9404 G	Total/NA	Solid	DPS-0	265081
160-18639-2	YMTFA93 9404-8G	Total/NA	Solid	DPS-0	265081
MB 160-266721/1-A	Method Blank	Total/NA	Solid	DPS-0	
LCS 160-266721/2-A	Lab Control Sample	Total/NA	Solid	DPS-0	
160-18646-A-4-J DU	Duplicate	Total/NA	Solid	DPS-0	265348

Prep Batch: 268821

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-18639-1	YMTFA81 9404 G	Total/NA	Solid	LSC_Dist_Susp	
160-18639-2	YMTFA93 9404-8G	Total/NA	Solid	LSC_Dist_Susp	
MB 160-268821/1-A	Method Blank	Total/NA	Solid	LSC_Dist_Susp	
LCS 160-268821/2-A	Lab Control Sample	Total/NA	Solid	LSC_Dist_Susp	
160-18639-2 MS	YMTFA93 9404-8G	Total/NA	Solid	LSC_Dist_Susp	
160-18639-1 DU	YMTFA81 9404 G	Total/NA	Solid	LSC_Dist_Susp	

Prep Batch: 270099

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-18639-1	YMTFA81 9404 G	Total/NA	Solid	DPS-0	265081
160-18639-2	YMTFA93 9404-8G	Total/NA	Solid	DPS-0	265081
MB 160-270099/1-A	Method Blank	Total/NA	Solid	DPS-0	

Rad (Continued)

Prep Batch: 270099 (Continued)

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
LCS 160-270099/2-A	Lab Control Sample	Total/NA	Solid	DPS-0	
160-18615-A-6-E DU	Duplicate	Total/NA	Solid	DPS-0	264657

Prep Batch: 270733

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-18639-1	YMTFA81 9404 G	Total/NA	Solid	LSC_Dist_Susp	
160-18639-2	YMTFA93 9404-8G	Total/NA	Solid	LSC_Dist_Susp	
MB 160-270733/1-A	Method Blank	Total/NA	Solid	LSC_Dist_Susp	
LCS 160-270733/2-A	Lab Control Sample	Total/NA	Solid	LSC_Dist_Susp	
160-18700-A-1-G MS	Matrix Spike	Total/NA	Solid	LSC_Dist_Susp	
160-18700-A-1-H MSD	Matrix Spike Duplicate	Total/NA	Solid	LSC_Dist_Susp	

Surrogate Summary

Client: Alliant Corporation
Project/Site: ORNL Y-12 Outfall 200 Characterization

TestAmerica Job ID: 160-18639-1

Method: 8082A - Polychlorinated Biphenyls (PCBs) by Gas Chromatography

Matrix: Solid **Prep Type: Total/NA**

		Percent Surrogate Recovery (Acceptance Limits)							
Lab Sample ID	**Client Sample ID**	**DCB1 (23-146)**							
160-18632-A-1-K MS	Matrix Spike	94							
160-18632-A-1-L MSD	Matrix Spike Duplicate	88							
LCS 160-266347/2-A	Lab Control Sample	74							
MB 160-266347/1-A	Method Blank	79							

Surrogate Legend

DCB = DCB Decachlorobiphenyl (Surr)

Method: 8082A - Polychlorinated Biphenyls (PCBs) by Gas Chromatography

Matrix: Solid **Prep Type: Total/NA**

		Percent Surrogate Recovery (Acceptance Limits)							
Lab Sample ID	**Client Sample ID**	**DCB2 (23-146)**							
160-18639-1	YMTFA81 9404 G	36							
160-18639-2	YMTFA93 9404-8G	61							

Surrogate Legend

DCB = DCB Decachlorobiphenyl (Surr)

Tracer/Carrier Summary

Client: Alliant Corporation
Project/Site: ORNL Y-12 Outfall 200 Characterization

TestAmerica Job ID: 160-18639-1

Method: A-01-R - Isotopic Curium and/or Americium 241 (Alpha Spectrometry)

Matrix: Solid **Prep Type: Total/NA**

		Percent Yield (Acceptance Limits)
Lab Sample ID	**Client Sample ID**	**Am-243 (30-110)**
160-18639-1	YMTFA81 9404 G	96.8
160-18639-1 DU	YMTFA81 9404 G	91.5
160-18639-2	YMTFA93 9404-8G	59.2
LCS 160-265703/2-A	Lab Control Sample	68.9
MB 160-265703/1-A	Method Blank	47.3

Tracer/Carrier Legend

Am-243 = Americium-243

Method: A-01-R - Isotopic Neptunium (Alpha Spectrometry)

Matrix: Solid **Prep Type: Total/NA**

		Percent Yield (Acceptance Limits)
Lab Sample ID	**Client Sample ID**	**Np-239 (30-110)**
160-18639-1	YMTFA81 9404 G	102
160-18639-1 DU	YMTFA81 9404 G	90.6
160-18639-2	YMTFA93 9404-8G	95.5
LCS 160-265707/2-A	Lab Control Sample	102
MB 160-265707/1-A	Method Blank	85.7

Tracer/Carrier Legend

Np-239 = Neptunium-239

Method: A-01-R - Isotopic Plutonium (Alpha Spectrometry)

Matrix: Solid **Prep Type: Total/NA**

		Percent Yield (Acceptance Limits)
Lab Sample ID	**Client Sample ID**	**Pu-242 (T) (30-110)**
160-18639-1	YMTFA81 9404 G	91.9
160-18639-1 DU	YMTFA81 9404 G	100
160-18639-2	YMTFA93 9404-8G	96.8
LCS 160-265708/2-A	Lab Control Sample	98.6
MB 160-265708/1-A	Method Blank	85.4

Tracer/Carrier Legend

Pu-242 (T) = Pu-242 (T)

Method: A-01-R - Isotopic Thorium (Alpha Spectrometry)

Matrix: Solid **Prep Type: Total/NA**

		Percent Yield (Acceptance Limits)
Lab Sample ID	**Client Sample ID**	**Th-229 (30-110)**
160-18639-1	YMTFA81 9404 G	87.4
160-18639-1 DU	YMTFA81 9404 G	88.7
160-18639-2	YMTFA93 9404-8G	35.9
LCS 160-265705/2-A	Lab Control Sample	94.6
MB 160-265705/1-A	Method Blank	66.5

Tracer/Carrier Summary

Client: Alliant Corporation
Project/Site: ORNL Y-12 Outfall 200 Characterization

TestAmerica Job ID: 160-18639-1

Tracer/Carrier Legend

Th-229 = Thorium-229

Method: A-01-R - Isotopic Uranium (Alpha Spectrometry)

Matrix: Solid **Prep Type: Total/NA**

		Percent Yield (Acceptance Limits)
Lab Sample ID	**Client Sample ID**	**U-232 (30-110)**
160-18639-1	YMTFA81 9404 G	88.0
160-18639-1 DU	YMTFA81 9404 G	81.7
160-18639-2	YMTFA93 9404-8G	89.8
LCS 160-265710/2-A	Lab Control Sample	75.3
MB 160-265710/1-A	Method Blank	83.7

Tracer/Carrier Legend

U-232 = Uranium-232

Method: SR-03-RC - Total Beta Strontium (GFPC)

Matrix: Solid **Prep Type: Total/NA**

		Percent Yield (Acceptance Limits)
Lab Sample ID	**Client Sample ID**	**Sr (C) (40-110)**
160-18639-1	YMTFA81 9404 G	83.5
160-18639-2	YMTFA93 9404-8G	78.3
160-18646-A-4-J DU	Duplicate	83.5
LCS 160-266721/2-A	Lab Control Sample	87.4
MB 160-266721/1-A	Method Blank	84.9

Tracer/Carrier Legend

Sr (C) = Sr Carrier

Method: ST-RC-0301 - Radium-226 (Alpha Spectrometry)

Matrix: Solid **Prep Type: Total/NA**

		Percent Yield (Acceptance Limits)
Lab Sample ID	**Client Sample ID**	**At-217 (30-110)**
160-18615-A-6-E DU	Duplicate	70.0
160-18639-1	YMTFA81 9404 G	75.9
160-18639-2	YMTFA93 9404-8G	41.4
LCS 160-270099/2-A	Lab Control Sample	63.3
MB 160-270099/1-A	Method Blank	38.1

Tracer/Carrier Legend

At-217 = At-217

Method: TC-02-RC - Technetium-99 (LSC)

Matrix: Solid **Prep Type: Total/NA**

		Percent Yield (Acceptance Limits)
Lab Sample ID	**Client Sample ID**	**Tc-99m (30-110)**
160-18632-A-1-G DU	Duplicate	95.6
160-18639-1	YMTFA81 9404 G	87.3

Tracer/Carrier Summary

Client: Alliant Corporation
Project/Site: ORNL Y-12 Outfall 200 Characterization

TestAmerica Job ID: 160-18639-1

Method: TC-02-RC - Technetium-99 (LSC) (Continued)

Matrix: Solid **Prep Type: Total/NA**

		Percent Yield (Acceptance Limits)							
Lab Sample ID	**Client Sample ID**	**Tc-99m (30-110)**							
160-18639-2	YMTFA93 9404-8G	67.8							
LCS 160-266075/2-A	Lab Control Sample	89.7							
MB 160-266075/1-A	Method Blank	96.7							

Tracer/Carrier Legend

Tc-99m = Tc-99m