

The order of this data package is as follows:

1. Chain-of-Custody/Lab Request
2. Copies of COCs
3. Validation Report
4. Laboratory analysis

Comments:

[illegible]

LANL SMO

Los Alamos NM

Chain of Custody/Analysis Request

COC/Lab Request #:

2018-1615

Page 1 of 1

Client Contact:

Lab Agreement #:

Site Name:

Los Alamos National Laboratory

Project Number:

Analysis Turnaround Time:

24 Hour - ☐ Other - ☒7 Days - ☐14 Days - ☐21 Days - ☐28 Days - ☐

Rad Screening Info:

Lab Reporting Limit Type:

Method Detection Limit

Field Sample ID

Sample Date

Sample Time

Sample Matrix

MSGP-Hg

WSP-8260B-VOA

WSP-8270C-SVOA

WSP-8290-D/F

WSP-8330B-NMED HEXMOD

WSP-All Metals

WSP-CN(T)

WSP-EES-Br

WSP-EES-Tracers

WSP-GENINORG+PerChlorate

WSP-GrossA/B

WSP-LL-H-3

WSP-N15/O18-NO3

WSP-NH3+NO3/NO2+PO4

WSP-RAD

WSP-TKN+TOC

CAWA-18-33

Feb 6 2018

12:20

W

1

1

2

1

1

1

CAWA-18-108

Feb 6 2018

12:20

W

1

2

2

2

3

1

1

1

1

1

1

CAWA-18-34

Feb 6 2018

12:20

W

1

2

2

2

3

1

1

1

1

1

1

CAWA-18-38

Feb 6 2018

12:20

W

1

2

Special Instructions:

Relinquished by:

Print Name: *Tanner Bonham*Date/Time: *2/6/18 1324*

Received by:

*Renee Onstott*Print Name: *Renee Onstott*Date/Time: *2/6/18 1324*

Relinquished by:

Print Name:

Date/Time:

Received by:

Print Name:

Date/Time:

Relinquished by:

Print Name:

Date/Time:

Received by:

Print Name:

Date/Time:

Shipping Classification Determination Checklist

Page 6 of 6

Sampling Plan ID/Name: 11689 CDU-92(1)COC: 2018-16155R

TEST - Explosives				YES	NO
Samples collected from a WFO area? (Tas -8, 9, 11, 16, 37, 14, 15, 36, 22, 39, 40, and 49)				X	
Field Test for Explosives Results				YES	NO
HE SPOT test result positive. If YES - Do not transport.					X
TEST - Chemical Preservation				YES	NO
Samples are chemically preserved?				X	
Field Team Member Statement				YES	NO
Chemical preservation exceeds limits given 40 CFR 136, Table II - Required Containers, Preservation Techniques and Holding Times (footnote 3). If YES - Do not ship.					X
TEST - Field Screen				YES	NO
The sample has field screening measurements of alpha and beta activity?					X
Sample Activity (dpm/100cm ²)	Shipment Activity (dpm*g/100cm ²)	Sampled Location		YES	NO
Alpha detectable	AND Alpha ≥ 160,000	AT TA-1 and adjacent hillsides, TA-21, Acid Canyon, MDA C at TA-50, Area G at TA-54, TA-48, or TA-49			X
Alpha ≥ 125	AND Alpha ≥ 1,250,000	AT other locations			X
Beta ≥ 1,500	AND Beta ≥ 15,000,000	AT any location			X
The sample Alpha ≥ 16,000,000 dpm*g/100cm ² or Beta ≥ 160,000,000 dpm*g/100cm ² . If YES - Do not ship.					X
On the external surface of the sample container, alpha activity ≥ 24 dpm/cm ² , beta activity ≥ 240 dpm/cm ² , or surface activity ≥ 0.5 mR/hr. If YES - Do not ship.					X
The sample is tentatively identified as DOT hazard Class 7 (Radioactive). The shipment is labeled <i>Radioactive Material, Excepted Package - Limited Quantity Material - UN2910</i> , based on field screening measurements of alpha and beta activity.					X
TEST - Location				YES	NO
Prior analytical measurements of radioactive isotopes are available?				X	
Sample Activity (pCi/g)	Shipment Activity (pCi)			YES	NO
Am-241 ≥ 27 pCi/g	AND Am-241 ≥ 270,000 pCi Total				X
Cs-137 ≥ 270 pCi/g	AND Cs-137 ≥ 270,000 pCi Total				X
Pu-238 ≥ 27 pCi/g	AND Pu-238 ≥ 270,000 pCi Total				X
Pu-239/240 ≥ 27 pCi/g	AND Pu-239/240 ≥ 270,000 pCi Total				X
Th-228 ≥ 27 pCi/g	AND Th-228 ≥ 270,000 pCi Total				X
U-234 ≥ 270 pCi/g	AND U-234 ≥ 1,600,000,000 pCi Total				X
U-238 ≥ 270 pCi/g	AND U-238 ≥ unlimited				X
H-3 ≥ 27,000,000 pCi/g	AND H-3 ≥ 27,000,000,000 pCi Total				X
Am-241, Pu-238, Pu-239/240, or Th 228 ≥ 27,000,000 pCi; or Cs-137 ≥ 270,000,000 pCi or U-234 ≥ 160,000,000 pCi; or H-3 ≥ 1 Ci. If YES - Do not ship.					X
The sample is tentatively identified as DOT hazard Class 7 (Radioactive). The shipment is labeled <i>Radioactive Material, Excepted Package - Limited Quantity of Material - UN2910</i> , based on prior analytical measurements of radioactive isotopes.					X
TEST - AK				YES	NO
The shippers documented knowledge of the sample positively identifies appropriate labeling.					X
Documented Field Team Member Statement				YES	NO
The sample is tentatively identified as DOT hazard Class 7 (Radioactive). The shipment is labeled <i>Radioactive Material, Excepted Package - Limited Quantity of Material - UN2910</i> , and the sample is submitted to ARS or RP for hazard classification analysis.					X

These samples do not meet the criteria for classification in any hazard class according to regulation OSHA 29 CFR 1910.1200. The sample(s) contained in this shipment have been assigned a tentative proper DOT shipping name, hazard class, identification number, and packing group, based on the shipper's knowledge of the sample:

Hazard Assessment Completed	Date/Time
(Printed Name) Maurice Shuchter (Signature) <i>Maurice Shuchter</i>	2/6/18 1324

Hazard Assessment Reviewed	Date/Time
(Printed Name) Lance Oshitt (Signature) <i>Lance Oshitt</i>	2/6/18 1324

DATA VALIDATION REPORT

Chain Of Custody No. 2018-1615-CF

1. Distribution Of Samples In EDD.

SDG	Analytical Method	Regular Samples	Field Duplicates	Trip Blanks	Field Blanks	Equipment Blanks
11967	EPA:170.0	1				
11967	SW-846:8290A	1				

SDG	Analytical Method	Analysis Lot ID	Prep Lot ID	Regular Samples	Field Duplicates	Trip Blanks	Field Blanks	Equipment Blanks	Method Blanks	Matrix Spikes	Matrix Spike Dups	Analytical Spikes	Post-Digestion Spikes	Lab Control Samples	Lab Control Sample Dups	Blank Spike	Blank Spike Dups	Lab Duplicates	Storage Blanks	Preparation Blanks	Reagent Blanks
11967	EPA:170.0	NA	NA	1																	
11967	SW-846:8290A	36935	36931	1					1					1	1						

2. Distribution Of Analytes In EDD.

Analytical Method	Analytical Method Category	Field Sample ID	Lab Sample ID	Sample Purpose	Target Analytes	Surrogates	Spiked Compounds	TICS
EPA:170.0	VOC	CAWA-18-34	11967001	REG	1	0	0	0
SW-846:8290A	DIOXINS FURANS	CAWA-18-34	11967001	REG	25	9	0	0
SW-846:8290A	DIOXINS FURANS	LCS	12020694	LCS	0	9	17	0
SW-846:8290A	DIOXINS FURANS	LCSD	12020695	LCSD	0	9	17	0
SW-846:8290A	DIOXINS FURANS	MB	12020693	MB	25	9	0	0

3. Are any analytes missing?

No.

4. Were any holding times exceeded?

No.

5. Any contaminants in blanks?

Only results shown in Section 13 'Display Flagged Data' are current as of this report generation. All other sections are valid for the date the COC data was inserted into EIM, and may have changed due to data updates in the intervening time.

DATA VALIDATION REPORT

Blank FS ID	Blank Lab Sample	Blank Type	Analytical Method	Sample	Parameter Name	Blank Lab Result	Lab Qualifier	Blank Lab Units	Blank Lab Detection Limit
MB	12020693	METHOD BLANK	SW-846:8290A	W	Heptachlorodibenzofuran[1,2,3,4,6,7,8-]	11.1	J	pg/L	50
MB	12020693	METHOD BLANK	SW-846:8290A	W	Heptachlorodibenzofurans (Total)	17.2	J	pg/L	
MB	12020693	METHOD BLANK	SW-846:8290A	W	Octachlorodibenzodioxin	23.5	J	pg/L	100

Field Sample ID	Blank Lab	Blank Type	Analytical Method	Parameter Name	Blank Lab Result	Blank Lab Units	Lab Result	Lab Qualifier	Lab Detection Limit	Detect Flag	Detect to Nondetect Factor	Detect to Estimated Factor	Use Factors
CAWA-18-34	12020693	METHOD BLANK	SW-846:8290A	Heptachlorodibenzofuran[1,2,3,4,6,7,8-]	11.1	pg/L	5.33	BJ	52	Y	5	100	Y
CAWA-18-34	12020693	METHOD BLANK	SW-846:8290A	Heptachlorodibenzofurans (Total)	17.2	pg/L	5.33	BJ		Y	5	100	Y
CAWA-18-34	12020693	METHOD BLANK	SW-846:8290A	Octachlorodibenzodioxin[1,2,3,4,6,7,8,9-]	23.5	pg/L	15.9	BJK	100	Y	5	100	Y

6. Any surrogate recoveries outside the control limits?

No.

7. Any MS/MSD recoveries or RPDs outside the control limits?

No.

8. Any LCS/LCSD or BS/BSD recoveries or RPDs outside the control limits?

No.

9. Any Field Duplicate RPDs outside the desired limits?

Only results shown in Section 13 'Display Flagged Data' are current as of this report generation. All other sections are valid for the date the COC data was inserted into EIM, and may have changed due to data updates in the intervening time.

DATA VALIDATION REPORT

No.

10. Any Lab Duplicate RPDs outside the desired limits?

No.

11. Any required reporting limits exceeded?

No.

12. Additional Validator's Comments.

13. Display Flagged Data.

Location ID	COC Number	Field Sample ID	Sample Purpose	Analysis Type Code	Analytical Suite	Analytical Method	Parameter Name	Lab Qualifier	Validation Qualifier	Validation Reason Codes	Detect Flag	Lab Result	Lab Units	Report Result	Report Units	Report MDA	Report Uncertainty	Lab Matrix	Sample Date	Percent	Analysis Lot ID	Validation Status Code	Use Flag
CDV-9-1(i) S1	2018-1615-CF	CAWA-18-34	REG	INIT	DIOXINS FURANS	SW-846:8290A	Heptachlorodibenzofuran[1,2,3,4,6,7,8-]	BJ	U	DF4	N	5.33	pg/L	5.33e-006	ug/L			W	02/06/2018	36935		VAL	Y
CDV-9-1(i) S1	2018-1615-CF	CAWA-18-34	REG	INIT	DIOXINS FURANS	SW-846:8290A	Heptachlorodibenzofurans (Total)	BJ	U	DF4	N	5.33	pg/L	5.33e-006	ug/L			W	02/06/2018	36935		VAL	Y
CDV-9-1(i) S1	2018-1615-CF	CAWA-18-34	REG	INIT	DIOXINS FURANS	SW-846:8290A	Octachlorodibenzodioxin[1,2,3,4,6,7,8,9-]	BJK	U	DF4	N	15.9	pg/L	1.59e-005	ug/L			W	02/06/2018	36935		VAL	Y

Reason Code

Description

DF4	The sample result is =5 times the concentration of the related analyte in the method blank.
NQ	The analytical laboratory did not qualify the analyte as not detected and/or any other standard qualifire. The analyte is detected in the sample.
U_LAB	The analytical laboratory qualified the analyte as not detected.

14. Usable Result Count.

Field Sample ID	Location ID	Sample Purpose	Analytical Method	No. Unuseable Records	Total Records
CAWA-18-34	CDV-9-1(i) S1	REG	EPA:170.0	0	1
CAWA-18-34	CDV-9-1(i) S1	REG	SW-846:8290A	0	25

March 05, 2018

Ms. Nita Patel
Los Alamos National Laboratory
PO Box 1663
TA-03, SM271, Drop Pt. 02U, Rm111
Los Alamos, New Mexico 87545

Re: 2012 WQH with LOCUS EDD
Work Order: 11967
SDG: 2018-1615-CF

Dear Ms. Patel:

Cape Fear Analytical LLC (CFA) appreciates the opportunity to provide the enclosed analytical results for the sample(s) we received on February 08, 2018. This original data report has been prepared and reviewed in accordance with CFA's standard operating procedures.

Our policy is to provide high quality, personalized analytical services to enable you to meet your analytical needs on time every time. We trust that you will find everything in order and to your satisfaction. If you have any questions, please do not hesitate to call me at 910-795-0421.

Sincerely,



Cynde Larkins
Project Manager

Chain of Custody: 2018-1615-CF
Enclosures

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**Los Alamos National Laboratory
2012 WQH with LOCUS EDD
Workorder #: 11967
SDG # : 2018-1615-CF**

Case Narrative

**Receipt Narrative
for
Los Alamos National Laboratory
SDG: 2018-1615-CF
Work Order: 11967**

Laboratory Identification

Cape Fear Analytical, LLC
3306 Kitty Hawk Road, Suite 120
Wilmington, North Carolina 28405
(910) 795-0421

Summary

Sample receipt: The sample arrived at Cape Fear Analytical LLC (CFA), Wilmington, North Carolina on February 08, 2018 for analysis. The sample was delivered with proper chain of custody documentation and signatures. Shipping container temperature was checked, documented, and within specifications. All sample containers arrived without any visible signs of tampering or breakage. Appropriate sample containers were received. Sample containers were checked for pH, where appropriate, and matched the preservative as documented on the accompanying chain of custody. Sufficient sample was received for analysis. There are no additional comments concerning sample receipt.

Sample Identification: The laboratory received the following sample:

<u>Laboratory ID</u>	<u>Client ID</u>
11967001	CAWA-18-34

Case Narrative

Sample analyses were conducted using methodology as outlined in Cape Fear Analytical's Standard Operating Procedures. Any technical or administrative problems during analysis, data review, and reduction are contained in the analytical case narratives in the enclosed data package.

Data Package

The enclosed data package contains the following sections: Case Narrative, Chain of Custody, Cooler Receipt Checklist and data from the following fractions: High Resolution Dioxins and Furans.

Sincerely,



Cynde Larkins
Project Manager

List of current CFA Certifications as of 15 February 2018

State	Certification
California (NELAC)	09270CA
New Jersey (NELAC)	NC013
North Carolina	NC01894
South Carolina	99063001
Utah (Primary NELAC)	CFAL

Chain of Custody and Supporting Documentation

[illegible]

SAMPLE RECEIPT CHECKLIST
Cape Fear Analytical

Client: <u>LANL</u>	Work Order: <u>11967</u>
Shipping Company: <u>FedEx</u>	Date/Time Received: <u>08Feb18</u> <u>0948</u>

Suspected Hazard Information	Yes	NA	No
Shipped as DOT Hazardous?			<input checked="" type="checkbox"/>
Samples identified as Foreign Soil?			<input checked="" type="checkbox"/>

DOE Site Sample Packages	Yes	NA	No*
Screened <0.5 mR/hr?	<input checked="" type="checkbox"/>		
Samples < 2x background?	<input checked="" type="checkbox"/>		

* Notify RSO of any responses in this column immediately.

Air Sample Receipt Specifics	Yes	NA	No
Air sample in shipment?			<input checked="" type="checkbox"/>

Air Witness: _____

Sample Receipt Criteria	Yes	NA	No	Comments/Qualifiers (required for Non-Conforming Items)
1 Shipping containers received intact and sealed?	<input checked="" type="checkbox"/>			Circle Applicable: seals broken damaged container leaking container other(describe)
2 Chain of Custody documents included with shipment?	<input checked="" type="checkbox"/>			
3 Samples requiring cold preservation within 0-6°C?	<input checked="" type="checkbox"/>			Preservation Method: ice bags blue ice dry ice none other (describe) <u>5.3° - 1.9 = 3.4°C</u>
4 Aqueous samples found to have visible solids?			<input checked="" type="checkbox"/>	Sample IDs, containers affected:
5 Samples requiring chemical preservation at proper pH?		<input checked="" type="checkbox"/>		Sample IDs, containers affected and pH observed: <u>pH=8 on both containers</u> If preservative added, Lot#:
6 Samples requiring preservation have no residual chlorine?	<input checked="" type="checkbox"/>			Sample IDs, containers affected: If preservative added, Lot#:
7 Samples received within holding time?	<input checked="" type="checkbox"/>			Sample IDs, tests affected:
8 Sample IDs on COC match IDs on containers?	<input checked="" type="checkbox"/>			Sample IDs, containers affected:
9 Date & time of COC match date & time on containers?	<input checked="" type="checkbox"/>			Sample IDs, containers affected:
10 Number of containers received match number indicated on COC?	<input checked="" type="checkbox"/>			List type and number of containers / Sample IDs, containers affected: <u>2 - 1L WMA</u>
11 COC form is properly signed in relinquished/received sections?	<input checked="" type="checkbox"/>			

Comments:

Checklist performed by: Initials: CF

Date: 08Feb18

CF-UD-F-7

ORIGIN ID: SAFA (505) 665-9966
KEITH GREENE
LOS ALAMOS NATL LAB.
TA00 BLDG 1237 DPU 03

LOS ALAMOS, NM 87545
UNITED STATES US

SHIP DATE: 07FEB18
ACTWGT: 19.0 LB MAN
CAD: 0014176/CAFE2916

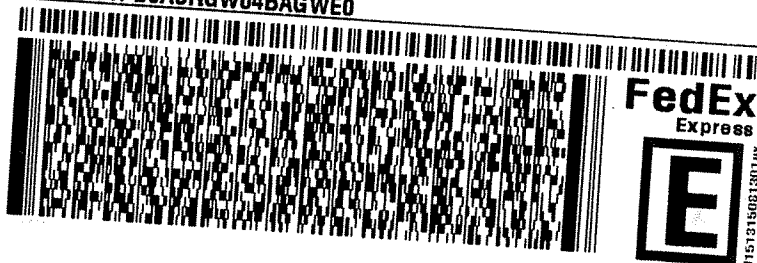
BILL SENDER

TO **CHRIS CORNWELL**
CAPE FEAR ANALYTICAL
3306 KITTY HAWK ROAD, SUITE 120

WILMINGTON NC 28405

(910) 795-0421

REF: 21PD0ASRGW04BAGWE0



TRK# 5908 1783 4742
0201

THU - 08 FEB 10:30A
PRIORITY OVERNIGHT

XH ILMA

28405
NC-US GSO



Part # 156148V-434 RIT2 EXP 02/18 ***

$$5.3^{\circ} - 1.9 = 3.4^{\circ}C$$

High Resolution Dioxins and Furans Analysis

Case Narrative

**HDOX LANL-FBWP Case Narrative
Los Alamos National Laboratory (LANL)
SDG 2018-1615-CF
Work Order 11967**

Method/Analysis Information

Product: Dioxins/Furans by SW846 Method 8290A in Liquids
Analytical Method: SW846 8290A
Extraction Method: SW846 3520C
Analytical Batch Number: 36935
Clean Up Batch Number: 36932
Extraction Batch Number: 36931

Sample Analysis

The following samples were analyzed using the analytical protocol as established in SW846 8290A:

Sample ID	Client ID
11967001	CAWA-18-34
12020693	Method Blank (MB)
12020694	Laboratory Control Sample (LCS)
12020695	Laboratory Control Sample Duplicate (LCSD)

The samples in this SDG were analyzed on an "as received" basis.

SOP Reference

Procedure for preparation, analysis and reporting of analytical data are controlled by Cape Fear Analytical LLC (CFA) as Standard Operating Procedure (SOP). The data discussed in this narrative has been analyzed in accordance with CF-OA-E-002 REV# 15.

Raw data reports are processed and reviewed by the analyst using the TargetLynx software package.

Calibration Information

Initial Calibration

All initial calibration requirements have been met for this sample delivery group (SDG).

Continuing Calibration Verification (CCV) Requirements

All associated calibration verification standard(s) (CCV) met the acceptance criteria.

Quality Control (QC) Information

Certification Statement

The test results presented in this document are certified to meet all requirements of the analytical method, the 2009 TNI Standard and the DoD/DOE QSM. (A2LA scope No. 3014-01)

Method Blank (MB) Statement

The MB(s) analyzed with this SDG met the acceptance criteria.

Surrogate Recoveries

All surrogate recoveries were within the established acceptance criteria for this SDG.

Laboratory Control Sample (LCS) Recovery

The LCS spike recoveries met the acceptance limits.

Laboratory Control Sample Duplicate (LCSD) Recovery

The LCSD spike recoveries met the acceptance limits.

LCS/LCSD Relative Percent Difference (RPD) Statement

The RPD(s) between the LCS and LCSD met the acceptance limits.

QC Sample Designation

A matrix spike and matrix spike duplicate analysis was not required for this SDG.

Technical Information

Holding Time Specifications

CFA assigns holding times based on the associated methodology, which assigns the date and time from sample collection. Those holding times expressed in hours are calculated in the AlphaLIMS system. Those holding times expressed as days expire at midnight on the day of expiration. All samples in this SDG met the specified holding time.

Preparation/Analytical Method Verification

All procedures were performed as stated in the SOP.

Sample Dilutions

The samples in this SDG did not require dilutions.

Sample Re-extraction/Re-analysis

Re-extractions or re-analyses were not required in this SDG.

Miscellaneous Information

Nonconformance (NCR) Documentation

A NCR was not required for this SDG.

Manual Integrations

Certain standards and QC samples required manual integrations to correctly position the baseline as set in the calibration standard injections. Where manual integrations were performed, copies of all manual integration peak profiles are included in the raw data section of this fraction. Manual integrations were required for data files in this SDG.

System Configuration

This analysis was performed on the following instrument configuration:

Instrument ID	Instrument	System Configuration	Column ID	Column Description
HRP763_1	Primary Dioxin Analysis	Dioxin Analysis	DB-5MS	60m x 0.25mm, 0.25um

Electronic Packaging Comment

This data package was generated using an electronic data processing program referred to as virtual packaging. In an effort to increase quality and efficiency, the laboratory has developed systems to generate all data packages electronically. The following change from traditional packages should be noted: Analyst/peer reviewer initials and dates are not present on the electronic data files. Presently, all initials and dates are present on the original raw data. These hard copies are temporarily stored in the laboratory. An electronic signature page inserted after the case narrative will include the data validator's signature and title. The signature page also includes the data qualifiers used in the fractional package. Data that are not generated electronically, such as hand written pages, will be scanned and inserted into the electronic package.

Sample Data Summary

Cape Fear Analytical, LLC

3306 Kitty Hawk Road Suite 120, Wilmington, NC 28405 - (910) 795-0421 - www.capefearanalytical.com

Qualifier Definition Report for

LANL001 Los Alamos National Laboratory

Client SDG: 2018-1615-CF CFA Work Order: 11967

The Qualifiers in this report are defined as follows:

- * A quality control analyte recovery is outside of specified acceptance criteria
- ** Analyte is a surrogate compound
- B The target analyte was detected in the associated blank.
- J Value is estimated
- K Estimated Maximum Possible Concentration
- U Analyte was analyzed for , but not detected above the specified detection limit.
- DL Indicates that sample is diluted.
- RA Indicates that sample is re-analyzed without re-extraction.
- RE Indicates that sample is re-extracted.

Review/Validation

Cape Fear Analytical requires all analytical data to be verified by a qualified data reviewer.

The following data validator verified the information presented in this case narrative:

Signature:



Name: Heather Patterson

Date: 05 MAR 2018

Title: Group Leader

**Hi-Res Dioxins/Furans
Certificate of Analysis
Sample Summary**

Page 1 of 1

SDG Number: 2018-1615-CF
Lab Sample ID: 11967001
Client Sample: 8290 Water
Client ID: CAWA-18-34
Batch ID: 36935
Run Date: 02/14/2018 04:52
Data File: b13feb18a_2-8
Prep Batch: 36931
Prep Date: 12-FEB-18

Client: LANL001
Date Collected: 02/06/2018 12:20
Date Received: 02/08/2018 09:48

Method: SW846 8290A
Analyst: CLP

Prep Method: SW846 3520C
Prep Aliquot: 967.5 mL

Project: LANL00112
Matrix: WATER

Prep Basis: As Received

Instrument: HRP763
Dilution: 1

CAS No.	Parmname	Qual	Result	EMPC	Units	EDL	PQL
1746-01-6	2,3,7,8-TCDD	U	1.03		pg/L	1.03	10.3
40321-76-4	1,2,3,7,8-PeCDD	U	5.17		pg/L	5.17	51.7
39227-28-6	1,2,3,4,7,8-HxCDD	U	5.17		pg/L	5.17	51.7
57653-85-7	1,2,3,6,7,8-HxCDD	U	5.17		pg/L	5.17	51.7
19408-74-3	1,2,3,7,8,9-HxCDD	U	5.17		pg/L	5.17	51.7
35822-46-9	1,2,3,4,6,7,8-HpCDD	U	5.17		pg/L	5.17	51.7
3268-87-9	1,2,3,4,6,7,8,9-OCDD	BJK		15.9	pg/L	10.3	103
51207-31-9	2,3,7,8-TCDF	U	1.03		pg/L	1.03	10.3
57117-41-6	1,2,3,7,8-PeCDF	U	5.17		pg/L	5.17	51.7
57117-31-4	2,3,4,7,8-PeCDF	U	5.17		pg/L	5.17	51.7
70648-26-9	1,2,3,4,7,8-HxCDF	U	5.17		pg/L	5.17	51.7
57117-44-9	1,2,3,6,7,8-HxCDF	U	5.17		pg/L	5.17	51.7
60851-34-5	2,3,4,6,7,8-HxCDF	U	5.17		pg/L	5.17	51.7
72918-21-9	1,2,3,7,8,9-HxCDF	U	5.17		pg/L	5.17	51.7
67562-39-4	1,2,3,4,6,7,8-HpCDF	BJ	5.33		pg/L	5.17	51.7
55673-89-7	1,2,3,4,7,8,9-HpCDF	U	5.17		pg/L	5.17	51.7
39001-02-0	1,2,3,4,6,7,8,9-OCDF	U	10.3		pg/L	10.3	103
41903-57-5	Total TCDDs	U	0		pg/L		
36088-22-9	Total PeCDDs	U	0		pg/L		
34465-46-8	Total HxCDDs	U	0		pg/L		
37871-00-4	Total HpCDDs	U	0		pg/L		
55722-27-5	Total TCDFs	U	0		pg/L		
30402-15-4	Total PeCDFs	U	0		pg/L		
55684-94-1	Total HxCDFs	U	0		pg/L		
38998-75-3	Total HpCDFs	BJ	5.33		pg/L		
3333-30-0	TEQ WHO2005 ND=0		0.0533	0.0581	pg/L		
3333-30-1	TEQ WHO2005 ND=0.5		5.92	5.93	pg/L		

Surrogate/Tracer recovery	Qual	Result	Nominal	Units	Recovery%	Acceptable Limits
13C-2,3,7,8-TCDD		1770	2070	pg/L	85.7	(40%-135%)
13C-1,2,3,7,8-PeCDD		1540	2070	pg/L	74.5	(40%-135%)
13C-1,2,3,6,7,8-HxCDD		1550	2070	pg/L	75.2	(40%-135%)
13C-1,2,3,4,6,7,8-HpCDD		1530	2070	pg/L	74.0	(40%-135%)
13C-OCDD		2440	4130	pg/L	58.9	(40%-135%)
13C-2,3,7,8-TCDF		1770	2070	pg/L	85.8	(40%-135%)
13C-1,2,3,7,8-PeCDF		1790	2070	pg/L	86.6	(40%-135%)
13C-1,2,3,6,7,8-HxCDF		1530	2070	pg/L	73.9	(40%-135%)
13C-1,2,3,4,6,7,8-HpCDF		1420	2070	pg/L	68.6	(40%-135%)

Comments:

- B** The target analyte was detected in the associated blank.
J Value is estimated
K Estimated Maximum Possible Concentration
U Analyte was analyzed for , but not detected above the specified detection limit.

Quality Control Summary

Hi-Res Dioxins/Furans **Surrogate Recovery Report**

SDG Number: 2018-1615-CF

Matrix Type: LIQUID

Sample ID	Client ID	Surrogate	QUAL	Recovery (%)	Acceptance Limits
12020694	LCS for batch 36931	13C-2,3,7,8-TCDD		82.9	(40%-135%)
		13C-1,2,3,7,8-PeCDD		73.8	(40%-135%)
		13C-1,2,3,6,7,8-HxCDD		76.7	(40%-135%)
		13C-1,2,3,4,6,7,8-HpCDD		73.5	(40%-135%)
		13C-OCDD		57.1	(40%-135%)
		13C-2,3,7,8-TCDF		83.3	(40%-135%)
		13C-1,2,3,7,8-PeCDF		84.7	(40%-135%)
		13C-1,2,3,6,7,8-HxCDF		74.9	(40%-135%)
		13C-1,2,3,4,6,7,8-HpCDF		70.0	(40%-135%)
12020695	LCSD for batch 36931	13C-2,3,7,8-TCDD		84.4	(40%-135%)
		13C-1,2,3,7,8-PeCDD		72.1	(40%-135%)
		13C-1,2,3,6,7,8-HxCDD		73.2	(40%-135%)
		13C-1,2,3,4,6,7,8-HpCDD		72.6	(40%-135%)
		13C-OCDD		58.6	(40%-135%)
		13C-2,3,7,8-TCDF		82.6	(40%-135%)
		13C-1,2,3,7,8-PeCDF		84.5	(40%-135%)
		13C-1,2,3,6,7,8-HxCDF		71.3	(40%-135%)
		13C-1,2,3,4,6,7,8-HpCDF		69.1	(40%-135%)
12020693	MB for batch 36931	13C-2,3,7,8-TCDD		84.3	(40%-135%)
		13C-1,2,3,7,8-PeCDD		71.0	(40%-135%)
		13C-1,2,3,6,7,8-HxCDD		72.5	(40%-135%)
		13C-1,2,3,4,6,7,8-HpCDD		74.9	(40%-135%)
		13C-OCDD		60.2	(40%-135%)
		13C-2,3,7,8-TCDF		79.0	(40%-135%)
		13C-1,2,3,7,8-PeCDF		80.0	(40%-135%)
		13C-1,2,3,6,7,8-HxCDF		70.3	(40%-135%)
		13C-1,2,3,4,6,7,8-HpCDF		67.8	(40%-135%)
11967001	CAWA-18-34	13C-2,3,7,8-TCDD		85.7	(40%-135%)
		13C-1,2,3,7,8-PeCDD		74.5	(40%-135%)
		13C-1,2,3,6,7,8-HxCDD		75.2	(40%-135%)
		13C-1,2,3,4,6,7,8-HpCDD		74.0	(40%-135%)
		13C-OCDD		58.9	(40%-135%)
		13C-2,3,7,8-TCDF		85.8	(40%-135%)
		13C-1,2,3,7,8-PeCDF		86.6	(40%-135%)
		13C-1,2,3,6,7,8-HxCDF		73.9	(40%-135%)
		13C-1,2,3,4,6,7,8-HpCDF		68.6	(40%-135%)

* Recovery outside Acceptance Limits

Column to be used to flag recovery values

D Sample Diluted

Hi-Res Dioxins/Furans
Quality Control Summary
Spike Recovery Report

Page 1 of 2

SDG Number: 2018-1615-CF
Client ID: LCS for batch 36931
Lab Sample ID: 12020694
Instrument: HRP763
Analyst: CLP

Sample Type: Laboratory Control Sample
Matrix: WATER
Analysis Date: 02/13/2018 23:13
Dilution: 1
Prep Batch ID: 36931
Batch ID: 36935

CAS No.	Parmname	Amount Added pg/L	Spike Conc. pg/L	Recovery %	Acceptance Limits
1746-01-6	LCS 2,3,7,8-TCDD	200	201	100	70-130
40321-76-4	LCS 1,2,3,7,8-PeCDD	1000	1100	110	70-130
39227-28-6	LCS 1,2,3,4,7,8-HxCDD	1000	1030	103	70-130
57653-85-7	LCS 1,2,3,6,7,8-HxCDD	1000	1140	114	70-130
19408-74-3	LCS 1,2,3,7,8,9-HxCDD	1000	1130	113	70-130
35822-46-9	LCS 1,2,3,4,6,7,8-HpCDD	1000	894	89.4	70-130
3268-87-9	LCS 1,2,3,4,6,7,8,9-OCDD	2000	2050	102	70-130
51207-31-9	LCS 2,3,7,8-TCDF	200	180	90.2	70-130
57117-41-6	LCS 1,2,3,7,8-PeCDF	1000	955	95.5	70-130
57117-31-4	LCS 2,3,4,7,8-PeCDF	1000	882	88.2	70-130
70648-26-9	LCS 1,2,3,4,7,8-HxCDF	1000	1060	106	70-130
57117-44-9	LCS 1,2,3,6,7,8-HxCDF	1000	1070	107	70-130
60851-34-5	LCS 2,3,4,6,7,8-HxCDF	1000	1070	107	70-130
72918-21-9	LCS 1,2,3,7,8,9-HxCDF	1000	1050	105	70-130
67562-39-4	LCS 1,2,3,4,6,7,8-HpCDF	1000	998	99.8	70-130
55673-89-7	LCS 1,2,3,4,7,8,9-HpCDF	1000	918	91.8	70-130
39001-02-0	LCS 1,2,3,4,6,7,8,9-OCDF	2000	1930	96.6	70-130

Hi-Res Dioxins/Furans
Quality Control Summary
Spike Recovery Report

Page 2 of 2

SDG Number: 2018-1615-CF

Sample Type: Laboratory Control Sample Duplicate

Client ID: LCSD for batch 36931

Matrix: WATER

Lab Sample ID: 12020695

Instrument: HRP763

Analysis Date: 02/14/2018 00:01

Dilution: 1

Analyst: CLP

Prep Batch ID: 36931

Batch ID: 36935

CAS No.	Parmname	Amount Added pg/L	Spike Conc. pg/L	Recovery %	Acceptance Limits	RPD %	Acceptance Limits
1746-01-6	LCSD 2,3,7,8-TCDD	200	199	99.3	70-130	1.00	0-20
40321-76-4	LCSD 1,2,3,7,8-PeCDD	1000	1090	109	70-130	0.126	0-20
39227-28-6	LCSD 1,2,3,4,7,8-HxCDD	1000	1100	110	70-130	6.56	0-20
57653-85-7	LCSD 1,2,3,6,7,8-HxCDD	1000	1090	109	70-130	3.83	0-20
19408-74-3	LCSD 1,2,3,7,8,9-HxCDD	1000	1160	116	70-130	2.91	0-20
35822-46-9	LCSD 1,2,3,4,6,7,8-HpCDD	1000	906	90.6	70-130	1.33	0-20
3268-87-9	LCSD 1,2,3,4,6,7,8,9-OCDD	2000	2090	104	70-130	1.93	0-20
51207-31-9	LCSD 2,3,7,8-TCDF	200	176	88.1	70-130	2.40	0-20
57117-41-6	LCSD 1,2,3,7,8-PeCDF	1000	913	91.3	70-130	4.42	0-20
57117-31-4	LCSD 2,3,4,7,8-PeCDF	1000	860	86	70-130	2.52	0-20
70648-26-9	LCSD 1,2,3,4,7,8-HxCDF	1000	1070	107	70-130	0.606	0-20
57117-44-9	LCSD 1,2,3,6,7,8-HxCDF	1000	1080	108	70-130	0.409	0-20
60851-34-5	LCSD 2,3,4,6,7,8-HxCDF	1000	1110	111	70-130	3.91	0-20
72918-21-9	LCSD 1,2,3,7,8,9-HxCDF	1000	1080	108	70-130	2.80	0-20
67562-39-4	LCSD 1,2,3,4,6,7,8-HpCDF	1000	979	97.9	70-130	1.90	0-20
55673-89-7	LCSD 1,2,3,4,7,8,9-HpCDF	1000	923	92.3	70-130	0.543	0-20
39001-02-0	LCSD 1,2,3,4,6,7,8,9-OCDF	2000	1980	99.2	70-130	2.63	0-20

Method Blank Summary

Page 1 of 1

SDG Number: 2018-1615-CF
Client ID: MB for batch 36931
Lab Sample ID: 12020693
Column:

Client: LANL001
Instrument ID: HRP763
Prep Date: 12-FEB-18

Matrix: WATER
Data File: b13feb18a_2-3
Analyzed: 02/14/18 00:50

This method blank applies to the following samples and quality control samples:

Client Sample ID	Lab Sample ID	File ID	Date Analyzed	Time Analyzed
01 LCS for batch 36931	12020694	b13feb18a_2-1	02/13/18	2313
02 LCSD for batch 36931	12020695	b13feb18a_2-2	02/14/18	0001
03 CAWA-18-34	11967001	b13feb18a_2-8	02/14/18	0452

**Hi-Res Dioxins/Furans
Certificate of Analysis
Sample Summary**

Page 1 of 1

SDG Number: 2018-1615-CF
Lab Sample ID: 12020693
Client Sample: QC for batch 36931
Client ID: MB for batch 36931
Batch ID: 36935
Run Date: 02/14/2018 00:50
Data File: b13feb18a_2-3
Prep Batch: 36931
Prep Date: 12-FEB-18

Client: LANL001

Method: SW846 8290A
Analyst: CLP

Prep Method: SW846 3520C
Prep Aliquot: 1000 mL

Project: LANL00112
Matrix: WATER

Prep Basis: As Received

Instrument: HRP763
Dilution: 1

CAS No.	Parmname	Qual	Result	EMPC	Units	EDL	PQL
1746-01-6	2,3,7,8-TCDD	U	1		pg/L	1.00	10.0
40321-76-4	1,2,3,7,8-PeCDD	U	5		pg/L	5.00	50.0
39227-28-6	1,2,3,4,7,8-HxCDD	U	5		pg/L	5.00	50.0
57653-85-7	1,2,3,6,7,8-HxCDD	U	5		pg/L	5.00	50.0
19408-74-3	1,2,3,7,8,9-HxCDD	U	5		pg/L	5.00	50.0
35822-46-9	1,2,3,4,6,7,8-HpCDD	U	5		pg/L	5.00	50.0
3268-87-9	1,2,3,4,6,7,8,9-OCDD	J	23.5		pg/L	10.0	100
51207-31-9	2,3,7,8-TCDF	U	1		pg/L	1.00	10.0
57117-41-6	1,2,3,7,8-PeCDF	U	5		pg/L	5.00	50.0
57117-31-4	2,3,4,7,8-PeCDF	U	5		pg/L	5.00	50.0
70648-26-9	1,2,3,4,7,8-HxCDF	U	5		pg/L	5.00	50.0
57117-44-9	1,2,3,6,7,8-HxCDF	U	5		pg/L	5.00	50.0
60851-34-5	2,3,4,6,7,8-HxCDF	U	5		pg/L	5.00	50.0
72918-21-9	1,2,3,7,8,9-HxCDF	U	5		pg/L	5.00	50.0
67562-39-4	1,2,3,4,6,7,8-HpCDF	J	11.1		pg/L	5.00	50.0
55673-89-7	1,2,3,4,7,8,9-HpCDF	U	5		pg/L	5.00	50.0
39001-02-0	1,2,3,4,6,7,8,9-OCDF	U	10		pg/L	10.0	100
41903-57-5	Total TCDDs	U	0		pg/L		
36088-22-9	Total PeCDDs	U	0		pg/L		
34465-46-8	Total HxCDDs	U	0		pg/L		
37871-00-4	Total HpCDDs	U	0		pg/L		
55722-27-5	Total TCDFs	U	0		pg/L		
30402-15-4	Total PeCDFs	U	0		pg/L		
55684-94-1	Total HxCDFs	U	0		pg/L		
38998-75-3	Total HpCDFs	J	17.2		pg/L		
3333-30-0	TEQ WHO2005 ND=0		0.118	0.118	pg/L		
3333-30-1	TEQ WHO2005 ND=0.5		5.79	5.79	pg/L		

Surrogate/Tracer recovery	Qual	Result	Nominal	Units	Recovery%	Acceptable Limits
13C-2,3,7,8-TCDD		1690	2000	pg/L	84.3	(40%-135%)
13C-1,2,3,7,8-PeCDD		1420	2000	pg/L	71.0	(40%-135%)
13C-1,2,3,6,7,8-HxCDD		1450	2000	pg/L	72.5	(40%-135%)
13C-1,2,3,4,6,7,8-HpCDD		1500	2000	pg/L	74.9	(40%-135%)
13C-OCDD		2410	4000	pg/L	60.2	(40%-135%)
13C-2,3,7,8-TCDF		1580	2000	pg/L	79.0	(40%-135%)
13C-1,2,3,7,8-PeCDF		1600	2000	pg/L	80.0	(40%-135%)
13C-1,2,3,6,7,8-HxCDF		1410	2000	pg/L	70.3	(40%-135%)
13C-1,2,3,4,6,7,8-HpCDF		1360	2000	pg/L	67.8	(40%-135%)

Comments:**J** Value is estimated**K** Estimated Maximum Possible Concentration**U** Analyte was analyzed for , but not detected above the specified detection limit.

**Hi-Res Dioxins/Furans
Certificate of Analysis
Sample Summary**

Page 1 of 1

SDG Number: 2018-1615-CF
Lab Sample ID: 12020694
Client Sample: QC for batch 36931
Client ID: LCS for batch 36931
Batch ID: 36935
Run Date: 02/13/2018 23:13
Data File: b13feb18a_2-1
Prep Batch: 36931
Prep Date: 12-FEB-18

Client: LANL001

Method: SW846 8290A
Analyst: CLP

Prep Method: SW846 3520C
Prep Aliquot: 1000 mL

Project: LANL00112
Matrix: WATER

Prep Basis: As Received

Instrument: HRP763
Dilution: 1

CAS No.	Parmname	Qual	Result	EMPC	Units	EDL	PQL
1746-01-6	2,3,7,8-TCDD		201		pg/L	1.00	10.0
40321-76-4	1,2,3,7,8-PeCDD		1100		pg/L	5.00	50.0
39227-28-6	1,2,3,4,7,8-HxCDD		1030		pg/L	5.00	50.0
57653-85-7	1,2,3,6,7,8-HxCDD		1140		pg/L	5.00	50.0
19408-74-3	1,2,3,7,8,9-HxCDD		1130		pg/L	5.00	50.0
35822-46-9	1,2,3,4,6,7,8-HpCDD		894		pg/L	5.00	50.0
3268-87-9	1,2,3,4,6,7,8,9-OCDD		2050		pg/L	10.0	100
51207-31-9	2,3,7,8-TCDF		180		pg/L	1.00	10.0
57117-41-6	1,2,3,7,8-PeCDF		955		pg/L	5.00	50.0
57117-31-4	2,3,4,7,8-PeCDF		882		pg/L	5.00	50.0
70648-26-9	1,2,3,4,7,8-HxCDF		1060		pg/L	5.00	50.0
57117-44-9	1,2,3,6,7,8-HxCDF		1070		pg/L	5.00	50.0
60851-34-5	2,3,4,6,7,8-HxCDF		1070		pg/L	5.00	50.0
72918-21-9	1,2,3,7,8,9-HxCDF		1050		pg/L	5.00	50.0
67562-39-4	1,2,3,4,6,7,8-HpCDF		998		pg/L	5.00	50.0
55673-89-7	1,2,3,4,7,8,9-HpCDF		918		pg/L	5.00	50.0
39001-02-0	1,2,3,4,6,7,8,9-OCDF		1930		pg/L	10.0	100

Surrogate/Tracer recovery	Qual	Result	Nominal	Units	Recovery%	Acceptable Limits
13C-2,3,7,8-TCDD		1660	2000	pg/L	82.9	(40%-135%)
13C-1,2,3,7,8-PeCDD		1480	2000	pg/L	73.8	(40%-135%)
13C-1,2,3,6,7,8-HxCDD		1530	2000	pg/L	76.7	(40%-135%)
13C-1,2,3,4,6,7,8-HpCDD		1470	2000	pg/L	73.5	(40%-135%)
13C-OCDD		2280	4000	pg/L	57.1	(40%-135%)
13C-2,3,7,8-TCDF		1670	2000	pg/L	83.3	(40%-135%)
13C-1,2,3,7,8-PeCDF		1690	2000	pg/L	84.7	(40%-135%)
13C-1,2,3,6,7,8-HxCDF		1500	2000	pg/L	74.9	(40%-135%)
13C-1,2,3,4,6,7,8-HpCDF		1400	2000	pg/L	70.0	(40%-135%)

Comments:

U Analyte was analyzed for , but not detected above the specified detection limit.

**Hi-Res Dioxins/Furans
Certificate of Analysis
Sample Summary**

Page 1 of 1

SDG Number: 2018-1615-CF
Lab Sample ID: 12020695
Client Sample: QC for batch 36931
Client ID: LCSD for batch 36931
Batch ID: 36935
Run Date: 02/14/2018 00:01
Data File: b13feb18a_2-2
Prep Batch: 36931
Prep Date: 12-FEB-18

Client: LANL001

Method: SW846 8290A
Analyst: CLP

Prep Method: SW846 3520C
Prep Aliquot: 1000 mL

Project: LANL00112
Matrix: WATER

Prep Basis: As Received

Instrument: HRP763
Dilution: 1

CAS No.	Parmname	Qual	Result	EMPC	Units	EDL	PQL
1746-01-6	2,3,7,8-TCDD		199		pg/L	1.00	10.0
40321-76-4	1,2,3,7,8-PeCDD		1090		pg/L	5.00	50.0
39227-28-6	1,2,3,4,7,8-HxCDD		1100		pg/L	5.00	50.0
57653-85-7	1,2,3,6,7,8-HxCDD		1090		pg/L	5.00	50.0
19408-74-3	1,2,3,7,8,9-HxCDD		1160		pg/L	5.00	50.0
35822-46-9	1,2,3,4,6,7,8-HpCDD		906		pg/L	5.00	50.0
3268-87-9	1,2,3,4,6,7,8,9-OCDD		2090		pg/L	10.0	100
51207-31-9	2,3,7,8-TCDF		176		pg/L	1.03	10.0
57117-41-6	1,2,3,7,8-PeCDF		913		pg/L	5.00	50.0
57117-31-4	2,3,4,7,8-PeCDF		860		pg/L	5.00	50.0
70648-26-9	1,2,3,4,7,8-HxCDF		1070		pg/L	5.00	50.0
57117-44-9	1,2,3,6,7,8-HxCDF		1080		pg/L	5.00	50.0
60851-34-5	2,3,4,6,7,8-HxCDF		1110		pg/L	5.00	50.0
72918-21-9	1,2,3,7,8,9-HxCDF		1080		pg/L	5.00	50.0
67562-39-4	1,2,3,4,6,7,8-HpCDF		979		pg/L	5.00	50.0
55673-89-7	1,2,3,4,7,8,9-HpCDF		923		pg/L	5.00	50.0
39001-02-0	1,2,3,4,6,7,8,9-OCDF		1980		pg/L	10.0	100

Surrogate/Tracer recovery	Qual	Result	Nominal	Units	Recovery%	Acceptable Limits
13C-2,3,7,8-TCDD		1690	2000	pg/L	84.4	(40%-135%)
13C-1,2,3,7,8-PeCDD		1440	2000	pg/L	72.1	(40%-135%)
13C-1,2,3,6,7,8-HxCDD		1460	2000	pg/L	73.2	(40%-135%)
13C-1,2,3,4,6,7,8-HpCDD		1450	2000	pg/L	72.6	(40%-135%)
13C-OCDD		2340	4000	pg/L	58.6	(40%-135%)
13C-2,3,7,8-TCDF		1650	2000	pg/L	82.6	(40%-135%)
13C-1,2,3,7,8-PeCDF		1690	2000	pg/L	84.5	(40%-135%)
13C-1,2,3,6,7,8-HxCDF		1430	2000	pg/L	71.3	(40%-135%)
13C-1,2,3,4,6,7,8-HpCDF		1380	2000	pg/L	69.1	(40%-135%)

Comments:

U Analyte was analyzed for , but not detected above the specified detection limit.