LABORATORY DATA CONSULTANTS, INC.
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AECOM
1001 Bishop Street Suite 1600
Honolulu, HI 96813
ATTN: Ms. Alethea Ramos
alethea.ramos@aecom.com

May 12, 2021

SUBJECT: Red Hill Bulk Storage Facility, CTO 18F0126, Data Validation

Dear Ms. Ramos,

Enclosed are the final validation reports for the fractions listed below. This SDG was received on April 21, 2021. Attachment 1 is a summary of the samples that were reviewed for each analysis.

LDC Project #50747B:

SDG #	Fraction
95603/1C31030/B21032068	Volatiles, Semivolatiles, Lead, Dissolved Organic Carbon, Total Petroleum Hydrocarbons as Extractables

The data validation was performed under Stage 2B validation guidelines. The analyses were validated using the following documents and variances, as applicable to each method:

- Work Plan/Scope of Work, Investigation and Remediation of Releases and Groundwater Protection and Evaluation, Red Hill Bulk Fuel Storage Facility, Joint Base Pearl Harbor-Hickam, O'ahu, Hawai'i; Revision 02, January 2017
- Sampling and Analysis Plan, Investigation and Remediation of Releases and Groundwater Protection and Evaluation, Red Hill Bulk Fuel Storage Facility, Joint Base Pearl Harbor-Hickam, O'ahu, Hawai'i; Revision 01, April 2017
- Sampling and Analysis Plan, Addendum 01, Investigation and Remediation of Releases and Groundwater Protection and Evaluation, Red Hill Bulk Fuel Storage Facility, Joint Base Pearl Harbor-Hickam, O'ahu, Hawai'i; Revision 00, September 2017
- Sampling and Analysis Plan, Addendum 03, Investigation and Remediation of Releases and Groundwater Protection and Evaluation, Red Hill Bulk Fuel Storage Facility, Joint Base Pearl Harbor-Hickam, O'ahu, Hawai'i; Revision 00, June 2018
- U.S. Department of Defense Quality Systems Manual for Environmental Laboratories, Version 5.3; 2019
- DoD General Validation Guidelines; November 2019
- U.S. Department of Defense Data Validation Guidelines Module 1: Data Validation Procedure for Organic Analysis by GCMS; May 2020
- U.S. Department of Defense Data Validation Guidelines Module 2: Data Validation Procedure for Metals by ICP-OES; May 2020
- U.S. Department of Defense Data Validation Guidelines Module 4: Data Validation Procedure for Organic Analysis by GC; March 2021
- EPA SW 846, Third Edition, Test Methods for Evaluating Solid Waste, update 1, July 1992; update IIA, August 1993; update II, September 1994; update IIB, January 1995; update III, December 1996; update IIIA, April 1998; IIIB, November 2004; update IV, February 2007; update V, July 2014

Please feel free to contact us if you have any questions.

Sincerely,

Stella Cuenco
scuenco@lab-data.com
Operations Manager/Senior Chemist

305 pages-DL/EM R3 (added B2 & B8) Attachment 1

90/10 2B/4 EDD

LDC #50747 (AECOM-Honolulu, HI / Red Hill Bulk Storage Facility, CTO 18F0126)

LDC	SDG#	DATE REC'D	(2) DATE DUE	VOA (524.2)		SVOA (525.2)		Pb (200.8)		TPH-E (8015B)		DOC (9060A)																					
Matrix:	Water/Soil			W	S	W	S	W	S	W	S	W	S	-	-	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S
B	95603	04/21/21	05/05/21	3	0	3	0	2	0	2	0	2	0																				
Total	T/J/SC			3	0	3	0	2	0	2	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	12

Shaded cells indicate Stage 4 validation (all other cells are Stage 2B/4 validation). These sample counts do not include MS/MSD, and DUPs L:\AECOM\Red Hill\50747ST_B_only_18F0126.wpd

Laboratory Data Consultants, Inc.
Data Validation Report

Project/Site Name: Red Hill Bulk Storage Facility, CTO 18F0126

LDC Report Date: May 5, 2021

Parameters: Volatiles

Validation Level: Stage 2B

Laboratory: APPL, Inc.

Sample Delivery Group (SDG): 95603

Sample Identification	Laboratory Sample Identification	Matrix	Collection Date
ERH1293	BA29551	Water	03/24/21
ERH1294	BA29552	Water	03/24/21
ERH1295	BA29553	Water	03/24/21

Introduction

This Data Validation Report (DVR) presents data validation findings and results for the associated samples listed on the cover page. Data validation was performed in accordance with the Work Plan/Scope of Work, Investigation and Remediation of Releases and Groundwater Protection and Evaluation, Red Hill Bulk Fuel Storage Facility, Joint Base Pearl Harbor-Hickam, O'ahu, Hawai'i (Revision 02, January 2017), the Sampling and Analysis Plan, Investigation and Remediation of Releases and Groundwater Protection and Evaluation, Red Hill Bulk Fuel Storage Facility, Joint Base Pearl Harbor-Hickam, O'ahu, Hawai'i (Revision 01, April 2017), the Sampling and Analysis Plan, Addendum 01, Investigation and Remediation of Releases and Groundwater Protection and Evaluation, Red Hill Bulk Fuel Storage Facility, Joint Base Pearl Harbor-Hickam, O'ahu, Hawai'i (Revision 00, September 2017), the Sampling and Analysis Plan, Addendum 03, Investigation and Remediation of Releases and Groundwater Protection and Evaluation, Red Hill Bulk Fuel Storage Facility, Joint Base Pearl Harbor-Hickam, O'ahu, Hawai'i (Revision 00, June 2018), the U.S. Department of Defense (DoD) Quality Systems Manual (QSM) for Environmental Laboratories, Version 5.3 (2019), the DoD General Validation Guidelines (November 2019), and the U.S. Department of Defense (DoD) Data Validation Guidelines Module 1: Data Validation Procedure for Organic Analysis by GC/MS (May 2020). Where specific guidance was not available, the data has been evaluated in a conservative manner consistent with industry standards using professional experience.

The analyses were performed by the following method:

Volatile Organic Compounds (VOCs) by Environmental Protection Agency (EPA) Method 524.2

All sample results were subjected to Stage 2B data validation, which comprises an evaluation of quality control (QC) summary results.

The following are definitions of the data qualifiers utilized during data validation:

J+ (Estimated, High Bias): The compound or analyte was analyzed for and positively identified by the laboratory; however the reported concentration is estimated, displaying high bias, due to non-conformances discovered during data validation.

J- (Estimated, Low Bias): The compound or analyte was analyzed for and positively identified by the laboratory; however the reported concentration is estimated, displaying low bias, due to non-conformances discovered during data validation.

J (Estimated, Bias Indeterminate): The compound or analyte was analyzed for and positively identified by the laboratory; however the reported concentration is estimated due to non-conformances discovered during data validation. Bias is indeterminate.

U (Non-detected): The compound or analyte was analyzed for and positively identified by the laboratory; however the compound or analyte should be considered non-detected due to the presence of contaminants detected in the associated blank(s).

UJ (Non-detected estimated): The analyte was not detected and the associated numerical value is approximate.

X (Exclusion of data recommended): The sample results (including non-detects) were affected by serious deficiencies in the ability to analyze the sample and to meet published method and project quality control criteria. The presence or absence of the analyte cannot be substantiated by the data provided. Exclusion of the data is recommended.

NA (Not Applicable): The non-conformance discovered during data validation demonstrates a high bias, while the affected compound or analyte in the associated sample(s) was reported as not detected by the laboratory and did not warrant the qualification of the data.

A qualification summary table is provided at the end of this report if data has been qualified. Flags are classified as P (protocol) or A (advisory) to indicate whether the flag is due to a laboratory deviation from a specified protocol or is of technical advisory nature.

The following are definitions of the data qualifiers utilized during data validation:

J+ (Estimated, High Bias): The analyte was analyzed for and positively identified by the laboratory; however the reported concentration is estimated, displaying high bias, due to non-conformances discovered during data validation.

J- (Estimated, Low Bias): The analyte was analyzed for and positively identified by the laboratory; however the reported concentration is estimated, displaying low bias, due to non-conformances discovered during data validation.

J (Estimated, Bias Indeterminate): The analyte was analyzed for and positively identified by the laboratory; however the reported concentration is estimated due to non-conformances discovered during data validation. Bias is indeterminate.

U (Non-detected): The analyte was analyzed for and positively identified by the laboratory; however the analyte should be considered non-detected due to the presence of contaminants detected in the associated blank(s).

UJ (Non-detected estimated): The analyte was not detected and the associated numerical value is approximate.

X (Exclusion of data recommended): The sample results (including non-detects) were affected by serious deficiencies in the ability to analyze the sample and to meet published method and project quality control criteria. The presence or absence of the analyte cannot be substantiated by the data provided. Exclusion of the data is recommended.

NA (Not Applicable): The non-conformance discovered during data validation demonstrates a high bias, while the affected analyte in the associated sample(s) was reported as not detected by the laboratory and did not warrant the qualification of the data.

A qualification summary table is provided at the end of this report if data has been qualified. Flags are classified as P (protocol) or A (advisory) to indicate whether the flag is due to a laboratory deviation from a specified protocol or is of technical advisory nature.

Qualification Code Reference

a ICP Serial Dilution %D was not within control limits.

b Presumed contamination from preparation (method blank).

c Calibration %RSD, r, r^2, %D or %R was noncompliant.

d The analysis with this flag should not be used because another more technically sound analysis is available.

e MS/MSD or Duplicate RPD was high.

f Presumed contamination from FB or ER.

g ICP ICS results were unsatisfactory.

h Holding times were exceeded.

i Internal standard performance was unsatisfactory.

k Estimated Maximum Possible Concentration (HRGC/HRMS only)

l LCS/LCSD %R was not within control limits.

m Result exceeded the calibration range.

o Cooler temperature or temperature blank was noncompliant and/or sample custody problems.

p RPD between two columns was high (GC only).

q MS/MSD recovery was not within control limits.

s Surrogate recovery was not within control limits.

t Presumed contamination from trip blank.

v Unusual problems found with the data not defined elsewhere. Description of the problem can be found in the validation report.

w LCS/LCSD RPD was high.

y Chemical recovery was not within control limits (Radiochemistry only).

VI. Field Blanks

Sample ERH1293 was identified as a trip blank. No contaminants were found with the following exceptions:

Blank ID	Collection Date	Analyte	Concentration	Associated Samples
ERH1293	03/24/21	Methylene chloride	3.0 ug/L	ERH1294 ERH1295

Sample concentrations were compared to concentrations detected in the field blanks. The sample concentrations were either not detected or were significantly greater (>10X for common contaminants, >5X for other contaminants) than the concentrations found in the associated field blanks.

VII. Surrogates

Surrogates were added to all samples as required by the method. All surrogate recoveries (%R) were within QC limits.

VIII. Matrix Spike/Matrix Spike Duplicates

The laboratory has indicated that there were no matrix spike (MS) and matrix spike duplicate (MSD) analyses specified for the samples in this SDG, and therefore matrix spike and matrix spike duplicate analyses were not performed for this SDG.

IX. Laboratory Control Samples

Laboratory control samples (LCS) and laboratory control samples duplicates (LCSD) were analyzed as required by the method. Percent recoveries (%R) were within QC limits. Relative percent differences (RPD) were within QC limits.

X. Field Duplicates

No field duplicates were identified in this SDG.

XI. Internal Standards

All internal standard areas and retention times were within QC limits.

XII. Target Analyte Quantitation

Raw data were not reviewed for Stage 2B validation.

XIII. Target Analyte Identification

Raw data were not reviewed for Stage 2B validation.

XIV. System Performance

Raw data were not reviewed for Stage 2B validation.

XV. Overall Assessment of Data

The analysis was conducted within all specifications of the method. No results were rejected in this SDG.

Red Hill Bulk Storage Facility, CTO 18F0126
Volatiles - Data Qualification Summary - SDG 95603

No Sample Data Qualified in this SDG

Red Hill Bulk Storage Facility, CTO 18F0126
Volatiles - Laboratory Blank Data Qualification Summary - SDG 95603

No Sample Data Qualified in this SDG

Red Hill Bulk Storage Facility, CTO 18F0126
Volatiles - Field Blank Data Qualification Summary - SDG 95603

No Sample Data Qualified in this SDG

LDC #: 50747B1a
SDG #: 95603
Laboratory: APPL, Inc.

VALIDATION COMPLETENESS WORKSHEET
Stage 2B

Date: 05/03/21
Page: 1 of 1
Reviewer: LC
2nd Reviewer: AL

METHOD: GC/MS Volatiles (EPA Method 524.2)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I.	Sample receipt/Technical holding times	A / A	
II.	GC/MS Instrument performance check	SW	Ending CCV analyzed past 12-hr criteria. (16.88 hrs)
III.	Initial calibration/ICV	A / A	RSD≤20%. r^2 ICV≤30%.
IV.	Continuing calibration Ending	A	CCV≤30%/50%.
V.	Laboratory Blanks	A	
VI.	Field blanks	SW	TB=1
VII.	Surrogate spikes	A	
VIII.	Matrix spike/Matrix spike duplicates	N	
IX.	Laboratory control samples	A	LCS1D
X.	Field duplicates	N	
XI.	Internal standards	A	
XII.	Target analyte quantitation	N	
XIII.	Target analyte identification	N	
XIV.	System performance	N	
XV.	Overall assessment of data	A	

Note: A = Acceptable; N = Not provided/applicable; SW = See worksheet; ND = No compounds detected; R = Rinsate; FB = Field blank; D = Duplicate; TB = Trip blank; EB = Equipment blank; SB=Source blank; OTHER:

	Client ID	Lab ID	Matrix	Date
1	ERH1293 TB	BA29551	Water	03/24/21
2	ERH1294	BA29552	Water	03/24/21
3	ERH1295	BA29553	Water	03/24/21
4				
5				
6				
7				
8				
9				

Notes:

1	210329 Am-B UC						

LDC #: 50747B1a

VALIDATION FINDINGS WORKSHEET
Field Blanks

Reviewer: LT

METHOD: GC/MS VOA (EPA SW 846 Method 8260B)

Yes x No__ N/A__ Were field blanks identified in this SDG?

Yes x No__ N/A__ Were target compounds detected in the field blanks?

Blank units: ug/L **Associated sample units:** ug/L

Sampling date: 03/24/21

Field blank type: (circle one) Field Blank / Rinsate / Trip Blank / Other: TB Associated Samples: 2,3 (ND) (t)

Compound	Blank ID	Sample Identification								
	1									
Methylene chloride	3.0									

Blank units: ug/L **Associated sample units:** ug/L

Sampling date:

Field blank type: (circle one) Field Blank / Rinsate / Trip Blank / Other: Associated Samples:

Compound	Blank ID	Sample Identification									

CIRCLED RESULTS WERE NOT QUALIFIED. ALL RESULTS NOT CIRCLED WERE QUALIFIED BY THE FOLLOWING STATEMENT:
Common contaminants such as Methylene chloride, Acetone, 2-Butanone and Carbon disulfide that were detected in samples within ten times the associated field blank concentration were qualified as not detected, "U". Other contaminants within five times the field blank concentration were also qualified as not detected, "U".

Laboratory Data Consultants, Inc.
Data Validation Report

Project/Site Name: Red Hill Bulk Storage Facility, CTO 18F0126

LDC Report Date: May 11, 2021

Parameters: Semivolatiles

Validation Level: Stage 2B

Laboratory: APPL, Inc./Weck Laboratories, Inc.

Sample Delivery Group (SDG): 95603/1C31030

Sample Identification	Laboratory Sample Identification	Matrix	Collection Date
ERH1294	BA29552/1C31030-01	Water	03/24/21
ERH1295	BA29553/1C31030-02	Water	03/24/21
ERH1296	BA29554/1C31030-03	Water	03/24/21

Introduction

This Data Validation Report (DVR) presents data validation findings and results for the associated samples listed on the cover page. Data validation was performed in accordance with the Work Plan/Scope of Work, Investigation and Remediation of Releases and Groundwater Protection and Evaluation, Red Hill Bulk Fuel Storage Facility, Joint Base Pearl Harbor-Hickam, O'ahu, Hawai'i (Revision 02, January 2017), the Sampling and Analysis Plan, Investigation and Remediation of Releases and Groundwater Protection and Evaluation, Red Hill Bulk Fuel Storage Facility, Joint Base Pearl Harbor-Hickam, O'ahu, Hawai'i (Revision 01, April 2017), the Sampling and Analysis Plan, Addendum 01, Investigation and Remediation of Releases and Groundwater Protection and Evaluation, Red Hill Bulk Fuel Storage Facility, Joint Base Pearl Harbor-Hickam, O'ahu, Hawai'i (Revision 00, September 2017), the Sampling and Analysis Plan, Addendum 03, Investigation and Remediation of Releases and Groundwater Protection and Evaluation, Red Hill Bulk Fuel Storage Facility, Joint Base Pearl Harbor-Hickam, O'ahu, Hawai'i (Revision 00, June 2018), the U.S. Department of Defense (DoD) Quality Systems Manual (QSM) for Environmental Laboratories, Version 5.3 (2019), the DoD General Validation Guidelines (November 2019), and the U.S. Department of Defense (DoD) Data Validation Guidelines Module 1: Data Validation Procedure for Organic Analysis by GC/MS (May 2020). Where specific guidance was not available, the data has been evaluated in a conservative manner consistent with industry standards using professional experience.

The analyses were performed by the following method:

Semivolatile Organic Compounds (SVOCs) by Environmental Protection Agency (EPA) Method 525.2

All sample results were subjected to Stage 2B data validation, which comprises an evaluation of quality control (QC) summary results.

The following are definitions of the data qualifiers utilized during data validation:

J+ (Estimated, High Bias): The analyte was analyzed for and positively identified by the laboratory; however the reported concentration is estimated, displaying high bias, due to non-conformances discovered during data validation.

J- (Estimated, Low Bias): The analyte was analyzed for and positively identified by the laboratory; however the reported concentration is estimated, displaying low bias, due to non-conformances discovered during data validation.

J (Estimated, Bias Indeterminate): The analyte was analyzed for and positively identified by the laboratory; however the reported concentration is estimated due to non-conformances discovered during data validation. Bias is indeterminate.

U (Non-detected): The analyte was analyzed for and positively identified by the laboratory; however the analyte should be considered non-detected due to the presence of contaminants detected in the associated blank(s).

UJ (Non-detected estimated): The analyte was not detected and the associated numerical value is approximate.

X (Exclusion of data recommended): The sample results (including non-detects) were affected by serious deficiencies in the ability to analyze the sample and to meet published method and project quality control criteria. The presence or absence of the analyte cannot be substantiated by the data provided. Exclusion of the data is recommended.

NA (Not Applicable): The non-conformance discovered during data validation demonstrates a high bias, while the affected analyte in the associated sample(s) was reported as not detected by the laboratory and did not warrant the qualification of the data.

A qualification summary table is provided at the end of this report if data has been qualified. Flags are classified as P (protocol) or A (advisory) to indicate whether the flag is due to a laboratory deviation from a specified protocol or is of technical advisory nature.

Qualification Code Reference

a ICP Serial Dilution %D was not within control limits.

b Presumed contamination from preparation (method blank).

c Calibration %RSD, r, r^2, %D or %R was noncompliant.

d The analysis with this flag should not be used because another more technically sound analysis is available.

e MS/MSD or Duplicate RPD was high.

f Presumed contamination from FB or ER.

g ICP ICS results were unsatisfactory.

h Holding times were exceeded.

i Internal standard performance was unsatisfactory.

k Estimated Maximum Possible Concentration (HRGC/HRMS only)

l LCS/LCSD %R was not within control limits.

m Result exceeded the calibration range.

o Cooler temperature or temperature blank was noncompliant and/or sample custody problems.

p RPD between two columns was high (GC only).

q MS/MSD recovery was not within control limits.

s Surrogate recovery was not within control limits.

t Presumed contamination from trip blank.

v Unusual problems found with the data not defined elsewhere. Description of the problem can be found in the validation report.

w LCS/LCSD RPD was high.

y Chemical recovery was not within control limits (Radiochemistry only).

I. Sample Receipt and Technical Holding Times

All samples were received in good condition and cooler temperatures upon receipt met validation criteria.

All technical holding time requirements were met with the following exceptions:

Sample	Analyte	Total Days From Sample Collection Until Extraction	Required Holding Time (in Days) From Sample Collection Until Extraction	Flag	A or P
ERH1294 ERH1295 ERH1296	All analytes	8	7	UJ (all non-detects)	P

II. GC/MS Instrument Performance Check

A decafluorotriphenylphosphine (DFTPP) tune was performed at 12 hour intervals.

All ion abundance requirements were met.

III. Initial Calibration and Initial Calibration Verification

An initial calibration was performed as required by the method.

The percent relative standard deviations (%RSD) were less than or equal to 30.0% for all analytes.

Average relative response factors (RRF) for all analytes were within validation criteria.

The percent differences (%D) of the initial calibration verification (ICV) standard were less than or equal to 30.0% for all analytes with the following exceptions:

Date	Analyte	%D	Associated Samples	Flag	A or P
03/13/21	2,6-Dinitrotoluene	40.27	ERH1294 ERH1295 ERH1296	UJ (all non-detects)	A

IV. Continuing Calibration

Continuing calibration was performed at the required frequencies.

The percent differences (%D) were less than or equal to 30.0% for all analytes with the following exceptions:

Date	Analyte	%D	Associated Samples	Flag	A or P
04/05/21 (GCMS16_04052103)	Captan	33.43	ERH1294 ERH1295 ERH1296	UJ (all non-detects)	A
04/05/21 (GCMS16_04052104)	Disulfoton Butachlor Ethion Trithion Benzo(b)fluoranthene Metribuzin	34.68 46.23 46.49 32.99 39.04 51.96	ERH1294 ERH1295 ERH1296	UJ (all non-detects) UJ (all non-detects) UJ (all non-detects) UJ (all non-detects) UJ (all non-detects) UJ (all non-detects)	A
04/05/21 (GCMS16_04052106)	Methoxychlor	38.11	ERH1294 ERH1295 ERH1296	UJ (all non-detects)	A

Although the percent difference was grossly exceeded (>50%) for metribuzin, using professional judgment, associated results were qualified as estimated instead of "X", since the percent difference was biased high and the associated results were not detected.

The percent differences (%D) of the ending continuing calibration verifications (CCVs) were less than or equal to 50.0% for all analytes.

All of the continuing calibration relative response factors (RRF) were within validation criteria.

V. Laboratory Blanks

Laboratory blanks were analyzed as required by the method. No contaminants were found in the laboratory blanks.

VI. Field Blanks

Sample ERH1296 was identified as a field blank. No contaminants were found.

VII. Surrogates

Surrogates were added to all samples as required by the method. All surrogate recoveries (%R) were within QC limits.

VIII. Matrix Spike/Matrix Spike Duplicates

The laboratory has indicated that there were no matrix spike (MS) and matrix spike duplicate (MSD) analyses specified for the samples in this SDG, and therefore matrix spike and matrix spike duplicate analyses were not performed for this SDG.

IX. Laboratory Control Samples

Laboratory control samples (LCS) and laboratory control samples duplicates (LCSD) were analyzed as required by the method with the following exceptions:

LCS ID	Analyte	Finding	Associated Samples	Flag	A or P
W1D0006-BS1/BSD1	4,4'-DDD	The laboratory indicated that these analytes were not spiked in the LCS/LCSD mix analyzed for this SDG.	All samples in SDG 95603/1C31030	UJ (all non-detects)	P
	4,4'-DDE			UJ (all non-detects)	
	4,4'-DDT			UJ (all non-detects)	
	Aldrin			UJ (all non-detects)	
	alpha-BHC			UJ (all non-detects)	
	alpha-Chlordane			UJ (all non-detects)	
	beta-BHC			UJ (all non-detects)	
	delta-BHC			UJ (all non-detects)	
	Dieldrin			UJ (all non-detects)	
	Endosulfan I			UJ (all non-detects)	
	Endosulfan II			UJ (all non-detects)	
	Endosulfan sulfate			UJ (all non-detects)	
	Endrin			UJ (all non-detects)	
	Endrin aldehyde			UJ (all non-detects)	
	Endrin ketone			UJ (all non-detects)	
	gamma-BHC			UJ (all non-detects)	
	gamma-Chlordane			UJ (all non-detects)	
	Heptachlor			UJ (all non-detects)	
	Heptachlor epoxide			UJ (all non-detects)	
	Hexachlorobenzene			UJ (all non-detects)	
	Hexachlorocyclopentadiene			UJ (all non-detects)	
	Methoxychlor			UJ (all non-detects)	
	Propachlor			UJ (all non-detects)	
	Trifluralin			UJ (all non-detects)	

Relative percent differences (RPD) were within QC limits.

X. Field Duplicates

No field duplicates were identified in this SDG.

XI. Internal Standards

All internal standard areas and retention times were within QC limits.

XII. Target Analyte Quantitation

Raw data were not reviewed for Stage 2B validation.

XIII. Target Analyte Identification

Raw data were not reviewed for Stage 2B validation.

XIV. System Performance

Raw data were not reviewed for Stage 2B validation.

XV. Overall Assessment of Data

The analysis was conducted within all specifications of the method. No results were rejected in this SDG.

Due to technical holding time, ICV %D, continuing calibration %D, and LCS/LCSD not spiked, data were qualified as estimated in three samples.

Red Hill Bulk Storage Facility, CTO 18F0126
Semivolatiles - Data Qualification Summary - SDG 95603/1C31030

Sample	Analyte	Flag	A or P	Reason
ERH1294 ERH1295 ERH1296	All analytes	UJ (all non-detects)	P	Technical holding times (h)
ERH1294 ERH1295 ERH1296	2,6-Dinitrotoluene	UJ (all non-detects)	A	Initial calibration verification (%D) (c)
ERH1294 ERH1295 ERH1296	Captan Disulfoton Butachlor Ethion Trithion Benzo(b)fluoranthene Metribuzin Methoxychlor	UJ (all non-detects) UJ (all non-detects) UJ (all non-detects) UJ (all non-detects) UJ (all non-detects) UJ (all non-detects) UJ (all non-detects) UJ (all non-detects)	A	Continuing calibration (%D) (c)
ERH1294 ERH1295 ERH1296	4,4'-DDD 4,4'-DDE 4,4'-DDT Aldrin alpha-BHC alpha-Chlordane beta-BHC delta-BHC Dieldrin Endosulfan I Endosulfan II Endosulfan sulfate Endrin Endrin aldehyde Endrin ketone gamma-BHC gamma-Chlordane Heptachlor Heptachlor epoxide Hexachlorobenzene Hexachlorocyclopentadiene Methoxychlor Propachlor Trifluralin	UJ (all non-detects) UJ (all non-detects)	P	Laboratory control samples (not spiked) (v)

Red Hill Bulk Storage Facility, CTO 18F0126
Semivolatiles - Laboratory Blank Data Qualification Summary - SDG 95603/1C31030

No Sample Data Qualified in this SDG

Red Hill Bulk Storage Facility, CTO 18F0126
Semivolatiles - Field Blank Data Qualification Summary - SDG 95603/1C31030

No Sample Data Qualified in this SDG

LDC #: 50747B2a **VALIDATION COMPLETENESS WORKSHEET** Date: 05/06/21
SDG #: 95603/1C31030 Stage 2B Page: 1 of 1
Laboratory: APPL, Inc./Weck Laboratories, Inc. Reviewer: VT
2nd Reviewer: [illegible]

METHOD: GC/MS Semivolatiles (EPA Method 525.2)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I.	Sample receipt/Technical holding times	A, SW	
II.	GC/MS Instrument performance check	A	
III.	Initial calibration/ICV	A SW	RSD ≤ 30%. ICV ≤ 30%.
IV.	Continuing calibration/ending	SW	CCV ≤ 30%. /50%.
V.	Laboratory Blanks	A	
VI.	Field blanks	ND	FB = 3
VII.	Surrogate spikes	A	
VIII.	Matrix spike/Matrix spike duplicates	N	
IX.	Laboratory control samples	SW	LCSID
X.	Field duplicates	N	
XI.	Internal standards	A N	
XII.	Target analyte quantitation	N	
XIII.	Target analyte identification	N	
XIV.	System performance	N	
XV.	Overall assessment of data	A	

Note: A = Acceptable; N = Not provided/applicable; SW = See worksheet; ND = No compounds detected; R = Rinsate; FB = Field blank; D = Duplicate; TB = Trip blank; EB = Equipment blank; SB=Source blank; OTHER:

	Client ID	SW Lab ID		Lab ID	Matrix	Date
1	ERH1294	1C31030-01		BA29552	Water	03/24/21
2	ERH1295	-02		BA29553	Water	03/24/21
3	ERH1296	-03	FB	BA29554	Water	03/24/21
4						
5						
6						
7						
8						
9						

Notes:

1	WID0006-BK1						

VALIDATION FINDINGS WORKSHEET

METHOD: GC/MS SVOA

A. Phenol	CC. Dimethylphthalate	EEE. Bis(2-ethylhexyl)phthalate	GGGG. C30-Hopane	I1. Methyl methanesulfonate
B. Bis (2-chloroethyl) ether	DD. Acenaphthylene	FFF. Di-n-octylphthalate	HHHH. 1-Methylphenanthrene	J1. Ethyl methanesulfonate
C. 2-Chlorophenol	EE. 2,6-Dinitrotoluene	GGG. Benzo(b)fluoranthene	IIII. 1,4-Dioxane	K1. o,o',o"-Triethylphosphorothioate
D. 1,3-Dichlorobenzene	FF. 3-Nitroaniline	HHH. Benzo(k)fluoranthene	JJJJ. Acetophenone	L1. n-Phenylene diamine
E. 1,4-Dichlorobenzene	GG. Acenaphthene	III. Benzo(a)pyrene	KKKK. Atrazine	M1. 1,4-Naphthoquinone
F. 1,2-Dichlorobenzene	HH. 2,4-Dinitrophenol	JJJ. Indeno(1,2,3-cd)pyrene	LLLL. Benzaldehyde	N1. N-Nitro-o-toluidine
G. 2-Methylphenol	II. 4-Nitrophenol	KKK. Dibenz(a,h)anthracene	MMMM. Caprolactam	O1. 1,3,5-Trinitrobenzene
H. 2,2'-Oxybis(1-chloropropane)	JJ. Dibenzofuran	LLL. Benzo(g,h,i)perylene	NNNN. 2,6-Dichlorophenol	P1. Pentachlorobenzene
I. 4-Methylphenol	KK. 2,4-Dinitrotoluene	MMM. Bis(2-Chloroisopropyl)ether	OOOO. 1,2-Diphenylhydrazine	Q1. 4-Aminobiphenyl
J. N-Nitroso-di-n-propylamine	LL. Diethylphthalate	NNN. Aniline	PPPP. 3-Methylphenol	R1. 2-Naphthylamine
K. Hexachloroethane	MM. 4-Chlorophenyl-phenyl ether	OOO. N-Nitrosodimethylamine	QQQQ. 3&4-Methylphenol	S1. Triphenylene
L. Nitrobenzene	NN. Fluorene	PPP. Benzoic Acid	RRRR. 4-Dimethyldibenzothiophene (4MDT)	T1. Octachlorostyrene
M. Isophorone	OO. 4-Nitroaniline	QQQ. Benzyl alcohol	SSSS. 2/3-Dimethyldibenzothiophene (4MDT)	U1. Famphur
N. 2-Nitrophenol	PP. 4,6-Dinitro-2-methylphenol	RRR. Pyridine	TTTT. 1-Methyldibenzothiophene (1MDT)	V1. 1,4-phenylenediamine
O. 2,4-Dimethylphenol	QQ. N-Nitrosodiphenylamine	SSS. Benzidine	UUUU.. 2,3,4,6-Tetrachlorophenol	W1. Methapyrilene
P. Bis(2-chloroethoxy)methane	RR. 4-Bromophenyl-phenylether	TTT. 1-Methylnaphthalene	VVVV. 1,2,4,5-Tetrachlorobenzene	X1. Pentachloroethane
Q. 2,4-Dichlorophenol	SS. Hexachlorobenzene	UUU.Benzo(b)thiophene	WWWW.. 2-Picoline	Y1. 3,3'-Dimethylbenzidine
R. 1,2,4-Trichlorobenzene	TT. Pentachlorophenol	VVV.Benzonaphthothiophene	XXXX. 3-Methylcholanthrene	Z1. o-Toluidine
S. Naphthalene	UU. Phenanthrene	WWW.Benzo(e)pyrene	YYYY. a,a-Dimethylphenethylamine	A2. 1-Naphthylamine
T. 4-Chloroaniline	VV. Anthracene	XXX. 2,6-Dimethylnaphthalene	ZZZZ. Hexachloropropene	B2. 4-Aminobiphenyl
U. Hexachlorobutadiene	WW. Carbazole	YYY. 2,3,5-Trimethylnaphthalene	A1. N-Nitrosodiethylamine	C2. 4-Nitroquinoline-1-oxide
V. 4-Chloro-3-methylphenol	XX. Di-n-butylphthalate	ZZZ. Perylene	B1. N-Nitrosodi-n-butylamine	D2. Hexachloropene
W. 2-Methylnaphthalene	YY. Fluoranthene	AAAA. Dibenzothiophene	C1. N-Nitrosomethylethylamine	E2. Bis (2-chloro-1-methylethyl) ether
X. Hexachlorocyclopentadiene	ZZ. Pyrene	BBBB. Benzo(a)fluoranthene	D1. N-Nitrosomorpholine	F2. Bifenthrin
Y. 2,4,6-Trichlorophenol	AAA. Butylbenzylphthalate	CCCC. Benzo(b)fluorene	E1. N-Nitrosopyrrolidine	G2. Cyfluthrin
Z. 2,4,5-Trichlorophenol	BBB. 3,3'-Dichlorobenzidine	DDDD. cis/trans-Decalin	F1. Phenacetin	H2. Cypermethrin
AA. 2-Chloronaphthalene	CCC. Benzo(a)anthracene	EEEE. 1,1'-Biphenyl	G1. 2-Acetylaminofluorene	I2. Permethrin (cis/trans)
BB. 2-Nitroaniline	DDD. Chrysene	FFFF. Retene	H1. Pronamide	J2. 5-Nitro-o-toluidine

VALIDATION FINDINGS WORKSHEET

METHOD: Pesticides

A. alpha-BHC	K. Endrin	U. Toxaphene	EE. 2,4'-DDT	OO. oxy-Chlordane
B. beta-BHC	L. Endosulfan II	V. Aroclor-1016	FF. Hexachlorobenzene	PP. cis-Nonachlor
C. delta-BHC	M. 4,4'-DDD	W. Aroclor-1221	GG. Chlordane	QQ. trans-Nonachlor
D. gamma-BHC	N. Endosulfan sulfate	X. Aroclor-1232	HH. Chlordane (Technical)	RR. cis-Chlordane
E. Heptachlor	O. 4,4'-DDT	Y. Aroclor-1242	II. p,p'-DDE	SS. trans-Chlordane
F. Aldrin	P. Methoxychlor	Z. Aroclor-1248	JJ. p,p'-DDD	TT. alpha-Endosulphan
G. Heptachlor epoxide	Q. Endrin ketone	AA. Aroclor-1254	KK. p,p'-DDT	UU. beta-Endosulphan
H. Endosulfan I	R. Endrin aldehyde	BB. Aroclor-1260	LL. o,p'-DDT	VV. Endosulphan Sulphate
I. Dieldrin	S. alpha-Chlordane	CC. 2,4'-DDD	MM. o,p'-DDE	WW. Mirex
J. 4,4'-DDE	T. gamma-Chlordane	DD. 2,4'-DDE	NN. o,p'-DDD	

Notes:_____

LDC #: 50747B2a

VALIDATION FINDINGS WORKSHEET
Technical Holding Times

Reviewer: LT

All circled dates have exceeded the technical holding times.
YES Were all cooler temperatures within validation criteria?

METHOD : GC/MS SVOA (EPA Method 525.2)

Sample ID	Matrix	Preserved	Sampling Date	Extraction date	Analysis date	Total # of Days	Qualifier
1-3 (ND)	W	N	03/24/21	04/01/21	04/05/21	8	J-/UJ/P (h)

TECHNICAL HOLDING TIME CRITERIA

Water: Extracted within 7 days, analyzed within 30 days.

LDC #: 50747B2a

VALIDATION FINDINGS WORKSHEET
Initial Calibration Verification

Reviewer: LT

METHOD: GC/MS SVOA (EPA Method 525.2)
Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".
YES Was an initial calibration verification standard analyzed after each ICAL for each instrument?
NO Were all %D within the validation criteria of ≤30 %D ?

#	Date	Standard ID	Compound	Finding %D (Limit: <30.0%)	Associated Samples	Qualifications
	03/13/21	GCMS16_03122123	EE*	40.27	1-3 (ND)	J+/UJ/A (c)
			*Use SVOC codes			

LDC #: 50747B2a

VALIDATION FINDINGS WORKSHEET
Continuing Calibration

Reviewer: LT

METHOD: GC/MS SVOA (EPA Method 525.2)

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".

YES Was a continuing calibration standard analyzed at least once every 12 hours of sample analysis for each instrument?

NO Were all percent differences (%D) <30.0/50.0% ?

#	Date	Standard ID	Compound	Finding %D (Limit: <30.0/50.0%)	Finding RRF (Limit: >0.05)	Associated Samples	Qualifications
	04/05/21	GCMS16_04052103	Captan	33.43		1-3 (ND)	J+/UJ/A (c)
	04/05/21	GCMS16_04052104	Disulfoton	34.68		1-3 (ND)	J+/UJ/A
			Metribuzin	51.96		↓	J+/UJ/A
			Butachlor	46.23		↓	J+/UJ/A
			Ethion	46.49		↓	↓
			Trithion	32.99		↓	↓
			GGG*	39.04		↓	↓
	04/05/21	GCMS16_04052106	P**	38.11		1-3 (ND)	J+/UJ/A
		*Use SVOC codes					
		**Use Pesticides codes					

LDC #: 50747B2a

VALIDATION FINDINGS WORKSHEET
Laboratory Control Samples (LCS)

METHOD: GC/MS SVOA (EPA Method 525.2)

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".
YES Was a LCS analyzed for this SDG?
YES Was a LCS analyzed every 20 samples?
NO Were the LCS percent recoveries (%R) and relative percent difference (RPD) within the QC limits?

#	Date	Lab ID/Reference	Compound	LCS %R (Limits)	LCSD %R (Limits)	RPD (Limits)	Associated Samples	Qualifications
		W1D0006-BS1/BSD1	See attached	Not spiked			1-3 (ND)	J/UJ/P
			All Pesticides Codes except * and **					
			*SVOA Codes					
			**Please include					

APPL, Inc.
908 N. Temperance Avenue
Clovis, CA 93611

Project Number: 95603

Project Manager: Gregory Salata

Reported:
04/09/2021 12:02

Quality Control Results

(Continued)

Semivolatile Organic Compounds by GC/MS (Continued)

Analyte	Result	MRL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qualifier
Batch: W1D0006 - EPA 525.2 (Continued)										
Blank (W1D0006-BLK1)				**Prepared: 04/01/21 Analyzed: 04/05/21**						
Surrogate(s)										
Triphenyl phosphate	*5.10*		*ug/l*	*5.00*		*102*	*70-130*			
LCS (W1D0006-BS1)				**Prepared: 04/01/21 Analyzed: 04/05/21**						
M 4,4'-DDD	ND	0.10	ug/l				70-130			
J 4,4'-DDE	ND	0.20	ug/l				70-130			
O 4,4'-DDT	ND	0.10	ug/l				70-130			
Acenaphthene	4.61	0.50	ug/l	5.00		92	70-130			
Acenaphthylene	5.34	0.50	ug/l	5.00		107	70-130			
Acetochlor	4.98	0.10	ug/l	5.00		100	70-130			
Alachlor	5.10	0.10	ug/l	5.00		102	70-130			
F Aldrin	ND	0.10	ug/l				70-130			
A alpha-BHC	ND	0.10	ug/l				70-130			
S alpha-Chlordane	ND	0.10	ug/l				70-130			
Anthracene	4.55	0.50	ug/l	5.00		91	70-130			
Atrazine	5.68	0.10	ug/l	5.00		114	70-130			
Benzo (a) anthracene	5.32	0.50	ug/l	5.00		106	70-130			
Benzo (a) pyrene	4.83	0.10	ug/l	5.00		97	60-130			
Benzo (b) fluoranthene	4.49	0.50	ug/l	5.00		90	70-130			AN-IP
Benzo (g,h,i) perylene	4.53	0.50	ug/l	5.00		91	40-160			
Benzo (k) fluoranthene	5.39	0.50	ug/l	5.00		108	70-130			AN-IP
B beta-BHC	ND	0.20	ug/l				70-130			
Bis(2-ethylhexyl)adipate	5.65	5.0	ug/l	5.00		113	70-130			
Bis(2-ethylhexyl)phthalate	5.33	3.0	ug/l	5.00		107	70-130			
Bromacil	5.28	0.50	ug/l	5.00		106	70-130			
Butachlor	5.00	0.10	ug/l	5.00		100	70-130			
Butyl benzyl phthalate	5.11	2.0	ug/l	5.00		102	70-130			
Caffeine	4.30	0.10	ug/l	5.00		86	50-120			
Captan	6.06	1.0	ug/l	5.00		121	70-130			
Chlorpropham	5.20	0.10	ug/l	5.00		104	70-130			
Chrysene	5.21	0.50	ug/l	5.00		104	70-130			
Cyanazine	5.19	0.10	ug/l	5.00		104	70-130			
C delta-BHC	ND	0.10	ug/l				70-130			
Diazinon	4.41	0.10	ug/l	5.00		88	50-120			
Dibenzo (a,h) anthracene	4.20	0.50	ug/l	5.00		84	50-150			
I Dieldrin	ND	0.20	ug/l				70-130			
Diethyl phthalate	5.92	2.0	ug/l	5.00		118	70-130			
Dimethoate	4.82	0.20	ug/l	5.00		96	50-120			
Dimethyl phthalate	5.46	2.0	ug/l	5.00		109	70-130			
Di-n-butyl phthalate	5.06	2.0	ug/l	5.00		101	70-130			

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All Pesticides Codes except * 3 **.
* CVOA Codes

APPL, Inc.
908 N. Temperance Avenue
Clovis, CA 93611

Project Number: 95603

Project Manager: Gregory Salata

Reported:
04/09/2021 12:02

Quality Control Results

(Continued)

Semivolatile Organic Compounds by GC/MS (Continued)

Analyte	Result	MRL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qualifier
Batch: W1D0006 - EPA 525.2 (Continued)										
LCS (W1D0006-BS1)				**Prepared: 04/01/21 Analyzed: 04/05/21**						
Di-n-octyl phthalate	5.19	0.50	ug/l	5.00		104	70-130			
Diphenamid	5.71	0.10	ug/l	5.00		114	70-130			
Disulfoton	4.01	0.10	ug/l	5.00		80	50-120			
H Endosulfan I	ND	1.0	ug/l				70-130			
L Endosulfan II	ND	0.20	ug/l				70-130			
N Endosulfan sulfate	ND	0.20	ug/l				70-130			
F Endrin	ND	0.20	ug/l				70-130			
R Endrin aldehyde	ND	0.20	ug/l				70-130			
Q Endrin ketone	ND	0.10	ug/l				70-130			
EPTC	5.12	0.10	ug/l	5.00		102	70-130			
Ethion	6.11	0.10	ug/l	5.00		122	70-130			
Fluoranthene	5.25	0.50	ug/l	5.00		105	70-130			
Fluorene	5.25	0.50	ug/l	5.00		105	70-130			
D gamma-BHC (Lindane)	ND	0.10	ug/l				70-130			
T gamma-Chlordane	ND	0.10	ug/l				70-130			
E Heptachlor	ND	0.10	ug/l				70-130			
G1 Heptachlor epoxide	ND	0.10	ug/l				70-130			
FF Hexachlorobenzene	ND	0.10	ug/l				70-130			
* X Hexachlorocyclopentadiene	ND	1.0	ug/l				33-106			
Indeno (1,2,3-cd) pyrene	4.09	0.50	ug/l	5.00		82	50-150			
P Methoxychlor	ND	0.20	ug/l				70-130			
Metolachlor	4.99	0.10	ug/l	5.00		100	60-130			
Metribuzin	5.23	0.10	ug/l	5.00		105	50-120			
Molinate	4.48	0.10	ug/l	5.00		90	70-130			
Naphthalene	4.28	0.50	ug/l	5.00		86	70-130			
Pentachloronitrobenzene (PCNB)	4.35	0.10	ug/l	5.00		87	70-130			
Pentachlorophenol	3.67	1.0	ug/l	5.00		73	50-120			
Phenanthrene	5.11	0.50	ug/l	5.00		102	70-130			
Prometon	3.18	0.10	ug/l	5.00		64	15-120			
Prometryn	3.43	0.10	ug/l	5.00		69	30-120			
** Propachlor	ND	0.20	ug/l				70-130			
Pyrene	5.06	0.50	ug/l	5.00		101	70-130			
Simazine	4.36	0.10	ug/l	5.00		87	60-130			
Terbacil	4.24	2.0	ug/l	5.00		85	70-130			
Thiobencarb	3.95	0.10	ug/l	5.00		79	70-130			
** Trifluralin	ND	0.10	ug/l				70-130			
Trithion	4.48	0.10	ug/l	5.00		90	70-130			
Surrogate(s)										
1,3-Dimethyl-2-nitrobenzene	*4.49*		*ug/l*	*5.00*		*90*	*70-130*			

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Laboratory Data Consultants, Inc.
Data Validation Report

Project/Site Name: Red Hill Bulk Storage Facility, CTO 18F0126

LDC Report Date: May 12, 2021

Parameters: Lead

Validation Level: Stage 2B

Laboratory: APPL, Inc.

Sample Delivery Group (SDG): 95603

Sample Identification	Laboratory Sample Identification	Matrix	Collection Date
ERH1294	BA29552	Water	03/24/21
ERH1295	BA29553	Water	03/24/21

Introduction

This Data Validation Report (DVR) presents data validation findings and results for the associated samples listed on the cover page. Data validation was performed in accordance with the Work Plan/Scope of Work, Investigation and Remediation of Releases and Groundwater Protection and Evaluation, Red Hill Bulk Fuel Storage Facility, Joint Base Pearl Harbor-Hickam, O'ahu, Hawai'i (Revision 02, January 2017), the Sampling and Analysis Plan, Investigation and Remediation of Releases and Groundwater Protection and Evaluation, Red Hill Bulk Fuel Storage Facility, Joint Base Pearl Harbor-Hickam, O'ahu, Hawai'i (Revision 01, April 2017), the Sampling and Analysis Plan, Addendum 01, Investigation and Remediation of Releases and Groundwater Protection and Evaluation, Red Hill Bulk Fuel Storage Facility, Joint Base Pearl Harbor-Hickam, O'ahu, Hawai'i (Revision 00, September 2017), the Sampling and Analysis Plan, Addendum 03, Investigation and Remediation of Releases and Groundwater Protection and Evaluation, Red Hill Bulk Fuel Storage Facility, Joint Base Pearl Harbor-Hickam, O'ahu, Hawai'i (Revision 00, June 2018), the U.S. Department of Defense (DoD) Quality Systems Manual (QSM) for Environmental Laboratories, Version 5.3 (2019), the DoD General Validation Guidelines (November 2019), and the U.S. Department of Defense (DoD) Data Validation Guidelines Module 2: Data Validation Procedure for Metals by ICP-OES (May 2020). Where specific guidance was not available, the data has been evaluated in a conservative manner consistent with industry standards using professional experience.

The analyses were performed by the following method:

Lead by Environmental Protection Agency (EPA) Method 200.8

All sample results were subjected to Stage 2B data validation, which comprises an evaluation of quality control (QC) summary results.

The following are definitions of the data qualifiers utilized during data validation:

J+ (Estimated, High Bias): The compound or analyte was analyzed for and positively identified by the laboratory; however the reported concentration is estimated, displaying high bias, due to non-conformances discovered during data validation.

J- (Estimated, Low Bias): The compound or analyte was analyzed for and positively identified by the laboratory; however the reported concentration is estimated, displaying low bias, due to non-conformances discovered during data validation.

J (Estimated, Bias Indeterminate): The compound or analyte was analyzed for and positively identified by the laboratory; however the reported concentration is estimated due to non-conformances discovered during data validation. Bias is indeterminate.

U (Non-detected): The compound or analyte was analyzed for and positively identified by the laboratory; however the compound or analyte should be considered non-detected due to the presence of contaminants detected in the associated blank(s).

UJ (Non-detected estimated): The analyte was not detected and the associated numerical value is approximate.

X (Exclusion of data recommended): The sample results (including non-detects) were affected by serious deficiencies in the ability to analyze the sample and to meet published method and project quality control criteria. The presence or absence of the analyte cannot be substantiated by the data provided. Exclusion of the data is recommended.

NA (Not Applicable): The non-conformance discovered during data validation demonstrates a high bias, while the affected compound or analyte in the associated sample(s) was reported as not detected by the laboratory and did not warrant the qualification of the data.

A qualification summary table is provided at the end of this report if data has been qualified. Flags are classified as P (protocol) or A (advisory) to indicate whether the flag is due to a laboratory deviation from a specified protocol or is of technical advisory nature.

Qualification Code Reference

a ICP Serial Dilution %D was not within control limits.

b Presumed contamination from preparation (method blank).

c Calibration %RSD, r, r^2, %D or %R was noncompliant.

d The analysis with this flag should not be used because another more technically sound analysis is available.

e MS/MSD or Duplicate RPD was high.

f Presumed contamination from FB or ER.

g ICP ICS results were unsatisfactory.

h Holding times were exceeded.

i Internal standard performance was unsatisfactory.

k Estimated Maximum Possible Concentration (HRGC/HRMS only)

l LCS/LCSD %R was not within control limits.

m Result exceeded the calibration range.

o Cooler temperature or temperature blank was noncompliant and/or sample custody problems.

p RPD between two columns was high (GC only).

q MS/MSD recovery was not within control limits.

s Surrogate recovery was not within control limits.

t Presumed contamination from trip blank.

v Unusual problems found with the data not defined elsewhere. Description of the problem can be found in the validation report.

w LCS/LCSD RPD was high.

y Chemical recovery was not within control limits (Radiochemistry only).

I. Sample Receipt and Technical Holding Times

All samples were received in good condition.

All technical holding time requirements were met.

II. ICPMS Tune

The mass calibration was within 0.1 AMU and the percent relative standard deviation (%RSD) was less than or equal to 5%.

III. Instrument Calibration

Initial and continuing calibrations were performed as required by the method.

The initial calibration verification (ICV) and continuing calibration verification (CCV) standards were within QC limits.

IV. ICP Interference Check Sample Analysis

The frequency of interference check sample (ICS) analysis was met. All criteria were within QC limits.

V. Laboratory Blanks

Laboratory blanks were analyzed as required by the method. No contaminants were found in the laboratory blanks.

VI. Field Blanks

No field blanks were identified in this SDG.

VII. Matrix Spike/Matrix Spike Duplicates

The laboratory has indicated that there were no matrix spike (MS) and matrix spike duplicate (MSD) analyses specified for the samples in this SDG, and therefore matrix spike and matrix spike duplicate analyses were not performed for this SDG.

VIII. Duplicate Sample Analysis

The laboratory has indicated that there were no duplicate (DUP) analyses specified for the samples in this SDG, and therefore duplicate analyses were not performed for this SDG.

IX. Serial Dilution

Serial dilution was not performed for this SDG.

X. Laboratory Control Samples

Laboratory control samples (LCS) and laboratory control samples duplicates (LCSD) were analyzed as required by the method. Percent recoveries (%R) were within QC limits. Relative percent differences (RPD) were within QC limits.

XI. Field Duplicates

No field duplicates were identified in this SDG.

XII. Internal Standards (ICP-MS)

All internal standard percent recoveries (%R) were within QC limits.

XIII. Sample Result Verification

Raw data were not reviewed for Stage 2B validation.

XIV. Overall Assessment of Data

The analysis was conducted within all specifications of the method. No results were rejected in this SDG.

Red Hill Bulk Storage Facility, CTO 18F0126
Lead - Data Qualification Summary - SDG 95603

No Sample Data Qualified in this SDG

Red Hill Bulk Storage Facility, CTO 18F0126
Lead - Laboratory Blank Data Qualification Summary - SDG 95603

No Sample Data Qualified in this SDG

Red Hill Bulk Storage Facility, CTO 18F0126
Lead - Field Blank Data Qualification Summary - SDG 95603

No Sample Data Qualified in this SDG

LDC #: 50747B4a
SDG #: 95603
Laboratory: APPL, Inc.

VALIDATION COMPLETENESS WORKSHEET
Stage 2B

Date: 4/27/21
Page: 1 of 1
Reviewer: ATL
2nd Reviewer:

METHOD: Lead (EPA Method 200.8)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I.	Sample receipt/Technical holding times	A / A	
II.	ICP/MS Tune	A	
III.	Instrument Calibration	A	
IV.	ICP Interference Check Sample (ICS) Analysis	A	
V.	Laboratory Blanks	A	
VI.	Field Blanks	N	
VII.	Matrix Spike/Matrix Spike Duplicates	N	non-client sample used
VIII.	Duplicate sample analysis	N	
IX.	Serial Dilution	N	
X.	Laboratory control samples	A	LCS/LCSD
XI.	Field Duplicates	N	
XII.	Internal Standard (ICP-MS)	A	
XIII.	Sample Result Verification	N	
XIV.	Overall Assessment of Data	A	

Note: A = Acceptable
N = Not provided/applicable
SW = See worksheet
ND = No compounds detected
R = Rinsate
FB = Field blank
D = Duplicate
TB = Trip blank
EB = Equipment blank
SB=Source blank
OTHER:

	Client ID	Lab ID	Matrix	Date
1	ERH1294	BA29552	Water	03/24/21
2	ERH1295	BA29553	Water	03/24/21
3				
4				
5				
6				
7				
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Notes:

Laboratory Data Consultants, Inc.
Data Validation Report

Project/Site Name: Red Hill Bulk Storage Facility, CTO 18F0126

LDC Report Date: May 12, 2021

Parameters: Dissolved Organic Carbon

Validation Level: Stage 2B

Laboratory: APPL, Inc.

Sample Delivery Group (SDG): 95603

Sample Identification	Laboratory Sample Identification	Matrix	Collection Date
ERH1294	BA29552	Water	03/24/21
ERH1295	BA29553	Water	03/24/21
ERH1295DUP	BA29553DUP	Water	03/24/21

Introduction

This Data Validation Report (DVR) presents data validation findings and results for the associated samples listed on the cover page. Data validation was performed in accordance with the Work Plan/Scope of Work, Investigation and Remediation of Releases and Groundwater Protection and Evaluation, Red Hill Bulk Fuel Storage Facility, Joint Base Pearl Harbor-Hickam, O'ahu, Hawai'i (Revision 02, January 2017), the Sampling and Analysis Plan, Investigation and Remediation of Releases and Groundwater Protection and Evaluation, Red Hill Bulk Fuel Storage Facility, Joint Base Pearl Harbor-Hickam, O'ahu, Hawai'i (Revision 01, April 2017), the Sampling and Analysis Plan, Addendum 01, Investigation and Remediation of Releases and Groundwater Protection and Evaluation, Red Hill Bulk Fuel Storage Facility, Joint Base Pearl Harbor-Hickam, O'ahu, Hawai'i (Revision 00, September 2017), the Sampling and Analysis Plan, Addendum 03, Investigation and Remediation of Releases and Groundwater Protection and Evaluation, Red Hill Bulk Fuel Storage Facility, Joint Base Pearl Harbor-Hickam, O'ahu, Hawai'i (Revision 00, June 2018), the U.S. Department of Defense (DoD) Quality Systems Manual (QSM) for Environmental Laboratories, Version 5.3 (2019), and the DoD General Validation Guidelines (November 2019). Where specific guidance was not available, the data has been evaluated in a conservative manner consistent with industry standards using professional experience.

The analyses were performed by the following method:

Dissolved Organic Carbon by Environmental Protection Agency (EPA) SW 846 Method 9060A

All sample results were subjected to Stage 2B data validation, which comprises an evaluation of quality control (QC) summary results.

The following are definitions of the data qualifiers utilized during data validation:

J+ (Estimated, High Bias): The compound or analyte was analyzed for and positively identified by the laboratory; however the reported concentration is estimated, displaying high bias, due to non-conformances discovered during data validation.

J- (Estimated, Low Bias): The compound or analyte was analyzed for and positively identified by the laboratory; however the reported concentration is estimated, displaying low bias, due to non-conformances discovered during data validation.

J (Estimated, Bias Indeterminate): The compound or analyte was analyzed for and positively identified by the laboratory; however the reported concentration is estimated due to non-conformances discovered during data validation. Bias is indeterminate.

U (Non-detected): The compound or analyte was analyzed for and positively identified by the laboratory; however the compound or analyte should be considered non-detected due to the presence of contaminants detected in the associated blank(s).

UJ (Non-detected estimated): The analyte was not detected and the associated numerical value is approximate.

X (Exclusion of data recommended): The sample results (including non-detects) were affected by serious deficiencies in the ability to analyze the sample and to meet published method and project quality control criteria. The presence or absence of the analyte cannot be substantiated by the data provided. Exclusion of the data is recommended.

NA (Not Applicable): The non-conformance discovered during data validation demonstrates a high bias, while the affected compound or analyte in the associated sample(s) was reported as not detected by the laboratory and did not warrant the qualification of the data.

A qualification summary table is provided at the end of this report if data has been qualified. Flags are classified as P (protocol) or A (advisory) to indicate whether the flag is due to a laboratory deviation from a specified protocol or is of technical advisory nature.

Qualification Code Reference

a ICP Serial Dilution %D was not within control limits.

b Presumed contamination from preparation (method blank).

c Calibration %RSD, r, r^2, %D or %R was noncompliant.

d The analysis with this flag should not be used because another more technically sound analysis is available.

e MS/MSD or Duplicate RPD was high.

f Presumed contamination from FB or ER.

g ICP ICS results were unsatisfactory.

h Holding times were exceeded.

i Internal standard performance was unsatisfactory.

k Estimated Maximum Possible Concentration (HRGC/HRMS only)

l LCS/LCSD %R was not within control limits.

m Result exceeded the calibration range.

o Cooler temperature or temperature blank was noncompliant and/or sample custody problems.

p RPD between two columns was high (GC only).

q MS/MSD recovery was not within control limits.

s Surrogate recovery was not within control limits.

t Presumed contamination from trip blank.

v Unusual problems found with the data not defined elsewhere. Description of the problem can be found in the validation report.

w LCS/LCSD RPD was high.

y Chemical recovery was not within control limits (Radiochemistry only).

I. Sample Receipt and Technical Holding Times

All samples were received in good condition.

All technical holding time requirements were met.

II. Initial Calibration

All criteria for the initial calibration were met.

III. Continuing Calibration

Continuing calibration frequency and analysis criteria were met.

IV. Laboratory Blanks

Laboratory blanks were analyzed as required by the methods. No contaminants were found in the laboratory blanks with the following exceptions:

Blank ID	Analyte	Maximum Concentration	Limit of Quantitation	Associated Samples
ICB/CCB	Dissolved organic carbon	0.26 mg/L	0.50 mg/L	All samples in SDG 95603

Data qualification by the laboratory blanks was based on the maximum contaminant concentration in the laboratory blanks in the analysis of each analyte. The sample concentrations were either not detected or were significantly greater (>5X blank contaminants) than the concentrations found in the associated laboratory blanks with the following exceptions:

Sample	Analyte	Reported Concentration	Modified Final Concentration
ERH1294	Dissolved organic carbon	0.37 mg/L	0.50U mg/L
ERH1295	Dissolved organic carbon	0.98 mg/L	0.98U mg/L

V. Field Blanks

No field blanks were identified in this SDG.

VI. Matrix Spike/Matrix Spike Duplicates

The laboratory has indicated that there were no matrix spike (MS) and matrix spike duplicate (MSD) analyses specified for the samples in this SDG, and therefore matrix spike and matrix spike duplicate analyses were not performed for this SDG.

VII. Duplicate Sample Analysis

Duplicate (DUP) sample analysis was performed on an associated project sample. Results were within QC limits.

VIII. Laboratory Control Samples

Laboratory control samples (LCS) and laboratory control samples duplicates (LCSD) were analyzed as required by the methods. Percent recoveries (%R) were within QC limits. Relative percent differences (RPD) were within QC limits.

IX. Field Duplicates

No field duplicates were identified in this SDG.

X. Sample Result Verification

Raw data were not reviewed for Stage 2B validation.

XI. Overall Assessment of Data

The analysis was conducted within all specifications of the methods.

Due to laboratory blank contamination, data were qualified as not detected in two samples.

No results were rejected in this SDG.

Red Hill Bulk Storage Facility, CTO 18F0126
Dissolved Organic Carbon - Data Qualification Summary - SDG 95603

No Sample Data Qualified in this SDG

Red Hill Bulk Storage Facility, CTO 18F0126
Dissolved Organic Carbon - Laboratory Blank Data Qualification Summary - SDG 95603

Sample	Analyte	Modified Final Concentration	A or P	Code
ERH1294	Dissolved organic carbon	0.50U mg/L	A	B
ERH1295	Dissolved organic carbon	0.98U mg/L	A	B

Red Hill Bulk Storage Facility, CTO 18F0126
Dissolved Organic Carbon - Field Blank Data Qualification Summary - SDG 95603

No Sample Data Qualified in this SDG

LDC #: 50747B6
SDG #: 95603
Laboratory: APPL, Inc.

VALIDATION COMPLETENESS WORKSHEET
Stage 2B

Date: 4/27/21
Page: 1 of 1
Reviewer: AFV
2nd Reviewer: [illegible]

METHOD: (Analyte) DOC (EPA SW846 Method 9060A)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I.	Sample receipt/Technical holding times	A/A	
II	Initial calibration	A	
III.	Calibration verification	A	
IV	Laboratory Blanks	SW	
V	Field blanks	N	
VI.	Matrix Spike/Matrix Spike Duplicates	N	
VII.	Duplicate sample analysis	A	3
VIII.	Laboratory control samples	A	LCS/LCSD
IX.	Field duplicates	N	
X.	Sample result verification	N	
XI.	Overall assessment of data	A	

Note: A = Acceptable; N = Not provided/applicable; SW = See worksheet; ND = No compounds detected; R = Rinsate; FB = Field blank; D = Duplicate; TB = Trip blank; EB = Equipment blank; SB=Source blank; OTHER:

	Client ID	Lab ID	Matrix	Date
1	ERH1294	BA29552	Water	03/24/21
2	ERH1295	BA29553	Water	03/24/21
3	↓ DUP	↓ DUP	↓	↓
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Notes:

LDC #: 50747B6

VALIDATION FINDINGS WORKSHEET
Blanks

Reviewer: ATL

METHOD: Inorganics, Method See Cover

Conc. units: mg/L **Associated Samples:** All **Code:** B

Analyte	Blank ID	Blank ID	Blank Action Limit										
	PB	ICB/CCB (mg/L)		LOQ	1	2							
DOC		0.26	1.30	0.50	0.37	0.98							

CIRCLED RESULTS WERE NOT QUALIFIED. ALL RESULTS NOT CIRCLED WERE QUALIFIED BY THE FOLLOWING STATEMENT:
All contaminants within five times the method blank concentration were qualified as not detected, "U".

Laboratory Data Consultants, Inc.
Data Validation Report

Project/Site Name: Red Hill Bulk Storage Facility, CTO 18F0126

LDC Report Date: May 11, 2021

Parameters: Total Petroleum Hydrocarbons as Extractables

Validation Level: Stage 2B

Laboratory: APPL, Inc./Energy Laboratories

Sample Delivery Group (SDG): 95603/B21032068

Sample Identification	Laboratory Sample Identification	Matrix	Collection Date
ERH1294	BA29552/B21032068-001	Water	03/24/21
ERH1295	BA29553/B21032068-002	Water	03/24/21
ERH1294MS	BA29552MS/B21032068-001MS	Water	03/24/21
ERH1294MSD	BA29552MSD/B21032068-001MSD	Water	03/24/21

Introduction

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The analyses were performed by the following method:

Total Petroleum Hydrocarbons (TPH) as Extractables by Environmental Protection Agency (EPA) SW 846 Method 8015C

All sample results were subjected to Stage 2B data validation, which comprises an evaluation of quality control (QC) summary results.

The following are definitions of the data qualifiers utilized during data validation:

J+ (Estimated, High Bias): The analyte was analyzed for and positively identified by the laboratory; however the reported concentration is estimated, displaying high bias, due to non-conformances discovered during data validation.

J- (Estimated, Low Bias): The analyte was analyzed for and positively identified by the laboratory; however the reported concentration is estimated, displaying low bias, due to non-conformances discovered during data validation.

J (Estimated, Bias Indeterminate): The analyte was analyzed for and positively identified by the laboratory; however the reported concentration is estimated due to non-conformances discovered during data validation. Bias is indeterminate.

U (Non-detected): The analyte was analyzed for and positively identified by the laboratory; however the analyte should be considered non-detected due to the presence of contaminants detected in the associated blank(s).

UJ (Non-detected estimated): The analyte was not detected and the associated numerical value is approximate.

X (Exclusion of data recommended): The sample results (including non-detects) were affected by serious deficiencies in the ability to analyze the sample and to meet published method and project quality control criteria. The presence or absence of the analyte cannot be substantiated by the data provided. Exclusion of the data is recommended.

NA (Not Applicable): The non-conformance discovered during data validation demonstrates a high bias, while the affected analyte in the associated sample(s) was reported as not detected by the laboratory and did not warrant the qualification of the data.

A qualification summary table is provided at the end of this report if data has been qualified. Flags are classified as P (protocol) or A (advisory) to indicate whether the flag is due to a laboratory deviation from a specified protocol or is of technical advisory nature.

Qualification Code Reference

a ICP Serial Dilution %D was not within control limits.

b Presumed contamination from preparation (method blank).

c Calibration %RSD, r, r^2, %D or %R was noncompliant.

d The analysis with this flag should not be used because another more technically sound analysis is available.

e MS/MSD or Duplicate RPD was high.

f Presumed contamination from FB or ER.

g ICP ICS results were unsatisfactory.

h Holding times were exceeded.

i Internal standard performance was unsatisfactory.

k Estimated Maximum Possible Concentration (HRGC/HRMS only)

l LCS/LCSD %R was not within control limits.

m Result exceeded the calibration range.

o Cooler temperature or temperature blank was noncompliant and/or sample custody problems.

p RPD between two columns was high (GC only).

q MS/MSD recovery was not within control limits.

s Surrogate recovery was not within control limits.

t Presumed contamination from trip blank.

v Unusual problems found with the data not defined elsewhere. Description of the problem can be found in the validation report.

w LCS/LCSD RPD was high.

y Chemical recovery was not within control limits (Radiochemistry only).

I. Sample Receipt and Technical Holding Times

All samples were received in good condition and cooler temperatures upon receipt met validation criteria.

All technical holding time requirements were met.

II. Initial Calibration and Initial Calibration Verification

An initial calibration was performed as required by the method.

The percent relative standard deviations (%RSD) were less than or equal to 20.0% for all analytes.

The percent differences (%D) of the initial calibration verification (ICV) standard were less than or equal to 20.0% for all analytes.

III. Continuing Calibration

Continuing calibration was performed at the required frequencies.

The percent differences (%D) were less than or equal to 20.0% for all analytes.

IV. Laboratory Blanks

Laboratory blanks were analyzed as required by the method. No contaminants were found in the laboratory blanks.

V. Field Blanks

No field blanks were identified in this SDG.

VI. Surrogates

Surrogates were added to all samples as required by the method. All surrogate recoveries (%R) were within QC limits.

VII. Matrix Spike/Matrix Spike Duplicates

Matrix spike (MS) and matrix spike duplicate (MSD) sample analysis was performed on an associated project sample. Percent recoveries (%R) were within QC limits. Relative percent differences (RPD) were within QC limits.

VIII. Laboratory Control Samples

Laboratory control samples (LCS) were analyzed as required by the method. Percent recoveries (%R) were within QC limits.

IX. Field Duplicates

No field duplicates were identified in this SDG.

X. Target Analyte Quantitation

Raw data were not reviewed for Stage 2B validation.

XI. Target Analyte Identification

Raw data were not reviewed for Stage 2B validation.

XII. Overall Assessment of Data

The analysis was conducted within all specifications of the method. No results were rejected in this SDG.

Red Hill Bulk Storage Facility, CTO 18F0126
Total Petroleum Hydrocarbons as Extractables - Data Qualification Summary - SDG 95603/B21032068

No Sample Data Qualified in this SDG

Red Hill Bulk Storage Facility, CTO 18F0126
Total Petroleum Hydrocarbons as Extractables - Laboratory Blank Data Qualification Summary - SDG 95603/B21032068

No Sample Data Qualified in this SDG

Red Hill Bulk Storage Facility, CTO 18F0126
Total Petroleum Hydrocarbons as Extractables - Field Blank Data Qualification Summary - SDG 95603/B21032068

No Sample Data Qualified in this SDG

LDC #: 50747B8 **VALIDATION COMPLETENESS WORKSHEET** Date: 6/10/21
SDG #: 95603/B21032068 Stage 2B Page: 1 of 1
Laboratory: APPL, Inc./Energy Laboratories Reviewer: LT
2nd Reviewer: [illegible]

METHOD: GC TPH as Extractables (EPA SW 846 Method 8015C)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I.	Sample receipt/Technical holding times	A/A	
II.	Initial calibration/ICV	A/A	RSD≤20%. ICV≤20%.
III.	Continuing calibration	A	CCV≤20%.
IV.	Laboratory Blanks	A	
V.	Field blanks	N	
VI.	Surrogate spikes	A	
VII.	Matrix spike/Matrix spike duplicates	A	(3,4)
VIII.	Laboratory control samples	A	LCS
IX.	Field duplicates	N	
X.	Target analyte quantitation	N	
XI.	Target analyte identification	N	
XII	Overall assessment of data	A	

Note: A = Acceptable; N = Not provided/applicable; SW = See worksheet; ND = No compounds detected; R = Rinsate; FB = Field blank; D = Duplicate; TB = Trip blank; EB = Equipment blank; SB=Source blank; OTHER:

	Client ID	Sample ID	Lab ID	Matrix	Date
1	ERH1294	B2103206B-001	BA29552	Water	03/24/21
2	ERH1295	-002	BA29553	Water	03/24/21
3	ERH1294MS	-001MS	BA29552MS	Water	03/24/21
4	ERH1294MSD	-001MSD	BA29552MSD	Water	03/24/21
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Notes:

1	MB-154820						