

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

March 31, 2022

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

Dear Ms. Ramos,

Enclosed are the final validation reports for the fractions listed below. These SDGs were received on September 29, 2021. Attachment 1 is a summary of the samples that were reviewed for each analysis.

Revision: Added qualifiers to TPH as Extractables due to blank contamination.

LDC Project #51261U&V:

<u>SDG #</u>	<u>Fraction</u>
97004, 97159	Volatiles, PAHs, GRO, TPH as Extractables

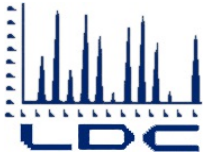
The data validation was performed under Stage 2B validation guidelines. The analyses were validated using the following documents and variances, as applicable to each method:

- 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 (DoD) Quality Systems Manual (QSM) for Environmental Laboratories, Version 5.3 (2019)
- DoD General Validation Guidelines (November 2019)
- U.S. Department of Defense (DoD) Data Validation Guidelines Module 1: Data Validation Procedure for Organic Analysis by GC/MS (May 2020)
- U.S. Department of Defense (DoD) 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; update VI, July 2018

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

Sincerely,

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



LABORATORY DATA CONSULTANTS, INC.

2701 Loker Ave. West, Suite 220, Carlsbad, CA 92010 Bus: 760-827-1100 Fax: 760-827-1099

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

November 4, 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. These SDGs were received on September 29, 2021. Attachment 1 is a summary of the samples that were reviewed for each analysis.

LDC Project #51261U&V:

<u>SDG #</u>	<u>Fraction</u>
97004, 97159	Volatiles, PAHs, GRO, TPH 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 (DoD) Quality Systems Manual (QSM) for Environmental Laboratories, Version 5.3 (2019)
- DoD General Validation Guidelines (November 2019)
- U.S. Department of Defense (DoD) Data Validation Guidelines Module 1: Data Validation Procedure for Organic Analysis by GC/MS (May 2020)
- U.S. Department of Defense (DoD) 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 I, 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; update VI, July 2018

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

Sincerely,

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

Laboratory Data Consultants, Inc. Data Validation Report

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

LDC Report Date: October 7, 2021

Parameters: Volatiles

Validation Level: Stage 2B

Laboratory: APPL, Inc., Clovis, CA

Sample Delivery Group (SDG): 97004

Sample Identification	Laboratory Sample Identification	Matrix	Collection Date
ERH1548	BA37020	Water	07/29/21
ERH1549	BA37021	Water	07/29/21
ERH1550	BA37023	Water	07/29/21
ERH1551	BA37024	Water	07/29/21
ERH1552	BA37026	Water	07/29/21
ERH1553	BA37027	Water	07/29/21
ERH1554	BA37029	Water	07/29/21
ERH1555	BA37030	Water	07/29/21

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) which are Benzene, Toluene, and Ethylbenzene, Xylenes (BTEX) by Environmental Protection Agency (EPA) SW 846 Method 8260B

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. GC/MS Instrument Performance Check

A bromofluorobenzene (BFB) 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 15.0% 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 20.0% for all analytes.

IV. 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.

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

Samples ERH1548, ERH1550, ERH1552, and ERH1554 were identified as trip blanks. 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 with the following exceptions:

Sample	Surrogate	%R (Limits)	Affected Analyte	Flag	A or P
ERH1548	Toluene-d8	114 (89-112)	All analytes	NA	-
ERH1553	Bromofluorobenzene	118 (85-114)	All analytes	NA	-
ERH1554	Toluene-d8	114 (89-112)	All analytes	NA	-

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 or recommended for exclusion in this SDG.

**Red Hill Bulk Storage Facility, CTO 18F0126
Volatiles - Data Qualification Summary - SDG 97004**

No Sample Data Qualified in this SDG

**Red Hill Bulk Storage Facility, CTO 18F0126
Volatiles - Laboratory Blank Data Qualification Summary - SDG 97004**

No Sample Data Qualified in this SDG

**Red Hill Bulk Storage Facility, CTO 18F0126
Volatiles - Field Blank Data Qualification Summary - SDG 97004**

No Sample Data Qualified in this SDG

LDC #: 51261U1a

VALIDATION COMPLETENESS WORKSHEET

Date: 10/4/21

SDG #: 97004

Stage 2B

Page: 1 of 1

Laboratory: APPL, Inc., Clovis, CA

Reviewer: [Signature]
2nd Reviewer: [Signature]

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

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 / Δ	
II.	GC/MS Instrument performance check	Δ	
III.	Initial calibration/ICV	Δ, Δ	% PSD ≤ 15 ICV ≤ 20
IV.	Continuing calibration	Δ	CV ≤ 20
V.	Laboratory Blanks	A	
VI.	Field blanks	NN	TB = 1, 3, 5, 7
VII.	Surrogate spikes	SW	
VIII.	Matrix spike/Matrix spike duplicates	N	CS
IX.	Laboratory control samples	Δ	LCSD
X.	Field duplicates	N	
XI.	Internal standards	Δ	
XII.	Target analyte quantitation	N	
XIII.	Target analyte identification	N	
XIV.	System performance	N	
XV.	Overall assessment of data	Δ	

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	ERH1548 TB	BA37020	Water	07/29/21
2	ERH1549	BA37021	Water	07/29/21
3	ERH1550 TB	BA37023	Water	07/29/21
4	ERH1551	BA37024	Water	07/29/21
5	ERH1552 TB	BA37026	Water	07/29/21
6	ERH1553	BA37027	Water	07/29/21
7	ERH1554 TB	BA37029	Water	07/29/21
8	ERH1555	BA37030	Water	07/29/21
9				

Notes:

1	210810AT-BIK				
2	210811AT-BIK				

VALIDATION FINDINGS WORKSHEET
Surrogate Spikes

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

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

(5)

- Y N N/A Were all surrogate %R within QC limits?
- Y N N/A If the percent recovery (%R) for one or more surrogates was out of QC limits, was a reanalysis performed to confirm samples with %R out of outside of criteria?

#	Sample ID	Surrogate	%Recovery (I limits)	Qualifications
	1	Tol	114 (89-112)	J ⁺ dū / P ND
			()	
			()	
	6	BFB	118 (85-114)	J ⁺ dū / P ND
			()	
			()	
	7	Tol	114 (89-112)	J ⁺ dū / P ND
			()	
			()	
			()	
			()	
			()	
			()	
			()	
			()	
			()	

SMC1 (TOL) = Toluene-d8
 SMC2 (BFB) = Bromofluorobenzene
 SMC3 (DCE) = 1,2-Dichloroethane-d4
 SMC4 (DFM) = Dibromofluoromethane

Laboratory Data Consultants, Inc. Data Validation Report

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

LDC Report Date: October 7, 2021

Parameters: Polynuclear Aromatic Hydrocarbons

Validation Level: Stage 2B

Laboratory: APPL, Inc., Clovis, CA

Sample Delivery Group (SDG): 97004

Sample Identification	Laboratory Sample Identification	Matrix	Collection Date
ERH1549	BA37021	Water	07/29/21
ERH1551	BA37024	Water	07/29/21
ERH1553	BA37027	Water	07/29/21
ERH1555	BA37030	Water	07/29/21

Introduction

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The analyses were performed by the following method:

Polynuclear Aromatic Hydrocarbons (PAHs) which are 1-Methylnaphthalene, 2-Methylnaphthalene, and Naphthalene by Environmental Protection Agency (EPA) SW 846 Method 8270D in Selected Ion Monitoring (SIM) mode

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).
- UU (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, r², %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. 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 15.0% 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 20.0% for all analytes.

IV. 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.

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

No field blanks were identified in this SDG.

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 or recommended for exclusion in this SDG.

**Red Hill Bulk Storage Facility, CTO 18F0126
Polynuclear Aromatic Hydrocarbons - Data Qualification Summary - SDG 97004**

No Sample Data Qualified in this SDG

**Red Hill Bulk Storage Facility, CTO 18F0126
Polynuclear Aromatic Hydrocarbons - Laboratory Blank Data Qualification
Summary - SDG 97004**

No Sample Data Qualified in this SDG

**Red Hill Bulk Storage Facility, CTO 18F0126
Polynuclear Aromatic Hydrocarbons - Field Blank Data Qualification Summary -
SDG 97004**

No Sample Data Qualified in this SDG

LDC #: 51261U2b

VALIDATION COMPLETENESS WORKSHEET

SDG #: 97004

Stage 2B

Laboratory: APPL, Inc., Clovis, CA

Date: 10/4/21

Page: 1 of 1

Reviewer: [Signature]

2nd Reviewer: [Signature]

METHOD: GC/MS Polynuclear Aromatic Hydrocarbons (EPA SW 846 Method 8270D-SIM)

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 / Δ	
II.	GC/MS Instrument performance check	Δ	
III.	Initial calibration/ICV	Δ / Δ	0% PSD ≤ 15 ICV ≤ 20
IV.	Continuing calibration <i>pending</i>	Δ	CV ≤ 20 / SD
V.	Laboratory Blanks	A	
VI.	Field blanks	N	
VII.	Surrogate spikes	Δ	
VIII.	Matrix spike/Matrix spike duplicates	N	CS
IX.	Laboratory control samples	A	LOST
X.	Field duplicates	N	
XI.	Internal standards		
XII.	Target analyte quantitation	N	
XIII.	Target analyte identification	N	
XIV.	System performance	N	
XV.	Overall assessment of data		

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 ⁺	ERH1549	BA37021	Water	07/29/21
2 ⁺	ERH1551	BA37024	Water	07/29/21
3 ⁺	ERH1553	BA37027	Water	07/29/21
4 ⁻	ERH1555	BA37030	Water	07/29/21
5				
6				
7				
8				
9				

Notes:

210402A				

Laboratory Data Consultants, Inc. Data Validation Report

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

LDC Report Date: October 8, 2021

Parameters: Gasoline Range Organics

Validation Level: Stage 2B

Laboratory: APPL, Inc., Clovis, CA

Sample Delivery Group (SDG): 97004

Sample Identification	Laboratory Sample Identification	Matrix	Collection Date
ERH1548	BA37020	Water	07/29/21
ERH1549	BA37021	Water	07/29/21
ERH1550	BA37023	Water	07/29/21
ERH1551	BA37024	Water	07/29/21
ERH1552	BA37026	Water	07/29/21
ERH1553	BA37027	Water	07/29/21
ERH1554	BA37029	Water	07/29/21
ERH1555	BA37030	Water	07/29/21

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 4: Data Validation Procedure for Organic Analysis by GC (March 2021). 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:

Gasoline Range Organics by Environmental Protection Agency (EPA) SW 846 Method 8260B

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).
- UU (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, r², %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.

A curve fit, based on the initial calibration, was established for quantitation. The coefficient of determination (r^2) was greater than or equal to 0.990.

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

III. Continuing Calibration

Continuing calibration was performed at the required frequencies.

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

IV. Laboratory Blanks

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

V. Field Blanks

Samples ERH1548, ERH1550, ERH1552, and ERH1554 were identified as trip blanks. No contaminants were found.

VI. Surrogates

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

Sample	Surrogate	%R (Limits)	Affected Analyte	Flag	A or P
ERH1553	Bromofluorobenzene	118 (85-114)	Gasoline range organics	NA	-

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. 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.

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 or recommended for exclusion in this SDG.

**Red Hill Bulk Storage Facility, CTO 18F0126
Gasoline Range Organics - Data Qualification Summary - SDG 97004**

No Sample Data Qualified in this SDG

**Red Hill Bulk Storage Facility, CTO 18F0126
Gasoline Range Organics - Laboratory Blank Data Qualification Summary - SDG
97004**

No Sample Data Qualified in this SDG

**Red Hill Bulk Storage Facility, CTO 18F0126
Gasoline Range Organics - Field Blank Data Qualification Summary - SDG 97004**

No Sample Data Qualified in this SDG

LDC #: 51261U7

VALIDATION COMPLETENESS WORKSHEET

Date: 10/4/21

SDG #: 97004

Stage 2B

Page: 1 of 1

Laboratory: APPL, Inc., Clovis, CA

Reviewer: [Signature]

2nd Reviewer: [Signature]

METHOD: GC/MS Gasoline Range Organics (EPA SW 846 Method 8260B)

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 / Δ	
II.	GC/MS Instrument performance check	Δ	
III.	Initial calibration/ICV	Δ / Δ	ICV ≤ 20
IV.	Continuing calibration	Δ	CCV ≤ 20
V.	Laboratory Blanks	Δ	
VI.	Field blanks	ND	TB = 1, 3, 5, 7
VII.	Surrogate spikes	SW	
VIII.	Matrix spike/Matrix spike duplicates	N	CS
IX.	Laboratory control samples	Δ	LCSD
X.	Field duplicates	N	
XI.	Internal standards	Δ	
XII.	Target analyte quantitation	N	
XIII.	Target analyte identification	N	
XIV.	System performance	N	
XV.	Overall assessment of data	Δ	

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	ERH1548 TB	BA37020	Water	07/29/21
2	ERH1549	BA37021	Water	07/29/21
3	ERH1550 TB	BA37023	Water	07/29/21
4	ERH1551	BA37024	Water	07/29/21
5	ERH1552 TB	BA37026	Water	07/29/21
6	ERH1553	BA37027	Water	07/29/21
7	ERH1554 TB	BA37029	Water	07/29/21
8	ERH1555	BA37030	Water	07/29/21
9				

Notes:

1	210810AT				
2	210811AT				

Laboratory Data Consultants, Inc. Data Validation Report

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

LDC Report Date: October 8, 2021

Parameters: Total Petroleum Hydrocarbons as Extractables

Validation Level: Stage 2B

Laboratory: APPL, Inc., Clovis, CA

Sample Delivery Group (SDG): 97004

Sample Identification	Laboratory Sample Identification	Matrix	Collection Date
ERH1549	BA37021	Water	07/29/21
ERH1551	BA37024	Water	07/29/21
ERH1553	BA37027	Water	07/29/21
ERH1555	BA37030	Water	07/29/21
ERH1549(SGCU)	BA37021(SGCU)	Water	07/29/21
ERH1551(SGCU)	BA37024(SGCU)	Water	07/29/21
ERH1553(SGCU)	BA37027(SGCU)	Water	07/29/21
ERH1555(SGCU)	BA37030(SGCU)	Water	07/29/21

Samples appended with "SGCU" underwent Silica Gel cleanup

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 8015B

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).
- UU (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, r², %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.

For analytes where average calibration factors were utilized, percent relative standard deviations (%RSD) were less than or equal to 20.0%.

In the case where the laboratory used a calibration curve to evaluate the analytes, all coefficients of determination (r^2) were greater than or equal to 0.990.

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

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. 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.

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 or recommended for exclusion in this SDG.

**Red Hill Bulk Storage Facility, CTO 18F0126
Total Petroleum Hydrocarbons as Extractables - Data Qualification Summary -
SDG 97004**

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 97004**

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 97004**

No Sample Data Qualified in this SDG

LDC #: 51261U8

VALIDATION COMPLETENESS WORKSHEET

Date: 10/4/21

SDG #: 97004

Stage 2B

Page: 1 of 1

Laboratory: APPL, Inc., Clovis, CA

Reviewer: FE

2nd Reviewer: FE

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

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, 1 ² ICV ≤ 20
III.	Continuing calibration	Δ	CW ≤ 20
IV.	Laboratory Blanks	A	
V.	Field blanks	N	
VI.	Surrogate spikes	A	
VII.	Matrix spike/Matrix spike duplicates	N	CS
VIII.	Laboratory control samples	A	les ID
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	Lab ID	Matrix	Date
1 †	ERH1549	BA37021	Water	07/29/21
2	ERH1551	BA37024	Water	07/29/21
3	ERH1553	BA37027	Water	07/29/21
4	ERH1555	BA37030	Water	07/29/21
5	ERH1549(SGCU)	BA37021(SGCU)	Water	07/29/21
6	ERH1551(SGCU)	BA37024(SGCU)	Water	07/29/21
7	ERH1553(SGCU)	BA37027(SGCU)	Water	07/29/21
8	ERH1555(SGCU)	BA37030(SGCU)	Water	07/29/21
9				
10				
11				
12				
13				

Notes:

210803 A-BLK				
210803 A1-BLK				

Laboratory Data Consultants, Inc. Data Validation Report

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

LDC Report Date: October 7, 2021

Parameters: Volatiles

Validation Level: Stage 2B

Laboratory: APPL, Inc., Clovis, CA

Sample Delivery Group (SDG): 97159

Sample Identification	Laboratory Sample Identification	Matrix	Collection Date
ERH1583	BA37729	Water	08/12/21
ERH1584	BA37730	Water	08/12/21
ERH1585	BA37732	Water	08/12/21
ERH1586	BA37733	Water	08/12/21
ERH1587	BA37735	Water	08/12/21
ERH1588	BA37736	Water	08/12/21
ERH1589	BA37738	Water	08/12/21
ERH1590	BA37739	Water	08/12/21

Introduction

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The analyses were performed by the following method:

Volatile Organic Compounds (VOCs) which are Benzene, Toluene, and Ethylbenzene, Xylenes (BTEX) by Environmental Protection Agency (EPA) SW 846 Method 8260B

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).
- UU (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, r², %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. GC/MS Instrument Performance Check

A bromofluorobenzene (BFB) 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 15.0% 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 20.0% for all analytes.

IV. 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.

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

Samples ERH1583, ERH1585, ERH1587, and ERH1589 were identified as trip blanks. 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. 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 or recommended for exclusion in this SDG.

Red Hill Bulk Storage Facility, CTO 18F0126
Volatiles - Data Qualification Summary - SDG 97159

No Sample Data Qualified in this SDG

Red Hill Bulk Storage Facility, CTO 18F0126
Volatiles - Laboratory Blank Data Qualification Summary - SDG 97159

No Sample Data Qualified in this SDG

Red Hill Bulk Storage Facility, CTO 18F0126
Volatiles - Field Blank Data Qualification Summary - SDG 97159

No Sample Data Qualified in this SDG

LDC #: 51261V1a

VALIDATION COMPLETENESS WORKSHEET

Date: 10/4/21

SDG #: 97159

Stage 2B

Page: 1 of 1

Laboratory: APPL, Inc., Clovis, CA

Reviewer: [Signature]
2nd Reviewer: [Signature]

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

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	Δ/Δ	
II.	GC/MS Instrument performance check	Δ	
III.	Initial calibration/ICV	Δ/Δ	% RSD ≤ 15 ICV ≤ 20
IV.	Continuing calibration <i>fending</i>	Δ	CW ≤ 20 SD
V.	Laboratory Blanks	A	
VI.	Field blanks	ND	TB = 1, 3, 5, 7
VII.	Surrogate spikes	Δ	
VIII.	Matrix spike/Matrix spike duplicates	N	CS
IX.	Laboratory control samples	Δ	LSID
X.	Field duplicates	N	
XI.	Internal standards	Δ	
XII.	Target analyte quantitation	N	
XIII.	Target analyte identification	N	
XIV.	System performance	N	
XV.	Overall assessment of data	Δ	

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

	Client ID	Lab ID	Matrix	Date
1	ERH1583 TB	BA37729	Water	08/12/21
2	ERH1584	BA37730	Water	08/12/21
3	ERH1585 TB	BA37732	Water	08/12/21
4	ERH1586	BA37733	Water	08/12/21
5	ERH1587 TB	BA37735	Water	08/12/21
6	ERH1588	BA37736	Water	08/12/21
7	ERH1589 TB	BA37738	Water	08/12/21
8	ERH1590	BA37739	Water	08/12/21
9				

Notes:

210825 AM					

**Laboratory Data Consultants, Inc.
Data Validation Report**

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

LDC Report Date: October 7, 2021

Parameters: Polynuclear Aromatic Hydrocarbons

Validation Level: Stage 2B

Laboratory: APPL, Inc., Clovis, CA

Sample Delivery Group (SDG): 97159

Sample Identification	Laboratory Sample Identification	Matrix	Collection Date
ERH1584	BA37730	Water	08/12/21
ERH1586	BA37733	Water	08/12/21
ERH1588	BA37736	Water	08/12/21
ERH1590	BA37739	Water	08/12/21

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:

Polynuclear Aromatic Hydrocarbons (PAHs) which are 1-Methylnaphthalene, 2-Methylnaphthalene, and Naphthalene by Environmental Protection Agency (EPA) SW 846 Method 8270D in Selected Ion Monitoring (SIM) mode

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).
- UU (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, r², %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. 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 15.0% 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 20.0% for all analytes.

IV. 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.

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

No field blanks were identified in this SDG.

VII. Surrogates

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

Sample	Surrogate	%R (Limits)	Affected Analyte	Flag	A or P
ERH1588	Fluoranthene-d10	41.1 (58-120)	All analytes	UJ (all non-detects)	P

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 or recommended for exclusion in this SDG.

Due to surrogate %R, data were qualified as estimated in one sample.

**Red Hill Bulk Storage Facility, CTO 18F0126
Polynuclear Aromatic Hydrocarbons - Data Qualification Summary - SDG 97159**

Sample	Analyte	Flag	A or P	Reason (Code)
ERH1588	All analytes	UJ (all non-detects)	P	Surrogates (%R) (s)

**Red Hill Bulk Storage Facility, CTO 18F0126
Polynuclear Aromatic Hydrocarbons - Laboratory Blank Data Qualification
Summary - SDG 97159**

No Sample Data Qualified in this SDG

**Red Hill Bulk Storage Facility, CTO 18F0126
Polynuclear Aromatic Hydrocarbons - Field Blank Data Qualification Summary -
SDG 97159**

No Sample Data Qualified in this SDG

LDC #: 51261V2b

VALIDATION COMPLETENESS WORKSHEET

Date: 10/4/21

SDG #: 97159

Stage 2B

Page: 1 of 1

Laboratory: APPL, Inc., Clovis, CA

Reviewer: [Signature]
2nd Reviewer: [Signature]

METHOD: GC/MS Polynuclear Aromatic Hydrocarbons (EPA SW 846 Method 8270D-SIM)

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	A	
III.	Initial calibration/ICV	A/A	% RSD ≤ 15 ICV ≤ 20
IV.	Continuing calibration <i>tending</i>	A	CV ≤ 20/50
V.	Laboratory Blanks	A	
VI.	Field blanks	N	
VII.	Surrogate spikes	SW	
VIII.	Matrix spike/Matrix spike duplicates	N	CS
IX.	Laboratory control samples	A	100%
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 ND = No compounds detected D = Duplicate SB=Source blank
 N = Not provided/applicable R = Rinsate TB = Trip blank OTHER:
 SW = See worksheet FB = Field blank EB = Equipment blank

	Client ID	Lab ID	Matrix	Date
1 ⁺	ERH1584	BA37730	Water	08/12/21
2 [↓]	ERH1586	BA37733	Water	08/12/21
3 [~]	ERH1588	BA37736	Water	08/12/21
4 ⁻	ERH1590	BA37739	Water	08/12/21
5				
6				
7				
8				
9				

Notes:

210817A				

Laboratory Data Consultants, Inc. Data Validation Report

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

LDC Report Date: October 8, 2021

Parameters: Gasoline Range Organics

Validation Level: Stage 2B

Laboratory: APPL, Inc., Clovis, CA

Sample Delivery Group (SDG): 97159

Sample Identification	Laboratory Sample Identification	Matrix	Collection Date
ERH1583	BA37729	Water	08/12/21
ERH1584	BA37730	Water	08/12/21
ERH1585	BA37732	Water	08/12/21
ERH1586	BA37733	Water	08/12/21
ERH1587	BA37735	Water	08/12/21
ERH1588	BA37736	Water	08/12/21
ERH1589	BA37738	Water	08/12/21
ERH1590	BA37739	Water	08/12/21

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 4: Data Validation Procedure for Organic Analysis by GC (March 2021). 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:

Gasoline Range Organics by Environmental Protection Agency (EPA) SW 846 Method 8260B

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).
- UU (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, r², %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.

A curve fit, based on the initial calibration, was established for quantitation. The coefficient of determination (r^2) was greater than or equal to 0.990.

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

III. Continuing Calibration

Continuing calibration was performed at the required frequencies.

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

IV. Laboratory Blanks

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

V. Field Blanks

Samples ERH1583, ERH1585, ERH1587, and ERH1589 were identified as trip blanks. No contaminants were found.

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

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. 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.

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 or recommended for exclusion in this SDG.

**Red Hill Bulk Storage Facility, CTO 18F0126
Gasoline Range Organics - Data Qualification Summary - SDG 97159**

No Sample Data Qualified in this SDG

**Red Hill Bulk Storage Facility, CTO 18F0126
Gasoline Range Organics - Laboratory Blank Data Qualification Summary - SDG
97159**

No Sample Data Qualified in this SDG

**Red Hill Bulk Storage Facility, CTO 18F0126
Gasoline Range Organics - Field Blank Data Qualification Summary - SDG 97159**

No Sample Data Qualified in this SDG

LDC #: 51261V7
 SDG #: 97159
 Laboratory: APPL, Inc., Clovis, CA

VALIDATION COMPLETENESS WORKSHEET
 Stage 2B

Date: 10/4/21
 Page: 1 of 1
 Reviewer: [Signature]
 2nd Reviewer: [Signature]

METHOD: GC/MS Gasoline Range Organics (EPA SW 846 Method 8260B)

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/Δ	
II.	GC/MS Instrument performance check	Δ	
III.	Initial calibration/ICV	Δ/Δ	✓ ICV = 20
IV.	Continuing calibration	Δ	CW = 20
V.	Laboratory Blanks	Δ	
VI.	Field blanks	ND	TB = 1, 3, 5, 7
VII.	Surrogate spikes	Δ	
VIII.	Matrix spike/Matrix spike duplicates	N	CS
IX.	Laboratory control samples	Δ	LESID
X.	Field duplicates	N	
XI.	Internal standards	Δ	
XII.	Target analyte quantitation	N	
XIII.	Target analyte identification	N	
XIV.	System performance	N	
XV.	Overall assessment of data	Δ	

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

	Client ID	Lab ID	Matrix	Date
1	ERH1583 TP	BA37729	Water	08/12/21
2	ERH1584	BA37730	Water	08/12/21
3	ERH1585 TB	BA37732	Water	08/12/21
4	ERH1586	BA37733	Water	08/12/21
5	ERH1587 TP	BA37735	Water	08/12/21
6	ERH1588	BA37736	Water	08/12/21
7	ERH1589 TP	BA37738	Water	08/12/21
8	ERH1590	BA37739	Water	08/12/21
9				

Notes:

2 10x25 AM				

Laboratory Data Consultants, Inc. Data Validation Report

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

LDC Report Date: March 31, 2022

Parameters: Total Petroleum Hydrocarbons as Extractables

Validation Level: Stage 2B

Laboratory: APPL, Inc., Clovis, CA

Sample Delivery Group (SDG): 97159

Sample Identification	Laboratory Sample Identification	Matrix	Collection Date
ERH1584	BA37730	Water	08/12/21
ERH1586	BA37733	Water	08/12/21
ERH1588	BA37736	Water	08/12/21
ERH1590	BA37739	Water	08/12/21
ERH1584(SGCU)	BA37730(SGCU)	Water	08/12/21
ERH1586(SGCU)	BA37733(SGCU)	Water	08/12/21
ERH1588(SGCU)	BA37736(SGCU)	Water	08/12/21
ERH1590(SGCU)	BA37739(SGCU)	Water	08/12/21

Samples appended with "SGCU" underwent Silica Gel cleanup

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 4: Data Validation Procedure for Organic Analysis by GC (March 2021). 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:

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

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).
- UU (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.

For analytes where average calibration factors were utilized, percent relative standard deviations (%RSD) were less than or equal to 20.0%.

In the case where the laboratory used a calibration curve to evaluate the analytes, all coefficients of determination (r^2) were greater than or equal to 0.990.

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 with the following exceptions:

Blank ID	Extraction Date	Analyte	Concentration	Associated Samples
210818A-BLK	08/18/21	Diesel (C10-C24) Oil (C24-C40)	160 ug/L 230 ug/L	ERH1584 ERH1586 ERH1588 ERH1590

Sample concentrations were compared to concentrations detected in the laboratory blanks. 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
ERH1584	Diesel (C10-C24) Oil (C24-C40)	200 ug/L 160 ug/L	300.0U ug/L 300.0U ug/L

Sample	Analyte	Reported Concentration	Modified Final Concentration
ERH1586	Oil (C24-C40)	480 ug/L	480J+ ug/L
ERH1588	Diesel (C10-C24) Oil (C24-C40)	350 ug/L 790 ug/L	350J+ ug/L 790J+ ug/L
ERH1590	Oil (C24-C40)	480 ug/L	480J+ ug/L

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

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. 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.

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 or recommended for exclusion in this SDG.

Due to laboratory blank contamination, data were qualified as not detected or estimated in four samples.

**Red Hill Bulk Storage Facility, CTO 18F0126
 Total Petroleum Hydrocarbons as Extractables - Data Qualification Summary -
 SDG 97159**

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 97159**

Sample	Analyte	Modified Final Concentration	A or P	Code
ERH1584	Diesel (C10-C24) Oil (C24-C40)	300.0U ug/L 300.0U ug/L	A	b
ERH1586	Oil (C24-C40)	480J+ ug/L	A	b
ERH1588	Diesel (C10-C24) Oil (C24-C40)	350J+ ug/L 790J+ ug/L	A	b
ERH1590	Oil (C24-C40)	480J+ ug/L	A	b

**Red Hill Bulk Storage Facility, CTO 18F0126
 Total Petroleum Hydrocarbons as Extractables - Field Blank Data Qualification
 Summary - SDG 97159**

No Sample Data Qualified in this SDG

LDC #: 51261V8

VALIDATION COMPLETENESS WORKSHEET

SDG #: 97159

Stage 2B

Laboratory: APPL, Inc., Clovis, CA

Date: 10/4/21

Page: 1 of 1

Reviewer: [Signature]

2nd Reviewer: [Signature]

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

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	0% PSD ≤ 20 , 12 ICV ≤ 20
III.	Continuing calibration	A	CCV ≤ 20
IV.	Laboratory Blanks	9/N	
V.	Field blanks	N	
VI.	Surrogate spikes	A	
VII.	Matrix spike/Matrix spike duplicates	N	CD
VIII.	Laboratory control samples	A	LCS ID
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	Lab ID	Matrix	Date
1	ERH1584	BA37730	Water	08/12/21
2	ERH1586	BA37733	Water	08/12/21
3	ERH1588	BA37736	Water	08/12/21
4	ERH1590	BA37739	Water	08/12/21
5	ERH1584(SGCU)	BA37730(SGCU)	Water	08/12/21
6	ERH1586(SGCU)	BA37733(SGCU)	Water	08/12/21
7	ERH1588(SGCU)	BA37736(SGCU)	Water	08/12/21
8	ERH1590(SGCU)	BA37739(SGCU)	Water	08/12/21
9				
10				
11				
12				
13				

Notes:

	210818A			
	210818A1			

LDC #: 5126148

VALIDATION FINDINGS WORKSHEET
Blanks

Page: 1 of 1
Reviewer: FT

METHOD: GC HPLC

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

- N/A Were all samples associated with a given method blank?
- N/A Was a method blank performed for each matrix and whenever a sample extraction procedure was performed? (b)
- N/A Was a method blank performed with each extraction batch?
- N/A Were any contaminants found in the method blanks? If yes, please see findings below.

Level IV/D Only

N/A (Gasoline and aromatics only) Was a method blank analyzed with each 24 hour batch?

N/A Was a method blank analyzed for each analytical / extraction batch of ≤20 samples?

Blank extraction date: 8/18/21 Blank analysis date: 8/24/21 Associated samples: 1 → 4

Conc. units: ug/l

Compound	Blank ID	Sample Identification					
		1	2	3	4		
	210818A-BLK						
Diesel (C10-C24)	160	200 / 300.04	-	350 J ⁺	-		
Oil (C24-C40)	230	160 / ↓	480 J ⁺	790 J ⁺	480 J ⁺		

Blank extraction date: _____ Blank analysis date: _____ Associated samples: _____

Conc. units: _____

Compound	Blank ID	Sample Identification					
		1	2	3	4		

ALL 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".

**Red Hill Bulk Storage Facility, CTO 18F0126 - SDG 97159
LDC 51261**

AECOM

EPA_NO	LAB_ID	DF	ANALYTE	COLL_DATE	ANAL_DATE	QCLev	RESULT	UNITS	LAB_Q	LOQ	LOD	REV	Q_C
METHOD: 8015B_E													
ERH1584	BA37730	1	C10-C24 DIESEL RANGE ORG SILICA GEL CLEAN	8/12/2021 9:48:00 AM	8/31/2021 12:37:00 PM	3	300.0	UG_L	U	320	300.0	U	
ERH1584	BA37730	1	C10-C24 DIESEL RANGE ORGANICS	8/12/2021 9:48:00 AM	8/24/2021 6:50:00 PM	3		UG_L	J	320	300.0	U	b
ERH1584	BA37730	1	C24-C40 OIL RANGE ORGANICS SILICA GEL CLEAN	8/12/2021 9:48:00 AM	8/31/2021 12:37:00 PM	3	300.0	UG_L	U	320	300.0	U	
ERH1584	BA37730	1	C24-C40 TOTAL PETROLEUM HYDROCARBONS, OI	8/12/2021 9:48:00 AM	8/24/2021 6:50:00 PM	3		UG_L	J	320	300.0	U	b
ERH1586	BA37733	1	C10-C24 DIESEL RANGE ORG SILICA GEL CLEAN	8/12/2021 10:47:00 AM	8/31/2021 1:05:00 PM	3	690	UG_L	D	320	300.0		
ERH1586	BA37733	1	C10-C24 DIESEL RANGE ORGANICS	8/12/2021 10:47:00 AM	8/24/2021 7:18:00 PM	3	3000	UG_L		320	300.0		
ERH1586	BA37733	1	C24-C40 OIL RANGE ORGANICS SILICA GEL CLEAN	8/12/2021 10:47:00 AM	8/31/2021 1:05:00 PM	3	300.0	UG_L	U	320	300.0	U	
ERH1586	BA37733	1	C24-C40 TOTAL PETROLEUM HYDROCARBONS, OI	8/12/2021 10:47:00 AM	8/24/2021 7:18:00 PM	3	480	UG_L		320	300.0	J+	b
ERH1588	BA37736	1	C10-C24 DIESEL RANGE ORG SILICA GEL CLEAN	8/12/2021 11:55:00 AM	8/31/2021 1:34:00 PM	3	300.0	UG_L	U	320	300.0	U	
ERH1588	BA37736	1	C10-C24 DIESEL RANGE ORGANICS	8/12/2021 11:55:00 AM	8/24/2021 7:47:00 PM	3	350	UG_L		320	300.0	J+	b
ERH1588	BA37736	1	C24-C40 OIL RANGE ORGANICS SILICA GEL CLEAN	8/12/2021 11:55:00 AM	8/31/2021 1:34:00 PM	3	260	UG_L	JD	320	300.0	J	
ERH1588	BA37736	1	C24-C40 TOTAL PETROLEUM HYDROCARBONS, OI	8/12/2021 11:55:00 AM	8/24/2021 7:47:00 PM	3	790	UG_L		320	300.0	J+	b
ERH1590	BA37739	1	C10-C24 DIESEL RANGE ORG SILICA GEL CLEAN	8/12/2021 8:37:00 AM	8/31/2021 2:02:00 PM	3	300.0	UG_L	U	320	300.0	U	
ERH1590	BA37739	1	C10-C24 DIESEL RANGE ORGANICS	8/12/2021 8:37:00 AM	8/24/2021 8:15:00 PM	3	300.0	UG_L	U	320	300.0	U	
ERH1590	BA37739	1	C24-C40 OIL RANGE ORGANICS SILICA GEL CLEAN	8/12/2021 8:37:00 AM	8/31/2021 2:02:00 PM	3	300.0	UG_L	U	320	300.0	U	
ERH1590	BA37739	1	C24-C40 TOTAL PETROLEUM HYDROCARBONS, OI	8/12/2021 8:37:00 AM	8/24/2021 8:15:00 PM	3	480	UG_L		320	300.0	J+	b
METHOD: 8260B													
ERH1583	BA37729	1	BENZENE	8/12/2021 9:45:00 AM	8/26/2021 4:46:00 AM	3	0.30	UG_L	U	1.0	0.30	U	
ERH1583	BA37729	1	ETHYLBENZENE	8/12/2021 9:45:00 AM	8/26/2021 4:46:00 AM	3	0.50	UG_L	U	1.0	0.50	U	
ERH1583	BA37729	1	PETROLEUM HYDROCARBONS C6-C10	8/12/2021 9:45:00 AM	8/26/2021 4:47:00 AM	3	18.0	UG_L	U	20	18.0	U	
ERH1583	BA37729	1	TOLUENE	8/12/2021 9:45:00 AM	8/26/2021 4:46:00 AM	3	0.30	UG_L	U	1.0	0.30	U	
ERH1583	BA37729	1	Xylenes	8/12/2021 9:45:00 AM	8/26/2021 4:46:00 AM	3	0.30	UG_L	U	2.0	0.30	U	
ERH1584	BA37730	1	BENZENE	8/12/2021 9:48:00 AM	8/26/2021 5:15:00 AM	3	0.30	UG_L	U	1.0	0.30	U	
ERH1584	BA37730	1	ETHYLBENZENE	8/12/2021 9:48:00 AM	8/26/2021 5:15:00 AM	3	0.50	UG_L	U	1.0	0.50	U	
ERH1584	BA37730	1	PETROLEUM HYDROCARBONS C6-C10	8/12/2021 9:48:00 AM	8/26/2021 5:14:00 AM	3	18.0	UG_L	U	20	18.0	U	

EPA_NO	LAB_ID	DF	ANALYTE	COLL_DATE	ANAL_DATE	QCLev	RESULT	UNITS	LAB_Q	LOQ	LOD	REV	Q_C
METHOD: 8260B													
ERH1584	BA37730	1	TOLUENE	8/12/2021 9:48:00 AM	8/26/2021 5:15:00 AM	3	0.30	UG_L	U	1.0	0.30	U	
ERH1584	BA37730	1	Xylenes	8/12/2021 9:48:00 AM	8/26/2021 5:15:00 AM	3	0.30	UG_L	U	2.0	0.30	U	
ERH1585	BA37732	1	BENZENE	8/12/2021 10:43:00 AM	8/26/2021 5:42:00 AM	3	0.30	UG_L	U	1.0	0.30	U	
ERH1585	BA37732	1	ETHYLBENZENE	8/12/2021 10:43:00 AM	8/26/2021 5:42:00 AM	3	0.50	UG_L	U	1.0	0.50	U	
ERH1585	BA37732	1	PETROLEUM HYDROCARBONS C6-C10	8/12/2021 10:43:00 AM	8/26/2021 5:41:00 AM	3	18.0	UG_L	U	20	18.0	U	
ERH1585	BA37732	1	TOLUENE	8/12/2021 10:43:00 AM	8/26/2021 5:42:00 AM	3	0.30	UG_L	U	1.0	0.30	U	
ERH1585	BA37732	1	Xylenes	8/12/2021 10:43:00 AM	8/26/2021 5:42:00 AM	3	0.30	UG_L	U	2.0	0.30	U	
ERH1586	BA37733	1	BENZENE	8/12/2021 10:47:00 AM	8/26/2021 6:09:00 AM	3	0.30	UG_L	U	1.0	0.30	U	
ERH1586	BA37733	1	ETHYLBENZENE	8/12/2021 10:47:00 AM	8/26/2021 6:09:00 AM	3	0.50	UG_L	U	1.0	0.50	U	
ERH1586	BA37733	1	PETROLEUM HYDROCARBONS C6-C10	8/12/2021 10:47:00 AM	8/26/2021 6:10:00 AM	3	18.0	UG_L	U	20	18.0	U	
ERH1586	BA37733	1	TOLUENE	8/12/2021 10:47:00 AM	8/26/2021 6:09:00 AM	3	0.30	UG_L	U	1.0	0.30	U	
ERH1586	BA37733	1	Xylenes	8/12/2021 10:47:00 AM	8/26/2021 6:09:00 AM	3	0.30	UG_L	U	2.0	0.30	U	
ERH1587	BA37735	1	BENZENE	8/12/2021 11:48:00 AM	8/26/2021 6:37:00 AM	3	0.30	UG_L	U	1.0	0.30	U	
ERH1587	BA37735	1	ETHYLBENZENE	8/12/2021 11:48:00 AM	8/26/2021 6:37:00 AM	3	0.50	UG_L	U	1.0	0.50	U	
ERH1587	BA37735	1	PETROLEUM HYDROCARBONS C6-C10	8/12/2021 11:48:00 AM	8/26/2021 6:38:00 AM	3	18.0	UG_L	U	20	18.0	U	
ERH1587	BA37735	1	TOLUENE	8/12/2021 11:48:00 AM	8/26/2021 6:37:00 AM	3	0.30	UG_L	U	1.0	0.30	U	
ERH1587	BA37735	1	Xylenes	8/12/2021 11:48:00 AM	8/26/2021 6:37:00 AM	3	0.30	UG_L	U	2.0	0.30	U	
ERH1588	BA37736	1	BENZENE	8/12/2021 11:55:00 AM	8/26/2021 7:05:00 AM	3	0.30	UG_L	U	1.0	0.30	U	
ERH1588	BA37736	1	ETHYLBENZENE	8/12/2021 11:55:00 AM	8/26/2021 7:05:00 AM	3	0.50	UG_L	U	1.0	0.50	U	
ERH1588	BA37736	1	PETROLEUM HYDROCARBONS C6-C10	8/12/2021 11:55:00 AM	8/26/2021 7:06:00 AM	3	18.0	UG_L	U	20	18.0	U	
ERH1588	BA37736	1	TOLUENE	8/12/2021 11:55:00 AM	8/26/2021 7:05:00 AM	3	0.30	UG_L	U	1.0	0.30	U	
ERH1588	BA37736	1	Xylenes	8/12/2021 11:55:00 AM	8/26/2021 7:05:00 AM	3	0.30	UG_L	U	2.0	0.30	U	
ERH1589	BA37738	1	BENZENE	8/12/2021 8:32:00 AM	8/26/2021 7:33:00 AM	3	0.30	UG_L	U	1.0	0.30	U	
ERH1589	BA37738	1	ETHYLBENZENE	8/12/2021 8:32:00 AM	8/26/2021 7:33:00 AM	3	0.50	UG_L	U	1.0	0.50	U	
ERH1589	BA37738	1	PETROLEUM HYDROCARBONS C6-C10	8/12/2021 8:32:00 AM	8/26/2021 7:34:00 AM	3	18.0	UG_L	U	20	18.0	U	
ERH1589	BA37738	1	TOLUENE	8/12/2021 8:32:00 AM	8/26/2021 7:33:00 AM	3	0.30	UG_L	U	1.0	0.30	U	
ERH1589	BA37738	1	Xylenes	8/12/2021 8:32:00 AM	8/26/2021 7:33:00 AM	3	0.30	UG_L	U	2.0	0.30	U	

EPA_NO	LAB_ID	DF	ANALYTE	COLL_DATE	ANAL_DATE	QCLev	RESULT	UNITS	LAB_Q	LOQ	LOD	REV	Q_C
METHOD: 8260B													
ERH1590	BA37739	1	BENZENE	8/12/2021 8:37:00 AM	8/26/2021 8:02:00 AM	3	0.30	UG_L	U	1.0	0.30	U	
ERH1590	BA37739	1	ETHYLBENZENE	8/12/2021 8:37:00 AM	8/26/2021 8:02:00 AM	3	0.50	UG_L	U	1.0	0.50	U	
ERH1590	BA37739	1	PETROLEUM HYDROCARBONS C6-C10	8/12/2021 8:37:00 AM	8/26/2021 8:01:00 AM	3	18.0	UG_L	U	20	18.0	U	
ERH1590	BA37739	1	TOLUENE	8/12/2021 8:37:00 AM	8/26/2021 8:02:00 AM	3	0.30	UG_L	U	1.0	0.30	U	
ERH1590	BA37739	1	Xylenes	8/12/2021 8:37:00 AM	8/26/2021 8:02:00 AM	3	0.30	UG_L	U	2.0	0.30	U	
METHOD: 8270DSIM													
ERH1584	BA37730	1	1-METHYLNAPHTHALENE	8/12/2021 9:48:00 AM	8/20/2021 1:42:00 PM	3	0.088	UG_L	J	0.2	0.10	J	
ERH1584	BA37730	1	2-METHYLNAPHTHALENE	8/12/2021 9:48:00 AM	8/20/2021 1:42:00 PM	3	0.10	UG_L	U	0.2	0.10	U	
ERH1584	BA37730	1	NAPHTHALENE	8/12/2021 9:48:00 AM	8/20/2021 1:42:00 PM	3	0.10	UG_L	U	0.2	0.10	U	
ERH1586	BA37733	1	1-METHYLNAPHTHALENE	8/12/2021 10:47:00 AM	8/20/2021 2:04:00 PM	3	32	UG_L		0.2	0.10		
ERH1586	BA37733	1	2-METHYLNAPHTHALENE	8/12/2021 10:47:00 AM	8/20/2021 2:04:00 PM	3	26	UG_L		0.2	0.10		
ERH1586	BA37733	1	NAPHTHALENE	8/12/2021 10:47:00 AM	8/20/2021 2:04:00 PM	3	67	UG_L		0.2	0.10		
ERH1588	BA37736	1	1-METHYLNAPHTHALENE	8/12/2021 11:55:00 AM	8/20/2021 2:26:00 PM	3	0.10	UG_L	U	0.2	0.10	UJ	s
ERH1588	BA37736	1	2-METHYLNAPHTHALENE	8/12/2021 11:55:00 AM	8/20/2021 2:26:00 PM	3	0.10	UG_L	U	0.2	0.10	UJ	s
ERH1588	BA37736	1	NAPHTHALENE	8/12/2021 11:55:00 AM	8/20/2021 2:26:00 PM	3	0.10	UG_L	U	0.2	0.10	UJ	s
ERH1590	BA37739	1	1-METHYLNAPHTHALENE	8/12/2021 8:37:00 AM	8/20/2021 2:48:00 PM	3	0.10	UG_L	U	0.2	0.10	U	
ERH1590	BA37739	1	2-METHYLNAPHTHALENE	8/12/2021 8:37:00 AM	8/20/2021 2:48:00 PM	3	0.10	UG_L	U	0.2	0.10	U	
ERH1590	BA37739	1	NAPHTHALENE	8/12/2021 8:37:00 AM	8/20/2021 2:48:00 PM	3	0.10	UG_L	U	0.2	0.10	U	

**Red Hill Bulk Storage Facility, CTO 18F0126 - SDG 97159
LDC 51261**

AECOM

EPA_NO	LAB_ID	DF	ANALYTE	COLL_DATE	ANAL_DATE	QCLev	RESULT	UNITS	LAB_Q	LOQ	LOD	REV	Q_C
METHOD: 8015B_E													
ERH1584	BA37730	1	C10-C24 DIESEL RANGE ORG SILICA GEL CLEAN	8/12/2021 9:48:00 AM	8/31/2021 12:37:00 PM	3	300.0	UG_L	U	320	300.0	U	
ERH1584	BA37730	1	C10-C24 DIESEL RANGE ORGANICS	8/12/2021 9:48:00 AM	8/24/2021 6:50:00 PM	3	200	UG_L	J	320	300.0	J	
ERH1584	BA37730	1	C24-C40 OIL RANGE ORGANICS SILICA GEL CLEAN	8/12/2021 9:48:00 AM	8/31/2021 12:37:00 PM	3	300.0	UG_L	U	320	300.0	U	
ERH1584	BA37730	1	C24-C40 TOTAL PETROLEUM HYDROCARBONS, OI	8/12/2021 9:48:00 AM	8/24/2021 6:50:00 PM	3	160	UG_L	J	320	300.0	J	
ERH1586	BA37733	1	C10-C24 DIESEL RANGE ORG SILICA GEL CLEAN	8/12/2021 10:47:00 AM	8/31/2021 1:05:00 PM	3	690	UG_L	D	320	300.0		
ERH1586	BA37733	1	C10-C24 DIESEL RANGE ORGANICS	8/12/2021 10:47:00 AM	8/24/2021 7:18:00 PM	3	3000	UG_L		320	300.0		
ERH1586	BA37733	1	C24-C40 OIL RANGE ORGANICS SILICA GEL CLEAN	8/12/2021 10:47:00 AM	8/31/2021 1:05:00 PM	3	300.0	UG_L	U	320	300.0	U	
ERH1586	BA37733	1	C24-C40 TOTAL PETROLEUM HYDROCARBONS, OI	8/12/2021 10:47:00 AM	8/24/2021 7:18:00 PM	3	480	UG_L		320	300.0		
ERH1588	BA37736	1	C10-C24 DIESEL RANGE ORG SILICA GEL CLEAN	8/12/2021 11:55:00 AM	8/31/2021 1:34:00 PM	3	300.0	UG_L	U	320	300.0	U	
ERH1588	BA37736	1	C10-C24 DIESEL RANGE ORGANICS	8/12/2021 11:55:00 AM	8/24/2021 7:47:00 PM	3	350	UG_L		320	300.0		
ERH1588	BA37736	1	C24-C40 OIL RANGE ORGANICS SILICA GEL CLEAN	8/12/2021 11:55:00 AM	8/31/2021 1:34:00 PM	3	260	UG_L	JD	320	300.0	J	
ERH1588	BA37736	1	C24-C40 TOTAL PETROLEUM HYDROCARBONS, OI	8/12/2021 11:55:00 AM	8/24/2021 7:47:00 PM	3	790	UG_L		320	300.0		
ERH1590	BA37739	1	C10-C24 DIESEL RANGE ORG SILICA GEL CLEAN	8/12/2021 8:37:00 AM	8/31/2021 2:02:00 PM	3	300.0	UG_L	U	320	300.0	U	
ERH1590	BA37739	1	C10-C24 DIESEL RANGE ORGANICS	8/12/2021 8:37:00 AM	8/24/2021 8:15:00 PM	3	300.0	UG_L	U	320	300.0	U	
ERH1590	BA37739	1	C24-C40 OIL RANGE ORGANICS SILICA GEL CLEAN	8/12/2021 8:37:00 AM	8/31/2021 2:02:00 PM	3	300.0	UG_L	U	320	300.0	U	
ERH1590	BA37739	1	C24-C40 TOTAL PETROLEUM HYDROCARBONS, OI	8/12/2021 8:37:00 AM	8/24/2021 8:15:00 PM	3	480	UG_L		320	300.0		
METHOD: 8260B													
ERH1583	BA37729	1	BENZENE	8/12/2021 9:45:00 AM	8/26/2021 4:46:00 AM	3	0.30	UG_L	U	1.0	0.30	U	
ERH1583	BA37729	1	ETHYLBENZENE	8/12/2021 9:45:00 AM	8/26/2021 4:46:00 AM	3	0.50	UG_L	U	1.0	0.50	U	
ERH1583	BA37729	1	PETROLEUM HYDROCARBONS C6-C10	8/12/2021 9:45:00 AM	8/26/2021 4:47:00 AM	3	18.0	UG_L	U	20	18.0	U	
ERH1583	BA37729	1	TOLUENE	8/12/2021 9:45:00 AM	8/26/2021 4:46:00 AM	3	0.30	UG_L	U	1.0	0.30	U	
ERH1583	BA37729	1	Xylenes	8/12/2021 9:45:00 AM	8/26/2021 4:46:00 AM	3	0.30	UG_L	U	2.0	0.30	U	
ERH1584	BA37730	1	BENZENE	8/12/2021 9:48:00 AM	8/26/2021 5:15:00 AM	3	0.30	UG_L	U	1.0	0.30	U	
ERH1584	BA37730	1	ETHYLBENZENE	8/12/2021 9:48:00 AM	8/26/2021 5:15:00 AM	3	0.50	UG_L	U	1.0	0.50	U	
ERH1584	BA37730	1	PETROLEUM HYDROCARBONS C6-C10	8/12/2021 9:48:00 AM	8/26/2021 5:14:00 AM	3	18.0	UG_L	U	20	18.0	U	

EPA_NO	LAB_ID	DF	ANALYTE	COLL_DATE	ANAL_DATE	QCLev	RESULT	UNITS	LAB_Q	LOQ	LOD	REV	Q_C
METHOD: 8260B													
ERH1584	BA37730	1	TOLUENE	8/12/2021 9:48:00 AM	8/26/2021 5:15:00 AM	3	0.30	UG_L	U	1.0	0.30	U	
ERH1584	BA37730	1	Xylenes	8/12/2021 9:48:00 AM	8/26/2021 5:15:00 AM	3	0.30	UG_L	U	2.0	0.30	U	
ERH1585	BA37732	1	BENZENE	8/12/2021 10:43:00 AM	8/26/2021 5:42:00 AM	3	0.30	UG_L	U	1.0	0.30	U	
ERH1585	BA37732	1	ETHYLBENZENE	8/12/2021 10:43:00 AM	8/26/2021 5:42:00 AM	3	0.50	UG_L	U	1.0	0.50	U	
ERH1585	BA37732	1	PETROLEUM HYDROCARBONS C6-C10	8/12/2021 10:43:00 AM	8/26/2021 5:41:00 AM	3	18.0	UG_L	U	20	18.0	U	
ERH1585	BA37732	1	TOLUENE	8/12/2021 10:43:00 AM	8/26/2021 5:42:00 AM	3	0.30	UG_L	U	1.0	0.30	U	
ERH1585	BA37732	1	Xylenes	8/12/2021 10:43:00 AM	8/26/2021 5:42:00 AM	3	0.30	UG_L	U	2.0	0.30	U	
ERH1586	BA37733	1	BENZENE	8/12/2021 10:47:00 AM	8/26/2021 6:09:00 AM	3	0.30	UG_L	U	1.0	0.30	U	
ERH1586	BA37733	1	ETHYLBENZENE	8/12/2021 10:47:00 AM	8/26/2021 6:09:00 AM	3	0.50	UG_L	U	1.0	0.50	U	
ERH1586	BA37733	1	PETROLEUM HYDROCARBONS C6-C10	8/12/2021 10:47:00 AM	8/26/2021 6:10:00 AM	3	18.0	UG_L	U	20	18.0	U	
ERH1586	BA37733	1	TOLUENE	8/12/2021 10:47:00 AM	8/26/2021 6:09:00 AM	3	0.30	UG_L	U	1.0	0.30	U	
ERH1586	BA37733	1	Xylenes	8/12/2021 10:47:00 AM	8/26/2021 6:09:00 AM	3	0.30	UG_L	U	2.0	0.30	U	
ERH1587	BA37735	1	BENZENE	8/12/2021 11:48:00 AM	8/26/2021 6:37:00 AM	3	0.30	UG_L	U	1.0	0.30	U	
ERH1587	BA37735	1	ETHYLBENZENE	8/12/2021 11:48:00 AM	8/26/2021 6:37:00 AM	3	0.50	UG_L	U	1.0	0.50	U	
ERH1587	BA37735	1	PETROLEUM HYDROCARBONS C6-C10	8/12/2021 11:48:00 AM	8/26/2021 6:38:00 AM	3	18.0	UG_L	U	20	18.0	U	
ERH1587	BA37735	1	TOLUENE	8/12/2021 11:48:00 AM	8/26/2021 6:37:00 AM	3	0.30	UG_L	U	1.0	0.30	U	
ERH1587	BA37735	1	Xylenes	8/12/2021 11:48:00 AM	8/26/2021 6:37:00 AM	3	0.30	UG_L	U	2.0	0.30	U	
ERH1588	BA37736	1	BENZENE	8/12/2021 11:55:00 AM	8/26/2021 7:05:00 AM	3	0.30	UG_L	U	1.0	0.30	U	
ERH1588	BA37736	1	ETHYLBENZENE	8/12/2021 11:55:00 AM	8/26/2021 7:05:00 AM	3	0.50	UG_L	U	1.0	0.50	U	
ERH1588	BA37736	1	PETROLEUM HYDROCARBONS C6-C10	8/12/2021 11:55:00 AM	8/26/2021 7:06:00 AM	3	18.0	UG_L	U	20	18.0	U	
ERH1588	BA37736	1	TOLUENE	8/12/2021 11:55:00 AM	8/26/2021 7:05:00 AM	3	0.30	UG_L	U	1.0	0.30	U	
ERH1588	BA37736	1	Xylenes	8/12/2021 11:55:00 AM	8/26/2021 7:05:00 AM	3	0.30	UG_L	U	2.0	0.30	U	
ERH1589	BA37738	1	BENZENE	8/12/2021 8:32:00 AM	8/26/2021 7:33:00 AM	3	0.30	UG_L	U	1.0	0.30	U	
ERH1589	BA37738	1	ETHYLBENZENE	8/12/2021 8:32:00 AM	8/26/2021 7:33:00 AM	3	0.50	UG_L	U	1.0	0.50	U	
ERH1589	BA37738	1	PETROLEUM HYDROCARBONS C6-C10	8/12/2021 8:32:00 AM	8/26/2021 7:34:00 AM	3	18.0	UG_L	U	20	18.0	U	
ERH1589	BA37738	1	TOLUENE	8/12/2021 8:32:00 AM	8/26/2021 7:33:00 AM	3	0.30	UG_L	U	1.0	0.30	U	
ERH1589	BA37738	1	Xylenes	8/12/2021 8:32:00 AM	8/26/2021 7:33:00 AM	3	0.30	UG_L	U	2.0	0.30	U	

EPA_NO	LAB_ID	DF	ANALYTE	COLL_DATE	ANAL_DATE	QCLev	RESULT	UNITS	LAB_Q	LOQ	LOD	REV	Q_C
METHOD: 8260B													
ERH1590	BA37739	1	BENZENE	8/12/2021 8:37:00 AM	8/26/2021 8:02:00 AM	3	0.30	UG_L	U	1.0	0.30	U	
ERH1590	BA37739	1	ETHYLBENZENE	8/12/2021 8:37:00 AM	8/26/2021 8:02:00 AM	3	0.50	UG_L	U	1.0	0.50	U	
ERH1590	BA37739	1	PETROLEUM HYDROCARBONS C6-C10	8/12/2021 8:37:00 AM	8/26/2021 8:01:00 AM	3	18.0	UG_L	U	20	18.0	U	
ERH1590	BA37739	1	TOLUENE	8/12/2021 8:37:00 AM	8/26/2021 8:02:00 AM	3	0.30	UG_L	U	1.0	0.30	U	
ERH1590	BA37739	1	Xylenes	8/12/2021 8:37:00 AM	8/26/2021 8:02:00 AM	3	0.30	UG_L	U	2.0	0.30	U	
METHOD: 8270DSIM													
ERH1584	BA37730	1	1-METHYLNAPHTHALENE	8/12/2021 9:48:00 AM	8/20/2021 1:42:00 PM	3	0.088	UG_L	J	0.2	0.10	J	
ERH1584	BA37730	1	2-METHYLNAPHTHALENE	8/12/2021 9:48:00 AM	8/20/2021 1:42:00 PM	3	0.10	UG_L	U	0.2	0.10	U	
ERH1584	BA37730	1	NAPHTHALENE	8/12/2021 9:48:00 AM	8/20/2021 1:42:00 PM	3	0.10	UG_L	U	0.2	0.10	U	
ERH1586	BA37733	1	1-METHYLNAPHTHALENE	8/12/2021 10:47:00 AM	8/20/2021 2:04:00 PM	3	32	UG_L		0.2	0.10		
ERH1586	BA37733	1	2-METHYLNAPHTHALENE	8/12/2021 10:47:00 AM	8/20/2021 2:04:00 PM	3	26	UG_L		0.2	0.10		
ERH1586	BA37733	1	NAPHTHALENE	8/12/2021 10:47:00 AM	8/20/2021 2:04:00 PM	3	67	UG_L		0.2	0.10		
ERH1588	BA37736	1	1-METHYLNAPHTHALENE	8/12/2021 11:55:00 AM	8/20/2021 2:26:00 PM	3	0.10	UG_L	U	0.2	0.10	UJ	s
ERH1588	BA37736	1	2-METHYLNAPHTHALENE	8/12/2021 11:55:00 AM	8/20/2021 2:26:00 PM	3	0.10	UG_L	U	0.2	0.10	UJ	s
ERH1588	BA37736	1	NAPHTHALENE	8/12/2021 11:55:00 AM	8/20/2021 2:26:00 PM	3	0.10	UG_L	U	0.2	0.10	UJ	s
ERH1590	BA37739	1	1-METHYLNAPHTHALENE	8/12/2021 8:37:00 AM	8/20/2021 2:48:00 PM	3	0.10	UG_L	U	0.2	0.10	U	
ERH1590	BA37739	1	2-METHYLNAPHTHALENE	8/12/2021 8:37:00 AM	8/20/2021 2:48:00 PM	3	0.10	UG_L	U	0.2	0.10	U	
ERH1590	BA37739	1	NAPHTHALENE	8/12/2021 8:37:00 AM	8/20/2021 2:48:00 PM	3	0.10	UG_L	U	0.2	0.10	U	