



# 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](mailto:alethea.ramos@aecom.com)

November 11, 2021

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

Dear Ms. Ramos,

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

## LDC Project #52421:

<u>SDG #</u>	<u>Fraction</u>
B21100171	Diesel Range Organics
B21100756	

The data validation was performed under Stage 2B validation guidelines. The analysis was validated using the following documents and variances, as applicable to the 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 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](mailto:scuenco@lab-data.com)

90/10 2B/4 EDD

**LDC# 52421 (AECOM - Honolulu, HI / Red Hill Bulk Storage Facility, CTO 18F0126)**

LDC	SDG#	DATE REC'D	(2) DATE DUE	DRO (8015C)																												
				W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W
Matrix: Water/Soil																																
A	B21100171	10/29/21	11/03/21	1	0																											
B	B21100756	10/29/21	11/03/21	1	0																											
Total	T/SC			2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	

Shaded cells indicate Stage 4 validation (all other cells are Stage 2B validation). These sample counts do not include MS/MSD, and DUPs

## Laboratory Data Consultants, Inc. Data Validation Report

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

**LDC Report Date:** November 2, 2021

**Parameters:** Diesel Range Organics

**Validation Level:** Stage 2B

**Laboratory:** Energy Laboratories, Billings, MT

**Sample Delivery Group (SDG):** B21100171

<b>Sample Identification</b>	<b>Laboratory Sample Identification</b>	<b>Matrix</b>	<b>Collection Date</b>
ERH1776(RHSF,Pre-chlorination)	B21100171-001	Water	10/01/21

## 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:

Diesel Range Organics by Environmental Protection Agency (EPA) SW 846 Method 8015C

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

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

- J+ (Estimated, High Bias): The analyte was analyzed for and positively identified by the laboratory; however the reported concentration is estimated, displaying high bias, due to non-conformances discovered during data validation.
- J- (Estimated, Low Bias): The analyte was analyzed for and positively identified by the laboratory; however the reported concentration is estimated, displaying low bias, due to non-conformances discovered during data validation.
- J (Estimated, Bias Indeterminate): The analyte was analyzed for and positively identified by the laboratory; however the reported concentration is estimated due to non-conformances discovered during data validation. Bias is indeterminate.
- U (Non-detected): The analyte was analyzed for and positively identified by the laboratory; however the analyte should be considered non-detected due to the presence of contaminants detected in the associated blank(s).
- 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<sup>2</sup>, %D or %R was noncompliant.
- d The analysis with this flag should not be used because another more technically sound analysis is available.
- e MS/MSD or Duplicate RPD was high.
- f Presumed contamination from FB or ER.
- g ICP ICS results were unsatisfactory.
- h Holding times were exceeded.
- i Internal standard performance was unsatisfactory.
- k Estimated Maximum Possible Concentration (HRGC/HRMS only)
- l LCS/LCSD %R was not within control limits.
- m Result exceeded the calibration range.
- o Cooler temperature or temperature blank was noncompliant and/or sample custody problems.
- p RPD between two columns was high (GC only).
- q MS/MSD recovery was not within control limits.
- s Surrogate recovery was not within control limits.
- t Presumed contamination from trip blank.
- v Unusual problems found with the data not defined elsewhere. Description of the problem can be found in the validation report.
- w LCS/LCSD RPD was high.
- y Chemical recovery was not within control limits (Radiochemistry only).

## **I. Sample Receipt and Technical Holding Times**

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

All technical holding time requirements were met.

## **II. Initial Calibration and Initial Calibration Verification**

An initial calibration was performed as required by the method.

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

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

## **III. Continuing Calibration**

Continuing calibration was performed at the required frequencies.

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

## **IV. Laboratory Blanks**

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

## **V. Field Blanks**

No field blanks were identified in this SDG.

## **VI. Surrogates**

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

## **VII. Matrix Spike/Matrix Spike Duplicates**

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

### **IX. Field Duplicates**

No field duplicates were identified in this SDG.

### **X. Target Analyte Quantitation**

Raw data were not reviewed for Stage 2B validation.

### **XI. Target Analyte Identification**

Raw data were not reviewed for Stage 2B validation.

### **XII. Overall Assessment of Data**

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



**Red Hill Bulk Storage Facility, CTO 18F0126  
Diesel Range Organics - Data Qualification Summary - SDG B21100171**

No Sample Data Qualified in this SDG

**Red Hill Bulk Storage Facility, CTO 18F0126  
Diesel Range Organics - Laboratory Blank Data Qualification Summary - SDG  
B21100171**

No Sample Data Qualified in this SDG

**Red Hill Bulk Storage Facility, CTO 18F0126  
Diesel Range Organics - Field Blank Data Qualification Summary - SDG  
B21100171**

No Sample Data Qualified in this SDG

LDC #: 52421A8

**VALIDATION COMPLETENESS WORKSHEET**

Date: 11/1/21

SDG #: B21100171

Stage 2B

Page: 1 of 1

Laboratory: Energy Laboratories, Billings, MT

Reviewer: F7

2nd Reviewer: K

**METHOD:** GC Diesel Range Organics (EPA SW 846 Method 8015C)

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

	Validation Area		Comments
I.	Sample receipt/Technical holding times	Δ Δ	
II.	Initial calibration/ICV	Δ Δ	% PSD / ICV ≤ 20
III.	Continuing calibration	Δ	CW ≤ 20
IV.	Laboratory Blanks	Δ	
V.	Field blanks	N	
VI.	Surrogate spikes	Δ	
VII.	Matrix spike/Matrix spike duplicates	N	CS
VIII.	Laboratory control samples	Δ	LC
IX.	Field duplicates	N	
X.	Target analyte quantitation	N	
XI.	Target analyte identification	N	
XII.	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	ERH1776(RHSF,Pre-chlorination)	B21100171-001	Water	10/01/21
2				
3				
4				
5				
6				
7				
8				
9				
10				
11				
12				
13				

Notes:

159988				

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

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

**LDC Report Date:** November 2, 2021

**Parameters:** Diesel Range Organics

**Validation Level:** Stage 2B

**Laboratory:** Energy Laboratories, Billings, MT

**Sample Delivery Group (SDG):** B21100756

<b>Sample Identification</b>	<b>Laboratory Sample Identification</b>	<b>Matrix</b>	<b>Collection Date</b>
ERH1777(RHSF,Pre-chlorination)	B21100756-001	Water	10/02/21

## 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:

Diesel Range Organics by Environmental Protection Agency (EPA) SW 846 Method 8015C

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

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

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- 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

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- b Presumed contamination from preparation (method blank).
- c Calibration %RSD, r, r<sup>2</sup>, %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 with the following exceptions:

Sample	Analyte	Finding	Criteria	Flag	A or P
ERH1777(RHSF,Pre-chlorination)	Diesel range organics	Cooler temperature was reported at 18.2°C upon receipt by the laboratory.	Cooler temperature must be 4±2°C.	UJ (all non-detects)	A

All technical holding time requirements were met.

## II. Initial Calibration and Initial Calibration Verification

An initial calibration was performed as required by the method.

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

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

## III. Continuing Calibration

Continuing calibration was performed at the required frequencies.

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

## IV. Laboratory Blanks

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

## V. Field Blanks

No field blanks were identified in this SDG.

## VI. Surrogates

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

## VII. Matrix Spike/Matrix Spike Duplicates

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

### **IX. Field Duplicates**

No field duplicates were identified in this SDG.

### **X. Target Analyte Quantitation**

Raw data were not reviewed for Stage 2B validation.

### **XI. Target Analyte Identification**

Raw data were not reviewed for Stage 2B validation.

### **XII. Overall Assessment of Data**

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

Due to cooler temperature, data were qualified as estimated in one sample.



**Red Hill Bulk Storage Facility, CTO 18F0126  
Diesel Range Organics - Data Qualification Summary - SDG B21100756**

<b>Sample</b>	<b>Analyte</b>	<b>Flag</b>	<b>A or P</b>	<b>Reason (Code)</b>
ERH1777(RHSF,Pre-chlorination)	Diesel range organics	UJ (all non-detects)	A	Cooler temperature (o)

**Red Hill Bulk Storage Facility, CTO 18F0126  
Diesel Range Organics - Laboratory Blank Data Qualification Summary - SDG  
B21100756**

No Sample Data Qualified in this SDG

**Red Hill Bulk Storage Facility, CTO 18F0126  
Diesel Range Organics - Field Blank Data Qualification Summary - SDG  
B21100756**

No Sample Data Qualified in this SDG

LDC #: 52421B8

**VALIDATION COMPLETENESS WORKSHEET**

SDG #: B21100756

Stage 2B

Laboratory: Energy Laboratories, Billings, MT

Date: 11/1/21

Page: 1 of 1

Reviewer: [Signature]

2nd Reviewer: [Signature]

**METHOD:** GC Diesel Range Organics (EPA SW 846 Method 8015C)

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

	Validation Area		Comments
I.	Sample receipt/Technical holding times	sw, Δ	
II.	Initial calibration/ICV	Δ, Δ	% PSD / ICV ≤ 20
III.	Continuing calibration	Δ	CV ≤ 20
IV.	Laboratory Blanks	Δ	
V.	Field blanks	N	
VI.	Surrogate spikes	Δ	
VII.	Matrix spike/Matrix spike duplicates	N	CS
VIII.	Laboratory control samples	Δ	LCs
IX.	Field duplicates	N	
X.	Target analyte quantitation	N	
XI.	Target analyte identification	N	
XII.	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	ERH1777(RHSF,Pre-chlorination)	B21100756-001	Water	10/02/21
2				
3				
4				
5				
6				
7				
8				
9				
10				
11				
12				
13				

Notes:

160178				

LDC #: 52421B8

### VALIDATION FINDINGS WORKSHEET Technical Holding Times

All circled dates have exceeded the technical holding times.  
Y/N/A Were all cooler temperatures within validation criteria?

METHOD: <input checked="" type="checkbox"/> GC <input type="checkbox"/> HPLC							
Sample ID	Matrix	Preserved	Sampling Date	Extraction date	Analysis date	Total # of Days	Qualifier
1	cedar	temp =	18.2°C				JUS/A all ND

**TECHNICAL HOLDING TIME CRITERIA**

- VOLATILES:**
- Water unpreserved: Aromatic within 7 days, non-aromatic within 14 days of sample collection.
  - Water preserved: Both within 14 days of sample collection.
  - Soils: Both within 14 days of sample collection.
  - Encores unpreserved: Both within 48 hours of sample collection.
  - Encores preserved: Both within 14 days of sample collection.
- EXTRACTABLES:**
- Water: Extracted within 7 days, analyzed within 40 days.
  - Soil: Extracted within 14 days, analyzed within 40 days.

Red Hill Bulk Storage Facility, CTO 18F0126 - SDG B21100171  
LDC 52421

AECOM

EPA_NO	LAB_ID	DF	ANALYTE	COLL_DATE	ANAL_DATE	QCLev	RESULT	UNITS	LAB_Q	LOQ	LOD	REV	Q_C
<b>METHOD: 8015C</b>													
ERH1776	B211001714		C10-C24 DIESEL RANGE ORGANICS	10/1/2021 12:32:00 PM	10/6/2021 5:44:00 AM	3		MG/L	U	0.30	0.14	U	
ERH1776	B211001714		C24-C40 TOTAL PETROLEUM HYDROCARBONS, OI	10/1/2021 12:32:00 PM	10/6/2021 5:44:00 AM	3		MG/L	U	0.30	0.14	U	

**Red Hill Bulk Storage Facility, CTO 18F0126 - SDG B21100756  
LDC 52421**

AECOM

EPA_NO	LAB_ID	DF	ANALYTE	COLL_DATE	ANAL_DATE	QCLev	RESULT	UNITS	LAB_Q	LOQ	LOD	REV	Q_C
<b>METHOD: 8015C</b>													
ERH1777	B211007564		C10-C24 DIESEL RANGE ORGANICS	10/2/2021 12:40:00 PM	10/11/2021 10:28:00 PM	3		MG/L	U	0.30	0.14	UJ	o
ERH1777	B211007564		C24-C40 TOTAL PETROLEUM HYDROCARBONS, OI	10/2/2021 12:40:00 PM	10/11/2021 10:28:00 PM	3		MG/L	U	0.30	0.14	UJ	o