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

June 26, 2023

SUBJECT: Red Hill Oily Waste Disposal Facility, CTO 18F0176 - Data Validation

Dear Ms. Ramos,

Enclosed are the final validation reports for the fractions listed below. This SDG was received on January 18, 2023. Attachment 1 is a summary of the samples that were reviewed for each analysis.

LDC Project #55184_RV1:

SDG #	**Fraction**
580-118073-1, 580-118075-1, 580-118149-1, 580-118152-1, 580-118264-1	Wet Chemistry, Semivolatiles, Polynuclear Aromatic Hydrocarbons, Metals, Methane, Gasoline Range Organics, Polychlorinated Dioxins/Dibenzofurans

The data validation was performed under Stage 2B & 4 guidelines. The analysis was validated using the following documents, as applicable to each method:

- Final Site Assessment Work Plan, Red Hill Oily Waste Disposal Facility, Pearl Harbor HI FISC Site 22, Joint Base Pearl Harbor-Hickam, Oahu, Hawaii (February 2021)
- 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 2: Data Validation Procedure for Metals by ICP-OES (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
scuenco@lab-data.com
Project Manager/Senior Chemist

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294 pages-ADV

Attachment 1

90/10 2B/4 EDD

LDC# 55184 (AECOM - Honolulu, HI / Red Hill Oily Waste, CTO 18F0176)

LDC	SDG#	DATE REC'D	(3) DATE DUE	VOA (8260D)		SVOA (8270E)		PAHs (8270E -SIM)		(5) Metals (6010D)		GRO (8260/ LUFT)		Dioxins (8290A)		Methane (175)		Alk. (2320B)		Br,Cl,F SO_4 (300.0)		NO_3-N (300.0)		NO_3/ NO_2-N (353.2)		DOC (9060A)		TOC (9060A)					
Matrix:	Water/Soil			W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S
A	580-118073-1	10/14/22	11/04/22	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	0	1	0	-	-	-	-	-	-				
B	580-118075-1	10/14/22	11/04/22	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	0	1	0	-	-	-	-	-	-				
C	580-118149-1	10/14/22	11/04/22	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3	0	3	0	-	-	-	-	-	-				
D	580-118152-1	10/14/22	11/04/22	2	0	1	0	1	0	1	0	2	0	1	0	2	0	1	0	-	-	-	-	1	0	1	0	1	0				
E	580-118264-1	10/14/22	11/04/22	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	0	1	0	-	-	-	-	-	-				
Total	TR/SC			2	0	1	0	1	0	1	0	2	0	1	0	2	0	1	0	6	0	6	0	1	0	1	0	1	0	0	0	0	26

Shaded cells indicate Level D validation (all other cells are Level C validation). These sample counts do not include MS/MSD, and DUPs

V:\LOGIN\AECOM\Red Hill\55184ST_Oily_Eurofins.wpd

Laboratory Data Consultants, Inc.
Data Validation Report

Project/Site Name: Red Hill Oily Waste Disposal Facility, CTO 18F0176

LDC Report Date: December 8, 2022

Parameters: Wet Chemistry

Validation Level: Stage 2B

Laboratory: Eurofins, Tacoma, WA

Sample Delivery Group (SDG): 580-118073-1

Sample Identification	Laboratory Sample Identification	Matrix	Collection Date
HU145	580-118073-1	Water	09/19/22
HU145MS	580-118073-1MS	Water	09/19/22
HU145MSD	580-118073-1MSD	Water	09/19/22

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 Final Site Assessment Work Plan, Red Hill Oily Waste Disposal Facility, Pearl Harbor HI FISC Site 22, Joint Base Pearl Harbor-Hickam, Oahu, Hawaii (February 2021), the U.S. Department of Defense (DoD) Quality Systems Manual (QSM) for Environmental Laboratories, Version 5.3 (2019), and the DoD General Validation Guidelines (November 2019). Where specific guidance was not available, the data has been evaluated in a conservative manner consistent with industry standards using professional experience.

The analyses were performed by the following method:

Bromide, Chloride, Fluoride, Nitrate as Nitrogen, and Sulfate by Environmental Protection Agency (EPA) Method 300.0

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.

All technical holding time requirements were met.

II. Initial Calibration

All criteria for the initial calibration were met.

III. Continuing Calibration

Continuing calibration frequency and analysis criteria were met.

IV. Laboratory Blanks

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

V. Field Blanks

No field blanks were identified in this SDG.

VI. Matrix Spike/Matrix Spike Duplicates

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

VII. Duplicate Sample Analysis

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

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. 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
Wet Chemistry - Data Qualification Summary - SDG 580-118073-1

No Sample Data Qualified in this SDG

Red Hill Bulk Storage Facility, CTO 18F0126
Wet Chemistry - Laboratory Blank Data Qualification Summary - SDG 580-118073-1

No Sample Data Qualified in this SDG

Red Hill Bulk Storage Facility, CTO 18F0126
Wet Chemistry - Field Blank Data Qualification Summary - SDG 580-118073-1

No Sample Data Qualified in this SDG

LDC #: 55184A6

SDG #: 580-118073-1

Laboratory: Eurofins, Tacoma, WA

VALIDATION COMPLETENESS WORKSHEET

Stage 2B

Date: 12/06/22

Reviewer: NC

2nd Reviewer:

METHOD: (Analyte) Bromide, Chloride, Fluoride, Nitrate-N, Sulfate (EPA Method 300.0)

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

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

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

	Client ID	Lab ID	Matrix	Date
1	HU145	580-118073-1	Water	09/19/22
2	HU145MS	580-118073-1MS	Water	09/19/22
3	HU145MSD	580-118073-1MSD	Water	09/19/22
4				
5				
6				
7				
8				
9				
10				
11				
12				
13				
14				

All elements are applicable to each sample as noted below.

Sample ID	Target Analyte List
1	Br, Cl, F, NO3-N, SO4
QC	
2, 3	Br, Cl, F, NO3-N, SO4

Laboratory Data Consultants, Inc.
Data Validation Report

Project/Site Name: Red Hill Oily Waste Disposal Facility, CTO 18F0176

LDC Report Date: December 8, 2022

Parameters: Wet Chemistry

Validation Level: Stage 2B

Laboratory: Eurofins, Tacoma, WA

Sample Delivery Group (SDG): 580-118075-1

Sample Identification	Laboratory Sample Identification	Matrix	Collection Date
HU147	580-118075-1	Water	09/19/22

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 Final Site Assessment Work Plan, Red Hill Oily Waste Disposal Facility, Pearl Harbor HI FISC Site 22, Joint Base Pearl Harbor-Hickam, Oahu, Hawaii (February 2021), the U.S. Department of Defense (DoD) Quality Systems Manual (QSM) for Environmental Laboratories, Version 5.3 (2019), and the DoD General Validation Guidelines (November 2019). Where specific guidance was not available, the data has been evaluated in a conservative manner consistent with industry standards using professional experience.

The analyses were performed by the following method:

Bromide, Chloride, Fluoride, Nitrate as Nitrogen, and Sulfate by Environmental Protection Agency (EPA) Method 300.0

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.

All technical holding time requirements were met.

II. Initial Calibration

All criteria for the initial calibration were met.

III. Continuing Calibration

Continuing calibration frequency and analysis criteria were met.

IV. Laboratory Blanks

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

V. Field Blanks

No field blanks were identified in this SDG.

VI. Matrix Spike/Matrix Spike Duplicates

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

VII. Duplicate Sample Analysis

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

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. 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
Wet Chemistry - Data Qualification Summary - SDG 580-118075-1

No Sample Data Qualified in this SDG

Red Hill Bulk Storage Facility, CTO 18F0126
Wet Chemistry - Laboratory Blank Data Qualification Summary - SDG 580-118075-1

No Sample Data Qualified in this SDG

Red Hill Bulk Storage Facility, CTO 18F0126
Wet Chemistry - Field Blank Data Qualification Summary - SDG 580-118075-1

No Sample Data Qualified in this SDG

LDC #: 55184B6 **VALIDATION COMPLETENESS WORKSHEET** Date: 12/06/22

SDG #: 580-118075-1 Stage 2B Page: 1 of 1

Laboratory: Eurofins, Tacoma, WA Reviewer: NC

2nd Reviewer:

METHOD: (Analyte) Bromide, Chloride, Fluoride, Nitrate-N, Sulfate (EPA Method 300.0)

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

	Validation Area		Comments
I.	Sample receipt/Technical holding times	A/A	
II	Initial calibration	A	
III.	Calibration verification	A	
IV	Laboratory Blanks	A	
V	Field blanks	N	
VI.	Matrix Spike/Matrix Spike Duplicates	A ~~N~~	From SDG # 580-118073-1 (HU145MS/MSD)
VII.	Duplicate sample analysis	N	
VIII.	Laboratory control samples	A	LCS/LCSD
IX.	Field duplicates	N	
X.	Target Analyte Quantitation	N	
XI.	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	HU147	580-118075-1	Water	09/19/22
2				
3				
4				
5				
6				
7				
8				
9				
10				
11				
12				
13				
14				

Sample Specific Element Reference

All elements are applicable to each sample as noted below.

Sample ID	Target Analyte List
1	Br, Cl, F, NO3-N, SO4

Laboratory Data Consultants, Inc.
Data Validation Report

Project/Site Name: Red Hill Oily Waste Disposal Facility, CTO 18F0176

LDC Report Date: December 8, 2022

Parameters: Wet Chemistry

Validation Level: Stage 2B

Laboratory: Eurofins, Tacoma, WA

Sample Delivery Group (SDG): 580-118149-1

Sample Identification	Laboratory Sample Identification	Matrix	Collection Date
HU159	580-118149-1	Water	09/21/22
HU161	580-118149-2	Water	09/21/22
HU163	580-118149-3	Water	09/21/22

Introduction

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The analyses were performed by the following method:

Bromide, Chloride, Fluoride, Nitrate as Nitrogen, and Sulfate by Environmental Protection Agency (EPA) Method 300.0

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.

All technical holding time requirements were met.

II. Initial Calibration

All criteria for the initial calibration were met.

III. Continuing Calibration

Continuing calibration frequency and analysis criteria were met with the following exceptions:

Date	Lab. Reference/ID	Analyte	%R (Limits)	Associated Samples	Flag	A or P
09/23/22	CCV 410-299377/30	Fluoride	110.8 (90-110)	HU159 HU163	NA	-

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. Matrix Spike/Matrix Spike Duplicates

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

VII. Duplicate Sample Analysis

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

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. 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
Wet Chemistry - Data Qualification Summary - SDG 580-118149-1

No Sample Data Qualified in this SDG

Red Hill Bulk Storage Facility, CTO 18F0126
Wet Chemistry - Laboratory Blank Data Qualification Summary - SDG 580-118149-1

No Sample Data Qualified in this SDG

Red Hill Bulk Storage Facility, CTO 18F0126
Wet Chemistry - Field Blank Data Qualification Summary - SDG 580-118149-1

No Sample Data Qualified in this SDG

LDC #: 55184C6 **VALIDATION COMPLETENESS WORKSHEET** Date: 12/06/22

SDG #: 580-118149-1 Stage 2B Page: 1 of 1

Laboratory: Eurofins, Tacoma, WA Reviewer: NC

2nd Reviewer: AT

METHOD: (Analyte) Bromide, Chloride, Fluoride, Nitrate-N, Sulfate (EPA Method 300.0)

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

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

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

	Client ID	Lab ID	Matrix	Date
1	HU159	580-118149-1	Water	09/21/22
2	HU161	580-118149-2	Water	09/21/22
3	HU163	580-118149-3	Water	09/21/22
4				
5				
6				
7				
8				
9				
10				
11				
12				
13				

All elements are applicable to each sample as noted below.

Sample ID	Target Analyte List
1, 2, 3	Br, Cl, F, NO3-N, SO4

Calibration

METHOD: Inorganics Code: c

All initial calibration verifications (ICVs) and continuing calibration verifications (CCVs) were performed at the required frequency and were within the acceptance limits with the following exceptions:

Date	Time	Calibration ID	Analyte	%R	%R Limits	Associated Samples	Qualification	Det/ND
9/23/2022	16:01	CCV 410-299377/30	F	110.8	90-110	1, 3	J+Det/P	ND

Comments:

Laboratory Data Consultants, Inc.
Data Validation Report

Project/Site Name: Red Hill Oily Waste Disposal Facility, CTO 18F0176

LDC Report Date: December 8, 2022

Parameters: Wet Chemistry

Validation Level: Stage 2B

Laboratory: Eurofins, Tacoma, WA

Sample Delivery Group (SDG): 580-118152-1

Sample Identification	Laboratory Sample Identification	Matrix	Collection Date
HU152	580-118152-1	Water	09/20/22
HU152MS	580-118152-1MS	Water	09/20/22
HU152MSD	580-118152-1MSD	Water	09/20/22
HU152DUP	580-118152-1DUP	Water	09/20/22

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 Final Site Assessment Work Plan, Red Hill Oily Waste Disposal Facility, Pearl Harbor HI FISC Site 22, Joint Base Pearl Harbor-Hickam, Oahu, Hawaii (February 2021), the U.S. Department of Defense (DoD) Quality Systems Manual (QSM) for Environmental Laboratories, Version 5.3 (2019), and the DoD General Validation Guidelines (November 2019). Where specific guidance was not available, the data has been evaluated in a conservative manner consistent with industry standards using professional experience.

The analyses were performed by the following methods:

Alkalinity by Standard Method 2320B
Dissolved Organic Carbon by Environmental Protection Agency (EPA) SW 846 Method 9060A
Nitrate/Nitrite as Nitrogen by EPA Method 353.2
Total Organic Carbon by EPA SW 846 Method 9060A

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

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

J+ (Estimated, High Bias): The 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.

All technical holding time requirements were met.

II. Initial Calibration

All criteria for the initial calibration of each method were met.

III. Continuing Calibration

Continuing calibration frequency and analysis criteria were met for each method when applicable.

IV. Laboratory Blanks

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

V. Field Blanks

No field blanks were identified in this SDG.

VI. Matrix Spike/Matrix Spike Duplicates

Matrix spike (MS) and matrix spike duplicate (MSD) sample analysis was performed on an associated project sample. Percent recoveries (%R) were within QC limits with the following exceptions:

Spike ID (Associated Samples)	Analyte	MS (%R) (Limits)	MSD (%R) (Limits)	Flag	A or P
HU152MS/MSD (HU152)	Nitrate/Nitrite as N	82 (90-110)	83 (90-110)	J- (all detects)	A

Relative percent differences (RPD) were within QC limits.

VII. Duplicate Sample Analysis

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

VIII. Laboratory Control Samples

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

IX. Field Duplicates

No field duplicates were identified in this SDG.

X. Target Analyte Quantitation

Raw data were not reviewed for Stage 2B validation.

XI. Overall Assessment of Data

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

Due to MS/MSD %R, data were qualified as estimated in one sample.

Red Hill Bulk Storage Facility, CTO 18F0126
Wet Chemistry - Data Qualification Summary - SDG 580-118152-1

Sample	Analyte	Flag	A or P	Reason (Code)
HU152	Nitrate/Nitrite as N	J- (all detects)	A	Matrix spike/Matrix spike duplicate (%R) (q)

Red Hill Bulk Storage Facility, CTO 18F0126
Wet Chemistry - Laboratory Blank Data Qualification Summary - SDG 580-118152-1

No Sample Data Qualified in this SDG

Red Hill Bulk Storage Facility, CTO 18F0126
Wet Chemistry - Field Blank Data Qualification Summary - SDG 580-118152-1

No Sample Data Qualified in this SDG

LDC #: 55184D6 **VALIDATION COMPLETENESS WORKSHEET** Date: 12/06/22

SDG #: 580-118152-1 Stage 2B Page: 1 of 1

Laboratory: Eurofins, Tacoma, WA Reviewer: NC

2nd Reviewer:

METHOD: (Analyte) Alkalinity (SM2320B), DOC (EPA SW-846 Method 9060A), Nitrate/Nitrite-N (EPA Method 353.2), TOC (EPA SW-846 Method 9060A)

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

	Validation Area		Comments
I.	Sample receipt/Technical holding times	A/A	
II	Initial calibration	A	
III.	Calibration verification	A	
IV	Laboratory Blanks	A	
V	Field blanks	N	
VI.	Matrix Spike/Matrix Spike Duplicates	SW	
VII.	Duplicate sample analysis	A	
VIII.	Laboratory control samples	A	LCS/LCSD
IX.	Field duplicates	N	
X.	Target Analyte Quantitation	N	
XI.	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	HU152	580-118152-1	Water	09/20/22
2	HU152MS	580-118152-1MS	Water	09/20/22
3	HU152MSD	580-118152-1MSD	Water	09/20/22
4	HU152DUP	580-118152-1DUP	Water	09/20/22
5				
6				
7				
8				
9				
10				
11				
12				
13				

All elements are applicable to each sample as noted below.

Sample ID	Target Analyte List
1	Alkalinity, Bicarbonate Alkalinity as CaCO3, Carbonate Alkalinity as CaCO3, DOC, TOC, NO3 NO2 as N
QC	
2, 3	DOC, TOC, NO3 NO2 as N
4	Alkalinity, Bicarbonate Alkalinity as CaCO3, Carbonate Alkalinity as CaCO3, NO3 NO2 as N

METHOD: Inorganics

Code: q

MS/MSD analysis was performed by the laboratory. All MS/MSD percent recoveries (%R) and relative percent differences (RPDs) were within the acceptable limits with the following exceptions:

MS/MSD ID	Matrix	Analyte	MS %R	MSD %R	%R Limit	RPD	RPD Limit	Associated Samples	Qualification	Det/ND
2, 3	W	NO3 NO2 as N	82	83	90-110			1	J-/UJ/A	Det

Comments:

Laboratory Data Consultants, Inc.
Data Validation Report

Project/Site Name: Red Hill Oily Waste Disposal Facility, CTO 18F0176

LDC Report Date: May 30, 2023

Parameters: Volatiles

Validation Level: Stage 2B

Laboratory: Eurofins, Tacoma, WA

Sample Delivery Group (SDG): 580-118152-1

Sample Identification	Laboratory Sample Identification	Matrix	Collection Date
HU152	580-118152-1	Water	09/20/22
HU151	580-118152-2	Water	09/20/22
HU152MS	580-118152-1MS	Water	09/20/22
HU152MSD	580-118152-1MSD	Water	09/20/22

Introduction

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The analyses were performed by the following method:

Volatile Organic Compounds (VOCs) by Environmental Protection Agency (EPA) SW 846 Method 8260D

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.

For analytes where average relative response factors (RRFs) were utilized, the percent relative standard deviations (%RSD) were less than or equal to 15.0%.

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.

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 with the following exceptions:

Date	Analyte	%D	Associated Samples	Flag	A or P
09/20/22	1,1-Dichloroethene Bromomethane Vinyl chloride	22.4 30.3 29.3	All samples in SDG 580-118152-1	UJ (all non-detects) UJ (all non-detects) UJ (all non-detects)	A

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 with the following exceptions:

Blank ID	Analysis Date	Analyte	Concentration	Associated Samples
MB 580-405368	09/28/22	Hexachlorobutadiene	0.137 ug/L	HU152 HU151

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

VI. Field Blanks

Sample HU151 was identified as a trip blank. No contaminants were found with the following exceptions:

Blank ID	Collection Date	Analyte	Concentration	Associated Samples
HU151	09/20/22	Acetone	5.6 ug/L	HU152

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

VII. Surrogates

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

VIII. Matrix Spike/Matrix Spike Duplicates

Matrix spike (MS) and matrix spike duplicate (MSD) sample analysis was performed on an associated project sample. Percent recoveries (%R) were within QC limits with the following exceptions:

Spike ID (Associated Samples)	Analyte	MS (%R) (Limits)	MSD (%R) (Limits)	Flag	A or P
HU152MS/MSD (HU152)	1,1-Dichloroethene Vinyl chloride	- -	132 (71-131) 143 (58-137)	NA	-

Relative percent differences (RPD) were within QC limits.

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 and Tentatively Identified Compound Quantitation

All target analyte and tentatively identified compound (TIC) quantitations met validation criteria with the following exceptions:

Sample	Analyte	Flag	A or P
HU152 HU151	All "unknown" laboratory calibrated analytes reported as TICs	NJ (all detects)	A

Sample	Analyte	Finding	Flag	A or P
HU152	Carbon disulfide Isopropylbenzene sec-Butylbenzene p-Isopropyltoluene n-Butylbenzene 1,2,3-Trichlorobenzene	All laboratory calibrated analytes reported as tentatively identified compounds (TIC).	J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects)	A
HU151	Isopropylbenzene p-Isopropyltoluene n-Butylbenzene 1,2,3-Trichlorobenzene	All laboratory calibrated analytes reported as tentatively identified compounds (TIC).	J (all detects) J (all detects) J (all detects) J (all detects)	A

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 continuing calibration %D, data were qualified as estimated in two samples.

Due to TICs, data were qualified as presumptive and estimated in two samples.

Red Hill Oily Waste Disposal Facility, CTO 18F0176
Volatiles - Data Qualification Summary - SDG 580-118152-1

Sample	Analyte	Flag	A or P	Reason (Code)
HU152 HU151	1,1-Dichloroethene Bromomethane Vinyl chloride	UJ (all non-detects) UJ (all non-detects) UJ (all non-detects)	A	Continuing calibration (%D) (c)
HU152 HU151	All "unknown" laboratory calibrated analytes reported as TICs	NJ (all detects)	A	Tentatively identified compounds quantitation (v)
HU152	Carbon disulfide Isopropylbenzene sec-Butylbenzene p-Isopropyltoluene n-Butylbenzene 1,2,3-Trichlorobenzene	J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects)	A	Tentatively identified compounds quantitation (v)
HU151	Isopropylbenzene p-Isopropyltoluene n-Butylbenzene 1,2,3-Trichlorobenzene	J (all detects) J (all detects) J (all detects) J (all detects)	A	Tentatively identified compounds quantitation (v)

Red Hill Oily Waste Disposal Facility, CTO 18F0176
Volatiles - Laboratory Blank Data Qualification Summary - SDG 580-118152-1

No Sample Data Qualified in this SDG

Red Hill Oily Waste Disposal Facility, CTO 18F0176
Volatiles - Field Blank Data Qualification Summary - SDG 580-118152-1

No Sample Data Qualified in this SDG

LDC #: 55184D1a

SDG #: 580-118152-1

Laboratory: Eurofins, Tacoma, WA

VALIDATION COMPLETENESS WORKSHEET

Stage 2B

Date: 10/26/22

Page: 1 of 1

Reviewer: KJ

2nd Reviewer: AC

METHOD: GC/MS Volatiles (EPA SW-846 Method 8260D)

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	%D/RSD ≤ 15, r² ICV ≤ 20
IV.	Continuing calibration	SW	CCV ≤ 20/SD
V.	Laboratory Blanks	SW	
VI.	Field blanks	SW	
VII.	Surrogate spikes	A	
VIII.	Matrix spike/Matrix spike duplicates	SW	
IX.	Laboratory control samples	SW	LCS ID
X.	Field duplicates	N	
XI.	Internal standards	A	
XII.	Target analyte quantitation	SW	
XIII.	Target analyte identification	N	
XIV.	System performance	N	
XV.	Overall assessment of data	A	

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

	Client ID	Lab ID	Matrix	Date
1r	HU152 1 = MEK	580-118152-1	Water	09/20/22
2r	HU151 1 = MEK TB	580-118152-2	Water	09/20/22
3	HU152MS	580-118152-1MS	Water	09/20/22
4	HU152MSD	580-118152-1MSD	Water	09/20/22
5				
6				
7				
8				
9				

Notes:

1	MB 580-405348						
2	MB 580-405536						

No TICs in the MB

TARGET COMPOUND WORKSHEET

METHOD: VOA

A. Chloromethane	AA. Tetrachloroethene	AAA. 1,3,5-Trimethylbenzene	AAAA. Ethyl tert-butyl ether	A1. 1,3-Butadiene
B. Bromomethane	BB. 1,1,2,2-Tetrachloroethane	BBB. 4-Chlorotoluene	BBBB. tert-Amyl methyl ether	B1. Hexane
C. Vinyl chloride	CC. Toluene	CCC. tert-Butylbenzene	CCCC. 1-Chlorohexane	C1. Heptane
D. Chloroethane	DD. Chlorobenzene	DDD. 1,2,4-Trimethylbenzene	DDDD. Isopropyl alcohol	D1. Propylene
E. Methylene chloride	EE. Ethylbenzene	EEE. sec-Butylbenzene	EEEE. Acetonitrile	E1. Freon 11
F. Acetone	FF. Styrene	FFF. 1,3-Dichlorobenzene	FFFF. Acrolein	F1. Freon 12
G. Carbon disulfide	GG. Xylenes, total	GGG. p-Isopropyltoluene	GGGG. Acrylonitrile	G1. Freon 113
H. 1,1-Dichloroethene	HH. Vinyl acetate	HHH. 1,4-Dichlorobenzene	HHHH. 1,4-Dioxane	H1. Freon 114
I. 1,1-Dichloroethane	II. 2-Chloroethylvinyl ether	III. n-Butylbenzene	IIII. Isobutyl alcohol	I1. 2-Nitropropane
J. 1,2-Dichloroethene, total	JJ. Dichlorodifluoromethane	JJJ. 1,2-Dichlorobenzene	JJJJ. Methacrylonitrile	J1. Dimethyl disulfide
K. Chloroform	KK. Trichlorofluoromethane	KKK. 1,2,4-Trichlorobenzene	KKKK. Propionitrile	K1. 2,3-Dimethyl pentane
L. 1,2-Dichloroethane	LL. Methyl-tert-butyl ether	LLL. Hexachlorobutadiene	LLLL. Ethyl ether	L1. 2,4-Dimethyl pentane
M. 2-Butanone	MM. 1,2-Dibromo-3-chloropropane	MMM. Naphthalene	MMMM. Benzyl chloride	M1. 3,3-Dimethyl pentane
N. 1,1,1-Trichloroethane	NN. Methyl ethyl ketone	NNN. 1,2,3-Trichlorobenzene	NNNN. Iodomethane	N1. 2-Methylpentane
O. Carbon tetrachloride	OO. 2,2-Dichloropropane	OOO. 1,3,5-Trichlorobenzene	OOOO.1,1-Difluoroethane	O1. 3-Methylpentane
P. Bromodichloromethane	PP. Bromochloromethane	PPP. trans-1,2-Dichloroethene	PPPP. Tetrahydrofuran	P1. 3-Ethylpentane
Q. 1,2-Dichloropropane	QQ. 1,1-Dichloropropene	QQQ. cis-1,2-Dichloroethene	QQQQ. Methyl acetate	Q1. 2,2-Dimethylpentane
R. cis-1,3-Dichloropropene	RR. Dibromomethane	RRR. m,p-Xylenes	RRRR. Ethyl acetate	R1. 2,2,3- Trimethylbutane
S. Trichloroethene	SS. 1,3-Dichloropropane	SSS. o-Xylene	SSSS. Cyclohexane	S1. 2,2,4-Trimethylpentane
T. Dibromochloromethane	TT. 1,2-Dibromoethane	TTT. 1,1,2-Trichloro-1,2,2-trifluoroethane	TTTT. Methylcyclohexane	T1. 2-Methylhexane
U. 1,1,2-Trichloroethane	UU. 1,1,1,2-Tetrachloroethane	UUU. 1,2-Dichlorotetrafluoroethane	UUUU. Allyl chloride	U1. Nonanal
V. Benzene	VV. Isopropylbenzene	VVV. 4-Ethyltoluene	VVVV. Methyl methacrylate	V1. 2-Methylnaphthalene
W. trans-1,3-Dichloropropene	WW. Bromobenzene	WWW. Ethanol	WWWW. Ethyl methacrylate	W1. Methanol
X. Bromoform	XX. 1,2,3-Trichloropropane	XXX. Di-isopropyl ether	XXXX. cis-1,4-Dichloro-2-butene	X1. 1,2,3-Trimethylbenzene
Y. 4-Methyl-2-pentanone	YY. n-Propylbenzene	YYY. tert-Butanol	YYYY. trans-1,4-Dichloro-2-butene	Y1. 2-Propanol
Z. 2-Hexanone	ZZ. 2-Chlorotoluene	ZZZ. tert-Butyl alcohol	ZZZZ. Pentachloroethane	Z1. Ethylene Dibromide

LDC #: 55184D1a

VALIDATION FINDINGS WORKSHEET
Continuing Calibration

Reviewer: FT

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

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

Y N N/A Was a continuing calibration standard analyzed at least once every 12 hours for each instrument?
Y N N/A Were percent differences (%D) and relative response factors (RRF) within method criteria for all CCC's and SPCC's ?
Y N N/A Were all %D and RRFs within the validation criteria of ≤20 %D and ≥0.05 RRF ?

(c)

#	Date	Standard ID	Compound	Finding %D (Limit: ≤20.0%)	Finding RRF (Limit: ≥0.05)	Associated Samples	Qualifications
	9/21/22	CCV 580-405368	H	22.4		1, 2, 3, 4, MB 580-405368 (All)	J+/UJ/A ND
			B	30.3			
			C	29.3			

CONCAL.wpd

LDC #: 55184D1a

VALIDATION FINDINGS WORKSHEET
Blanks

Reviewer: FT

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

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

K N N/A Was a method blank associated with every sample in this SDG?

Y N N/A Was a method blank analyzed at least once every 12 hours for each matrix and concentration?

Y N N/A Was there contamination in the method blanks? If yes, please see the qualifications below.

Blank analysis date: 9/28/22

Conc. units: ug/L

Associated Samples: 1, 2 (ND)

Compound	Blank ID	Sample Identification								
	MB 580-405368									
LLL	0.137									

Blank analysis date:

Conc. units:

Associated Samples:

Compound	Blank ID	Sample Identification								

All results were qualified using the criteria stated below except those circled.

Note: Common contaminants such as Methylene chloride, Acetone, 2-Butanone, Carbon disulfide and TICs that were detected in samples within ten times the associated method blank concentration were qualified as not detected, "U". Other contaminants within five times the method blank concentration were also qualified as not detected, "U".

LDC #: 55184D1a

VALIDATION FINDINGS WORKSHEET
Field Blanks

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

Y N N/A Were field blanks identified in this SDG?

Y N N/A Were target compounds detected in the field blanks?

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

Sampling date: 09/20/22

Field blank type: (circle one) Field Blank / Rinsate / Trip Blank / Other: TB Associated Samples: 1 (ND)

Compound	Blank ID	Sample Identification								
	2									
F	5.6									

Blank units: _____ **Associated sample units:** _____

Sampling date: _____

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

Compound	Blank ID	Sample Identification								

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

LDC #: 55184O|a

VALIDATION FINDINGS WORKSHEET
Matrix Spike/Matrix Spike Duplicates

Reviewer: FT

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

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

Y N N/A Were a matrix spike (MS) and matrix spike duplicate (MSD) analyzed for each matrix in this SDG? If no, indicate which matrix does not have an associated MS/MSD. Soil / Water.

Y N N/A Was a MS/MSD analyzed every 20 samples of each matrix?

Y N N/A Were the MS/MSD percent recoveries (%R) and the relative percent differences (RPD) within the QC limits?

#	MS/MSD ID	Compound	MS %R (Limits)	MSD %R (Limits)	RPD (Limits)	Associated Samples	Qualifications
	3+4	H	( )	132 FT (71-131)	( )	#1	J dw/A NP
		C	( )	143 (58-137)	( )	↓	↓
			( )	( )	( )		
			( )	( )	( )		
			( )	( )	( )		
			( )	( )	( )		
			( )	( )	( )		
			( )	( )	( )		
			( )	( )	( )		
			( )	( )	( )		
			( )	( )	( )		
			( )	( )	( )		
			( )	( )	( )		
			( )	( )	( )		
			( )	( )	( )		
			( )	( )	( )		
			( )	( )	( )		
			( )	( )	( )		
			( )	( )	( )		
			( )	( )	( )		
			( )	( )	( )		

LDC #: 55184D1a

VALIDATION FINDINGS WORKSHEET
Target Analyte Quantitation

Reviewer: FT

METHOD: GCMS VOA 8260 D

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

Level IV/D Only

Y N N/A Were CRQLs adjusted for sample dilutions, dry weight factors, etc.?

Y N N/A Did the reported results for detected target compounds agree within 10.0% of the recalculated results? (√)

#	Associated Samples	Compound Name	Findings	Qualifications
	1, 2	All unknown reported as TIC		NJ/A
	1	G, VV, EEE, GGG, III, NNN	all calibrated analytes reported as TIC	Jdet/A
	2	VV, GGG, III, NNN	↓	Jdet/A

Comments: See sample calculation verification worksheet for recalculations

Laboratory Data Consultants, Inc.
Data Validation Report

Project/Site Name: Red Hill Oily Waste Disposal Facility, CTO 18F0176

LDC Report Date: June 26, 2023

Parameters: Semivolatiles

Validation Level: Stage 2B

Laboratory: Eurofins, Tacoma, WA

Sample Delivery Group (SDG): 580-118152-1

Sample Identification	Laboratory Sample Identification	Matrix	Collection Date
HU152	580-118152-1	Water	09/20/22
HU152MS	580-118152-1MS	Water	09/20/22
HU152MSD	580-118152-1MSD	Water	09/20/22

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 Final Site Assessment Work Plan, Red Hill Oily Waste Disposal Facility, Pearl Harbor HI FISC Site 22, Joint Base Pearl Harbor-Hickam, Oahu, Hawaii (February 2021), the U.S. Department of Defense (DoD) Quality Systems Manual (QSM) for Environmental Laboratories, Version 5.3 (2019), the DoD General Validation Guidelines (November 2019), and the U.S. Department of Defense (DoD) Data Validation Guidelines Module 1: Data Validation Procedure for Organic Analysis by GC/MS (May 2020). Where specific guidance was not available, the data has been evaluated in a conservative manner consistent with industry standards using professional experience.

The analyses were performed by the following method:

Semivolatile Organic Compounds (SVOCs) and Tentatively Identified Compounds (TICs) by Environmental Protection Agency (EPA) SW 846 Method 8270E

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

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

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

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

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

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

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

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

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

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

Qualification Code Reference

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

b Presumed contamination from preparation (method blank).

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

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

e MS/MSD or Duplicate RPD was high.

f Presumed contamination from FB or ER.

g ICP ICS results were unsatisfactory.

h Holding times were exceeded.

i Internal standard performance was unsatisfactory.

k Estimated Maximum Possible Concentration (HRGC/HRMS only)

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

m Result exceeded the calibration range.

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

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

q MS/MSD recovery was not within control limits.

s Surrogate recovery was not within control limits.

t Presumed contamination from trip blank.

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

w LCS/LCSD RPD was high.

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

I. Sample Receipt and Technical Holding Times

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

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

Sample	Analyte	Total Days From Sample Collection Until Extraction	Required Holding Time (in Days) From Sample Collection Until Extraction	Flag	A or P
HU152	2,4,5-Trichlorophenol 2,4-Dichlorophenol 2-Chlorophenol	9	7	UJ (all non-detects) UJ (all non-detects) UJ (all non-detects)	A

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.

For analytes where average relative response factors (RRFs) were utilized, the percent relative standard deviations (%RSD) were less than or equal to 15.0%.

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.

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 with the following exceptions:

Date	Analyte	%D	Associated Samples	Flag	A or P
08/29/22	Phenol	23	All samples in SDG 580-118152-1	UJ (all non-detects)	A

IV. Continuing Calibration

Continuing calibration was performed at the required frequencies.

The percent differences (%D) were less than or equal to 20.0% for all analytes with the following exceptions:

Date	Analyte	%D	Associated Samples	Flag	A or P
09/27/22	1,2,4-Trichlorobenzene Dimethylphthalate Pentachlorophenol Hexachlorobenzene	20.8 24.4 25.8 21.0	All samples in SDG 580-118152-1	UJ (all non-detects) UJ (all non-detects) UJ (all non-detects) UJ (all non-detects)	A

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

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

Relative percent differences (RPD) were within QC limits with the following exceptions:

Spike ID (Associated Samples)	Analyte	RPD (Limits)	Flag	A or P
HU152MS/MSD (HU152)	Phenol	21 (≤20)	NA	-

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 with the following exceptions:

LCS ID (Associated Samples)	Analyte	LCS %R (Limits)	LCSD %R (Limits)	Flag	A or P
LCS 580-404969 (All samples in SDG 580-118152-1)	2,4,5-Trichlorophenol 2,4-Dichlorophenol 2-Chlorophenol	34 (53-123) 26 (47-121) 26 (38-117)	- - -	UJ (all non-detects) UJ (all non-detects) UJ (all non-detects)	P

Relative percent differences (RPD) were within QC limits with the following exceptions:

LCS ID (Associated Samples)	Analyte	RPD (Limits)	Flag	A or P
LCS 580-404969 (All samples in SDG 580-118152-1)	2,3,4,6-Tetrachlorophenol 2,4,6-Trichlorophenol 2,4-Dinitrophenol Hexachlorobutadiene Pentachlorophenol Phenol	48 (≤20) 35 (≤20) 68 (≤20) 24 (≤20) 61 (≤20) 24 (≤20)	NA	-

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 and Tentatively Identified Compounds Quantitation

All tentatively identified compound quantitations met validation criteria with the following exceptions:

Sample	Analyte	Flag	A or P
All samples in SDG 580-118152-1	All tentatively identified compounds (TIC)	NJ (all detects)	A

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 holding time summary, ICV %D, continuing calibration %D, and LCS %R, data were qualified as estimated in one sample.

Due to TICs, data were qualified as presumptive and estimated in one sample.

Red Hill Oily Waste Disposal Facility, CTO 18F0176
Semivolatiles - Data Qualification Summary - SDG 580-118152-1

Sample	Analyte	Flag	A or P	Reason (Code)
HU152	2,4,5-Trichlorophenol 2,4-Dichlorophenol 2-Chlorophenol	UJ (all non-detects) UJ (all non-detects) UJ (all non-detects)	A	Technical holding times (h)
HU152	Phenol	UJ (all non-detects)	A	Initial calibration verification (%D) (c)
HU152	1,2,4-Trichlorobenzene Dimethylphthalate Pentachlorophenol Hexachlorobenzene	UJ (all non-detects) UJ (all non-detects) UJ (all non-detects) UJ (all non-detects)	A	Continuing calibration (%D) (c)
HU152	2,4,5-Trichlorophenol 2,4-Dichlorophenol 2-Chlorophenol	UJ (all non-detects) UJ (all non-detects) UJ (all non-detects)	P	Laboratory control samples (%R) (l)
HU152	All tentatively identified compounds (TIC)	NJ (all detects)	A	Tentatively identified compound quantitation (v)

Red Hill Oily Waste Disposal Facility, CTO 18F0176
Semivolatiles - Laboratory Blank Data Qualification Summary - SDG 580-118152-1

No Sample Data Qualified in this SDG

Red Hill Oily Waste Disposal Facility, CTO 18F0176
Semivolatiles - Field Blank Data Qualification Summary - SDG 580-118152-1

No Sample Data Qualified in this SDG

LDC #: 55184D2a

SDG #: 580-118152-1

Laboratory: Eurofins, Tacoma, WA

VALIDATION COMPLETENESS WORKSHEET

Stage 2B

Date: 10/26/22

Page: 1 of 1

Reviewer: [illegible]

2nd Reviewer: [illegible]

METHOD: GC/MS Semivolatiles (EPA SW-846 Method 8270E) +TICs

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

	Validation Area		Comments
I.	Sample receipt/Technical holding times	A, SW	
II.	GC/MS Instrument performance check	A	
III.	Initial calibration/ICV	A SW	%D RSD ≤ 15, r² ICV ≤ 20
IV.	Continuing calibration	SW	CCV ≤ 20/50
V.	Laboratory Blanks	A	
VI.	Field blanks	N	
VII.	Surrogate spikes	SW	
VIII.	Matrix spike/Matrix spike duplicates	SW	
IX.	Laboratory control samples	SW	LCS
X.	Field duplicates	N	
XI.	Internal standards	A	
XII.	Target analyte quantitation	SW	
XIII.	Target analyte identification	N	
XIV.	System performance	N	
XV.	Overall assessment of data	A	

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

	Client ID	Lab ID	Matrix	Date
1 1	HU152 2 = 2,8,C	580-118152-1	Water	09/20/22
2 1	HU152MS	580-118152-1MS	Water	09/20/22
3 1	HU152MSD	580-118152-1MSD	Water	09/20/22
4				
5				
6				
7				
8				
9				

Notes:

1	MB 580-404969						
2	MB 580-405394						

VALIDATION FINDINGS WORKSHEET

METHOD: GC/MS SVOA

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

LDC #: 55184D2a

VALIDATION FINDINGS WORKSHEET
Technical Holding Times

Reviewer: FO

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

METHOD : GC/MA BNA SW846 Method 8270 E (h)

Sample ID	Matrix	Preserved	Sampling Date	Extraction date	Analysis date	Total # of Days	Qualifier
1, 2, 3	W		9/20/22	9/29/22	9/29/22	9	J-/UJ/A
						all	ND
					qual Z,	Q, C	only

TECHNICAL HOLDING TIME CRITERIA

Water: Extracted within 7 days, analyzed within 40 days.
Soil: Extracted within 14 days, analyzed within 40 days.

LDC #: 55184D2a

VALIDATION FINDINGS WORKSHEET
Initial Calibration Verification

METHOD: GC/MS SVOA (EPA Method 8270 E)

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

(Y) N N/A Was an initial calibration verification standard analyzed after each ICAL for each instrument?

Y (N) N/A Were all %D within the validation criteria of ≤20 / 30 %D ?

(c)

#	Date	Standard ID	Compound	Finding %D (Limit: < 20 / 30.0%)	Associated Samples	Qualifications
	8/29/22 2137	ICV 580-402255	A	23	all	J+/UJ/A ND

LDC #: 55184O2a

VALIDATION FINDINGS WORKSHEET
Continuing Calibration

Reviewer: FT

METHOD: GC/MS BNA (EPA SW 846 Method 8270 E)

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

Y (N) N/A Was a continuing calibration standard analyzed at least once every 12 hours of sample analysis for each instrument?

(Y) N N/A Were percent differences (%D) and relative response factors (RRF) within method criteria for all CCC's and SPCC's ?

Y (N) N/A Were all %D and RRFs within the validation criteria of ≤20%D and ≥0.05 RRF ? (c)

#	Date	Standard ID	Compound	Finding %D (Limit: <20.0%)	Finding RRF (Limit: >0.05)	Associated Samples	Qualifications
	9/27/22 1023	CCV-TAL05 1	R	20.8		All	J+ /UJ/A all ND
			CC	24.4		↓	↓
			TI	25.8			
			SS	21.0		All	J+ /UJ/A all ND

LDC #: 55184D2a

VALIDATION FINDINGS WORKSHEET

Surrogate Recovery

Page: 1 of 1
Reviewer: FT

METHOD: GC/MS BNA (EPA SW 846 Method 8270 E)

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

Y (N) N/A Were percent recoveries (%R) for surrogates within QC limits?

Y (N) N/A If 2 or more base neutral or acid surrogates were outside QC limits, was a reanalysis performed to confirm %R?

Y (N) N/A If any %R was less than 10 percent, was a reanalysis performed to confirm %R?

#	Sample ID	Surrogate	%R (Limits)	Qualifications
	MB 580-404969	TBP	12 (43-141)	J-/X/P all Acid
		2FP	2 (19-119)	↓
			( )	
			( )	
			( )	
			( )	
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			( )	

(NBZ) = Nitrobenzene - d5
(FBP) = 2-Fluorobiphenyl
(TPH) = Terphenyl - d14
(2FP) = 2-Fluorophenol
(TBP) = 2,4,6 -Tribromophenol
(2CP) = 2-Chlorophenol - d4

LDC #: 55184D2a

VALIDATION FINDINGS WORKSHEET
Matrix Spike/Matrix Spike Duplicates

Reviewer: FT

METHOD: GC/MS BNA (EPA SW 846 Method 8270 E)

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

Y N N/A Were a matrix spike (MS) and matrix spike duplicate (MSD) analyzed for each matrix in this SDG? If no, indicate which matrix does not have an associated MS/MSD. Soil / Water.

Y N N/A Was a MS/MSD analyzed every 20 samples of each matrix?

Y N N/A Were the MS/MSD percent recoveries (%R) and the relative percent differences (RPD) within the QC limits?

#	MS/MSD ID	Compound	MS %R (Limits)	MSD %R (Limits)	RPD (Limits)	Associated Samples	Qualifications
	2 + 3	A	( )	( )	21 (20)	1	J all +A (NO)
			( )	( )	( )		
			( )	( )			
			( )	( )	( )		
			( )	( )	( )		
			( )	( )	( )		
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LDC #: 55184D2a

VALIDATION FINDINGS WORKSHEET
Laboratory Control Samples (LCS)

Reviewer: FT

METHOD: GC/MS BNA (Method 8270E

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

(Y) N N/A Was a LCS required?

Y (N) N/A Were the LCS/LCSD percent recoveries (%R) and the relative percent differences (RPD) within the QC limits?

#	LCS/LCSD ID	Compound	LCS %R (Limits)	LCSD %R (Limits)	RPD (Limits)	Associated Samples	Qualifications
	LC> 580	Z	34 (53-123)	( )	( )	All (1)	J-/UJ/P all ND
	404969	Q	26 (47-121)	( )	( )		
		~~B~~	( )	( )	( )		
		C	26 (38-117)	( )	( )		
		UUUU	( )	( )	48 (20)	(w)	J-/UJ/P
		Y	( )	( )	35 ( )		J det /P
		HH	( )	( )	68 ( )		
		U	( )	( )	24 ( )		
		TT	( )	( )	61 ( )		
		A	( )	( )	24 ( )		
			( )	( )	( )		
			( )	( )	( )		
			( )	( )	( )		
			( )	( )	( )		
			( )	( )	( )		
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			( )	( )	( )		
			( )	( )	( )		

LDC #: 55184D2a

VALIDATION FINDINGS WORKSHEET
Target Analyte Quantitation

Reviewer: FT

METHOD: GC/GCMS EPA SW 8270 C

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

Y N N/A Were the correct internal standard (IS), quantitation ion and relative response factor (RRF) used to quantitate the compound?

Y N N/A Were compound quantitation and CRQLs adjusted to reflect all sample dilutions and dry weight factors applicable to level IV validation?

#	Date	Sample ID	Compound	Lab RL is higher than QAPP RL	Qualifications
		All	all analytes reported as Tentatively Identified Compound (TIC)		NJ/A

Comments: See sample calculation verification worksheet for recalculations

LDC Report# 55184D2b

Laboratory Data Consultants, Inc.
Data Validation Report

Project/Site Name: Red Hill Oily Waste Disposal Facility, CTO 18F0176

LDC Report Date: November 2, 2022

Parameters: Polynuclear Aromatic Hydrocarbons

Validation Level: Stage 2B

Laboratory: Eurofins, Tacoma, WA

Sample Delivery Group (SDG): 580-118152-1

Sample Identification	Laboratory Sample Identification	Matrix	Collection Date
HU152	580-118152-1	Water	09/20/22
HU152MS	580-118152-1MS	Water	09/20/22
HU152MSD	580-118152-1MSD	Water	09/20/22

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 Final Site Assessment Work Plan, Red Hill Oily Waste Disposal Facility, Pearl Harbor HI FISC Site 22, Joint Base Pearl Harbor-Hickam, Oahu, Hawaii (February 2021), 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) by Environmental Protection Agency (EPA) SW 846 Method 8270E 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).

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

Instrument performance check was performed at the required frequency.

All ion abundance requirements were met.

III. Initial Calibration and Initial Calibration Verification

An initial calibration was performed as required by the method.

For analytes where average relative response factors (RRFs) were utilized, percent relative standard deviations (%RSD) were less than or equal to 15.0%.

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.

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

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

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 Oily Waste Disposal Facility, CTO 18F0176
Polynuclear Aromatic Hydrocarbons - Data Qualification Summary - SDG 580-118152-1

No Sample Data Qualified in this SDG

Red Hill Oily Waste Disposal Facility, CTO 18F0176
Polynuclear Aromatic Hydrocarbons - Laboratory Blank Data Qualification Summary - SDG 580-118152-1

No Sample Data Qualified in this SDG

Red Hill Oily Waste Disposal Facility, CTO 18F0176
Polynuclear Aromatic Hydrocarbons - Field Blank Data Qualification Summary - SDG 580-118152-1

No Sample Data Qualified in this SDG

LDC #: 55184D2b

SDG #: 580-118152-1

Laboratory: Eurofins, Tacoma, WA

VALIDATION COMPLETENESS WORKSHEET

Stage 2B

Date: 10/26/22

Page: 1 of 1

Reviewer: [illegible]

2nd Reviewer: [illegible]

METHOD: GC/MS Polynuclear Aromatic Hydrocarbons (EPA SW-846 Method 8270E-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	%D RSD ≤ 15, r² ICV ≤ 20
IV.	Continuing calibration pending	A	CCV ≤ 20/50
V.	Laboratory Blanks	A	
VI.	Field blanks	N	
VII.	Surrogate spikes	A	
VIII.	Matrix spike/Matrix spike duplicates	A	
IX.	Laboratory control samples	A	LCS ID
X.	Field duplicates	N	
XI.	Internal standards	A	
XII.	Target analyte quantitation	N	
XIII.	Target analyte identification	N	
XIV.	System performance	N	
XV.	Overall assessment of data	A	

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

	Client ID	Lab ID	Matrix	Date
1	HU152	580-118152-1	Water	09/20/22
2	HU152MS	580-118152-1MS	Water	09/20/22
3	HU152MSD	580-118152-1MSD	Water	09/20/22
4				
5				
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7				
8				
9				

Notes:

	MB 580-404969						

Laboratory Data Consultants, Inc.
Data Validation Report

Project/Site Name: Red Hill Oily Waste Disposal Facility, CTO 18F0176

LDC Report Date: December 8, 2022

Parameters: Metals

Validation Level: Stage 2B

Laboratory: Eurofins, Tacoma, WA

Sample Delivery Group (SDG): 580-118152-1

Sample Identification	Laboratory Sample Identification	Matrix	Collection Date
HU152	580-118152-1	Water	09/20/22
HU152MS	580-118152-1MS	Water	09/20/22
HU152MSD	580-118152-1MSD	Water	09/20/22

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 Final Site Assessment Work Plan, Red Hill Oily Waste Disposal Facility, Pearl Harbor HI FISC Site 22, Joint Base Pearl Harbor-Hickam, Oahu, Hawaii (February 2021), the U.S. Department of Defense (DoD) Quality Systems Manual (QSM) for Environmental Laboratories, Version 5.3 (2019), the DoD General Validation Guidelines (November 2019), and the U.S. Department of Defense (DoD) Data Validation Guidelines Module 2: Data Validation Procedure for Metals by ICP-OES (May 2020). Where specific guidance was not available, the data has been evaluated in a conservative manner consistent with industry standards using professional experience.

The analyses were performed by the following method:

Calcium, Magnesium, Manganese, Potassium, and Sodium by Environmental Protection Agency (EPA) SW 846 Method 6010D

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.

All technical holding time requirements were met.

II. Instrument Calibration

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

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

III. ICP Interference Check Sample Analysis

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

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	Analyte	Maximum Concentration	Associated Samples
ICB/CCB	Calcium Manganese Potassium Sodium	0.0472 mg/L 0.0029 mg/L 0.256 mg/L 0.114 mg/L	HU152

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

Sample	Analyte	Reported Concentration	Modified Final Concentration
HU152	Manganese	9.5 mg/L	9.5J+ mg/L

V. Field Blanks

No field blanks were identified in this SDG.

VI. Matrix Spike/Matrix Spike Duplicates

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

VII. Duplicate Sample Analysis

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

VIII. Serial Dilution

Serial dilution was 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. Target Analyte Quantitation

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 estimated in one sample.

Red Hill Oily Waste Disposal Facility, CTO 18F0176
Metals - Data Qualification Summary - SDG 580-118152-1

No Sample Data Qualified in this SDG

Red Hill Oily Waste Disposal Facility, CTO 18F0176
Metals - Laboratory Blank Data Qualification Summary - SDG 580-118152-1

Sample	Analyte	Modified Final Concentration	A or P	Code
HU152	Manganese	9.5J+ mg/L	A	b

Red Hill Oily Waste Disposal Facility, CTO 18F0176
Metals - Field Blank Data Qualification Summary - SDG 580-118152-1

No Sample Data Qualified in this SDG

LDC #: 55184D4b

SDG #: 580-118152-1

Laboratory: Eurofins, Tacoma, WA

VALIDATION COMPLETENESS WORKSHEET

Stage 2B

Date: 12/06/22

Page: 1 of 1

Reviewer: NC

2nd Reviewer:

METHOD: Metals (EPA SW-846 Method 6010D)

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.	Instrument Calibration	A	
III.	ICP Interference Check Sample (ICS) Analysis	A	
IV.	Laboratory Blanks	SW	
V.	Field Blanks	N	
VI.	Matrix Spike/Matrix Spike Duplicates	A	
VII.	Duplicate sample analysis	N	
VIII.	Serial Dilution	N	
IX.	Laboratory control samples	A	LCS/LCSD
X.	Field Duplicates	N	
XI.	Target Analyte Quantitation	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	HU152	580-118152-1	Water	09/20/22
2	HU152MS	580-118152-1MS	Water	09/20/22
3	HU152MSD	580-118152-1MSD	Water	09/20/22
4				
5				
6				
7				
8				
9				
10				
11				
12				
13				

All elements are applicable to each sample as noted below.

Sample ID	Target Analyte List
1	Ca, Mg, Mn, K, Na
QC	
2, 3	Ca, Mg, Mn, K, Na

Analysis Method

ICP	Ca, Mg, Mn, K, Na

VALIDATION FINDINGS WORKSHEET
Laboratory Blank Contamination (PB/ICB/CCB)

METHOD: Trace Metals (EPA SW 846 Methods 6010/6020/7000)
Soil preparation factor applied (if applicable):

Sample Concentration, unless otherwise noted: mg/L Associated Samples: 1

				Sample Identification								
Analyte	**PB (ug/L)**	**Maximum ICB/CCB (mg/L)**	**Action Level (ug/L)**	1								
Ca		0.0472	236									
Mn		0.0029	14.5	9.5J+								
K		0.256	1280									
Na		0.114	570									

Comments: The listed analyte concentrtaion is the highest ICB or CCB detected in the analysis. The action level, when applicable, is established at 5X the highest ICB, CCB, or PB concentration.

Laboratory Data Consultants, Inc.
Data Validation Report

Project/Site Name: Red Hill Oily Waste Disposal Facility, CTO 18F0176

LDC Report Date: November 2, 2022

Parameters: Polychlorinated Dioxins/Dibenzofurans

Validation Level: Stage 2B

Laboratory: Eurofins, Tacoma, WA

Sample Delivery Group (SDG): 580-118152-1

Sample Identification	Laboratory Sample Identification	Matrix	Collection Date
HU152	580-118152-1	Water	09/20/22
HU152MS	580-118152-1MS	Water	09/20/22
HU152MSD	580-118152-1MSD	Water	09/20/22

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 Final Site Assessment Work Plan, Red Hill Oily Waste Disposal Facility, Pearl Harbor HI FISC Site 22, Joint Base Pearl Harbor-Hickam, Oahu, Hawaii (February 2021), the U.S. Department of Defense (DoD) Quality Systems Manual (QSM) for Environmental Laboratories, Version 5.3 (2019), and the DoD General Validation Guidelines (November 2019). Where specific guidance was not available, the data has been evaluated in a conservative manner consistent with industry standards using professional experience.

The analyses were performed by the following method:

Polychlorinated Dioxins/Dibenzofurans by Environmental Protection Agency (EPA) SW 846 Method 8290A

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. HRGC/HRMS Instrument Performance Check

Instrument performance was checked at the required frequency.

Retention time windows were established for all homologues. The chromatographic resolution between 2,3,7,8-TCDD and peaks representing any other unlabeled TCDD isomer was resolved with a valley of less than or equal to 25%.

The static resolving power was at least 10,000 (10% valley definition).

III. Initial Calibration and Initial Calibration Verification

A five point 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 and labeled compounds.

The ion abundance ratios for all PCDDs/PCDFs were within method and validation criteria.

The minimum S/N ratio was greater than or equal to 2.5 for each analyte and greater than or equal to 10 for each labeled compound associated to samples which underwent Stage 4 validation. Raw data were not reviewed for Stage 2B validation.

The percent differences (%D) of the initial calibration verification (ICV) standard were less than or equal to 20.0% for all analytes and less than or equal to 30.0% for labeled compounds.

IV. Continuing Calibration

Continuing calibration was performed at the required frequencies.

All of the continuing calibration percent differences (%D) between the initial calibration RRF and the continuing calibration RRF were less than or equal to 20.0% for all analytes and less than or equal to 30.0% for labeled compounds.

The ion abundance ratios for all PCDDs and PCDFs were within method and validation criteria.

The minimum S/N ratio was greater than or equal to 10 for each analyte and labeled compound associated to samples which underwent Stage 4 validation. Raw data were not reviewed for Stage 2B validation.

V. 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
MB 410-301590	09/29/22	1,2,3,4,6,7,8-HpCDD	0.00000139 ug/L	All samples in SDG 580-118152-1
		1,2,3,4,6,7,8-HpCDF	0.000000283 ug/L	
		1,2,3,6,7,8-HxCDF	0.000000370 ug/L	
		1,2,3,7,8-PeCDF	0.000000374 ug/L	
		1,2,3,7,8,9-HxCDF	0.000000594 ug/L	
		2,3,4,6,7,8-HxCDF	0.000000590 ug/L	
		OCDD	0.000000411 ug/L	
		OCDF	0.000000309 ug/L	
		Total HxCDF	0.00000155 ug/L	
		Total HpCDD	0.00000139 ug/L	
		Total HpCDF	0.000000283 ug/L	
		Total PeCDF	0.000000374 ug/L	
		Total PeCDD/Total PeCDF	0.00000432 ug/L	
		Total PeCDD	0.00000180 ug/L	
		Total PeCDF	0.00000252 ug/L	

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
HU152	1,2,3,4,6,7,8-HpCDD	0.00000080 ug/L	0.00000080U ug/L
	1,2,3,4,6,7,8-HpCDF	0.00000064 ug/L	0.00000064U ug/L
	1,2,3,6,7,8-HxCDF	0.00000038 ug/L	0.00000038U ug/L
	1,2,3,7,8,9-HxCDF	0.00000063 ug/L	0.00000063U ug/L
	2,3,4,6,7,8-HxCDF	0.00000054 ug/L	0.00000054U ug/L
	OCDF	0.00000090 ug/L	0.00000090U ug/L
	Total HxCDF	0.0000020 ug/L	0.0000020U ug/L
	Total HpCDD	0.00000080 ug/L	0.00000080U ug/L
	Total PeCDF	0.00000061 ug/L	0.00000061U ug/L
	Total PeCDD/Total PeCDF	0.0000091 ug/L	0.0000091U ug/L
	Total PeCDD	0.0000038 ug/L	0.0000038U ug/L
	Total PeCDF	0.0000047 ug/L	0.0000047U ug/L

VI. Field Blanks

No field blanks were identified in this SDG.

VII. Matrix Spike/Matrix Spike Duplicates

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

VIII. Laboratory Control Samples

Laboratory control samples (LCS) 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. Labeled Compounds

All percent recoveries (%R) for labeled compounds used to quantitate target analytes were within QC limits.

XI. Target Analyte Quantitation

All target analyte quantitations met validation criteria with the following exceptions:

Sample	Analyte	Flag	A or P
All samples in SDG 580-118152-1	Results flagged "I" by the laboratory as estimated maximum possible concentration (EMPC).	J (all detects)	A

Raw data were not reviewed for Stage 2B validation.

XII. Target Analyte Identification

Raw data were not reviewed for Stage 2B validation.

XIII. System Performance

Raw data were not reviewed for Stage 2B validation.

XIV. Overall Assessment of Data

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

Due to results reported by the laboratory as EMPC, data were qualified as estimated in one sample.

Due to laboratory blank contamination, data were qualified as not detected in one sample.

Red Hill Oily Waste Disposal Facility, CTO 18F0176
Polychlorinated Dioxins/Dibenzofurans - Data Qualification Summary - SDG 580-118152-1

Sample	Analyte	Flag	A or P	Reason (Code)
HU152	Results flagged "I" by the laboratory as estimated maximum possible concentration (EMPC).	J (all detects)	A	Target analyte quantitation (EMPC) (k)

Red Hill Oily Waste Disposal Facility, CTO 18F0176
Polychlorinated Dioxins/Dibenzofurans - Laboratory Blank Data Qualification Summary - SDG 580-118152-1

Sample	Analyte	Modified Final Concentration	A or P	Code
HU152	1,2,3,4,6,7,8-HpCDD	0.00000080U ug/L	A	b
	1,2,3,4,6,7,8-HpCDF	0.00000064U ug/L		
	1,2,3,6,7,8-HxCDF	0.00000038U ug/L		
	1,2,3,7,8,9-HxCDF	0.00000063U ug/L		
	2,3,4,6,7,8-HxCDF	0.00000054U ug/L		
	OCDF	0.00000090U ug/L		
	Total HxCDF	0.0000020U ug/L		
	Total HpCDD	0.00000080U ug/L		
	Total PeCDF	0.00000061U ug/L		
	Total PeCDD/Total PeCDF	0.0000091U ug/L		
	Total PeCDD	0.0000038U ug/L		
	Total PeCDF	0.0000047U ug/L		

Red Hill Oily Waste Disposal Facility, CTO 18F0176
Polychlorinated Dioxins/Dibenzofurans - Field Blank Data Qualification Summary - SDG 580-118152-1

No Sample Data Qualified in this SDG

LDC #: 55184D21
SDG #: 580-118152-1
Laboratory: Eurofins, Tacoma, WA

VALIDATION COMPLETENESS WORKSHEET
Stage 2B

Date: 10/26/22
Page: 1 of 1
Reviewer: EF
2nd Reviewer: AF

METHOD: HRGC/HRMS Polychlorinated Dioxins/Dibenzofurans (EPA SW-846 Method 8290A)

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.	HRGC/HRMS Instrument performance check	A	
III.	Initial calibration/ICV	A/A	%D/RSD ≤ 20 ICV ≤ 20/30
IV.	Continuing calibration	A	CCV ≤ 20/30
V.	Laboratory Blanks	SW	
VI.	Field blanks	N	
VII.	Matrix spike/Matrix spike duplicates	A	
VIII.	Laboratory control samples	A	LCS ID
IX.	Field duplicates	N	
X.	Labeled Compounds	A	
XI.	Target analyte quantitation	SW	
XII.	Target analyte identification	N	
XIII.	System performance	N	
XIV.	Overall assessment of data	A	

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

	Client ID	Lab ID	Matrix	Date
1	HU152	580-118152-1	Water	09/20/22
2	HU152MS	580-118152-1MS	Water	09/20/22
3	HU152MSD	580-118152-1MSD	Water	09/20/22
4				
5				
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9				
10				

Notes:

	MB HD-30/590						

VALIDATION FINDINGS WORKSHEET

METHOD: HRGC/HRMS Dioxins/Dibenzofurans (EPA SW 846 Method 8290)

A. 2,3,7,8-TCDD	F. 1,2,3,4,6,7,8-HpCDD	K. 1,2,3,4,7,8-HxCDF	P. 1,2,3,4,7,8,9-HpCDF	U. Total HpCDD
B. 1,2,3,7,8-PeCDD	G. OCDD	L. 1,2,3,6,7,8-HxCDF	Q. OCDF	V. Total TCDF
C. 1,2,3,4,7,8-HxCDD	H. 2,3,7,8-TCDF	M. 2,3,4,6,7,8-HxCDF	R. Total TCDD	W. Total PeCDF
D. 1,2,3,6,7,8-HxCDD	I. 1,2,3,7,8-PeCDF	N. 1,2,3,7,8,9-HxCDF	S. Total PeCDD	X. Total HxCDF
E. 1,2,3,7,8,9-HxCDD	J. 2,3,4,7,8-PeCDF	O. 1,2,3,4,6,7,8-HpCDF	T. Total HxCDD	Y. Total HpCDF

Notes:_____

LDC #: 55184D2/

VALIDATION FINDINGS WORKSHEET
Blanks

Page: 1 of 1
Reviewer: [illegible]

METHOD: HRGC/HRMS Dioxins/Dibenzofurans (EPA SW 846 Method 8290A)
Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".

Y N N/A Were all samples associated with a method blank?
Y N N/A Was a method blank performed for each matrix and whenever a sample extraction was performed?
Y N N/A Was the method blank contaminated?

(b)

Blank extraction date: 9/29/22 **Blank analysis date:** 9/30/22 **Associated samples:** All

Conc. units: ug/L

Compound	Blank ID	Sample Identification								
	MB410-301590				1					
F	0.00000139				0.00000080 U					
Ø	0.00000283				0.00000064 U					
L	0.00000370				0.00000038 U					
I	0.00000374				–					
N	0.00000594				0.00000063 U					
M	0.00000590				0.00000054 U					
G	0.00000411				–					
Q	0.00000309				0.00000090 U					
X	0.00000155				0.00000020 U					
U	0.00000139				0.00000080 U					
Y	0.00000283				–					
W	0.00000374				0.00000061 U					
S/W	0.00000432				0.00000911 U					
S	0.00000180				0.00000381 U					
W	0.00000255				0.00000471 U					

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".

LDC #: 55184D21

VALIDATION FINDINGS WORKSHEET
Target Analyte Quantitation

Reviewer: F

METHOD: HRGC/HRMS Dioxins/Dibenzofurans (EPA SW 846 Method 8290)~~A~~

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

Y N N/A Were the correct internal standard (IS), quantitation ions and relative response factors (RRF) used to quantitate the compound?
Y N N/A Compound quantitation and CRQLs were adjusted to reflect all sample dilutions and dry weight factors (if necessary).

#	Date	Sample ID	Finding	Associated Samples	Qualifications
		All	Results flagged "I" by the lab as EMPC		J (all) / A

Comments: See sample calculation verification worksheet for recalculations

Laboratory Data Consultants, Inc.
Data Validation Report

Project/Site Name: Red Hill Oily Waste Disposal Facility, CTO 18F0176

LDC Report Date: November 2, 2022

Parameters: Methane

Validation Level: Stage 2B

Laboratory: Eurofins, Tacoma, WA

Sample Delivery Group (SDG): 580-118152-1

Sample Identification	Laboratory Sample Identification	Matrix	Collection Date
HU152	580-118152-1	Water	09/20/22
HU151	580-118152-2	Water	09/20/22
HU152MS	580-118152-1MS	Water	09/20/22
HU152MSD	580-118152-1MSD	Water	09/20/22

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 Final Site Assessment Work Plan, Red Hill Oily Waste Disposal Facility, Pearl Harbor HI FISC Site 22, Joint Base Pearl Harbor-Hickam, Oahu, Hawaii (February 2021), 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:

Methane by Method RSK-175

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

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

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

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

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

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

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

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

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

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

Qualification Code Reference

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

b Presumed contamination from preparation (method blank).

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

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

e MS/MSD or Duplicate RPD was high.

f Presumed contamination from FB or ER.

g ICP ICS results were unsatisfactory.

h Holding times were exceeded.

i Internal standard performance was unsatisfactory.

k Estimated Maximum Possible Concentration (HRGC/HRMS only)

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

m Result exceeded the calibration range.

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

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

q MS/MSD recovery was not within control limits.

s Surrogate recovery was not within control limits.

t Presumed contamination from trip blank.

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

w LCS/LCSD RPD was high.

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

I. Sample Receipt and Technical Holding Times

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

All technical holding time requirements were met.

II. Initial Calibration and Initial Calibration Verification

An initial calibration was performed as required by the method.

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

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 required frequencies.

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

The percent differences (%D) of the ending continuing calibration verifications (CCVs) 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

Sample HU151 was identified as a trip blank. No contaminants were found.

VI. Matrix Spike/Matrix Spike Duplicates

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

VII. Laboratory Control Samples

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

VIII. Field Duplicates

No field duplicates were identified in this SDG.

IX. Target Analyte Quantitation

Raw data were not reviewed for Stage 2B validation.

X. Target Analyte Identification

Raw data were not reviewed for Stage 2B validation.

XI. 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 Oily Waste Disposal Facility, CTO 18F0176
Methane - Data Qualification Summary - SDG 580-118152-1

No Sample Data Qualified in this SDG

Red Hill Oily Waste Disposal Facility, CTO 18F0176
Methane - Laboratory Blank Data Qualification Summary - SDG 580-118152-1

No Sample Data Qualified in this SDG

Red Hill Oily Waste Disposal Facility, CTO 18F0176
Methane - Field Blank Data Qualification Summary - SDG 580-118152-1

No Sample Data Qualified in this SDG

LDC #: 55184D51 **VALIDATION COMPLETENESS WORKSHEET** Date: 10/26/22

SDG #: 580-118152-1 Stage 2B Page: 1 of 1

Laboratory: Eurofins, Tacoma, WA Reviewer: [illegible]

2nd Reviewer: [illegible]

METHOD: GC Methane (Method RSK-175)

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	%D RSD / ICV ≤ 20
III.	Continuing calibration	A	CCV ≤ 20/20
IV.	Laboratory Blanks	A	
V.	Field blanks	ND	TB
VI.	Surrogate spikes	A	
VII.	Matrix spike/Matrix spike duplicates	A	
VIII.	Laboratory control samples	A	LCS
IX.	Field duplicates	N	
X.	Target analyte quantitation	N	
XI.	Target analyte identification	N	
XII.	Overall assessment of data	A	

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

	Client ID	Lab ID	Matrix	Date
1	HU152	580-118152-1	Water	09/20/22
2	HU151 TB	580-118152-2	Water	09/20/22
3	HU152MS	580-118152-1MS	Water	09/20/22
4	HU152MSD	580-118152-1MSD	Water	09/20/22
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11				
12				

Notes:

	MB 410-301674						

LDC Report# 55184D7

Laboratory Data Consultants, Inc.
Data Validation Report

Project/Site Name: Red Hill Oily Waste Disposal Facility, CTO 18F0176

LDC Report Date: November 2, 2022

Parameters: Gasoline Range Organics

Validation Level: Stage 2B

Laboratory: Eurofins, Tacoma, WA

Sample Delivery Group (SDG): 580-118152-1

Sample Identification	Laboratory Sample Identification	Matrix	Collection Date
HU152	580-118152-1	Water	09/20/22
HU151	580-118152-2	Water	09/20/22
HU152MS	580-118152-1MS	Water	09/20/22
HU152MSD	580-118152-1MSD	Water	09/20/22

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 Final Site Assessment Work Plan, Red Hill Oily Waste Disposal Facility, Pearl Harbor HI FISC Site 22, Joint Base Pearl Harbor-Hickam, Oahu, Hawaii (February 2021), 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 methods:

Gasoline Range Organics by Environmental Protection Agency (EPA) SW 846 Method 8260 and CADOHS LUFT Method

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 methods.

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.

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

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

IV. Continuing Calibration

Continuing calibration was performed at the required frequencies.

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

The percent differences (%D) of the ending continuing calibration verifications (CCVs) were less than or equal to 20.0%.

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

V. Laboratory Blanks

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

VI. Field Blanks

Sample HU151 was identified as a trip blank. No contaminants were found.

VII. Surrogates

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

VIII. Matrix Spike/Matrix Spike Duplicates

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

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 methods. No results were rejected or recommended for exclusion in this SDG.

Red Hill Oily Waste Disposal Facility, CTO 18F0176
Gasoline Range Organics - Data Qualification Summary - SDG 580-118152-1

No Sample Data Qualified in this SDG

Red Hill Oily Waste Disposal Facility, CTO 18F0176
Gasoline Range Organics - Laboratory Blank Data Qualification Summary - SDG 580-118152-1

No Sample Data Qualified in this SDG

Red Hill Oily Waste Disposal Facility, CTO 18F0176
Gasoline Range Organics - Field Blank Data Qualification Summary - SDG 580-118152-1

No Sample Data Qualified in this SDG

LDC #: 55184D7

SDG #: 580-118152-1

Laboratory: Eurofins, Tacoma, WA

VALIDATION COMPLETENESS WORKSHEET

Stage 2B

Date: 10/26/22

Page: 1 of 1

Reviewer: [illegible]

2nd Reviewer: [illegible]

METHOD: GC/MS Gasoline Range Organics (EPA SW-846 Method 8260/CADOHS LUFT Method)

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	A	
III.	Initial calibration/ICV	Δ Δ	r² ICV ≤ 20
IV.	Continuing calibration ending	A	CCV ≤ 20/20
V.	Laboratory Blanks	Δ	
VI.	Field blanks	ND	TB = 2
VII.	Surrogate spikes	Δ	
VIII.	Matrix spike/Matrix spike duplicates	Δ	
IX.	Laboratory control samples	Δ	LCS ID
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	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	HU152	580-118152-1	Water	09/20/22
2	HU151 TB	580-118152-2	Water	09/20/22
3	HU152MS	580-118152-1MS	Water	09/20/22
4	HU152MSD	580-118152-1MSD	Water	09/20/22
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Notes:

	MB 580-405708						

Laboratory Data Consultants, Inc.
Data Validation Report

Project/Site Name: Red Hill Oily Waste Disposal Facility, CTO 18F0176

LDC Report Date: December 8, 2022

Parameters: Wet Chemistry

Validation Level: Stage 4

Laboratory: Eurofins, Tacoma, WA

Sample Delivery Group (SDG): 580-118264-1

Sample Identification	Laboratory Sample Identification	Matrix	Collection Date
HU154	580-118264-1	Water	09/26/22
HU154MS	580-118264-1MS	Water	09/26/22
HU154MSD	580-118264-1MSD	Water	09/26/22

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 Final Site Assessment Work Plan, Red Hill Oily Waste Disposal Facility, Pearl Harbor HI FISC Site 22, Joint Base Pearl Harbor-Hickam, Oahu, Hawaii (February 2021), the U.S. Department of Defense (DoD) Quality Systems Manual (QSM) for Environmental Laboratories, Version 5.3 (2019), and the DoD General Validation Guidelines (November 2019). Where specific guidance was not available, the data has been evaluated in a conservative manner consistent with industry standards using professional experience.

The analyses were performed by the following method:

Bromide, Chloride, Fluoride, Nitrate as Nitrogen, and Sulfate by Environmental Protection Agency (EPA) Method 300.0

All sample results were subjected to Stage 4 data validation, which is comprised of the quality control (QC) summary forms as well as the raw data, to confirm sample quantitation and identification.

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.

All technical holding time requirements were met.

II. Initial Calibration

All criteria for the initial calibration were met.

III. Continuing Calibration

Continuing calibration frequency and analysis criteria were met.

IV. Laboratory Blanks

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

V. Field Blanks

No field blanks were identified in this SDG.

VI. Matrix Spike/Matrix Spike Duplicates

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

VII. Duplicate Sample Analysis

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

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

All target analyte quantitations were acceptable.

XI. 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
Wet Chemistry - Data Qualification Summary - SDG 580-118264-1

No Sample Data Qualified in this SDG

Red Hill Bulk Storage Facility, CTO 18F0126
Wet Chemistry - Laboratory Blank Data Qualification Summary - SDG 580-118264-1

No Sample Data Qualified in this SDG

Red Hill Bulk Storage Facility, CTO 18F0126
Wet Chemistry - Field Blank Data Qualification Summary - SDG 580-118264-1

No Sample Data Qualified in this SDG

LDC #: 55184E6

SDG #: 580-118264-1

Laboratory: Eurofins, Tacoma, WA

VALIDATION COMPLETENESS WORKSHEET

Stage 4

Date: 12/06/22

Page: 1 of 1

Reviewer: NC

2nd Reviewer:

METHOD: (Analyte) Bromide, Chloride, Fluoride, Nitrate-N, Sulfate (EPA Method 300.0)

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

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

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

	Client ID	Lab ID	Matrix	Date
1	HU154	580-118264-1	Water	09/26/22
2	HU154MS	580-118264-1MS	Water	09/26/22
3	HU154MSD	580-118264-1MSD	Water	09/26/22
4				
5				
6				
7				
8				
9				
10				
11				
12				
13				
14				

METHOD: Inorganics				
Validation Area	**Yes**	**No**	**NA**	**Comments**
I. Technical holding times				
Were all technical holding times met?	Yes			
II. Calibration				
Were all instruments calibrated at the required frequency?	Yes			
Were the proper number of standards used?	Yes			
Were all initial and continuing calibration verifications within the QC limits?	Yes			
Were all initial calibration correlation coefficients within limits as specifed by the method?	Yes			
Were balance checks performed as required?			NA	
III. Blanks				
Was a method blank associated with every sample in this SDG?	Yes			
Was there contamination in the method blanks?		No		
Was there contamination in the initial and continuing calibration blanks?		No		
IV. Matrix Spike/Matrix Spike Duplicates/Laboratory Duplicates				
Were MS/MSD recoveries within the QC limits? (If the sample concentration exceeded the spike concentration by a factor of 4, no action was taken.)	Yes			
Were the MS/MSD or laboratory duplicate relative percent differences (RPDs) within the QC limits?	Yes			
V. Laboratory Control Samples				
Was a LCS analyzed for each batch in the SDG?	Yes			
Were the LCS recoveries and RPDs (if applicable) within QC limits?	Yes			
X. Sample Result Verification				
Were all reporting limits adjusted to reflect sample dilutions?	Yes			
Were all soil samples dry weight corrected			NA	
XI. Overall Assessment of Data				
Was the overall assessment of the data found to be acceptable?	Yes			
XII. Field Duplicates				
Were field duplicates identifed in this SDG?		No		
Were target analytes detected in the field duplicates?			NA	
XIII. Field Blanks				
Were field blanks identified in this SDG?		No		
Were target analytes detected in the field blanks?			NA	

All elements are applicable to each sample as noted below.

Sample ID	Target Analyte List
1	Br, Cl, F, NO3-N, SO4
QC	
2, 3	Br, Cl, F, NO3-N, SO4

Initial and Continuing Calibration Calculation Verification

METHOD: Inorganics

The correlation coefficient (r) for the calibration of Fluoride were recalculated.
Calibration date: 9/23/22
An initial or continuing calibration verification percent recovery (%R) was recalculated for each type of analysis using the following formula:
%R = (Found/True) x 100
Found = concentration of each analyte measured in the analysis of the ICV or CCV solution
True = concentration of each analyte in the ICV or CCV source

Type of Analysis	Analyte	Standard	Concentration (mg/L)	Area	Recalculated r or r^2	Reported r or r^2	Acceptable (Y/N)
Initial Calibration	Fluoride	s1	0.2	0.0297	0.999818		Y
		s2	0.5	0.0724			
		s3	1	0.1488			
		s4	2	0.2894			
		s5	5	0.7819			
		s6	10	1.6053			
		s7					
		s8					
		s9					
		s10					
		s11					
		s12					

Type of Analysis	Analyte	Found (mg/L)	True (mg/L)		Recalculated r or r^2	Reported r or r^2	Acceptable (Y/N)
ICV	Cl	50.778	50		101.556	102	Y
CCV 580-405386/1	Br	10.9965	10		109.965	110	Y
CCV 580-405242/10	NO3	5.1318	5		102.636	103	Y

METHOD: Inorganics

Percent recoveries (%R) for the laboratory control sample (LCS) and matrix spike (MS) were recalcuated using the following formula:
%R = (Found/True) x 100
Found = concentration of each analyte measured in the analysis. For the MS calculation, Found = SSR (Spiked Sample Result) - SR (Sample Result)
True = concentration of each analyte in the source
The sample and duplicate relative percent difference (RPD) was recalculated using the following formula:
RPD = (Absolute value(S-D)x 200) / (S+D)
S = Original sample concentration
D = Duplicate sample concentration

Sample ID	Type of Analysis	Element	Found/S	True/D	Recalculated %R/RPD	Reported %R/RPD	Acceptable (Y/N)
LCS 580-405242/4	LCS	NO3	5116.1	5000	102.322	102	Y
MS 580-118264-1	MS	Cl	496434	500000	99.2868	99	
MS/D 580-118264-1	MS/MSD	Cl	680770	680598	0.025269	0	Y

METHOD: Inorganics

Analytes were recalculated and verified using the following equation:

Concentration = (Result from raw data x Final volume x Dilution factor) / (Percent solids (if applicable) x Initial weight or volume)

Sample ID	Analyte	Raw Data (ug/L)	Dilution	Initial Volume (mL)	Final Volume (mL)	Reported Result (ug/L)	Recalculated Result (ug/L)	Acceptable (Y/N)
1	SO4	13871.2	10	5	5	140000	138712	Y