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

October 20, 2022

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

Dear Ms. Ramos,

Enclosed is the final validation report for the fractions listed below. These SDGs were received on July 18, 2022. Attachment 1 is a summary of the samples that were reviewed for the analysis.

LDC Project #54723:

SDG #	Fraction
580-115203-1 580-115250-1 580-115346-1	Volatiles, Semivolatiles, Polynuclear Aromatic Hydrocarbons, Metals, Wet Chemistry, Gasoline Range Organics, Polychlorinated Dioxins/Dibenzofurans, Methane

The data validation was performed under Stage 2B & 4 validation guidelines. The analysis was validated using the following documents and variances, as applicable to the 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
Operations Manager/Senior Chemist
scuenco@lab-data.com

179 pages-ADV

Attachment 1

90/10 2B/4 EDD

LDC# 54723 (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	580-115203-1	07/18/22	08/08/22	6	0	3	0	3	0	3	0	6	0	3	0	6	0	3	0	-	-	-	-	3	0	3	0	3	0				
A	580-115203-1	07/18/22	08/08/22	2	0	1	0	1	0	1	0	2	0	1	0	2	0	1	0	-	-	-	-	1	0	1	0	1	0				
B	580-115250-1	07/18/22	08/08/22	7	0	4	0	4	0	2	0	7	0	4	0	4	0	2	0	-	-	-	-	2	0	2	0	2	0				
C	580-115346-1	07/18/22	08/08/22	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	0	1	0	-	-	-	-	-	-				
Total	T/SC			15	0	8	0	8	0	6	0	15	0	8	0	12	0	6	0	1	0	1	0	6	0	6	0	6	0	0	0	0	98

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

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LDC Report# 54723A1a

Laboratory Data Consultants, Inc.
Data Validation Report

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

LDC Report Date: August 24, 2022

Parameters: Volatiles

Validation Level: Stage 2B & 4

Laboratory: Eurofins, Tacoma, WA

Sample Delivery Group (SDG): 580-115203-1

Sample Identification	Laboratory Sample Identification	Matrix	Collection Date
HU135	580-115203-1	Water	06/22/22
HU134	580-115203-2	Water	06/22/22
HU126**	580-115203-3**	Water	06/22/22
HU125	580-115203-4	Water	06/22/22
HU110**	580-115203-5**	Water	06/22/22
HU109	580-115203-6	Water	06/22/22
HU119	580-115203-7	Water	06/22/22
HU118	580-115203-8	Water	06/22/22

**Indicates sample underwent Stage 4 validation

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:

Volatile Organic Compounds (VOCs) and Tentatively Identified Compounds (TICs) 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. Samples appended with a double asterisk on the cover page were subjected to Stage 4 data validation, which is comprised of the 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 and cooler temperatures upon receipt met validation criteria.

All technical holding time requirements were met.

II. GC/MS Instrument Performance Check

A bromofluorobenzene (BFB) tune was performed at 12 hour intervals.

All ion abundance requirements were met.

III. Initial Calibration and Initial Calibration Verification

An initial calibration was performed as required by the method.

The percent relative standard deviations (%RSD) were less than or equal to 15.0% for all analytes

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

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

Date	Analyte	%D	Associated Samples	Flag	A or P
06/22/22	Bromomethane	22.4	All samples in SDG 580-115203-1	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
06/26/22	Bromomethane Acetone	46.7 21.9	All samples in SDG 580-115203-1	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 with the following exceptions:

Date	Analyte	%D	Associated Samples	Flag	A or P
06/27/22	Bromomethane	105.1	All samples in SDG 580-115203-1	UJ (all non-detects)	A

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 TIC (RT in minutes)	Concentration	Associated Samples
MB 580-395002	06/26/22	1,2,4-Trichlorobenzene	0.208 ug/L	All samples in SDG 580-115203-1
		Dibromochloromethane	0.0552 ug/L	
		Ethylbenzene	0.0818 ug/L	
		Hexachlorobutadiene	0.106 ug/L	
		Naphthalene	0.432 ug/L	
		Styrene	0.211 ug/L	
		Xylenes, total	0.205 ug/L	
		o-Xylene (12.21)	0.205 ug/L	
		Isopropylbenzene (12.51)	0.264 ug/L	
		1,3,5-Trimethylbenzene (12.99)	0.154 ug/L	
		p-Isopropyltoluene (13.54)	0.162 ug/L	
		1,3,5-Trichlorobenzene (14.65)	0.0715 ug/L	
		1,2,3-Trichlorobenzene (15.53)	0.230 ug/L	

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 with the following exceptions:

Sample	Analyte TIC (RT in minutes)	Reported Concentration	Modified Final Concentration
HU135	Ethylbenzene	0.077 ug/L	0.077J+ ug/L
	Naphthalene	0.36 ug/L	0.50U ug/L
	Xylenes, total	0.20 ug/L	0.35U ug/L
	o-Xylene (12.21)	0.20 ug/L	0.20U ug/L
	1,3,5-Trimethylbenzene (12.99)	0.15 ug/L	0.15U ug/L
	p-Isopropyltoluene (13.59)	0.15 ug/L	0.15U ug/L
HU134	Ethylbenzene	0.079 ug/L	0.079J+ ug/L
	Styrene	0.36 ug/L	0.50U ug/L
	Naphthalene	0.21 ug/L	0.50U ug/L
	Xylenes, total	0.20 ug/L	0.35U ug/L
	o-Xylene (12.21)	0.20 ug/L	0.20U ug/L
	Isopropylbenzene (12.51)	0.26 ug/L	0.26U ug/L
	1,3,5-Trimethylbenzene (12.99)	0.15 ug/L	0.15U ug/L
	p-Isopropyltoluene (13.54)	0.16 ug/L	0.16U ug/L

Sample	Analyte TIC (RT in minutes)	Reported Concentration	Modified Final Concentration
HU126**	Ethylbenzene Styrene Xylenes, total o-Xylene (12.21) 1,3,5-Trimethylbenzene (12.99) p-Isopropyltoluene (13.54)	0.078 ug/L 0.21 ug/L 0.20 ug/L 0.20 ug/L 0.15 ug/L 0.15 ug/L	0.078J+ ug/L 0.50U ug/L 0.35U ug/L 0.20U ug/L 0.15U ug/L 0.15U ug/L
HU125	Ethylbenzene Naphthalene Styrene Xylenes, total o-Xylene (12.20) Isopropylbenzene (12.51) 1,3,5-Trimethylbenzene (12.99) p-Isopropyltoluene (13.54)	0.078 ug/L 0.36 ug/L 0.21 ug/L 0.20 ug/L 0.20 ug/L 0.26 ug/L 0.15 ug/L 0.16 ug/L	0.078J+ ug/L 0.50U ug/L 0.50U ug/L 0.35U ug/L 0.20U ug/L 0.26U ug/L 0.15U ug/L 0.16U ug/L
HU110**	Ethylbenzene Naphthalene Styrene Xylenes, total o-Xylene (12.21) 1,3,5-Trimethylbenzene (12.99)	0.078 ug/L 0.36 ug/L 0.21 ug/L 0.20 ug/L 0.20 ug/L 0.15 ug/L	0.078J+ ug/L 0.50U ug/L 0.50U ug/L 0.35U ug/L 0.20U ug/L 0.15U ug/L
HU109	Ethylbenzene Styrene Isopropylbenzene (12.51) 1,3,5-Trimethylbenzene (12.99) p-Isopropyltoluene (13.54)	0.078 ug/L 0.21 ug/L 0.26 ug/L 0.15 ug/L 0.16 ug/L	0.078J+ ug/L 0.50U ug/L 0.26U ug/L 0.15U ug/L 0.16U ug/L
HU119	Ethylbenzene Xylenes, total o-Xylene (12.21) Isopropylbenzene (12.51) 1,3,5-Trimethylbenzene (12.99) p-Isopropyltoluene (13.54)	0.077 ug/L 0.20 ug/L 0.20 ug/L 0.26 ug/L 0.15 ug/L 0.15 ug/L	0.077J+ ug/L 0.35U ug/L 0.20U ug/L 0.26U ug/L 0.15U ug/L 0.15U ug/L

VI. Field Blanks

Samples HU134, HU125, HU109, and HU118 were identified as trip blanks. No contaminants were found with the following exceptions:

Blank ID	Collection Date	Analyte	Concentration	Associated Samples
HU134	06/22/22	Ethylbenzene Naphthalene Styrene Xylenes, total	0.079 ug/L 0.36 ug/L 0.21 ug/L 0.20 ug/L	HU135
HU125	06/22/22	Ethylbenzene Naphthalene Styrene Xylenes, total	0.078 ug/L 0.36 ug/L 0.21 ug/L 0.20 ug/L	HU126**

Blank ID	Collection Date	Analyte	Concentration	Associated Samples
HU109	06/22/22	Ethylbenzene Styrene	0.078 ug/L 0.21 ug/L	HU110**
HU118	06/22/22	Chloromethane Ethylbenzene Naphthalene Styrene Xylenes, total	0.17 ug/L 0.078 ug/L 0.36 ug/L 0.21 ug/L 0.20 ug/L	HU119

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 with the following exceptions:

Sample	Analyte	Reported Concentration	Modified Final Concentration
HU135	Ethylbenzene Naphthalene Xylenes, total	0.077 ug/L 0.36 ug/L 0.20 ug/L	0.077J+ ug/L 0.50U ug/L 0.35U ug/L
HU126**	Ethylbenzene Styrene Xylenes, total	0.078 ug/L 0.21 ug/L 0.20 ug/L	0.078J+ ug/L 0.50U ug/L 0.35U ug/L
HU110**	Ethylbenzene Styrene	0.078 ug/L 0.21 ug/L	0.078J+ ug/L 0.50U ug/L
HU119	Ethylbenzene Xylenes, total	0.077 ug/L 0.20 ug/L	0.077J+ ug/L 0.35U ug/L

VII. Surrogates

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

VIII. Matrix Spike/Matrix Spike Duplicates

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

IX. Laboratory Control Samples

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

X. Field Duplicates

No field duplicates were identified in this SDG.

XI. Internal Standards

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

XII. Target Analyte and Tentatively Identified Compound Quantitation

All target analyte quantitations met validation criteria for samples which underwent Stage 4 validation.

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

Sample	Analyte	Flag	A or P
All samples in SDG 580-115203-1	All laboratory calibrated analytes reported as TICs	J (all detects)	A

Raw data were not reviewed for Stage 2B validation.

XIII. Target Analyte Identification

All target analyte identifications met validation criteria for samples which underwent Stage 4 validation. Raw data were not reviewed for Stage 2B validation.

Manual integrations were reviewed and were considered acceptable. The laboratory provided before and after integration printouts.

XIV. System Performance

The system performance was acceptable for samples which underwent Stage 4 validation. 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 ICV %D, continuing calibration %D, and TIC quantitation, data were qualified as estimated in eight samples.

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

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

Red Hill Oily Waste Disposal Facility, CTO 18F0176
Volatiles - Data Qualification Summary - SDG 580-115203-1

Sample	Analyte	Flag	A or P	Reason (Code)
HU135 HU134 HU126** HU125 HU110** HU109 HU119 HU118	Bromomethane	UJ (all non-detects)	A	Initial calibration verification (%D) (c)
HU135 HU134 HU126** HU125 HU110** HU109 HU119 HU118	Bromomethane Acetone	UJ (all non-detects) UJ (all non-detects)	A	Continuing calibration (%D) (c)
HU135 HU134 HU126** HU125 HU110** HU109 HU119 HU118	Bromomethane	UJ (all non-detects)	A	Continuing calibration (ending CCV %D) (c)
HU135 HU134 HU126** HU125 HU110** HU109 HU119 HU118	All laboratory calibrated analytes reported as TICs	J (all detects)	A	Tentatively Identified Compounds (TIC) quantitation (v)

Red Hill Oily Waste Disposal Facility, CTO 18F0176
Volatiles - Laboratory Blank Data Qualification Summary - SDG 580-115203-1

Sample	Analyte TIC (RT in minutes)	Modified Final Concentration	A or P	Code
HU135	Ethylbenzene Naphthalene Xylenes, total o-Xylene (12.21) 1,3,5-Trimethylbenzene (12.99) p-Isopropyltoluene (13.59)	0.077J+ ug/L 0.50U ug/L 0.35U ug/L 0.20U ug/L 0.15U ug/L 0.15U ug/L	A	b

Sample	Analyte TIC (RT in minutes)	Modified Final Concentration	A or P	Code
HU134	Ethylbenzene Styrene Naphthalene Xylenes, total o-Xylene (12.21) Isopropylbenzene (12.51) 1,3,5-Trimethylbenzene (12.99) p-Isopropyltoluene (13.54)	0.079J+ ug/L 0.50U ug/L 0.50U ug/L 0.35U ug/L 0.20U ug/L 0.26U ug/L 0.15U ug/L 0.16U ug/L	A	b
HU126**	Ethylbenzene Styrene Xylenes, total o-Xylene (12.21) 1,3,5-Trimethylbenzene (12.99) p-Isopropyltoluene (13.54)	0.078J+ ug/L 0.50U ug/L 0.35U ug/L 0.20U ug/L 0.15U ug/L 0.15U ug/L	A	b
HU125	Ethylbenzene Naphthalene Styrene Xylenes, total o-Xylene (12.20) Isopropylbenzene (12.51) 1,3,5-Trimethylbenzene (12.99) p-Isopropyltoluene (13.54)	0.078J+ ug/L 0.50U ug/L 0.50U ug/L 0.35U ug/L 0.20U ug/L 0.26U ug/L 0.15U ug/L 0.16U ug/L	A	b
HU110**	Ethylbenzene Naphthalene Styrene Xylenes, total o-Xylene (12.21) 1,3,5-Trimethylbenzene (12.99)	0.078J+ ug/L 0.50U ug/L 0.50U ug/L 0.35U ug/L 0.20U ug/L 0.15U ug/L	A	b
HU109	Ethylbenzene Styrene Isopropylbenzene (12.51) 1,3,5-Trimethylbenzene (12.99) p-Isopropyltoluene (13.54)	0.078J+ ug/L 0.50U ug/L 0.26U ug/L 0.15U ug/L 0.16U ug/L	A	b
HU119	Ethylbenzene Xylenes, total o-Xylene (12.21) Isopropylbenzene (12.51) 1,3,5-Trimethylbenzene (12.99) p-Isopropyltoluene (13.54)	0.077J+ ug/L 0.35U ug/L 0.20U ug/L 0.26U ug/L 0.15U ug/L 0.15U ug/L	A	b

Red Hill Oily Waste Disposal Facility, CTO 18F0176
Volatiles - Field Blank Data Qualification Summary - SDG 580-115203-1

Sample	Analyte	Modified Final Concentration	A or P	Code
HU135	Ethylbenzene Naphthalene Xylenes, total	0.077J+ ug/L 0.50U ug/L 0.35U ug/L	A	t

Sample	Analyte	Modified Final Concentration	A or P	Code
HU126**	Ethylbenzene Styrene Xylenes, total	0.078J+ ug/L 0.50U ug/L 0.35U ug/L	A	t
HU110**	Ethylbenzene Styrene	0.078J+ ug/L 0.50U ug/L	A	t
HU119	Ethylbenzene Xylenes, total	0.077J+ ug/L 0.35U ug/L	A	t

LDC #: 54723A1a **VALIDATION COMPLETENESS WORKSHEET** Date: 8/21/22
SDG #: 580-115203-1 Stage 2B/4 Page: 1 of 1
Laboratory: Eurofins, Tacoma, WA Reviewer: [illegible]
2nd Reviewer: [illegible]

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

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 / SW	%RSD ≤ 15, r² ICV ≤ 20
IV.	Continuing calibration	SW	CCV ≤ 20/50
V.	Laboratory Blanks	SW	
VI.	Field blanks	SW	TB = 2, 4, 6, 8
VII.	Surrogate spikes	Δ	
VIII.	Matrix spike/Matrix spike duplicates	N	
IX.	Laboratory control samples	Δ	LCS ID
X.	Field duplicates	N	
XI.	Internal standards	Δ	
XII.	Target analyte quantitation / TIC	SW	Not reviewed for Stage 2B validation.
XIII.	Target analyte identification	Δ	Not reviewed for Stage 2B validation. MI
XIV.	System performance	A	Not reviewed for Stage 2B validation.
XV.	Overall assessment of data	Δ	

Note: A = Acceptable ND = No compounds detected D = Duplicate SB=Source blank
N = Not provided/applicable R = Rinsate TB = Trip blank OTHER:
SW = See worksheet FB = Field blank EB = Equipment blank
** Indicates sample underwent Stage 4 validation

	Client ID	Lab ID	Matrix	Date
1	HU135	580-115203-1	Water	06/22/22
2	HU134 TB	580-115203-2	Water	06/22/22
3	HU126**	580-115203-3**	Water	06/22/22
4	HU125 TB	580-115203-4	Water	06/22/22
5	HU110**	580-115203-5**	Water	06/22/22
6	HU109 TB	580-115203-6	Water	06/22/22
7	HU119	580-115203-7	Water	06/22/22
8	HU118 TB	580-115203-8	Water	06/22/22
9				

Notes:

	MB 580-395002						

ICV in 54723B

LDC #: 54723A1a

VALIDATION FINDINGS CHECKLIST

Reviewer: FT

Method: Volatiles (EPA SW 846 Method 8260 D)

Validation Area	Yes	No	NA	Findings/Comments
I. Technical holding times				
Were all technical holding times met?	✓			
Was cooler temperature criteria met?	✓			
II. GC/MS Instrument performance check				
Were the BFB performance results reviewed and found to be within the specified criteria?	✓			
Were all samples analyzed within the 12 hour clock criteria?	✓			
IIIa. Initial calibration				
Did the laboratory perform a 5 point calibration prior to sample analysis?	✓			
Were all percent relative standard deviations (%RSD) ≤ 15% and relative response factors (RRF) within method criteria?	✓			
Was a curve fit used for evaluation? If yes, did the initial calibration meet the curve fit acceptance criteria of ≥ 0.990?	✓			
IIIb. Initial Calibration Verification				
Was an initial calibration verification standard analyzed after each initial calibration for each instrument?	✓			
Were all percent differences (%D) ≤ 20% ?		✓		
IV. Continuing calibration				
Was a continuing calibration standard analyzed at least once every 12 hours for each instrument?	✓			
Were all percent differences (%D) ≤ 20% and relative response factors (RRF) within method criteria? Were all percent differences (%D) ≤ 50% in the ending CCV?		✓		
V. Laboratory Blanks				
Was a laboratory blank associated with every sample in this SDG?	✓			
Was a laboratory blank analyzed at least once every 12 hours for each matrix and concentration?	✓			
Was there contamination in the laboratory blanks? If yes, please see the Blanks validation findings worksheet.	✓			
VI. Field blanks				
Were field blanks were identified in this SDG?	✓			
Were target analytes detected in the field blanks?	✓			
VII. Surrogate spikes				
Were all surrogate percent recovery (%R) within QC limits?	✓			
If the percent recovery (%R) for one or more surrogates was out of QC limits, was a reanalysis performed to confirm samples with %R outside of criteria?			✓	
VIII. Matrix spike/Matrix spike duplicates				
Were matrix spike (MS) and matrix spike duplicate (MSD) analyzed in this SDG?			✓	
Were the MS/MSD percent recoveries (%R) and the relative percent differences (RPD) within the QC limits?			✓	

Validation Area	Yes	No	NA	Findings/Comments
IX. Laboratory control samples				
Was an LCS analyzed for this SDG?	✓			
Was an LCS analyzed per analytical batch?	✓			
Were the LCS percent recoveries (%R) and relative percent difference (RPD) within the QC limits?	✓			
X. Field duplicates				
Were field duplicate pairs identified in this SDG?		✓		
Were target analytes detected in the field duplicates?			✓	
XI. Internal standards				
Were internal standard area counts within -50% to +100% of the associated calibration standard?	✓			
Were retention times within ± 30 seconds of the associated calibration standard?	✓			
XII. Target analyte quantitation				
Did the laboratory LOQs/RLs meet the QAPP LOQs/RLs?	✓			
Were the correct internal standard (IS), quantitation ion and relative response factor (RRF) used to quantitate the target analyte?	✓			
Were target analyte quantitation and RLs adjusted to reflect all sample dilutions and dry weight factors applicable to level IV validation?	✓			
XIII. Target analyte identification				
Were relative retention times (RRT's) within ± 0.06 RRT units of the standard?	✓			
Did analyte spectra meet specified EPA "Functional Guidelines" criteria?	✓			
Were chromatogram peaks verified and accounted for?	✓			
Were manual integrations reviewed and found acceptable?	✓			
Did the laboratory provide before and after integration printouts?	✓			
XIV. System performance				
System performance was found to be acceptable.	✓			
XV. Overall assessment of data				
Overall assessment of data was found to be acceptable.	✓			

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 choride	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. Methyl cyclohexane	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.

LDC #: 54723A1a

VALIDATION FINDINGS WORKSHEET
Initial Calibration Verification

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 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 %D?

(C)

#	Date	Standard ID	Compound	Finding %D (Limit: ≤20.0%/30%)	Associated Samples	Qualifications
	6/22/22 2024	ICV	B	22.4	All	J+/UJ/A ND

LDC #: 54723A1a

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
	6/26/22 2032	CCV 580-395002	B	46.7		All	J+/UJ/A ND
			F	21.9		↓	
	6/27/22 0648	CCV-closing	B	105.1		↓	J+/UJ/A ND

CONCAL.wpd

LDC #: 54723A1a

VALIDATION FINDINGS WORKSHEET
Blanks

Reviewer: FT

METHOD: GC/MS VOA (EPA SW 846 Method 8260 B)
Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".
Y 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? (b)
Y N N/A Was there contamination in the method blanks? If yes, please see the qualifications below.
Blank analysis date: 6/26/22
Conc. units: ug/L Associated Samples: All

Compound	Blank ID	Sample Identification							
	MB 580-395002		1	2	3	4	5	6	7
KKK	0.208								
T	0.0952								
EE	0.0818		0.077J+	0.079J+	0.078J+	0.078J+	0.078J+	0.078J+	0.077J+
~~LLL~~	0.106								
MMM	0.432		0.36 | 0.50 U	0.36 | 0.50 U		0.36 | 0.50 U	0.36 | 0.50 U		
FF	0.211			0.21 | ↓	0.21 | 0.50 U	0.21 | ↓	0.21 | ↓	0.21 | 0.50 U	
GG	0.205		0.20 | 0.35 U	0.20 | 0.35 U	0.20 | 0.35 U	0.20 | 0.35 U	0.20 | 0.35 U		0.20 | 0.35 U

Blank analysis date: ↓
Conc. units: ↓ Associated Samples: All

Compound	Blank ID	Sample Identification							
TIC	↓		1	2	3	4	5	6	7
SSS	0.205 (12.21)		0.20 (12.21)	0.20 (12.21)	0.20 (12.21)	0.20 (12.21)	0.20 (12.21)		0.20 (12.21)
VV	0.264 (12.51)			0.26 (12.51)		0.26 (12.51)	~~0.15 (12.99)~~	0.26 (12.51)	0.26 (12.51)
1,3,5-Trimethylbenzene	0.154 (12.99)		0.15 (12.99)	0.15 (12.99)	0.15 (12.99)	0.15 (12.99)	0.15 (12.99)	0.15 (12.99)	0.15 (12.99)
GGG	0.162 (13.54)		0.15 (13.59	0.16 (13.54)	0.15 (13.54)	0.16 (13.54)		0.16 (13.54)	0.15 (13.54)
1,3,5-Trichlorobenzene	0.0715 (14.65)								
NNN	0.230 (15.53)								

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 #: 54723A1a

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?

(4) (7)

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

Sampling date: ug/L 6/22/22

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

Compound	Blank ID	Sample Identification								
	2		1							
EE	0.079		0.077 J+							
MMM	0.36		0.36 | 0.50 U							
FF	0.21		-							
GG	0.20		0.20 | 0.35 U							

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

Sampling date: 6/22/22

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

Compound	Blank ID	Sample Identification								
	4		3							
EE	0.078		0.078 J+							
MMM	0.36		-							
FF	0.21		0.21 | 0.50 U							
GG	0.20		0.20 | 0.35 U							

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 #: 54723A1a

VALIDATION FINDINGS WORKSHEET
Field Blanks

Page: 1 of 1
Reviewer: FT

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: 6/22/22
Field blank type: (circle one) Field Blank / Rinsate / Trip Blank / Other: TB Associated Samples: 5

Compound	Blank ID	Sample Identification								
	6		5							
EE	0.078		0.078 J+							
FF	0.21		0.21 / 0.50 U							

Blank units: ug/L **Associated sample units:** ug/L
Sampling date: 6/22/22
Field blank type: (circle one) Field Blank / Rinsate / Trip Blank / Other: TB Associated Samples: 7

Compound	Blank ID	Sample Identification								
	8		7							
A	0.17		-							
EE	0.078		0.077 J+							
MMM	0.36									
FF	0.21									
GG	0.20		0.20 / 0.35 U							

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 #: 54723A1a

VALIDATION FINDINGS WORKSHEET
Target Analyte Quantitation

Reviewer: FT

METHOD: GCMS VOA EPA SW 846 Method 8260D

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

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

Y 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 laboratory calibrated analytes reported as Tentatively Identified Compounds (TICs)		Jdet/A (V)

Comments: See sample calculation verification worksheet for recalculations

METHOD: GCMS 8260D

The calibration factors (RRFF), average RRFF, and relative standard deviation (%RSD) were recalculated for compounds identified below using the following calculations:

RRF = (Ax)(Cis)/(Ais)(Cx)
average RRF = sum of the RRFs/number of standards
%RSD = 100 * (S/X)

Where:

Ax = Area of compound
Cx = Concentration of compound
S = Standard deviation of the RRFs
X = Mean of the RRFs
Ais = Area of associated internal standard
Cis = Concentration of internal Standard

#	Standard ID	Calibration Date	Compound	Reported (RRF 5ug/L std)	Recalculated (RRF 5ug/Lstd)	Reported AverageRRF (Initial)	Recalculated Average RRF (Initial)	Reported %RSD	Recalculated %RSD
	ICAL	6/22/2022	A	0.4917	0.4917	0.4786	0.4786	14.1	14.1
	TAC 113		CC	1.6414	1.6414	1.5432	1.5432	5.5	5.5
			JJJ	1.7421	1.7421	1.5218	1.5218	7.9	7.9

LDC #: 54723A1a

VALIDATION FINDINGS WORKSHEET
Continuing Calibration Results Verification

Reviewer: FT

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

The percent difference (%D) of the initial calibration average Relative Response Factors (RRFs) and the continuing calibration RRFs were recalculated for the target analytes identified below using the following calculation:

% Difference = 100 * (ave. RRF - RRF)/ave. RRF

$RRF = (A_x)(C_{is})/(A_{is})(C_x)$

Where:
ave. RRF = initial calibration average RRF
A_x = Area of target analyte
C_x = Concentration of target analyte
RRF = continuing calibration RRF
A_{is} = Area of associated internal standard
C_{is} = Concentration of internal standard

#	Standard ID	Calibration Date	Target Analyte (Internal Standard)	Average RRF (initial)	Reported RRF (CC)	Recalculated RRF (CC)	Reported %D	Recalculated %D
1	ccv	6/26/22 2032	Δ	0.4786	0.4392	0.4392	8.2	8.2
			CC	1.5432	1.549	1.549	0.4	0.4
			JJ	1.5218	1.507	1.507	1.0	1.0
2								
3								
4								

LDC #: 54723A1a

VALIDATION FINDINGS WORKSHEET
Surrogate Results Verification

Reviewer: FT

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

The percent recoveries (%R) of surrogates were recalculated for the compounds identified below using the following calculation:

% Recovery: SF/SS * 100

Where: SF = Surrogate Found
SS = Surrogate Spiked

Sample ID: #5

	Surrogate Spiked	Surrogate Found	Percent Recovery Reported	Percent Recovery Recalculated	Percent Difference
Dibromofluoromethane	10.0	11.6	116	116	0
1,2-Dichloroethane-d4	↓	11.5	115	115	
Toluene-d8		9.52	95	95	↓
Bromofluorobenzene	↓	9.70	98	98	

Comments: _____

LDC #: 54723A1a

VALIDATION FINDINGS WORKSHEET
Laboratory Control Sample Results Verification

Reviewer: FT

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

The percent recoveries (%R) and Relative Percent Difference (RPD) of the laboratory control sample and laboratory control sample duplicate (if applicable) were recalculated for the target analytes identified below using the following calculation:

% Recovery = 100 * SSC/SA

RPD = I LCSC - LCSDC I * 2/(LCSC + LCSDC)

Where: SSC = Spiked sample concentration
SA = Spike added
LCSC = Laboratory control sample concentration
LCSDC = Laboratory control sample duplicate concentration

LCS ID: lcsID 580-395002

Compound	Spike Added (ug/L)		Spiked Sample Concentration (ug/L)		LCS Percent Recovery		LCSD Percent Recovery		LCS/LCSD RPD	
	LCS	LCSD	LCS	LCSD	Reported	Recalc.	Reported	Recalc.	Reported	Recalc.
1,1-Dichloroethene	5.0	5.0	5.11	4.97	102	102	99	99	3	3
Trichloroethene	↓	↓	4.69	4.56	94	94	91	91	3	3
Benzene			5.01	4.92	100	100	98	98	2	2
Toluene			4.89	4.84	98	98	97	97	1	1
Chlorobenzene			4.78	4.72	96	96	94	94	1	1

Comments: _____

LDC #: 54723A1a

VALIDATION FINDINGS WORKSHEET
Sample Calculation Verification

Reviewer: FT

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

The concentration of the sample was calculated for the target analytes identified below using the following calculation:

$$\text{Concentration} = \frac{(A_x)(I_s)(DF)}{(A_{is})(RRF)(V_o)(\%S)}$$

A_x = Area of the characteristic ion (EICP) for the target analyte to be measured

A_{is} = Area of the characteristic ion (EICP) for the specific internal standard

I_s = Amount of internal standard added in nanograms (ng)

RRF = Relative response factor of the calibration standard.

V_o = Volume or weight of sample pruged in milliliters (ml) or grams (g).

Df = Dilution factor.

%S = Percent solids, applicable to soils and solid matrices only.

Example:

Sample I.D. #3 , A

$$\text{Conc.} = \frac{(10657)(100)}{(1336701)(0.4786)}$$

$$= 0.1666 \text{ ug/L}$$

#	Sample ID	Compound	Reported Concentration (ug/L)	Calculated Concentration (ug/L)	Qualification
	#3	A	0.17	0.1666	-

Laboratory Data Consultants, Inc.
Data Validation Report

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

LDC Report Date: August 24, 2022

Parameters: Semivolatiles

Validation Level: Stage 2B & 4

Laboratory: Eurofins, Tacoma, WA

Sample Delivery Group (SDG): 580-115203-1

Sample Identification	Laboratory Sample Identification	Matrix	Collection Date
HU135	580-115203-1	Water	06/22/22
HU126**	580-115203-3**	Water	06/22/22
HU110	580-115203-5	Water	06/22/22
HU119	580-115203-7	Water	06/22/22

**Indicates sample underwent Stage 4 validation

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. Samples appended with a double asterisk on the cover page were subjected to Stage 4 data validation, which is comprised of the 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 and cooler temperatures upon receipt met validation criteria.

All technical holding time requirements were met.

II. GC/MS Instrument Performance Check

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

All ion abundance requirements were met.

III. Initial Calibration and Initial Calibration Verification

An initial calibration was performed as required by the method.

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.

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. Surrogate recoveries (%R) were not within QC limits for sample HU119. Using professional judgment, no data were qualified when one base or one acid surrogate %R was outside the QC limits and the %R was greater than or equal to 10%.

VIII. Matrix Spike/Matrix Spike Duplicates

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

IX. Laboratory Control Samples

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

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

LCS ID (Associated Samples)	Analyte	RPD (Limits)	Flag	A or P
LCS/LCSD 580-395333 (All samples in SDG 580-115203-1)	Hexachlorobutadiene Hexachloroethane	38 (≤20) 23 (≤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 target analyte quantitations met validation criteria for samples which underwent Stage 4 validation.

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

Sample	Analyte	Flag	A or P
HU126**	All laboratory calibrated analytes reported as tentatively identified compounds (TIC).	J (all detects)	A

Sample	Analyte	Flag	A or P
All samples in SDG 580-115203-1	All tentatively identified compounds (TIC).	NJ (all detects)	A

Raw data were not reviewed for Stage 2B validation.

XIII. Target Analyte Identification

All target analyte identifications met validation criteria for samples which underwent Stage 4 validation. Raw data were not reviewed for Stage 2B validation.

Manual integrations were reviewed and were considered acceptable. The laboratory provided before and after integration printouts.

XIV. System Performance

The system performance was acceptable for samples which underwent Stage 4 validation. 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 TICs, data were qualified as presumptive and estimated in four samples.

Red Hill Oily Waste Disposal Facility, CTO 18F0176
Semivolatiles - Data Qualification Summary - SDG 580-115203-1

Sample	Analyte	Flag	A or P	Reason (Code)
HU126**	All laboratory calibrated analytes reported as tentatively identified compounds (TIC)	J (all detects)	A	Target analyte quantitation (TICs) (v)
HU135 HU126** HU110 HU119	All tentatively identified compounds (TIC)	NJ (all detects)	A	Target analyte quantitation (TICs) (v)

Red Hill Oily Waste Disposal Facility, CTO 18F0176
Semivolatiles - Laboratory Blank Data Qualification Summary - SDG 580-115203-1

No Sample Data Qualified in this SDG

Red Hill Oily Waste Disposal Facility, CTO 18F0176
Semivolatiles - Field Blank Data Qualification Summary - SDG 580-115203-1

No Sample Data Qualified in this SDG

LDC #: 54723A2a **VALIDATION COMPLETENESS WORKSHEET** Date: 8/21/22
SDG #: 580-115203-1 Stage 2B/4 Page: 1 of 1
Laboratory: Eurofins, Tacoma, WA Reviewer:
2nd Reviewer:

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 / 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	SW	
VIII.	Matrix spike/Matrix spike duplicates	N	CS
IX.	Laboratory control samples	SW	LCS ID
X.	Field duplicates	N	
XI.	Internal standards	A	
XII.	Target analyte quantitation /TIC	SW	Not reviewed for Stage 2B validation.
XIII.	Target analyte identification	A	Not reviewed for Stage 2B validation. MI
XIV.	System performance	A	Not reviewed for Stage 2B validation.
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:

** Indicates sample underwent Stage 4 validation

	Client ID	Lab ID	Matrix	Date
1	HU135	580-115203-1	Water	06/22/22
2	HU126**	580-115203-3**	Water	06/22/22
3	HU110	580-115203-5	Water	06/22/22
4	HU119	580-115203-7	Water	06/22/22
5				
6				
7				
8				
9				

Notes:

	MB 580-395333						

LDC #: 54123A2a

VALIDATION FINDINGS CHECKLIST

Reviewer: FT

Method: Semivolatiles (EPA SW 846 Method 8270E)

Validation Area	Yes	No	NA	Findings/Comments
I. Technical holding times				
Were all technical holding times met?	✓			
Was cooler temperature criteria met?	✓			
II. GC/MS Instrument performance check				
Were the DFTPP performance results reviewed and found to be within the specified criteria?	✓			
Were all samples analyzed within the 12 hour clock criteria?	✓			
IIIa. Initial calibration				
Did the laboratory perform a 5 point calibration prior to sample analysis?	✓			
Were all percent relative standard deviations (%RSD) ≤ 15% and relative response factors (RRF) within method criteria?	✓			
Was a curve fit used for evaluation? If yes, did the initial calibration meet the curve fit acceptance criteria of ≥ 0.990?	✓			
IIIb. Initial Calibration Verification				
Was an initial calibration verification standard analyzed after each initial calibration for each instrument?	✓			
Were all percent differences (%D) ≤ 20%?	✓			
IV. Continuing calibration				
Was a continuing calibration standard analyzed at least once every 12 hours for each instrument?	✓			
Were all percent differences (%D) ≤ 20% and relative response factors (RRF) within method criteria? Were all percent differences (%D) ≤ 50% for closing calibration verification?	✓			
V. Laboratory Blanks				
Was a laboratory blank associated with every sample in this SDG?	✓			
Was a laboratory blank analyzed at least once every 12 hours for each matrix and concentration?	✓			
Was there contamination in the laboratory blanks? If yes, please see the blanks validation findings worksheet.		✓		
VI. Field blanks				
Were field blanks were identified in this SDG?		✓		
Were target analytes detected in the field blanks?			✓	
VII. Surrogate spikes				
Were all surrogate percent recovery (%R) within QC limits?		✓		
If 2 or more base neutral or acid surrogates were outside QC limits, was a reanalysis performed to confirm %R?			✓	
If any percent recoveries (%R) was less than 10%, was a reanalysis performed to confirm %R ?			✓	
VIII. Matrix spike/Matrix spike duplicates				
Were matrix spike (MS) and matrix spike duplicate (MSD) analyzed in this SDG?	✓			

Validation Area	Yes	No	NA	Findings/Comments
Were the MS/MSD percent recoveries (%R) and the relative percent differences (RPD) within the QC limits?			✓	
IX. Laboratory control samples				
Was an LCS analyzed per extraction batch?	✓			
Were the LCS percent recoveries (%R) and relative percent difference (RPD) within the QC limits?		✓		
X. Field duplicates				
Were field duplicate pairs identified in this SDG?		✓		
Were target analytes detected in the field duplicates?			✓	
XI. Internal standards				
Were internal standard area counts within -50% to +100% of the associated calibration standard?	✓			
Were retention times within ± 30 seconds of the associated calibration standard?	✓			
XII. Target analyte quantitation				
Did the laboratory LOQs/RLs meet the QAPP LOQs/RLs?	✓			
Were the correct internal standard (IS), quantitation ion and relative response factor (RRF) used to quantitate the target analyte?	✓			
Were compound quantitation and RLs adjusted to reflect all sample dilutions and dry weight factors applicable to level IV validation?	✓			
XIII. Target analyte identification				
Were relative retention times (RRT's) within ± 0.06 RRT units of the standard?	✓			
Did compound spectra meet specified EPA "Functional Guidelines" criteria?	✓			
Were chromatogram peaks verified and accounted for?	✓			
Were manual integrations reviewed and found acceptable?	✓			
Did the laboratory provide before and after integration printouts?	✓			
XIV. System performance				
System performance was found to be acceptable.	✓			
XV. Overall assessment of data				
Overall assessment of data was found to be acceptable.	✓			

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 #: 54723A2a

VALIDATION FINDINGS WORKSHEET
Surrogate Recovery

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

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
	4	TPH	135 (50-134)	no qual
			( )	
			( )	
			( )	
			( )	
	MB 580-395333	↓	136 (↓)	↓
			( )	
			( )	
			( )	
			( )	
			( )	
			( )	
			( )	
			( )	
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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 #: 54723A2a

VALIDATION FINDINGS WORKSHEET
Laboratory Control Samples (LCS)

Page: 1 of 1
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 LCS required?
Y N N/A Were the LCS/LCSD percent recoveries (%R) and the relative percent differences (RPD) within the QC limits?

(w)

#	LCS/LCSD ID	Compound	LCS %R (Limits)	LCSD %R (Limits)	RPD (Limits)	Associated Samples	Qualifications
	LCS ID	U	( )	( )	38 (20)	all	J dets/P ND
	580-395333	K	( )	( )	23 (20)	↓	↓
			( )	( )	( )		
			( )	( )	( )		
			( )	( )	( )		
			( )	( )	( )		
			( )	( )	( )		
			( )	( )	( )		
			( )	( )	( )		
			( )	( )	( )		
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			( )	( )	( )		
			( )	( )	( )		
			( )	( )	( )		
			( )	( )	( )		
			( )	( )	( )		

LDC #: 54723A2a

VALIDATION FINDINGS WORKSHEET
Target Analyte Quantitation

Reviewer: FT

METHOD: GCMS VOA EPA SW 846 Method 8260D

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

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

Y 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 Compounds (TICs)		NJ/A (V)
		2	Lab calibrated analytes reported as TIC		J/A data (V)

Comments: See sample calculation verification worksheet for recalculations

LDC #: _54723A2a

Validation Findings Worksheet
Initial Calibration Calculation Verification

Method: 8270E

Calibration Date	Instrument/Column	Compound	Standard	(Y) Response	(X) Conc.	(X^2) Conc.
6/30/2022	GCMS	BBB	1	0.052	0.4	0.16
	TACO40		2	0.167	1	1
			3	0.475	2	4
			4	1.152	4	16
			5	2.778	10	100
			6	5.160	20	400
			7	9.924	40	1600
			8	23.160	100	10000
			9	43.480	200	40000

Regression Output	**Calculated**		***Reported***	
Constant	c	0.0961	c	-6.1910
Std Err of Y Est				
R Squared		0.9998843		0.9920000
Degrees of Freedom				
	a	b	a	b
X Coefficient(s)	2.48329E-01	-1.5802E-04	2.71400E-01	-3.0000E-06
Std Err of Coef.				
Correlation Coefficient		0.999942		
Coefficient of Determination (r^2)		0.999884		

Method: SVOA 8270E

Calibration Date	System	Compound	Standard	(Y) Response	weighted (X) Concentration
6/30/2022	GCMS TACO40	SS	1	0.04365	0.1
			2	0.05402	0.2
			3	0.1517	0.5
			4	0.29	1
			5	0.5892	2
			6	1.442	5
			7	2.735	10
			8	5.414	20
			9	13.42	50
			10	26.35	100

Regression Output		*Reported*
Constant	*0.068234*	*1.553700*
Std Err of Y Est		
R Squared	*0.999915*	*1.000000*
Degrees of Freedom		
X Coefficient(s)	*0.263809*	*0.266600*
Std Err of Coef.		
Correlation Coefficient	*0.999958*	
Coefficient of Determination (r^2)	*0.999915*	*1.000000*

LDC #: 54723A2a

VALIDATION FINDINGS WORKSHEET
Initial Calibration Calculation Verification

Reviewer: ____FT____

METHOD: GCMS 8270E

The calibration factors (RRFF), average RRFF, and relative standard deviation (%RSD) were recalculated for compounds identified below using the following calculations:

RRF = (Ax)(Cis)/(Ais)(Cx)
average RRF = sum of the RRFs/number of standards
%RSD = 100 * (S/X)

Where:

Ax = Area of compound
Cx = Concentration of compound
S = Standard deviation of the RRFs
X = Mean of the RRFs
Ais = Area of associated internal standard
Cis = Concentration of internal Standard

#	Standard ID	Calibration Date	Compound	Reported (RRF 500 std)	Recalculated (RRF500 std)	Reported AverageRRF (Initial)	Recalculated Average RRF (Initial)	Reported %RSD	Recalculated %RSD
	ICAL	6/30/2022	A	1.1113	1.1113	1.1448	1.1448	6.7	6.7
	TACO40		U	0.2434	0.2434	0.2392	0.2392	4.9	4.9
			LL	1.0230	1.0230	1.0401	1.0401	4.7	4.7
			SS	see curve					
			BBB	see curve					

LDC #: 54723A2a

VALIDATION FINDINGS WORKSHEET
Continuing Calibration Results Verification

Reviewer: FT

METHOD: GC/MS BNA (EPA SW 846 Method 8270 E)
The percent difference (%D) of the initial calibration average Relative Response Factors (RRFs) and the continuing calibration RRFs were recalculated for the target analytes identified below using the following calculation:

% Difference = 100 * (ave. RRF - RRF)/ave. RRF
$RRF = (A_x)(C_{is})/(A_{is})(C_x)$

Where: ave. RRF = initial calibration average RRF
A_x = Area of target analyte
C_x = Concentration of target analyte
RRF = continuing calibration RRF
A_{is} = Area of associated internal standard
C_{is} = Concentration of internal standard

#	Standard ID	Calibration Date	Target Analyte (Internal Standard)	Average RRF (Initial)	Reported RRF (CC)	Recalculated RRF (CC)	Reported %D	Recalculated %D
1	CCV	7/2/22	A (1st IS)	1.1448	1.321	1.321	15.4	15.4
			U (2nd IS)	0.2392	0.2400	0.2400	0.4	0.4
			LL (3rd IS)	1.0401	1.084	1.084	4.3	4.3
			SS (L) (4th IS)	1000	1070	1070	6.6	6.6
			BBB (Q) (5th IS)	2000	21100	21100	5.3	5.3
			(6th IS)					
2			(1st IS)					
			(2nd IS)					
			(3rd IS)					
			(4th IS)					
			(5th IS)					
			(6th IS)					
3			(1st IS)					
			(2nd IS)					
			(3rd IS)					
			(4th IS)					
			(5th IS)					
			(6th IS)					

Comments: Refer to Continuing Calibration findings worksheet for list of qualifications and associated samples when reported results do not agree within 10.0% of the recalculated results.

LDC #: 54723A2a

VALIDATION FINDINGS WORKSHEET
Surrogate Results Verification

Reviewer: FT

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

The percent recoveries (%R) of surrogates were recalculated for the compounds identified below using the following calculation:

% Recovery: SF/SS * 100

Where: SF = Surrogate Found
SS = Surrogate Spiked

Sample ID: #2

	Surrogate Spiked	Surrogate Found	Percent Recovery Reported	Percent Recovery Recalculated	Percent Difference
Nitrobenzene-d5	1000.0	872.2	87	87	0
2-Fluorobiphenyl		726.9	73	73	
Terphenyl-d14	↓	305.3	114	114	↓
Phenol-d5		305.3	31	31	
2-Fluorophenol		485.4	49	49	
2,4,6-Tribromophenol		847.4	85	85	

Sample ID:

	Surrogate Spiked	Surrogate Found	Percent Recovery Reported	Percent Recovery Recalculated	Percent Difference
Nitrobenzene-d5					
2-Fluorobiphenyl					
Terphenyl-d14					
Phenol-d5					
2-Fluorophenol					
2,4,6-Tribromophenol					

LDC #: 54723A2a

VALIDATION FINDINGS WORKSHEET

Laboratory Control Sample/Laboratory Control Sample Duplicates Results Verification

Reviewer: FT

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

The percent recoveries (%R) and Relative Percent Difference (RPD) of the laboratory control sample and laboratory control sample duplicate were recalculated for the target analytes identified below using the following calculation:

$$SSC = \frac{(A_X)(C_{IS})(Fv)(Df)}{(A_{IS})(RRF)(Vs \text{ or } Ws)(\%S/100)}$$

%Recovery = (SSC/SA)*100

RPD =(({SSCLCS - SSCLCSD} * 2) / (SSCLCS + SSCLCSD))*100

Where: A_X= Area of the target analyte; A_{IS}= Area for the specific internal standard; C_{IS} = Concentration of internal standard; Fv =Final volume of extract; Df= Dilution factor; RRF= Average relative response factor of the target analyte; Ws= Initial weight of the sample; %S= Percent Solid; SSC = Spiked sample concentration; LCS = Laboratory control sample; LCSD = Laboratory control sample duplicate; Vs= Initial volume of the sample

LCS/LCSD samples: 580-395333

Compound	Spike Added (ug/L)		Spike Concentration (ug/kg)		LCS Percent Recovery		LCSD Percent Recovery		LCS/LCSD RPD	
	LCS	LCSD	LCS	LCSD	Reported	Recalc	Reported	Recalc	Reported	Recalculated
Phenol	2.0	2.0	1.01	0.966	51	51	48	48	5	5
N-Nitroso-di-n-propylamine	-									
4-Chloro-3-methylphenol										
Acenaphthene										
Pentachlorophenol	4.0		1.45	1.55	36	36	39	39	7	7
Pyrene										

LDC #: 54723A2a

VALIDATION FINDINGS WORKSHEET
Sample Calculation Verification

Reviewer: FT

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

The concentration of the sample was calculated for the target analyte identified below using the following calculation:

$$\text{Concentration} = \frac{(A_x)(I_s)(V_t)(DF)(2.0)}{(A_{is})(RRF)(V_o)(V_i)(\%S)}$$

A_x = Area of the characteristic ion (EICP) for the target analyte to be measured

A_{is} = Area of the characteristic ion (EICP) for the specific internal standard

I_s = Amount of internal standard added in nanograms (ng)

V_o = Volume or weight of sample extract in milliliters (ml) or grams (g).

V_i = Volume of extract injected in microliters (ul)

V_t = Volume of the concentrated extract in microliters (ul)

Df = Dilution Factor.

%S = Percent solids, applicable to soil and solid matrices only.

2.0 = Factor of 2 to account for GPC cleanup 2/1000

Example:

Sample I.D. LCS 580-395332 A

$$\text{Conc.} = \frac{(91836)(100.0)(2)}{(15826)(1.1448)(1000)}$$

= 1.0138 ug/L

#	Sample ID	Target Analyte	Reported Concentration (ug/L)	Calculated Concentration (ug/L)	Qualification
	LCS	A	1.01	1.0138	

LDC Report# 54723A2b

Laboratory Data Consultants, Inc.
Data Validation Report

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

LDC Report Date: August 24, 2022

Parameters: Polynuclear Aromatic Hydrocarbons

Validation Level: Stage 2B & 4

Laboratory: Eurofins, Tacoma, WA

Sample Delivery Group (SDG): 580-115203-1

Sample Identification	Laboratory Sample Identification	Matrix	Collection Date
HU135	580-115203-1	Water	06/22/22
HU126**	580-115203-3**	Water	06/22/22
HU110	580-115203-5	Water	06/22/22
HU119	580-115203-7	Water	06/22/22

**Indicates sample underwent Stage 4 validation

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. Samples appended with a double asterisk on the cover page were subjected to Stage 4 data validation, which is comprised of the 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 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

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

IX. Laboratory Control Samples

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

X. Field Duplicates

No field duplicates were identified in this SDG.

XI. Internal Standards

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

XII. Target Analyte Quantitation

All target analyte quantitations met validation criteria for samples which underwent Stage 4 validation. Raw data were not reviewed for Stage 2B validation.

XIII. Target Analyte Identification

All target analyte identifications met validation criteria for samples which underwent Stage 4 validation. Raw data were not reviewed for Stage 2B validation.

Manual integrations were reviewed and were considered acceptable. The laboratory provided before and after integration printouts.

XIV. System Performance

The system performance was acceptable for samples which underwent Stage 4 validation. 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 580-115203-1

No Sample Data Qualified in this SDG

Red Hill Oily Waste Disposal Facility, CTO 18F0176
Polynuclear Aromatic Hydrocarbons - Laboratory Blank Data Qualification Summary - SDG 580-115203-1

No Sample Data Qualified in this SDG

Red Hill Oily Waste Disposal Facility, CTO 18F0176
Polynuclear Aromatic Hydrocarbons - Field Blank Data Qualification Summary - SDG 580-115203-1

No Sample Data Qualified in this SDG

LDC #: 54723A2b

SDG #: 580-115203-1

Laboratory: Eurofins, Tacoma, WA

VALIDATION COMPLETENESS WORKSHEET

Stage 2B/4

Date: 8/22/22

Page: 1 of 1

Reviewer: EM

2nd Reviewer: AC

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	%RSD ≤ 15, r² ✓ ICV ≤ 20
IV.	Continuing calibration	A	CCV ≤ 20/20
V.	Laboratory Blanks	A	
VI.	Field blanks	N	
VII.	Surrogate spikes	A	
VIII.	Matrix spike/Matrix spike duplicates	N	CS
IX.	Laboratory control samples	A	LCS/D
X.	Field duplicates	N	
XI.	Internal standards	A	
XII.	Target analyte quantitation	A	Not reviewed for Stage 2B validation.
XIII.	Target analyte identification	A	Not reviewed for Stage 2B validation. MI
XIV.	System performance	A	Not reviewed for Stage 2B validation.
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:

** Indicates sample underwent Stage 4 validation

	Client ID	Lab ID	Matrix	Date
1	HU135	580-115203-1	Water	06/22/22
2	HU126**	580-115203-3**	Water	06/22/22
3	HU110	580-115203-5	Water	06/22/22
4	HU119	580-115203-7	Water	06/22/22
5				
6				
7				
8				
9				

Notes:

	MB 580-395333						

LDC #: 54723A24 **VALIDATION FINDINGS CHECKLIST** Page: 1 of 2
Reviewer: FT

Method: Semivolatiles (EPA SW 846 Method 8270 E) SIM

Validation Area	Yes	No	NA	Findings/Comments
I. Technical holding times				
Were all technical holding times met?	✓			
Was cooler temperature criteria met?	✓			
II. GC/MS Instrument performance check				
Were the DFTPP performance results reviewed and found to be within the specified criteria?	✓			
Were all samples analyzed within the 12 hour clock criteria?	✓			
IIIa. Initial calibration				
Did the laboratory perform a 5 point calibration prior to sample analysis?	✓			
Were all percent relative standard deviations (%RSD) ≤ 15% and relative response factors (RRF) within method criteria?	✓			
Was a curve fit used for evaluation? If yes, did the initial calibration meet the curve fit acceptance criteria of ≥ 0.990?	✓			
IIIb. Initial Calibration Verification				
Was an initial calibration verification standard analyzed after each initial calibration for each instrument?	✓			
Were all percent differences (%D) ≤ 20%?	✓			
IV. Continuing calibration				
Was a continuing calibration standard analyzed at least once every 12 hours for each instrument?	✓			
Were all percent differences (%D) ≤ 20% and relative response factors (RRF) within method criteria? Were all percent differences (%D) ≤ 50% for closing calibration verification?	✓			
V. Laboratory Blanks				
Was a laboratory blank associated with every sample in this SDG?	✓			
Was a laboratory blank analyzed at least once every 12 hours for each matrix and concentration?	✓			
Was there contamination in the laboratory blanks? If yes, please see the blanks validation findings worksheet.		✓		
VI. Field blanks				
Were field blanks were identified in this SDG?		✓		
Were target analytes detected in the field blanks?			✓	
VII. Surrogate spikes				
Were all surrogate percent recovery (%R) within QC limits?	✓			
If 2 or more base neutral or acid surrogates were outside QC limits, was a reanalysis performed to confirm %R?			✓	
If any percent recoveries (%R) was less than 10%, was a reanalysis performed to confirm %R ?			✓	
VIII. Matrix spike/Matrix spike duplicates				
Were matrix spike (MS) and matrix spike duplicate (MSD) analyzed in this SDG?			✓	

Validation Area	Yes	No	NA	Findings/Comments
Were the MS/MSD percent recoveries (%R) and the relative percent differences (RPD) within the QC limits?			✓	
IX. Laboratory control samples				
Was an LCS analyzed per extraction batch?	✓			
Were the LCS percent recoveries (%R) and relative percent difference (RPD) within the QC limits?	✓			
X. Field duplicates				
Were field duplicate pairs identified in this SDG?		✓		
Were target analytes detected in the field duplicates?			✓	
XI. Internal standards				
Were internal standard area counts within -50% to +100% of the associated calibration standard?	✓			
Were retention times within ± 30 seconds of the associated calibration standard?	✓			
XII. Target analyte quantitation				
Did the laboratory LOQs/RLs meet the QAPP LOQs/RLs?	✓			
Were the correct internal standard (IS), quantitation ion and relative response factor (RRF) used to quantitate the target analyte?	✓			
Were compound quantitation and RLs adjusted to reflect all sample dilutions and dry weight factors applicable to level IV validation?	✓			
XIII. Target analyte identification				
Were relative retention times (RRT's) within ± 0.06 RRT units of the standard?	✓			
Did compound spectra meet specified EPA "Functional Guidelines" criteria?	✓			
Were chromatogram peaks verified and accounted for?	✓			
Were manual integrations reviewed and found acceptable?	✓			
Did the laboratory provide before and after integration printouts?	✓			
XIV. System performance				
System performance was found to be acceptable.	✓			
XV. Overall assessment of data	✓			
Overall assessment of data was found to be acceptable.				

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 #: 54723A2b

VALIDATION FINDINGS WORKSHEET
Initial Calibration Calculation Verification

Reviewer: ____FT____

METHOD: GCMS 8270D SIM

The calibration factors (RRFF), average RRFF, and relative standard deviation (%RSD) were recalculated for compounds identified below using the following calculations:

RRF = (Ax)(Cis)/(Ais)(Cx)
average RRF = sum of the RRFs/number of standards
%RSD = 100 * (S/X)

Where:

Ax = Area of compound
Cx = Concentration of compound
S = Standard deviation of the RRFs
X = Mean of the RRFs
Ais = Area of associated internal standard
Cis = Concentration of internal Standard

#	Standard ID	Calibration Date	Compound	Reported (RRF 100ug/Lstd)	Recalculated (RRF 100ug/L std)	Reported AverageRRF (Initial)	Recalculated Average RRF (Initial)	Reported %RSD	Recalculated %RSD
	ICAL	6/30/2022	S	1.1129	1.1129	1.0772	1.0772	10.6	10.6
			DD	1.8997	1.8997	1.9330	1.9330	12.0	12.0
	TACO50		VV	1.1915	1.1915	1.1640	1.1640	7.7	7.7
			DDD	1.5208	1.5208	1.4993	1.4993	1.5	1.5
			III	1.1223	1.1223	1.1141	1.1141	12.1	12.1

LDC #: 54723A2h

VALIDATION FINDINGS WORKSHEET
Continuing Calibration Results Verification

Reviewer: FT

METHOD: GC/MS BNA (EPA SW 846 Method 8270 C)
The percent difference (%D) of the initial calibration average Relative Response Factors (RRFs) and the continuing calibration RRFs were recalculated for the target analytes identified below using the following calculation:

% Difference = 100 * (ave. RRF - RRF)/ave. RRF
$RRF = (A_x)(C_{is})/(A_{is})(C_x)$

Where: ave. RRF = initial calibration average RRF
A_x = Area of target analyte
C_x = Concentration of target analyte
RRF = continuing calibration RRF
A_{is} = Area of associated internal standard
C_{is} = Concentration of internal standard

#	Standard ID	Calibration Date	Target Analyte (Internal Standard)	Average RRF (Initial)	Reported RRF (CC)	Recalculated RRF (CC)	Reported %D	Recalculated %D
1	CCV	7/2/22 1755	S (1st IS)	1.0772	0.9898	0.9898	8.1	8.1
			DD (2nd IS)	1.9330	1.734	1.734	10.3	10.3
			VV (3rd IS)	1.1640	1.082	1.082	7.1	7.1
			DDD (4th IS)	1.4993	1.368	1.368	8.8	8.8
			111 (5th IS)	1.1141	1.053	1.053	5.5	5.5
			(6th IS)					
2			(1st IS)					
			(2nd IS)					
			(3rd IS)					
			(4th IS)					
			(5th IS)					
			(6th IS)					
3			(1st IS)					
			(2nd IS)					
			(3rd IS)					
			(4th IS)					
			(5th IS)					
			(6th IS)					

Comments: Refer to Continuing Calibration findings worksheet for list of qualifications and associated samples when reported results do not agree within 10.0% of the recalculated results.

LDC #: 54723A2b

VALIDATION FINDINGS WORKSHEET
Surrogate Results Verification

Reviewer: FT

METHOD: GC/MS Semivolatiles (EPA SW 846 Method 8270C)

The percent recoveries (%R) of surrogates were recalculated for the compounds identified below using the following calculation:

% Recovery: SF/SS * 100

Where: SF = Surrogate Found
SS = Surrogate Spiked

Sample ID: 2

	Surrogate Spiked	Surrogate Found	Percent Recovery Reported	Percent Recovery Recalculated	Percent Difference
Nitrobenzene-d5 w-d10	1000	655.8	66	66	0
2-Fluorobiphenyl -14- d10	↓	935.1	94	94	0
Terphenyl-d14			101	101	0
Phenol-d5					
2-Fluorophenol					
2,4,6-Tribromophenol					

Sample ID:

	Surrogate Spiked	Surrogate Found	Percent Recovery Reported	Percent Recovery Recalculated	Percent Difference
Nitrobenzene-d5					
2-Fluorobiphenyl					
Terphenyl-d14					
Phenol-d5					
2-Fluorophenol					
2,4,6-Tribromophenol					

LDC #: 54723A2b

VALIDATION FINDINGS WORKSHEET

Laboratory Control Sample/Laboratory Control Sample Duplicates Results Verification

Reviewer: FT

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

The percent recoveries (%R) and Relative Percent Difference (RPD) of the laboratory control sample and laboratory control sample duplicate were recalculated for the target analytes identified below using the following calculation:

$$SSC = \frac{(Ax)(C_{IS})(Fv)(Df)}{(A_{IS})(RRF)(Vs \text{ or } Ws)(\%S/100)}$$

%Recovery = (SSC/SA)*100

RPD =(({SSCLCS - SSCLCSD} * 2) / (SSCLCS + SSCLCSD))*100

Where: A_X= Area of the target analyte
A_{IS}= Area for the specific internal standard
C_{IS} = Concentration of internal standard
Fv =Final volume of extract
Df= Dilution factor
RRF= Average relative response factor of the target analyte
Ws= Initial weight of the sample
%S= Percent Solid
SSC = Spiked sample concentration
LCS = Laboratory control sample
LCSD = Laboratory control sample duplicate
Vs= Initial volume of the sample

LCS/LCSD samples: LCS ID

Compound	Spike Added (ug/L)		Spike Concentration (ug/L)		LCS Percent Recovery		LCSD Percent Recovery		LCS/LCSD RPD	
	LCS	LCSD	LCS	LCSD	Reported	Recalc	Reported	Recalc	Reported	Recalculated
Phenol										
N-Nitroso-di-n-propylamine										
4-Chloro-3-methylphenol										
Acenaphthene	2.0	2.0	1.66	1.70	83	83	85	85	2	2
Pentachlorophenol										
Pyrene	2.0	2.0	1.82	1.81	91	91	90	90	0	0

LDC #: 54723A2b

VALIDATION FINDINGS WORKSHEET
Sample Calculation Verification

Reviewer: FT

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

The concentration of the sample was calculated for the target analyte identified below using the following calculation:

$$\text{Concentration} = \frac{(A_x)(I_s)(V_t)(DF)(2.0)}{(A_{is})(RRF)(V_o)(V_i)(\%S)}$$

A_x = Area of the characteristic ion (EICP) for the target analyte to be measured

A_{is} = Area of the characteristic ion (EICP) for the specific internal standard

I_s = Amount of internal standard added in nanograms (ng)

V_o = Volume or weight of sample extract in milliliters (ml) or grams (g).

V_i = Volume of extract injected in microliters (ul)

V_t = Volume of the concentrated extract in microliters (ul)

Df = Dilution Factor.

%S = Percent solids, applicable to soil and solid matrices only.

2.0 = Factor of 2 to account for GPC cleanup PHN 2/972

Example:

Sample I.D. #2 , VV

$$\text{Conc.} = \frac{(7398)(100.0)(2)}{(23215)(1.164)(972)}$$

$$= 0.056$$

#	Sample ID	Target Analyte	Reported Concentration (ug/L)	Calculated Concentration ( )	Qualification
	#2	VV	0.056		

Laboratory Data Consultants, Inc.
Data Validation Report

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

LDC Report Date: October 3, 2022

Parameters: Metals

Validation Level: Stage 2B & 4

Laboratory: Eurofins, Tacoma, WA

Sample Delivery Group (SDG): 580-115203-1

Sample Identification	Laboratory Sample Identification	Matrix	Collection Date
HU135	580-115203-1	Water	06/22/22
HU126**	580-115203-3**	Water	06/22/22
HU110	580-115203-5	Water	06/22/22
HU119	580-115203-7	Water	06/22/22

**Indicates sample underwent Stage 4 validation

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. Samples appended with a double asterisk on the cover page were subjected to Stage 4 data validation, which is comprised of the 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. 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
PB (prep blank)	Potassium	197 ug/L	All samples in SDG 580-115203-1
ICB/CCB	Potassium Sodium	0.229 ug/L 0.179 ug/L	All samples in SDG 580-115203-1

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.

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. 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

All target analyte quantitation met validation criteria for samples which underwent Stage 4 validation. Raw data were not reviewed for Stage 2B validation.

XII. Overall Assessment of Data

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

Red Hill Bulk Storage Facility, CTO 18F0126
Metals - Data Qualification Summary - SDG 580-115203-1

No Sample Data Qualified in this SDG

Red Hill Bulk Storage Facility, CTO 18F0126
Metals - Laboratory Blank Data Qualification Summary - SDG 580-115203-1

No Sample Data Qualified in this SDG

Red Hill Bulk Storage Facility, CTO 18F0126
Metals - Field Blank Data Qualification Summary - SDG 580-115203-1

No Sample Data Qualified in this SDG

LDC #: 54723A4b

SDG #: 580-115203-1

Laboratory: Eurofins, Tacoma, WA

VALIDATION COMPLETENESS WORKSHEET

Stage 2B/4

Date: 9/28/22

Page: 1 of 1

Reviewer: ATV

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	N	C,S
VII.	Duplicate sample analysis	N	
VIII.	Serial Dilution	N	
IX.	Laboratory control samples	A	LCS/LCSD
X.	Field Duplicates	N	
XI.	Target Analyte Quantitation	A	Not reviewed for Stage 2B validation.
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:

** Indicates sample underwent Stage 4 validation

	Client ID	Lab ID	Matrix	Date
1	HU135	580-115203-1	Water	06/22/22
2	HU126**	580-115203-3**	Water	06/22/22
3	HU110	580-115203-5	Water	06/22/22
4	HU119	580-115203-7	Water	06/22/22
5				
6				
7				
8				
9				
10				
11				
12				
13				
14				
15				

Notes:

METHOD: Trace Metals (EPA SW 846 Methods 6010/6020/7000)				
Validation Area	**Yes**	**No**	**NA**	**Comments**
I. Technical holding times				
Were all technical holding times met?	✓			
Were all water samples preserved to a pH of <2.	✓			
II. ICP-MS Tune				
Were mass resolutions within 0.1 amu for all isotopes in the tuning solution?			✓	
Were %RSDs of isoptoes in the tuning solution ≤5%?			✓	
III. Calibration				
Were all instruments calibrated daily?	✓			
Were the proper standards used?	✓			
Were all initial and continuing calibration verifications within the 90-110% (80-120% for mercury) QC limits?	✓			
Were the low level standard checks within 70-130%? 80-120%	✓			
Were all initial calibration correlation coefficients within limits as specifed by the method?	✓			
IV. Blanks				
Was a method blank associated with every sample in this SDG?	✓			
Was there contamination in the method blanks?	✓			
Was there contamination in the initial and continuing calibration blanks?	✓			
V. Interference Check Sample				
Were the interference check samples performed daily?	✓			
Were the AB solution recoveries within 80-120%?	✓			
VI. 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.)			✓	
Were the MS/MSD or laboratory duplicate relative percent differences (RPDs) within the QC limits?			✓	
VII. Laboratory Control Samples				
SDG?	✓			

Were the LCS recoveries and RPDs (if applicable) within QC limits?	✓			
METHOD: Trace Metals (EPA SW 846 Methods 6010/6020/7000)				
Validation Area	**Yes**	**No**	**NA**	**Comments**
VIII. Internal Standards				
Were all percent recoveries within the 30-120% (60-125% for EPA Method 200.8) QC limits?			✓	
If the recoveries were outside the limits, was a reanalysis performed?			✓	
IX. Serial Dilution				
Were all percent differences <10%?			✓	
Was there evidence of negative interference? If yes, professional judgement will be used to qualify the data.			✓	
X. Target Analyte Quantitation				
Were all reporting limits adjusted to reflect sample dilutions?	✓			
Were all soil samples dry weight corrected?			✓	
XI. Overall Assessment of Data				
Was the overall assessment of the data found to be acceptable?	✓			
XII. Field Duplicates				
Were field duplicates identifed in this SDG?		✓		
Were target analytes detected in the field duplicates?			✓	
XIII. Field Blanks				
Were field blanks identified in this SDG?		✓		
Were target analytes detected in the field blanks?			✓	

LDC #: 54723A4b

VALIDATION FINDINGS WORKSHEET
Sample Specific Element Reference

Reviewer: ATL

All circled elements are applicable to each sample.

Sample ID	Matrix	Target Analyte List (TAL)
174	W	Al, Sb, As, Ba, Be, Cd, (Ca) Cr, Co, Cu, Fe, Pb, (Mg) (Mn) Hg, Ni, (K) Se, Ag, (Na) Tl, V, Zn, Mo, B, Sn, Ti, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Sn, Ti, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Sn, Ti, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Sn, Ti, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Sn, Ti, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Sn, Ti, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Sn, Ti, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Sn, Ti, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Sn, Ti, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Sn, Ti, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Sn, Ti, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Sn, Ti, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Sn, Ti, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Sn, Ti, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Sn, Ti, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Sn, Ti, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Sn, Ti, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Sn, Ti, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Sn, Ti, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Sn, Ti, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Sn, Ti, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Sn, Ti, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Sn, Ti, ___ ___
Analysis Method		
ICP		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Sn, Ti, ___ ___
ICP-MS		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Sn, Ti, ___ ___
GFAA		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Sn, Ti, ___ ___

Comments: Mercury by CVAA if performed

LDC #: 54723A4b

VALIDATION FINDINGS WORKSHEET
PB/ICB/CCB QUALIFIED SAMPLES

METHOD: Trace metals (EPA SW 864 Method 6010B/6020/7000) Soil preparation factor applied: NA
Sample Concentration units, unless otherwise noted: ug/L Associated Samples: all

Analyte	Maximum PB[a] (mg/Kg)	Maximum PB[a] (ug/L)	Maximum ICB/CCB[a] (mg/L)	Action Level									
K		197		985									
K			0.229	1145									
Na			0.179	895									

Samples with analyte concentrations within five times the associated ICB, CCB or PB concentration are listed above with the identifications from the Validation Completeness Worksheet. These sample results were qualified as not detected, "U".
Note : a - The listed analyte concentration is the highest ICB, CCB, or PB detected in the analysis of each element.

LDC #: 54723A4b

VALIDATION FINDINGS WORKSHEET
Initial and Continuing Calibration Calculation Verification

Reviewer: ATL

METHOD: Trace metals (EPA SW 846 Method 6010/6020/7000)

An initial and continuing calibration verification percent recovery (%R) was recalculated for each type of analysis using the following formula:

$$\%R = \frac{\text{Found}}{\text{True}} \times 100$$

Where, Found = concentration (in ug/L) of each analyte measured in the analysis of the ICV or CCV solution
True = concentration (in ug/L) of each analyte in the ICV or CCV source

Standard ID	Type of Analysis	Element	Found (mg/L ~~ug/L~~)	True (mg/L ~~ug/L~~)	Recalculated %R	Reported %R	Acceptable (Y/N)
ICVL	ICP (Low Level calibration)	K	3.474	3.30	105	105	Y
	ICP/MS (Low Level calibration)						
ICV	ICP (Initial calibration)	Mg	39.37	40.000	98	98	Y
	ICP/MS (Initial calibration)						
	CVAA (Initial calibration)						
CCV	ICP (Continuing calibration) 6/29 @ 21:02	Ca	96.27	100.00	96	96	Y
	ICP/MS (Continuing calibration)						
	CVAA (Continuing calibration)						

ICP-MS TUNE	Calculation	Mass	Actual (Mean Counts / Axis)	Required (Counts / Axis)	Recalculated %RSD	Acceptable (Y/N)
	Mass Axis			± 0.1 AMU	NA	
	%RSD			≤ 5% RSD		

Comments:

LDC #: 54723A4b

VALIDATION FINDINGS WORKSHEET
Level IV Recalculation Worksheet

Reviewer: ATL

METHOD: Trace Metals (EPA SW 846 Method 6010/6020/7000)

Percent recoveries (%R) for an ICP interference check sample, a laboratory control sample and a matrix spike sample were recalculated using the following formula:

$\%R = \frac{Found}{True} \times 100$ Where, Found = Concentration of each analyte measured in the analysis of the sample. For the matrix spike calculation, Found = SSR (spiked sample result) - SR (sample result).
True = Concentration of each analyte in the source.

A sample and duplicate relative percent difference (RPD) was recalculated using the following formula:

$RPD = \frac{|S-D|}{(S+D)/2} \times 100$ Where, S = Original sample concentration
D = Duplicate sample concentration

An ICP serial dilution percent difference (%D) was recalculated using the following formula:

$\%D = \frac{|I-SDR|}{I} \times 100$ Where, I = Initial Sample Result (mg/L)
SDR = Serial Dilution Result (mg/L) (Instrument Reading x 5)

Sample ID	Type of Analysis	Element	Found / S / I (µg/L) (units)	True / D / SDR (µg/L) (units)	Recalculated %R / RPD / %D	Reported %R / RPD / %D	Acceptable (Y/N)
ICSAB	ICP interference check	Na	10.98 mg/L	10.000 mg/L	110	110	Y
LCS	Laboratory control sample	Mn	1032	1000.00	103	103	Y
	Matrix spike		(SSR-SR)				
	Duplicate						
	Post digestion spike						
	ICP serial dilution						

Comments: _____

LDC #: 54723A46

VALIDATION FINDINGS WORKSHEET
Sample Calculation Verification

Page: 1 of 1
Reviewer: ATV

METHOD: Trace Metals (EPA SW 846 Method 6010/6020/7000)

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

(Y) N N/A Have results been reported and calculated correctly?
(Y) N N/A Are results within the calibrated range of the instruments and within the linear range of the ICP?
(Y) N N/A Are all detection limits below the CRDL?

Detected analyte results for Mn were recalculated and verified using the following equation:

Concentration = $\frac{(RD)(FV)(Dil)}{(In.\ Vol.)}$

RD = Raw data concentration
FV = Final volume (ml)
In. Vol. = Initial volume (ml) or weight (G)
Dil = Dilution factor

Recalculation:

2,222 x 1000 = 2222

#	Sample ID	Analyte	Reported Concentration (µg/L)	Calculated Concentration (µg/L)	Acceptable (Y/N)
	2	Mn	2200	2222	Y

Note: _____

LDC Report# 54723A6

Laboratory Data Consultants, Inc.
Data Validation Report

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

LDC Report Date: October 3, 2022

Parameters: Wet Chemistry

Validation Level: Stage 2B & 4

Laboratory: Eurofins, Tacoma, WA

Sample Delivery Group (SDG): 580-115203-1

Sample Identification	Laboratory Sample Identification	Matrix	Collection Date
HU135	580-115203-1	Water	06/22/22
HU126**	580-115203-3**	Water	06/22/22
HU110	580-115203-5	Water	06/22/22
HU119	580-115203-7	Water	06/22/22
HU135MS	580-115203-1MS	Water	06/22/22
HU135MSD	580-115203-1MSD	Water	06/22/22
HU135DUP	580-115203-1DUP	Water	06/22/22

**Indicates sample underwent Stage 4 validation

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 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. Samples appended with a double asterisk on the cover page were subjected to Stage 4 data validation, which is comprised of the 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 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	%R (Limits)	Flag	A or P
HU135MS (HU135)	Nitrate/Nitrite as nitrogen	89 (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

All target analyte quantitation met validation criteria for samples which underwent Stage 4 validation. 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 %R, data were qualified as estimated in one sample.

Red Hill Bulk Storage Facility, CTO 18F0126
Wet Chemistry - Data Qualification Summary - SDG 580-115203-1

Sample	Analyte	Flag	A or P	Reason
HU135	Nitrate/Nitrite as nitrogen	J- (all detects)	A	Matrix spike (%R) (q)

Red Hill Bulk Storage Facility, CTO 18F0126
Wet Chemistry - Laboratory Blank Data Qualification Summary - SDG 580-115203-1

No Sample Data Qualified in this SDG

Red Hill Bulk Storage Facility, CTO 18F0126
Wet Chemistry - Field Blank Data Qualification Summary - SDG 580-115203-1

No Sample Data Qualified in this SDG

LDC #: 54723A6 **VALIDATION COMPLETENESS WORKSHEET** Date: 9/28/22
SDG #: 580-115203-1 Stage 2B/4 Page: 1 of 1
Laboratory: Eurofins, Tacoma, WA Reviewer: AHL
2nd Reviewer: AL

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	(5,6)
VII.	Duplicate sample analysis	A	7
VIII.	Laboratory control samples	A	LCS/LCSD
IX.	Field duplicates	N	
X.	Target Analyte Quantitation	A	Not reviewed for Stage 2B validation.
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
** Indicates sample underwent Stage 4 validation

	Client ID	Lab ID	Matrix	Date
1	HU135	580-115203-1	Water	06/22/22
2	HU126**	580-115203-3**	Water	06/22/22
3	HU110	580-115203-5	Water	06/22/22
4	HU119	580-115203-7	Water	06/22/22
5	HU135MS	580-115203-1MS	Water	06/22/22
6	HU135MSD	580-115203-1MSD	Water	06/22/22
7	HU135DUP	580-115203-1DUP	Water	06/22/22
8				
9				
10				
11				
12				
13				
14				

Notes:

METHOD: Inorganics				
Validation Area	**Yes**	**No**	**NA**	**Comments**
I. Technical holding times				
Were all technical holding times met?	✓			
II. Calibration				
Were all instruments calibrated at the required frequency?	✓			
Were the proper number of standards used?	✓			
Were all initial and continuing calibration verifications within the QC limits?	✓			
Were all initial calibration correlation coefficients within limits as specifed by the method?	✓			
Were balance checks performed as required?			✓	
III. Blanks				
Was a method blank associated with every sample in this SDG?	✓			
Was there contamination in the method blanks?		✓		
Was there contamination in the initial and continuing calibration blanks?		✓		
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.)		✓		
Were the MS/MSD or laboratory duplicate relative percent differences (RPDs) within the QC limits?	✓			
V. Laboratory Control Samples				
Was a LCS analyzed for each batch in the SDG?	✓			
Were the LCS recoveries and RPDs (if applicable) within QC limits?	✓			
X. Target Analyte Quantitation				
Were all reporting limits adjusted to reflect sample dilutions?	✓			
Were all soil samples dry weight corrected?			✓	
XI. Overall Assessment of Data				
Was the overall assessment of the data found to be acceptable?	✓			

METHOD: Inorganics				
Validation Area	**Yes**	**No**	**NA**	**Comments**
XII. Field Duplicates				
Were field duplicates identifed in this SDG?		✓		
Were target analytes detected in the field duplicates?			✓	
XIII. Field Blanks				
Were field blanks identified in this SDG?		✓		
Were target analytes detected in the field blanks?			✓	

LDC #: 54723A6

VALIDATION FINDINGS WORKSHEET
Sample Specific Analysis Reference

Reviewer: ATV

All circled methods are applicable to each sample.

Sample ID	Parameter
1-4	pH TDS Cl F NO_3 NO_2 SO_4 O-PO_4 (Alk) CN NH_3 TKN (TOC) Cr6+ ClO_4 (NO3/NO2-N) (DOC)
	pH TDS Cl F NO_3 NO_2 SO_4 O-PO_4 Alk CN NH_3 TKN TOC Cr6+ ClO_4
	pH TDS Cl F NO_3 NO_2 SO_4 O-PO_4 Alk CN NH_3 TKN TOC Cr6+ ClO_4
	pH TDS Cl F NO_3 NO_2 SO_4 O-PO_4 Alk CN NH_3 TKN TOC Cr6+ ClO_4
	pH TDS Cl F NO_3 NO_2 SO_4 O-PO_4 Alk CN NH_3 TKN TOC Cr6+ ClO_4
QC	pH TDS Cl F NO_3 NO_2 SO_4 O-PO_4 Alk CN NH_3 TKN TOC Cr6+ ClO_4
5,7	pH TDS Cl F NO_3 NO_2 SO_4 O-PO_4 Alk CN NH_3 TKN TOC Cr6+ ClO_4 (NO3/NO2-N)
5,6	pH TDS Cl F NO_3 NO_2 SO_4 O-PO_4 Alk CN NH_3 TKN TOC Cr6+ ClO_4 (DOC)
	pH TDS Cl F NO_3 NO_2 SO_4 O-PO_4 Alk CN NH_3 TKN TOC Cr6+ ClO_4
	pH TDS Cl F NO_3 NO_2 SO_4 O-PO_4 Alk CN NH_3 TKN TOC Cr6+ ClO_4
	pH TDS Cl F NO_3 NO_2 SO_4 O-PO_4 Alk CN NH_3 TKN TOC Cr6+ ClO_4
	pH TDS Cl F NO_3 NO_2 SO_4 O-PO_4 Alk CN NH_3 TKN TOC Cr6+ ClO_4
	pH TDS Cl F NO_3 NO_2 SO_4 O-PO_4 Alk CN NH_3 TKN TOC Cr6+ ClO_4
	pH TDS Cl F NO_3 NO_2 SO_4 O-PO_4 Alk CN NH_3 TKN TOC Cr6+ ClO_4
	pH TDS Cl F NO_3 NO_2 SO_4 O-PO_4 Alk CN NH_3 TKN TOC Cr6+ ClO_4
	pH TDS Cl F NO_3 NO_2 SO_4 O-PO_4 Alk CN NH_3 TKN TOC Cr6+ ClO_4
	pH TDS Cl F NO_3 NO_2 SO_4 O-PO_4 Alk CN NH_3 TKN TOC Cr6+ ClO_4
	pH TDS Cl F NO_3 NO_2 SO_4 O-PO_4 Alk CN NH_3 TKN TOC Cr6+ ClO_4
	pH TDS Cl F NO_3 NO_2 SO_4 O-PO_4 Alk CN NH_3 TKN TOC Cr6+ ClO_4
	pH TDS Cl F NO_3 NO_2 SO_4 O-PO_4 Alk CN NH_3 TKN TOC Cr6+ ClO_4
	pH TDS Cl F NO_3 NO_2 SO_4 O-PO_4 Alk CN NH_3 TKN TOC Cr6+ ClO_4
	pH TDS Cl F NO_3 NO_2 SO_4 O-PO_4 Alk CN NH_3 TKN TOC Cr6+ ClO_4
	pH TDS Cl F NO_3 NO_2 SO_4 O-PO_4 Alk CN NH_3 TKN TOC Cr6+ ClO_4
	pH TDS Cl F NO_3 NO_2 SO_4 O-PO_4 Alk CN NH_3 TKN TOC Cr6+ ClO_4
	pH TDS Cl F NO_3 NO_2 SO_4 O-PO_4 Alk CN NH_3 TKN TOC Cr6+ ClO_4
	pH TDS Cl F NO_3 NO_2 SO_4 O-PO_4 Alk CN NH_3 TKN TOC Cr6+ ClO_4
	pH TDS Cl F NO_3 NO_2 SO_4 O-PO_4 Alk CN NH_3 TKN TOC Cr6+ ClO_4
	pH TDS Cl F NO_3 NO_2 SO_4 O-PO_4 Alk CN NH_3 TKN TOC Cr6+ ClO_4
	pH TDS Cl F NO_3 NO_2 SO_4 O-PO_4 Alk CN NH_3 TKN TOC Cr6+ ClO_4
	pH TDS Cl F NO_3 NO_2 SO_4 O-PO_4 Alk CN NH_3 TKN TOC Cr6+ ClO_4

Comments:

LDC #: 54723A6

VALIDATION FINDINGS WORKSHEET
Matrix Spike Analysis

Reviewer: ATV

METHOD: Inorganics, Method See cover

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

(Y) N N/A Was a matrix spike analyzed for each matrix in this SDG?

Y (N) N/A Were matrix spike percent recoveries (%R) within the control limits of ~~75-125~~ lab limits (85-115% for Method 300.0)? If the sample concentration exceeded the spike concentration by a factor of 4 or more, no action was taken.

LEVEL IV ONLY:

(Y) N N/A Were recalculated results acceptable? See Level IV Recalculation Worksheet for recalculations.

#	Date	Matrix Spike ID	Matrix	Analyte	%R	Associated Samples	Qualifications
		5	W	NO3/NO2-N	89 (90-110)	1	J-/UJ/A (detect) Code: q

Comments:

LDC #: 54723A6

Validation Findings Worksheet
Initial and Continuing Calibration Calculation Verification

Method: Inorganics, Method See Cover

The correlation coefficient (r) for the calibration of DOC was recalculated. Calibration date: 06/30/22

An initial or continuing calibration verification percent recovery (%R) was recalculated for each type of analysis using the following formula:

$$\%R = \frac{\text{Found} \times 100}{\text{True}}$$

Where, 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	FOUND Standard	TRUE Conc. (mg/L)	Area	Recalculated r or r^2	Reported r or r^2	Acceptable (Y/N)
Initial calibration	DOC	s1	0.0	0	*0.99999*	*1.00000*	Y
		s2	1	2.768			
		s3	5	12.6			
		s4	10	25.33			
		s5	25	62.6			
		s6	50	124.6			
CCV Calibration verification	NO3/NO2-N	2.495	2.500		100	100	Y
CCV (6/30 @ 01:02) Calibration verification	TOC	25.757	25.000		103	103	Y
CCV (6/30 @ 22:53) Calibration verification	DOC	24.356	25.000		97	97	Y

Comments: Refer to Calibration Verification findings worksheet for list of qualifications and associated samples when reported results do not agree within 10.0% of the recalculated results.

LDC #: 54723A6

VALIDATION FINDINGS WORKSHEET
Level IV Recalculation Worksheet

Reviewer: ATL

METHOD: Inorganics, Method see cover

Percent recoveries (%R) for a laboratory control sample and a matrix spike sample were recalculated using the following formula:

$\%R = \frac{Found}{True} \times 100$ Where, Found = concentration of each analyte measured in the analysis of the sample. For the matrix spike calculation, Found = SSR (spiked sample result) - SR (sample result).
True = concentration of each analyte in the source.

A sample and duplicate relative percent difference (RPD) was recalculated using the following formula:

$RPD = \frac{|S-D|}{(S+D)/2} \times 100$ Where, S = Original sample concentration
D = Duplicate sample concentration

Sample ID	Type of Analysis	Element	µg/L Found / S (units)	µg/L True / D (units)	Recalculated %R / RPD	Reported %R / RPD	Acceptable (Y/N)
LCS	Laboratory control sample	Alkalinity	98670	100000	99	99	Y
5	Matrix spike sample	DOC	(SSR-SR) 23930.73	25000	96	96	Y
7	Duplicate sample	NO3/NO2-N	0.868	0.848	2	2	Y

Comments: _____

LDC #: 54723A6

VALIDATION FINDINGS WORKSHEET
Sample Calculation Verification

Reviewer: ATL

METHOD: Inorganics, Method See cover

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

(Y) N N/A Have results been reported and calculated correctly?
(Y) N N/A Are results within the calibrated range of the instruments?
(Y) N N/A Are all detection limits below the CRQL?

Compound (analyte) results for NO3/NO2-N reported with a positive detect were recalculated and verified using the following equation:

Concentration = Recalculation:

$$(22753.7 \times 0.000004774370) - 0.00628680 =$$

#	Sample ID	Analyte	Reported Concentration (µg/L)	Calculated Concentration (µg/L)	Acceptable (Y/N)
	2	NO3/NO2-N	0.10 mg/L	0.102 mg/L	Y
	2	TOC	12000	11580.26	Y
	2	Alkalinity	460000	460350	Y
	2	DOC	11000	10926.104	Y

Note:

Laboratory Data Consultants, Inc.
Data Validation Report

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

LDC Report Date: October 13, 2022

Parameters: Gasoline Range Organics

Validation Level: Stage 2B & 4

Laboratory: Eurofins, Tacoma, WA

Sample Delivery Group (SDG): 580-115203-1

Sample Identification	Laboratory Sample Identification	Matrix	Collection Date
HU135	580-115203-1	Water	06/22/22
HU134	580-115203-2	Water	06/22/22
HU126**	580-115203-3**	Water	06/22/22
HU125	580-115203-4	Water	06/22/22
HU110**	580-115203-5**	Water	06/22/22
HU109	580-115203-6	Water	06/22/22
HU119	580-115203-7	Water	06/22/22
HU118	580-115203-8	Water	06/22/22

**Indicates sample underwent Stage 4 validation

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. Samples appended with a double asterisk on the cover page were subjected to Stage 4 data validation, which is comprised of the 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 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% with the following exceptions:

Date	Analyte	%D	Associated Samples	Flag	A or P
07/05/22	Gasoline range organics (C6-C12)	29.4	HU126** HU125 HU110**	UJ (all non-detects)	A

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

Date	Analyte	%D	Associated Samples	Flag	A or P
07/05/22 (2042)	Gasoline range organics (C6-C12)	29.4	HU135 HU134 HU109 HU119 HU118	UJ (all non-detects)	A

Date	Analyte	%D	Associated Samples	Flag	A or P
07/05/22 (2244)	Gasoline range organics (C6-C12)	25.9	HU126** HU125 HU110**	UJ (all non-detects)	A

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

Samples HU134, HU125, HU109, and HU118 were identified as trip blanks. 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

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

IX. Laboratory Control Samples

Laboratory control samples (LCS) and laboratory control samples duplicates (LCSD) were analyzed as required by the methods. 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

All target analyte quantitations met validation criteria for samples which underwent Stage 4 validation. Raw data were not reviewed for Stage 2B validation.

XIII. Target Analyte Identification

All target analyte identifications met validation criteria for samples which underwent Stage 4 validation. Raw data were not reviewed for Stage 2B validation.

XIV. System Performance

The system performance was acceptable for samples which underwent Stage 4 validation. 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.

Due to continuing calibration %D and ending CCV %D, data were qualified as estimated in eight samples.

Red Hill Oily Waste Disposal Facility, CTO 18F0176
Gasoline Range Organics - Data Qualification Summary - SDG 580-115203-1

Sample	Analyte	Flag	A or P	Reason (Code)
HU126** HU125 HU110**	Gasoline range organics (C6-C12)	UJ (all non-detects)	A	Continuing calibration (%D) (c)
HU135 HU134 HU109 HU119 HU118 HU126** HU125 HU110**	Gasoline range organics (C6-C12)	UJ (all non-detects)	A	Continuing calibration (ending CCV %D) (c)

Red Hill Oily Waste Disposal Facility, CTO 18F0176
Gasoline Range Organics - Laboratory Blank Data Qualification Summary - SDG 580-115203-1

No Sample Data Qualified in this SDG

Red Hill Oily Waste Disposal Facility, CTO 18F0176
Gasoline Range Organics - Field Blank Data Qualification Summary - SDG 580-115203-1

No Sample Data Qualified in this SDG

LDC #: 54723A7
SDG #: 580-115203-1
Laboratory: Eurofins, Tacoma, WA

VALIDATION COMPLETENESS WORKSHEET
Stage 2B/4

Date: 8/21/22
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/A	
II.	GC/MS Instrument performance check	A	
III.	Initial calibration/ICV	A/A	r2 ICV ≤ 20
IV.	Continuing calibration pending	SW	CCV ≤ 20/20
V.	Laboratory Blanks	A	
VI.	Field blanks	ND	TB = 2, 4, 6, 8
VII.	Surrogate spikes	A	
VIII.	Matrix spike/Matrix spike duplicates	N	
IX.	Laboratory control samples	A	LCS ID
X.	Field duplicates	N	
XI.	Internal standards	A	
XII.	Target analyte quantitation	A	Not reviewed for Stage 2B validation.
XIII.	Target analyte identification	A	Not reviewed for Stage 2B validation.
XIV.	System performance	A	Not reviewed for Stage 2B validation.
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:

** Indicates sample underwent Stage 4 validation

	Client ID	Lab ID	Matrix	Date
1	HU135	580-115203-1	Water	06/22/22
2	HU134 TB	580-115203-2	Water	06/22/22
3	HU126**	580-115203-3**	Water	06/22/22
4	HU125 TB	580-115203-4	Water	06/22/22
5	HU110**	580-115203-5**	Water	06/22/22
6	HU109 TB	580-115203-6	Water	06/22/22
7	HU119	580-115203-7	Water	06/22/22
8	HU118 TB	580-115203-8	Water	06/22/22
9				

Notes:

	MB 580-395957						

LDC #: 54723A7

VALIDATION FINDINGS CHECKLIST

Reviewer: FT

Method: ✓ GC __ HPLC

Validation Area	Yes	No	NA	Findings/Comments
I. Technical holding times				
Were all technical holding times met?	✓			
Was cooler temperature criteria met?	✓			
IIa. Initial calibration				
Did the laboratory perform a 5 point calibration prior to sample analysis?	✓			
Were all percent relative standard deviations (%RSD) ≤ 20%?	-		✓	
Was a curve fit used for evaluation? If yes, did the initial calibration meet the curve fit acceptance criteria of ≥0.990?	✓			
Were the RT windows properly established?	✓			
IIb. Initial calibration verification				
Was an initial calibration verification standard analyzed after each initial calibration for each instrument?	✓			
Were all percent differences (%D) ≤ 20%?	✓			
III. Continuing calibration				
Was a continuing calibration analyzed daily?	✓			
Were all percent differences (%D) ≤ 20%?	✓	✓		
Were all the retention times within the acceptance windows?	✓			
IV. Laboratory Blanks				
Was a laboratory blank associated with every sample in this SDG?	✓			
Was a laboratory blank analyzed for each matrix and concentration?	✓			
Was there contamination in the laboratory blanks?		✓		
V. Field Blanks				
Were field blanks identified in this SDG?	✓			
Were target analytes detected in the field blanks?		✓		
VI. Surrogate spikes				
Were all surrogate percent recovery (%R) within the QC limits?	✓			
If the percent recovery (%R) of one or more surrogates was outside QC limits, was a reanalysis performed to confirm %R?			✓	
If any %R was less than 10 percent, was a reanalysis performed to confirm %R?			✓	
VII. Matrix spike/Matrix spike duplicates				
Were matrix spike (MS) and matrix spike duplicate (MSD) analyzed in this SDG?			✓	
Were the MS/MSD percent recoveries (%R) and the relative percent differences (RPD) within the QC limits?			✓	
VIII. Laboratory control samples				
Was an LCS analyzed per analytical or extraction batch?	✓			
Were the LCS percent recoveries (%R) and relative percent difference (RPD) within the QC limits?	✓			

Validation Area	Yes	No	NA	Findings/Comments
IX. Field duplicates				
Were field duplicate pairs identified in this SDG?		✓		
Were target analytes detected in the field duplicates?			✓	
X. Target analyte quantitation				
Did the laboratory LOQs/RLs meet the QAPP LOQs/RLs?	✓			
Were analyte quantitation and RLs adjusted to reflect all sample dilutions and dry weight factors applicable to level IV validation?	✓			
XI. Target analyte identification				
Were the retention times of reported detects within the RT windows?	✓			
Were manual integrations reviewed and found acceptable?	✓			
Did the laboratory provide before and after integration printouts?	✓			
XIII. Overall assessment of data				
Overall assessment of data was found to be acceptable.	✓			

LDC #: 54723A7

VALIDATION FINDINGS WORKSHEET
Continuing Calibration

Reviewer: FT

METHOD: X **GC** ___ **HPLC**

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".
What type of continuing calibration calculation was performed? ___%D or ___%R
Y Were continuing calibration standards analyzed at the required frequencies?
N Did the continuing calibration standards meet the %D / %R validation criteria of ≤20.0% / 80-120%?
Level IV Only
Y Were the retention times for all calibrated analytes within their respective acceptance windows? (C)

#	Date	Standard ID	Compound	%D (Limit ≤ 20.0)	Associated Samples	Qualifications
	7/5/22	CCV-closing	Gasoline Range Organics (C6-C12)	29.4	1, 2, 6, 7, 8	J-UJ/A all ND
	2042					
	7/5/22	CCV	Gasoline Range Organics (C6-C12)	29.4	3, 4, 5	J-UJ/A all ND
	2042					
	7/5/22	CCV-closing	Gasoline Range Organics (C6-C12)	25.9	3, 4, 5	J-UJ/A all ND
	2244					

Method: GRO C6-C12

Calibration Date	System	Compound	Standard	(Y) Response	(X) Concentration
1/10/2022	TACO36	GRO (C6-C12)	1	16.5425	5
			2	22.146	10
			3	41.0075	25
			4	72.985	50
			5	158.84	100
			6	704.85	500
				141.71	100
			7	201.06	150
			8	423.176	260

Regression Output		*Reported*
Constant	*7.886150*	*91.455000*
Std Err of Y Est		
R Squared	*0.993124*	*0.991000*
Degrees of Freedom		
X Coefficient(s)	*1.426118*	*1.398400*
Std Err of Coef.		
Correlation Coefficient	*0.996556*	
Coefficient of Determination (r^2)	*0.993124*	*0.991000*

LDC #: 54723A7

VALIDATION FINDINGS WORKSHEET
Continuing Calibration Results Verification

Reviewer: FT

METHOD: GC X HPLC

The percent difference (%D) of the initial calibration average Calibration Factors (CF) and the continuing calibration CF were recalculated for the compounds identified below using the following calculation:

% Difference = 100 * (ave. CF -CF)/ave.CF

Where: ave. CF = initial calibration average CF
CF = continuing calibration CF
A = Area of compound
C = Concentration of compound

#	Standard ID	Calibration Date	Compound	Average CF(ICAL)/ CCV Conc.	Reported CF/ Conc. CCV	Recalculated CF/ Conc. CCV	Reported %D	Recalculated %D
1	CCV	7/5/22 11420	GRO (C6-C12)	1.00	0.870	0.870	13.0	13.0
2	CCV	7/5/22 2042	GRO (C6-C12)	1.00	0.706	0.706	29.4	29.4
3	CCV	7/5/22 2244	GRO (C6-C12)	1.00	0.741	0.741	25.9	25.9
4								

Comments: Refer to Continuing Calibration findings worksheet for list of qualifications and associated samples when reported results do not agree within 10.0% of the recalculated results.

LDC #: 54723A7

VALIDATION FINDINGS WORKSHEET

Laboratory Control Sample/Laboratory Control Sample Duplicates Results Verification

Reviewer: FT

METHOD: X GC ___HPLC

The percent recoveries (%R) and relative percent differences (RPD) of the laboratory control sample and laboratory control sample duplicate were recalculated for the compounds identified below using the following calculation:

%Recovery = 100 * (SSC/SA)
RPD =(({SSCLCS - SSCLCSD} * 2) / (SSCLCS + SSCLCSD))*100

Where SSC = Spiked sample concentration
LCS = Laboratory Control Sample
SA = Spike added
LCSD = Laboratory Control Sample duplicate

LCS/LCSD samples: LCSD 580-395957

Compound	Spike Added (ug/L)		Spike Sample Concentration (ug/L)		LCS Percent Recovery		LCSD Percent Recovery		LCS/LCSD RPD	
	LCS	LCSD	LCS	LCSD	Reported	Recalc.	Reported	Recalc.	Reported	Recalc.
GR) (C6-C12)	1000	1000	817	863	82	82	86	86	5	5

Comments: Refer to Laboratory Control Sample/Laboratory Control Sample Duplicate findings worksheet for list of qualifications and associated samples when reported results do not agree within 10.0% of the recalculated results.

LDC #: 54723A7

VALIDATION FINDINGS WORKSHEET
Sample Calculation Verification

Reviewer: FT

METHOD: X **GC** ___ **HPLC**

Y Were all reported results recalculated and verified for all level IV samples?
Y Were all recalculated results for detected target compounds within 10% of the reported results?

Concentration= $\frac{(A)(Fv)(Df)}{(RF)(Vs \text{ or } Ws)(\%S/100)}$

Example:

Sample ID. LCS 580-395957 Compound Name GRO (C6-C12)

A= Area or height of the compound to be measured
Fv= Final Volume of extract
Df= Dilution Factor
RF= Average response factor of the compound in the initial calibration
Vs= Initial volume of the sample
Ws= Initial weight of the sample
%S= Percent Solid

Concentration = ((28660252/232310) (10) - (91.455))/ (1.3984)

= 816.827 ug/L

#	Sample ID	Compound	Reported Concentrations (Ug/L)	Recalculated Results Concentrations (UG/L)	Qualifications
	LCS	GR (C6-C12)	817	816.827	

Comments: _____

Laboratory Data Consultants, Inc.
Data Validation Report

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

LDC Report Date: August 24, 2022

Parameters: Polychlorinated Dioxins/Dibenzofurans

Validation Level: Stage 2B & 4

Laboratory: Eurofins, Tacoma, WA

Sample Delivery Group (SDG): 580-115203-1

Sample Identification	Laboratory Sample Identification	Matrix	Collection Date
HU135	580-115203-1	Water	06/22/22
HU126**	580-115203-3**	Water	06/22/22
HU110	580-115203-5	Water	06/22/22
HU119	580-115203-7	Water	06/22/22

**Indicates sample underwent Stage 4 validation

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. Samples appended with a double asterisk on the cover page were subjected to Stage 4 data validation, which is comprised of the 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 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 410-270726	06/29/22	1,2,3,4,6,7,8-HpCDD	0.00000319 ug/L	All samples in SDG 580-115203-1
		1,2,3,4,6,7,8-HpCDF	0.000000668 ug/L	
		1,2,3,4,7,8-HxCDD	0.000000537 ug/L	
		1,2,3,4,7,8-HxCDF	0.000000587 ug/L	
		1,2,3,4,7,8,9-HpCDF	0.000000371 ug/L	
		1,2,3,6,7,8-HxCDD	0.000000571 ug/L	
		1,2,3,6,7,8-HxCDF	0.000000578 ug/L	
		1,2,3,7,8-PeCDD	0.000000319 ug/L	
		1,2,3,7,8-PeCDF	0.000000565 ug/L	
		1,2,3,7,8,9-HxCDD	0.000000478 ug/L	
		2,3,4,6,7,8-HxCDF	0.00000066 ug/L	
		2,3,4,7,8-PeCDF	0.000000453 ug/L	
		2,3,7,8-TCDD	0.0000000746 ug/L	
		2,3,7,8-TCDF	0.000000187 ug/L	
		OCDD	0.0000206 ug/L	
		OCDF	0.00000223 ug/L	
		Total HxCDD	0.00000159 ug/L	
		Total HxCDF	0.00000183 ug/L	
		Total HpCDD	0.00000319 ug/L	
		Total HpCDF	0.00000104 ug/L	
		Total PeCDD	0.000000319 ug/L	
		Total PeCDF	0.00000102 ug/L	
		Total TCDD	0.0000000746 ug/L	
		Total TCDF	0.000000187 ug/L	
		Total PCDD/PCDF	0.0000321 ug/L	
		Total PCDD	0.0000258 ug/L	
		Total PCDF	0.00000631 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
HU135	1,2,3,4,6,7,8-HpCDD	0.0000019 ug/L	0.0000019U ug/L
	1,2,3,4,6,7,8-HpCDF	0.00000027 ug/L	0.00000027U ug/L
	1,2,3,4,7,8-HxCDF	0.00000054 ug/L	0.00000054U ug/L
	1,2,3,4,7,8,9-HpCDF	0.00000040 ug/L	0.00000040U ug/L
	1,2,3,6,7,8-HxCDD	0.0000056 ug/L	0.0000056U ug/L
	1,2,3,7,8-PeCDF	0.00000039 ug/L	0.00000039U ug/L
	1,2,3,7,8,9-HxCDD	0.00000093 ug/L	0.00000093U ug/L
	2,3,4,6,7,8-HxCDF	0.00000069 ug/L	0.00000069U ug/L
	OCDD	0.000021 ug/L	0.000021U ug/L
	OCDF	0.0000022 ug/L	0.0000022U ug/L
	Total HxCDD	0.0000015 ug/L	0.0000015J ug/L
	Total HxCDF	0.0000012 ug/L	0.0000012J ug/L
	Total HpCDD	0.0000019 ug/L	0.0000019J ug/L
	Total HpCDF	0.00000067 ug/L	0.00000067J ug/L
	Total PeCDF	0.00000039 ug/L	0.00000039J ug/L
	Total PCDD/PCDF	0.000029 ug/L	0.000029J ug/L
	Total PCDD	0.000024 ug/L	0.000024J ug/L
	Total PCDF	0.0000045 ug/L	0.0000045J ug/L

Sample	Analyte	Reported Concentration	Modified Final Concentration
HU126**	1,2,3,4,6,7,8-HpCDD	0.0000015 ug/L	0.0000015U ug/L
	1,2,3,4,6,7,8-HpCDF	0.00000020 ug/L	0.00000020U ug/L
	1,2,3,4,7,8-HxCDD	0.00000065 ug/L	0.00000065U ug/L
	1,2,3,4,7,8-HxCDF	0.00000037 ug/L	0.00000037U ug/L
	1,2,3,4,7,8,9-HpCDF	0.00000045 ug/L	0.00000045U ug/L
	1,2,3,6,7,8-HxCDD	0.00000043 ug/L	0.00000043U ug/L
	1,2,3,6,7,8-HxCDF	0.00000020 ug/L	0.00000020U ug/L
	1,2,3,7,8-PeCDF	0.00000025 ug/L	0.00000025U ug/L
	1,2,3,7,8,9-HxCDD	0.00000053 ug/L	0.00000053U ug/L
	2,3,4,6,7,8-HxCDF	0.00000048 ug/L	0.00000048U ug/L
	2,3,4,7,8-PeCDF	0.00000051 ug/L	0.00000051U ug/L
	2,3,7,8-TCDD	0.00000017 ug/L	0.00000017U ug/L
	OCDD	0.000016 ug/L	0.000016U ug/L
	OCDF	0.0000019 ug/L	0.0000019U ug/L
	Total HxCDD	0.0000016 ug/L	0.0000016J ug/L
	Total HxCDF	0.0000017 ug/L	0.0000017J ug/L
	Total HpCDD	0.0000015 ug/L	0.0000015J ug/L
	Total HpCDF	0.00000065 ug/L	0.00000065J ug/L
	Total PeCDF	0.00000076 ug/L	0.00000076J ug/L
	Total TCDD	0.00000017 ug/L	0.00000017J ug/L
	Total PCDD/PCDF	0.000026 ug/L	0.000026J ug/L
	Total PCDD	0.000019 ug/L	0.000019J ug/L
	Total PCDF	0.0000050 ug/L	0.0000050J ug/L
HU110	1,2,3,4,6,7,8-HpCDD	0.0000043 ug/L	0.0000043U ug/L
	1,2,3,4,6,7,8-HpCDF	0.0000040 ug/L	0.0000040U ug/L
	1,2,3,4,7,8-HxCDD	0.0000011 ug/L	0.0000011U ug/L
	1,2,3,4,7,8-HxCDF	0.00000037 ug/L	0.00000037U ug/L
	1,2,3,4,7,8,9-HpCDF	0.00000041 ug/L	0.00000041U ug/L
	1,2,3,6,7,8-HxCDD	0.00000044 ug/L	0.00000044U ug/L
	1,2,3,6,7,8-HxCDF	0.00000077 ug/L	0.00000077U ug/L
	1,2,3,7,8-PeCDF	0.00000043 ug/L	0.00000043U ug/L
	1,2,3,7,8,9-HxCDD	0.0000013 ug/L	0.0000013U ug/L
	2,3,4,6,7,8-HxCDF	0.00000079 ug/L	0.00000079U ug/L
	2,3,4,7,8-PeCDF	0.00000038 ug/L	0.00000038U ug/L
	2,3,7,8-TCDF	0.00000029 ug/L	0.00000029U ug/L
	OCDD	0.000032 ug/L	0.000032U ug/L
	OCDF	0.0000028 ug/L	0.0000028U ug/L
	Total HxCDD	0.0000028 ug/L	0.0000028J ug/L
	Total HxCDF	0.0000023 ug/L	0.0000023J ug/L
	Total HpCDD	0.0000043 ug/L	0.0000043J ug/L
	Total HpCDF	0.00000081 ug/L	0.00000081J ug/L
	Total PeCDF	0.00000081 ug/L	0.00000081J ug/L
	Total TCDF	0.00000029 ug/L	0.00000029J ug/L
	Total PCDD/PCDF	0.000046 ug/L	0.000046J ug/L
	Total PCDD	0.000039 ug/L	0.000039J ug/L
	Total PCDF	0.0000070 ug/L	0.0000070J ug/L

Sample	Analyte	Reported Concentration	Modified Final Concentration
HU119	1,2,3,4,6,7,8-HpCDD	0.0000025 ug/L	0.0000025U ug/L
	1,2,3,4,6,7,8-HpCDF	0.00000073 ug/L	0.00000073U ug/L
	1,2,3,4,7,8-HxCDD	0.00000083 ug/L	0.00000083U ug/L
	1,2,3,4,7,8-HxCDF	0.00000081 ug/L	0.00000081U ug/L
	1,2,3,4,7,8,9-HpCDF	0.00000051 ug/L	0.00000051U ug/L
	1,2,3,6,7,8-HxCDD	0.00000081 ug/L	0.00000081U ug/L
	1,2,3,6,7,8-HxCDF	0.00000063 ug/L	0.00000063U ug/L
	1,2,3,7,8-PeCDD	0.0000011 ug/L	0.0000011U ug/L
	1,2,3,7,8-PeCDF	0.0000010 ug/L	0.0000010U ug/L
	1,2,3,7,8,9-HxCDD	0.00000079 ug/L	0.00000079U ug/L
	2,3,4,6,7,8-HxCDF	0.00000096 ug/L	0.00000096U ug/L
	2,3,4,7,8-PeCDF	0.0000014 ug/L	0.0000014U ug/L
	2,3,7,8-TCDF	0.00000015 ug/L	0.00000015U ug/L
	OCDD	0.000020 ug/L	0.000020U ug/L
	OCDF	0.0000025 ug/L	0.0000025U ug/L
	Total HxCDD	0.0000024 ug/L	0.0000024J ug/L
	Total HxCDF	0.0000029 ug/L	0.0000029J ug/L
	Total HpCDD	0.0000025 ug/L	0.0000025J ug/L
	Total HpCDF	0.0000012 ug/L	0.0000012J ug/L
	Total PeCDD	0.0000011 ug/L	0.0000011J ug/L
	Total PeCDF	0.0000024 ug/L	0.0000024J ug/L
	Total TCDF	0.00000015 ug/L	0.00000015J ug/L
	Total PCDD/PCDF	0.000037 ug/L	0.000037J ug/L
	Total PCDD	0.000026 ug/L	0.000026J ug/L
	Total PCDF	0.0000092 ug/L	0.0000092J ug/L

VI. Field Blanks

No field blanks were identified in this SDG.

VII. Matrix Spike/Matrix Spike Duplicates

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

VIII. 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 580-115203-1	Results flagged "I" by the laboratory as estimated maximum possible concentration (EMPC).	J (all detects)	A

For samples HU110 and HU119, 2,3,7,8-TCDF was not confirmed in the 2nd column since the 1st column result was less than the limit of quantitation.

Raw data were not reviewed for Stage 2B validation.

XII. Target Analyte Identification

All target analyte identifications met validation criteria for samples which underwent Stage 4 validation. Raw data were not reviewed for Stage 2B validation.

XIII. System Performance

The system performance was acceptable for samples which underwent Stage 4 validation. 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 four samples.

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

Red Hill Oily Waste Disposal Facility, CTO 18F0176
Polychlorinated Dioxins/Dibenzofurans - Data Qualification Summary - SDG 580-115203-1

Sample	Analyte	Flag	A or P	Reason (Code)
HU135 HU126** HU110 HU119	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 580-115203-1

Sample	Analyte	Modified Final Concentration	A or P	Code
HU135	1,2,3,4,6,7,8-HpCDD	0.0000019U ug/L	A	b
	1,2,3,4,6,7,8-HpCDF	0.00000027U ug/L		
	1,2,3,4,7,8-HxCDF	0.00000054U ug/L		
	1,2,3,4,7,8,9-HpCDF	0.00000040U ug/L		
	1,2,3,6,7,8-HxCDD	0.0000056U ug/L		
	1,2,3,7,8-PeCDF	0.00000039U ug/L		
	1,2,3,7,8,9-HxCDD	0.00000093U ug/L		
	2,3,4,6,7,8-HxCDF	0.00000069U ug/L		
	OCDD	0.000021U ug/L		
	OCDF	0.0000022U ug/L		
	Total HxCDD	0.0000015J ug/L		
	Total HxCDF	0.0000012J ug/L		
	Total HpCDD	0.0000019J ug/L		
	Total HpCDF	0.00000067J ug/L		
	Total PeCDF	0.00000039J ug/L		
	Total PCDD/PCDF	0.000029J ug/L		
	Total PCDD	0.000024J ug/L		
	Total PCDF	0.0000045J ug/L		
HU126**	1,2,3,4,6,7,8-HpCDD	0.0000015U ug/L	A	b
	1,2,3,4,6,7,8-HpCDF	0.00000020U ug/L		
	1,2,3,4,7,8-HxCDD	0.00000065U ug/L		
	1,2,3,4,7,8-HxCDF	0.00000037U ug/L		
	1,2,3,4,7,8,9-HpCDF	0.00000045U ug/L		
	1,2,3,6,7,8-HxCDD	0.00000043U ug/L		
	1,2,3,6,7,8-HxCDF	0.00000020U ug/L		
	1,2,3,7,8-PeCDF	0.00000025U ug/L		
	1,2,3,7,8,9-HxCDD	0.00000053U ug/L		
	2,3,4,6,7,8-HxCDF	0.00000048U ug/L		
	2,3,4,7,8-PeCDF	0.00000051U ug/L		
	2,3,7,8-TCDD	0.00000017U ug/L		
	OCDD	0.000016U ug/L		
	OCDF	0.0000019U ug/L		
	Total HxCDD	0.0000016J ug/L		
	Total HxCDF	0.0000017J ug/L		
	Total HpCDD	0.0000015J ug/L		
	Total HpCDF	0.00000065J ug/L		
	Total PeCDF	0.00000076J ug/L		
	Total TCDD	0.00000017J ug/L		
	Total PCDD/PCDF	0.000026J ug/L		
	Total PCDD	0.000019J ug/L		
	Total PCDF	0.0000050J ug/L		

Sample	Analyte	Modified Final Concentration	A or P	Code
HU110	1,2,3,4,6,7,8-HpCDD	0.0000043U ug/L	A	b
	1,2,3,4,6,7,8-HpCDF	0.0000040U ug/L		
	1,2,3,4,7,8-HxCDD	0.0000011U ug/L		
	1,2,3,4,7,8-HxCDF	0.00000037U ug/L		
	1,2,3,4,7,8,9-HpCDF	0.00000041U ug/L		
	1,2,3,6,7,8-HxCDD	0.00000044U ug/L		
	1,2,3,6,7,8-HxCDF	0.00000077U ug/L		
	1,2,3,7,8-PeCDF	0.00000043U ug/L		
	1,2,3,7,8,9-HxCDD	0.0000013U ug/L		
	2,3,4,6,7,8-HxCDF	0.00000079U ug/L		
	2,3,4,7,8-PeCDF	0.00000038U ug/L		
	2,3,7,8-TCDF	0.00000029U ug/L		
	OCDD	0.000032U ug/L		
	OCDF	0.0000028U ug/L		
	Total HxCDD	0.0000028J ug/L		
	Total HxCDF	0.0000023J ug/L		
	Total HpCDD	0.0000043J ug/L		
	Total HpCDF	0.00000081J ug/L		
	Total PeCDF	0.00000081J ug/L		
	Total TCDF	0.00000029J ug/L		
	Total PCDD/PCDF	0.000046J ug/L		
	Total PCDD	0.000039J ug/L		
	Total PCDF	0.0000070J ug/L		
HU119	1,2,3,4,6,7,8-HpCDD	0.0000025U ug/L	A	b
	1,2,3,4,6,7,8-HpCDF	0.00000073U ug/L		
	1,2,3,4,7,8-HxCDD	0.00000083U ug/L		
	1,2,3,4,7,8-HxCDF	0.00000081U ug/L		
	1,2,3,4,7,8,9-HpCDF	0.00000051U ug/L		
	1,2,3,6,7,8-HxCDD	0.00000081U ug/L		
	1,2,3,6,7,8-HxCDF	0.00000063U ug/L		
	1,2,3,7,8-PeCDD	0.0000011U ug/L		
	1,2,3,7,8-PeCDF	0.0000010U ug/L		
	1,2,3,7,8,9-HxCDD	0.00000079U ug/L		
	2,3,4,6,7,8-HxCDF	0.00000096U ug/L		
	2,3,4,7,8-PeCDF	0.0000014U ug/L		
	2,3,7,8-TCDF	0.00000015U ug/L		
	OCDD	0.000020U ug/L		
	OCDF	0.0000025U ug/L		
	Total HxCDD	0.0000024J ug/L		
	Total HxCDF	0.0000029J ug/L		
	Total HpCDD	0.0000025J ug/L		
	Total HpCDF	0.0000012J ug/L		
	Total PeCDD	0.0000011J ug/L		
	Total PeCDF	0.0000024J ug/L		
	Total TCDF	0.00000015J ug/L		
	Total PCDD/PCDF	0.000037J ug/L		
	Total PCDD	0.000026J ug/L		
	Total PCDF	0.0000092J ug/L		

Red Hill Oily Waste Disposal Facility, CTO 18F0176
Polychlorinated Dioxins/Dibenzofurans - Field Blank Data Qualification Summary - SDG 580-115203-1

No Sample Data Qualified in this SDG

LDC #: 54723A21 **VALIDATION COMPLETENESS WORKSHEET** Date: 8/22/22
SDG #: 580-115203-1 Stage 2B/4 Page: 1 of 1
Laboratory: Eurofins, Tacoma, WA Reviewer: EZ
2nd Reviewer: AC

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	N	
VIII.	Laboratory control samples	A	LCS ID
IX.	Field duplicates	N	
X.	Labeled Compounds	A	
XI.	Target analyte quantitation	SW	Not reviewed for Stage 2B validation.
XII.	Target analyte identification	A	Not reviewed for Stage 2B validation.
XIII.	System performance	A	Not reviewed for Stage 2B validation.
XIV.	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
** Indicates sample underwent Stage 4 validation

	Client ID	Lab ID	Matrix	Date
1	HU135	580-115203-1	Water	06/22/22
2	HU126**	580-115203-3**	Water	06/22/22
3	HU110	580-115203-5	Water	06/22/22
4	HU119	580-115203-7	Water	06/22/22
5				
6				
7				
8				
9				
10				

Notes:

	MB 410-270726						

LDC #: 54723 A21 **VALIDATION FINDINGS CHECKLIST** Page: 1 of 2
Reviewer: FT
2nd Reviewer: A

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

Validation Area	Yes	No	NA	Findings/Comments
I. Technical holding times				
All technical holding times were met.	✓			
Cooler temperature criteria was met.	✓			
II. GC/MS Instrument performance check				
Was PFK exact mass 380.9760 verified?	✓			
Were the retention time windows established for all homologues?	✓			
Was the chromatographic resolution between 2,3,7,8-TCDD and peaks representing any other unlabeled TCDD isomers ≤ 25% ?	✓			
Is the static resolving power at least 10,000 (10% valley definition)?	✓			
Was the mass resolution adequately check with PFK?	✓			
Was the presence of 1,2,8,9-TCDD and 1,3,4,6,8-PeCDF verified?	✓			
IIIa. Initial calibration				
Was the initial calibration performed at 5 concentration levels?	✓			
Were all percent relative standard deviations (%RSD) ≤ 20% for all analytes and labeled compounds ?	✓			
Did all calibration standards meet the Ion Abundance Ratio criteria?	✓			
Was the signal to noise ratio for each target compound ≥ 2.5 and for each recovery and internal standard ≥ 10?	✓			
IIIb. Initial Calibration Verification				
Was an initial calibration verification standard analyzed after each initial calibration for each instrument?	✓			
Were all percent differences (%D) ≤ 20% for unlabeled compounds and ≤30% for labeled compounds ?	✓			
IV. Continuing calibration				
Was a contiuning calibration performed at the beginning and end of each 12 hour period?	✓			
Were all percent differences (%D) ≤ 20% for unlabeled compounds and ≤ 30% for labeled compounds ?	✓			
Did all routine calibration standards meet the Ion Abundance Ratio criteria?	✓			
Was the signal to noise ratio for each target compound and for each recovery and internal standard ≥ 10?	✓			
V. Laboratory Blanks				
Was a method blank associated with every sample in this SDG?	✓			
Was a method blank performed for each matrix and whenever a sample extraction was performed?	✓			
Was there contamination in the method blanks?	✓			
VI. Field blanks				
Field blanks were identified in this SDG.		✓		
Target compounds were detected in the field blanks.			✓	

LDC #: 54723A21 **VALIDATION FINDINGS CHECKLIST** Page: 2 of 2
Reviewer: FT
2nd Reviewer: AC

VII. Matrix spike/Matrix spike duplicates				
Were matrix spike (MS) and matrix spike duplicate (MSD) analyzed in this SDG?			✓	
Were the MS/MSD percent recoveries (%R) and the relative percent differences (RPD) within the QC limits?			✓	
VIII. Laboratory control samples				
Was an LCS analyzed per extraction batch?	✓			
Were the LCS percent recoveries (%R) and relative percent difference (RPD) within the QC limits?	✓			
IX. Field duplicates				
Field duplicate pairs were identified in this SDG.		✓		
Target compounds were detected in the field duplicates.			✓	
X. Labeled Compoubds				
Were internal standard recoveries within the 40-135% criteria?	✓			
Was the minimum S/N ratio of all internal standard peaks ≥ 10?	✓			
XI. Compound quantitation				
Did the laboratory LOQs/RLs meet the QAPP LOQs/RLs?	✓			
Were the correct internal standard (IS), quantitation ion and relative response factor (RRF) used to quantitate the compound?	✓			
Were compound quantitation and CRQLs adjusted to reflect all sample dilutions and dry weight factors applicable to level IV validation?	✓			
XII. Target compound identification				
For 2,3,7,8 substituted congeners with associated labeled standards, were the retention times of the two quantitation peaks within -1 to 3 sec. of the RT of the labeled standard?	✓			
For 2,3,7,8 substituted congeners without associated labeled standards, were the relative retention times of the two quantitation peaks within 0.005 time units of the RRT measured in the routine calibration?	✓			
For non-2,3,7,8 substituted congeners, were the retention times of the two quantitation peaks within RT established in the performance check solution?	✓			
Did compound spectra contain all characteristic ions listed in the table attached?	✓			
Was the Ion Abundance Ratio for the two quantitation ions within criteria?	✓			
Was the signal to noise ratio for each target compound and labeled standard ≥ 2.5?	✓			
Does the maximum intensity of each specified characteristic ion coincide within ± 2 seconds (includes labeled standards)?	✓			
For PCDF identification, was any signal (S/N ≥ 2.5, at ± seconds RT) detected in the corresponding PCDPE channel?	✓			
Was an acceptable lock mass recorded and monitored?				
XIII. System performance				
System performance was found to be acceptable.	✓			
XIV. Overall assessment of data				
Overall assessment of data was found to be acceptable.	✓			

VALIDATION FINDINGS WORKSHEET

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

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 #: 54723A21

VALIDATION FINDINGS WORKSHEET
Blanks

Reviewer: FT

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 Were all samples associated with a method blank?
Y Was a method blank performed for each matrix and whenever a sample extraction was performed? (b)
Y Was the method blank contaminated?

Blank extraction date: 6/29/22 **Blank analysis date:** 6/29/22 **Associated samples:** All
Conc. units: ug/L

Compound	Blank ID	Sample Identification								
	MB 410 -270726	5x	1	2	3	4				
F	0.00000319	0.000015950	0.0000019U	0.0000015U	0.0000043U	0.0000025U				
O	0.000000668	0.000003340	0.00000027U	0.00000020U	0.00000040U	0.00000073U				
C	0.000000537	0.000002685	-	0.00000065U	0.0000011U	0.00000083U				
K	0.000000587	0.000002935	0.00000054U	0.00000037U	0.00000037U	0.00000081U				
P	0.000000371	0.000001855	0.00000040U	0.00000045U	0.00000041U	0.00000051U				
D	0.000000571	0.000002855	0.00000056U	0.00000043U	0.00000044U	0.00000081U				
L	0.000000578	0.000002890	-	0.00000020U	0.00000077U	0.00000063U				
B	0.000000319	0.000001595	-	-	-	0.0000011U				
I	0.000000565	0.000002825	0.00000039U	0.00000025U	0.00000043U	0.0000010U				
E	0.000000478	0.000002390	0.00000093U	0.00000053U	0.0000013U	0.00000079U				
M	0.00000066	0.000003300	0.00000069U	0.00000048U	0.00000079U	0.00000096U				
J	0.000000453	0.000002265	-	0.00000051U	0.00000038U	0.0000014U				
A	0.0000000746	0.000000373	-	0.00000017U	-	-				
H	0.000000187	0.000000935	-	-	0.00000029U	0.00000015U				
G	0.0000206	0.000103000	0.000021U	0.000016U	0.000032U	0.000020U				
Q	0.00000223	0.000011150	0.0000022U	0.0000019U	0.0000028U	0.0000025U				
T	0.00000159	0.000007950	0.0000015J	0.0000016J	0.0000028J	0.0000024J				
X	0.00000183	0.000009150	0.0000012J	0.0000017J	0.0000023J	0.0000029J				
U	0.00000319	0.000015950	0.0000019J	0.0000015J	0.0000043J	0.0000025J				
Y	0.00000104	0.000005200	0.00000067J	0.00000065J	0.00000081J	0.0000012J				

	MB 410 -270726	5x	1	2	3	4				
S	0.000000319	0.000001595	-	-	-	0.0000011J				
W	0.00000102	0.000005100	0.00000039J	0.00000076J	0.00000081J	0.0000024J				
R	0.0000000746	0.000000373	-	0.00000017J	-	-				
V	0.000000187	0.000000935	-	-	0.00000029J	0.00000015J				
Total PCDD/PCDF	0.0000321	0.000160500	0.000029J	0.000026J	0.000046J	0.000037J				
Total PCDD	0.0000258	0.000129000	0.000024J	0.000019J	0.000039J	0.000026J				
Total PCDF	0.00000631	0.000031550	0.0000045J	0.0000050J	0.0000070J	0.0000092J				

CIRCLED 0.00000079RESULTS WERE NOT QUALIFIED. ALL RESULTS NOT CIRCLED WERE QUALIFIED BY THE FOLLOWING STATEMENT:
All contaminants within0.00000089 five times the method blank concentration were qualified as not detected, "U".

LDC # 54723A21
54723A21 MB 410-27026 AECOM Red Hill Oily

LDC #: 54723A24

VALIDATION FINDINGS WORKSHEET
Target Analyte Quantitation

Reviewer: AC

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

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). (K)

#	Date	Sample ID	Finding	Associated Samples	Qualifications
		All	All results qualified "I" by the laboratory as EMPC		Jdet/A (K)
		3,4	H- No 2nd column confirmation was performed. Result less than LOQ		Text

Comments: See sample calculation verification worksheet for recalculations

LDC #: 54723A21

VALIDATION FINDINGS WORKSHEET
Initial Calibration Calculation Verification

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

The Relative Response Factor (RRF), average RRF, and percent relative standard deviation (%RSD) were recalculated for the compounds identified below using the following calculations:

$RRF = (A_x)(C_{is})/(A_{is})(C_x)$ — A_x = Area of Compound — A_{is} = Area of associated internal standard

average RRF = sum of the RRFs/number of standards — C_x = Concentration of compound, — C_{is} = Concentration of internal standard

%RSD = 100 * (S/X) — S= Standard deviation of the RRFs, — X = Mean of the RRFs

#	Standard ID	Calibration Date	Compound (IS)	Reported RRF (10/50/100 std)	Recalculated RRF (10/50/100 std)	Reported Average RRF (Initial)	Recalculated Average RRF (Initial)	Reported %RSD	Recalculated %RSD
1	ICAL DF18471	1/6/2022	2,3,7,8-TCDF	1.0576	1.0576	1.1309	1.1309	15.1	15.1
			2,3,7,8-TCDD	1.0589	1.0589	1.1359	1.1359	16.7	16.7
			1,2,3,6,7,8-HxCDD	1.0166	1.0166	1.0526	1.0526	5.1	5.1
			1,2,3,4,6,7,8-HpCDD	1.0509	1.0509	1.0671	1.0671	8.3	8.3
			OCDF	0.9190	0.9190	0.9320	0.9320	4.0	4.0

LDC #: 47723A21

VALIDATION FINDINGS WORKSHEET
Continuing Calibration Results Verification

Reviewer: FT

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

The percent difference (%D) of the initial calibration average Relative Response Factors (RRFs) and the continuing calibration RRFs were recalculated for the compounds identified below using the following calculation:

% Difference = 100 * (ave. RRF - RRF)/ave. RRF
$RRF = (A_x)(C_{is})/(A_{is})(C_x)$

Where: ave. RRF = initial calibration average RRF
RRF = continuing calibration RRF
A_x = Area of compound, A_{is} = Area of associated internal standard
C_x = Concentration of compound, C_{is} = Concentration of internal standard

#	Standard ID	Calibration Date	Compound (Reference Internal Standard)	Average RRF (initial)	Reported RRF (CC)	Recalculated RRF (CC)	Reported %D	Recalculated %D
1	CCV	6/29/22 1516	2,3,7,8-TCDF (^{13}C-2,3,7,8-TCDF)	1.1309	1.015	1.015	10.2	10.2
			2,3,7,8-TCDD (^{13}C-2,3,7,8-TCDD)	1.1359	1.104	1.104	2.8	2.8
			1,2,3,6,7,8-HxCDD (^{13}C-1,2,3,6,7,8-HxCDD)	1.0526	1.011	1.011	3.9	3.9
			1,2,3,4,6,7,8-HpCDD (^{13}C-1,2,4,6,7,8,-HpCDD)	1.0671	1.045	1.045	2.0	2.0
			OCDF (^{13}C-OCDD)	0.9320	0.9166	0.9166	1.7	1.7
2	CCV	6/29/22 1258	2,3,7,8-TCDF (^{13}C-2,3,7,8-TCDF)	1.131	1.043	1.043	7.8	7.8
			2,3,7,8-TCDD (^{13}C-2,3,7,8-TCDD)	1.1359	1.106	1.106	2.6	2.6
			1,2,3,6,7,8-HxCDD (^{13}C-1,2,3,6,7,8-HxCDD)	1.0526	1.062	1.062	0.9	0.9
			1,2,3,4,6,7,8-HpCDD (^{13}C-1,2,4,6,7,8,-HpCDD)	1.0671	1.009	1.009	5.5	5.5
			OCDF (^{13}C-OCDD)	0.9320	0.9189	0.9189	1.4	1.4
3			2,3,7,8-TCDF (^{13}C-2,3,7,8-TCDF)					
			2,3,7,8-TCDD (^{13}C-2,3,7,8-TCDD)					
			1,2,3,6,7,8-HxCDD (^{13}C-1,2,3,6,7,8-HxCDD)					
			1,2,3,4,6,7,8-HpCDD (^{13}C-1,2,4,6,7,8,-HpCDD)					
			OCDF (^{13}C-OCDD)					

Comments: Refer to Routine Calibration findings worksheet for list of qualifications and associated samples when reported results do not agree within 10.0% of the recalculated results.

LDC #: 42723A21

VALIDATION FINDINGS WORKSHEET
Laboratory Control Sample Results Verification

Reviewer: FT

METHOD: GC/MS Dioxins/Dibenzofurans (EPA SW 846 Method 8290A)

The percent recoveries (%R) and Relative Percent Difference (RPD) of the laboratoy control sample and laboratory control sample duplicate (if applicable) were recalculated for the compounds identified below using the following calculation:

% Recovery = 100 * SSC/SA Where: SSC = Spiked sample concentration
SA = Spike added

RPD = I LCS - LCSD I * 2/(LCS + LCSD) LCS = Laboraotry control sample percent recovery LCSD = Laboratory control sample duplicate percent recovery

LCS ID: LCS/D 410-270726

Compound	Spike Added (ng/L)		Spiked Sample Concentration (ng/L)		LCS Percent Recovery		LCSD Percent Recovery		LCS/LCSD RPD	
	LCS	LCSD	LCS	LCSD	Reported	Recalc	Reported	Recalc	Reported	Recalc
2,3,7,8-TCDD	0.00002	0.00002	0.000217	0.000215	108	108	108	108	1	1
1,2,3,7,8-PeCDD	0.00100	0.00100	0.00120	0.00121	120	120	121	121	1	1
1,2,3,4,7,8-HxCDD	0.00100	0.0010	0.00111	0.00107	111	111	107	107	3	3
1,2,3,4,7,8,9-HpCDF	0.00100	0.00100	0.00108	0.00103	108	108	103	103	4	4
OCDF	0.00200	0.00200	0.00222	0.00220	111	111	110	110	1	1

Comments: Refer to Laboratory Control Sample findings worksheet for list of qualifications and associated samples when reported results do not agree within 10.0% of the recalculated results.

LDC #: 54723A1

VALIDATION FINDINGS WORKSHEET
Sample Calculation Verification

Reviewer: [illegible]

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

Y N N/A Were all reported results recalculated and verified for all level IV samples?
Y N N/A Were all recalculated results for detected target compounds agree within 10.0% of the reported results?

Concentration = $\frac{(A_x)(I_s)(DF)}{(A_{is})(RRF)(V_o)(\%S)}$

A_x = Area of the characteristic ion (EICP) for the compound to be measured

A_{is} = Area of the characteristic ion (EICP) for the specific internal standard

I_s = Amount of internal standard added in nanograms (ng)

V_o = Volume or weight of sample extract in milliliters (ml) or grams (g).

RRF = Relative Response Factor (average) from the initial calibration

Df = Dilution Factor.

%S = Percent solids, applicable to soil and solid matrices only.

Example:

Sample I.D. #2, OCDF:

Conc. = $\frac{(1617)(200)(20)(1/1000)}{(3815764)(0.9320)(975.4)}$

=

0.00000186 ug/L

#	Sample ID	Compound	Reported Concentration (ug/L)	Calculated Concentration (ug/L)	Qualification
	#2	OCDF	0.0000019	0.00000186	

LDC Report# 54723A51

Laboratory Data Consultants, Inc.
Data Validation Report

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

LDC Report Date: August 24, 2022

Parameters: Methane

Validation Level: Stage 2B & 4

Laboratory: Eurofins, Tacoma, WA

Sample Delivery Group (SDG): 580-115203-1

Sample Identification	Laboratory Sample Identification	Matrix	Collection Date
HU135	580-115203-1	Water	06/22/22
HU134	580-115203-2	Water	06/22/22
HU126**	580-115203-3**	Water	06/22/22
HU125	580-115203-4	Water	06/22/22
HU110**	580-115203-5**	Water	06/22/22
HU109	580-115203-6	Water	06/22/22
HU119	580-115203-7	Water	06/22/22
HU118	580-115203-8	Water	06/22/22

**Indicates sample underwent Stage 4 validation

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. Samples appended with a double asterisk on the cover page were subjected to Stage 4 data validation, which is comprised of the 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 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%.

Retention time windows were established as required by the method for 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%.

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%.

Retention times in the calibration standards were within the established retention time windows for samples which underwent Stage 4 validation. Raw data were not reviewed for Stage 2B validation.

IV. Laboratory Blanks

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

V. Field Blanks

Samples HU134, HU125, HU109, and HU118 were identified as trip blanks. No contaminants were found.

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. 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.

VIII. Field Duplicates

No field duplicates were identified in this SDG.

IX. Target Analyte Quantitation

All target analyte quantitations met validation criteria for samples which underwent Stage 4 validation. Raw data were not reviewed for Stage 2B validation.

X. Target Analyte Identification

All target analyte identifications met validation criteria for samples which underwent Stage 4 validation. Raw data were not reviewed for Stage 2B validation.

Manual integrations were reviewed and were considered acceptable. The laboratory provided before and after integration printouts.

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 580-115203-1

No Sample Data Qualified in this SDG

Red Hill Oily Waste Disposal Facility, CTO 18F0176
Methane - Laboratory Blank Data Qualification Summary - SDG 580-115203-1

No Sample Data Qualified in this SDG

Red Hill Oily Waste Disposal Facility, CTO 18F0176
Methane - Field Blank Data Qualification Summary - SDG 580-115203-1

No Sample Data Qualified in this SDG

LDC #: 54723A51 **VALIDATION COMPLETENESS WORKSHEET** Date: 8/21/22
SDG #: 580-115203-1 Stage 2B/4 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 | ending	A	CCV ≤ 20/20
IV.	Laboratory Blanks	A	
V.	Field blanks	ND	TB = 2, 4, 6, 8
VI.	Surrogate spikes	A	
VII.	Matrix spike/Matrix spike duplicates	N	dil
VIII.	Laboratory control samples	A	LCS 1D
IX.	Field duplicates	N	
X.	Target analyte quantitation	A	Not reviewed for Stage 2B validation.
XI.	Target analyte identification	A	Not reviewed for Stage 2B validation. MI
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:

** Indicates sample underwent Stage 4 validation

	Client ID		Lab ID	Matrix	Date
1 1	HU135		580-115203-1	Water	06/22/22
2 1	HU134	TB	580-115203-2	Water	06/22/22
3 1	HU126**		580-115203-3**	Water	06/22/22
4 1	HU125	TB	580-115203-4	Water	06/22/22
5 1	HU110**		580-115203-5**	Water	06/22/22
6 2	HU109	TB	580-115203-6	Water	06/22/22
7 2	HU119		580-115203-7	Water	06/22/22
8 2	HU118	TB	580-115203-8	Water	06/22/22
9					
10					
11					
12					

Notes:

1	MB 410-270178							
2	MB 410-270747							

LDC #: 54723A5 (1)

VALIDATION FINDINGS CHECKLIST

Method: ✓GC __HPLC

Validation Area	Yes	No	NA	Findings/Comments
I. Technical holding times				
Were all technical holding times met?	✓			
Was cooler temperature criteria met?	✓			
IIa. Initial calibration				
Did the laboratory perform a 5 point calibration prior to sample analysis?	✓			
Were all percent relative standard deviations (%RSD) ≤ 20%?	✓			
Was a curve fit used for evaluation? If yes, did the initial calibration meet the curve fit acceptance criteria of ≥0.990?			✓	
Were the RT windows properly established?	✓			
IIb. Initial calibration verification				
Was an initial calibration verification standard analyzed after each initial calibration for each instrument?	✓			
Were all percent differences (%D) ≤ 20%?	✓			
III. Continuing calibration				
Was a continuing calibration analyzed daily?	✓			
Were all percent differences (%D) ≤ 20%?	✓			
Were all the retention times within the acceptance windows?	✓			
IV. Laboratory Blanks				
Was a laboratory blank associated with every sample in this SDG?	✓			
Was a laboratory blank analyzed for each matrix and concentration?	✓			
Was there contamination in the laboratory blanks?		✓		
V. Field Blanks				
Were field blanks identified in this SDG?	✓			
Were target analytes detected in the field blanks?		✓		
VI. Surrogate spikes				
Were all surrogate percent recovery (%R) within the QC limits?	✓			
If the percent recovery (%R) of one or more surrogates was outside QC limits, was a reanalysis performed to confirm %R?			✓	
If any %R was less than 10 percent, was a reanalysis performed to confirm %R?			✓	
VII. Matrix spike/Matrix spike duplicates				
Were matrix spike (MS) and matrix spike duplicate (MSD) analyzed in this SDG?			✓	
Were the MS/MSD percent recoveries (%R) and the relative percent differences (RPD) within the QC limits?			✓	
VIII. Laboratory control samples				
Was an LCS analyzed per analytical or extraction batch?	✓			
Were the LCS percent recoveries (%R) and relative percent difference (RPD) within the QC limits?	✓			

Validation Area	Yes	No	NA	Findings/Comments
IX. Field duplicates				
Were field duplicate pairs identified in this SDG?		✓		
Were target analytes detected in the field duplicates?			✓	
X. Target analyte quantitation				
Did the laboratory LOQs/RLs meet the QAPP LOQs/RLs?	✓			
Were analyte quantitation and RLs adjusted to reflect all sample dilutions and dry weight factors applicable to level IV validation?	✓			
XI. Target analyte identification				
Were the retention times of reported detects within the RT windows?	✓			
Were manual integrations reviewed and found acceptable?	✓			
Did the laboratory provide before and after integration printouts?	✓			
XIII. Overall assessment of data				
Overall assessment of data was found to be acceptable.	✓			

LDC #: 54723A51

VALIDATION FINDINGS WORKSHEET
Initial Calibration Calculation Verification

Page: 1 of 1
Reviewer: FT
2nd Reviewer:

METHOD: GC ✓ HPLC ____

The calibration factors (CF) and relative standard deviation (%RSD) were recalculated using the following calculations:

CF = A/C
Average CF = sum of the CF/number of standards
%RSD = 100 * (S/X)

Where: A = Area of compound
C = Concentration of compound
S = Standard deviation of calibration factors
X = Mean of calibration factors

#	Standard ID	Calibration Date	Compound	Reported CF (99.0 std)	Recalculated CF (99.0 std)	Reported CF (initial)	Recalculated CF (intial)	Reported %RSD	Recalculated %RSD
1	ICAL 19506	5/10/21	Methane HP Plot	1899545	1899545	1893853.78	1893853.78	8.6	8.6
2									
3									
4									

Comments: Refer to Initial Calibration findings worksheet for list of qualifications and associated samples when reported results do not agree within 10.0% of the recalculated results.

LDC #: 54723A5 1

VALIDATION FINDINGS WORKSHEET
Continuing Calibration Results Verification

Reviewer: FT

METHOD: GC ✓ HPLC _____

The percent difference (%D) of the initial calibration average Calibration Factors (CF) and the continuing calibration CF were recalculated for the target analytes identified below using the following calculation:

% Difference = 100 * (ave. CF -CF)/ave.CF

Where: ave. CF = initial calibration average CF
CF = continuing calibration CF
A = Area of target analyte
C = Concentration of target analyte

#	Standard ID	Calibration Date	Target Analyte	Average CF(Ical)/ CCV Conc.	Reported CF/ Conc. CCV	Recalculated CF/ Conc. CCV	Reported %D	Recalculated %D
1	CCV	6/28/22 0859 FT 0843	Methane	59.9	55.5	55.5	7.3	7.3
2	CCV	6/28/22 1146 1441	Methane	59.9	53.7	53.7	10.3	10.3
3		6/29 1736 2021	Level III					
4								

Comments: Refer to Continuing Calibration findings worksheet for list of qualifications and associated samples when reported results do not agree within 10.0% of the recalculated results.

LDC #: 54723A5)

VALIDATION FINDINGS WORKSHEET
Surrogate Results Verification

Reviewer: FT

METHOD: / GC __ HPLC

The percent recoveries (%R) of surrogates were recalculated for the compounds identified below using the following calculation:

% Recovery: SF/SS * 100

Where: SF = Surrogate Found
SS = Surrogate Spiked

Sample ID: 3

Surrogate	Column/Detector	Surrogate Spiked	Surrogate Found	Percent Recovery	Percent Recovery	Percent Difference
				Reported	Recalculated	
Propene		19.9	17.0	86	86	0

Sample ID: _____

Surrogate	Column/Detector	Surrogate Spiked	Surrogate Found	Percent Recovery	Percent Recovery	Percent Difference
				Reported	Recalculated	

	Surrogate Compound		Surrogate Compound		Surrogate Compound		Surrogate Compound		Surrogate Compound
A	Chlorobenzene (CBZ)	G	Octacosane	M	Benzo(e)Pyrene	S	1-Chloro-3-Nitrobenzene	Y	Tetrachloro-m- xylene
B	4-Bromofluorobenzene (BFB)	H	Ortho-Terphenyl	N	Terphenyl-D14	T	3,4-Dinitrotoluene	Z	2-Bromonaphthalene
C	a,a,a-Trifluorotoluene	I	Fluorobenzene (FBZ)	O	Decachlorobiphenyl (DCB)	U	Tripentyltin	AA	Chloro-octadecane
D	Bromochlorobenene	J	n-Triacontane	P	1-methylnaphthalene	V	Tri-n-propyltin	BB	2,4-Dichlorophenylacetic acid
E	1,4-Dichlorobutane	K	Hexacosane	Q	Dichlorophenyl Acetic Acid (DCAA)	W	Tributyl Phosphate	CC	2,5-Dibromotoluene
F	1,4-Difluorobenzene (DFB)	L	Bromobenzene	R	4-Nitrophenol	X	Triphenyl Phosphate		

LDC #: 54723A5)

VALIDATION FINDINGS WORKSHEET

Laboratory Control Sample/Laboratory Control Sample Duplicates Results Verification

Reviewer: FT

METHOD: ✓ GC __HPLC

The percent recoveries (%R) and relative percent differences (RPD) of the laboratory control sample and laboratory control sample duplicate were recalculated for the target analytes identified below using the following calculation:

%Recovery = 100 * (SSC/SA)
RPD =(({SSCLCS - SSCLCSD} * 2) / (SSCLCS + SSCLCSD))*100

Where SSC = Spiked sample concentration
LCS = Laboratory Control Sample

SA = Spike added
LCSD = Laboratory Control Sample duplicate

LCS/LCSD samples: LCS/D 410-27017

Compound	Spike Added (ug/L)		Spike Sample Concentration (ug/L)		LCS Percent Recovery		LCSD Percent Recovery		LCS/LCSD RPD	
	LCS	LCSD	LCS	LCSD	Reported	Recalc.	Reported	Recalc.	Reported	Recalc.
Methane	59.9	59.9	~~54.9~~ 56.1	54.9	94	94	92	92	2	~~2~~ FM

Comments: _____

LDC #: 54723A51

VALIDATION FINDINGS WORKSHEET
Sample Calculation Verification

Reviewer: FT

METHOD: ✓ GC __ HPLC

The concentration of the sample was calculated for the target analyte identified below using the following calculation:

Concentration= (A)(Fv)(Df) / (RF)(Vs or Ws)(%S/100)

A= Area or height of the target analyte to be measured
Fv= Final Volume of extract
Df= Dilution Factor
RF= Average response factor of the target analyte In the initial calibration
Vs= Initial volume of the sample
Ws= Initial weight of the sample
%S= Percent Solid

Example:

Sample ID. LCS 410-27017 Methane

Concentration = 106334281 / 1891385378 = 56.147 ng/L

#	Sample ID	Target analyte	Reported Concentrations (ug/L)	Recalculated Results Concentrations (ug/L)	Qualifications
	LCS	Methane	56.1	56.147	

Comments: _____

Laboratory Data Consultants, Inc.
Data Validation Report

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

LDC Report Date: August 24, 2022

Parameters: Volatiles

Validation Level: Stage 2B

Laboratory: Eurofins, Tacoma, WA

Sample Delivery Group (SDG): 580-115250-1

Sample Identification	Laboratory Sample Identification	Matrix	Collection Date
HU137	580-115250-1	Water	06/23/22
HU136	580-115250-2	Water	06/23/22
HU139	580-115250-3	Water	06/23/22
HU138	580-115250-4	Water	06/23/22
HU142	580-115250-5	Water	06/23/22
HU129	580-115250-6	Water	06/23/22
HU143	580-115250-7	Water	06/23/22

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:

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

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

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

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

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

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

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

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

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

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

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

Qualification Code Reference

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

b Presumed contamination from preparation (method blank).

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

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

e MS/MSD or Duplicate RPD was high.

f Presumed contamination from FB or ER.

g ICP ICS results were unsatisfactory.

h Holding times were exceeded.

i Internal standard performance was unsatisfactory.

k Estimated Maximum Possible Concentration (HRGC/HRMS only)

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

m Result exceeded the calibration range.

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

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

q MS/MSD recovery was not within control limits.

s Surrogate recovery was not within control limits.

t Presumed contamination from trip blank.

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

w LCS/LCSD RPD was high.

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

I. Sample Receipt and Technical Holding Times

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

All technical holding time requirements were met.

II. GC/MS Instrument Performance Check

A bromofluorobenzene (BFB) tune was performed at 12 hour intervals.

All ion abundance requirements were met.

III. Initial Calibration and Initial Calibration Verification

An initial calibration was performed as required by the method.

The percent relative standard deviations (%RSD) were less than or equal to 15.0% for all analytes

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

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

Date	Analyte	%D	Associated Samples	Flag	A or P
06/22/22	Bromomethane	22.4	All samples in SDG 580-115250-1	UJ (all non-detects)	A
07/01/22	Chloromethane	28.9	All samples in SDG 580-115250-1	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.

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

Date	Analyte	%D	Associated Samples	Flag	A or P
06/28/22	Bromomethane	57.1	All samples in SDG 580-115250-1	UJ (all non-detects)	A

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 TIC (RT in minutes)	Concentration	Associated Samples
MB 580-395127	06/27/22	1,2,4-Trichlorobenzene Ethylbenzene Hexachlorobutadiene Naphthalene Styrene Xylenes, total o-Xylene Isopropylbenzene (12.51) 1,3,5-Trimethylbenzene (12.99) p-Isopropyltoluene (13.54) 1,3,5-Trichlorobenzene (14.65) 1,2,3-Trichlorobenzene (15.53)	0.211 ug/L 0.0813 ug/L 0.107 ug/L 0.431 ug/L 0.211 ug/L 0.205 ug/L 0.205 ug/L 0.264 ug/L 0.153 ug/L 0.162 ug/L 0.0729 ug/L 0.222 ug/L	All samples in SDG 580-115250-1

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 with the following exceptions:

Sample	Analyte TIC (RT in minutes)	Reported Concentration	Modified Final Concentration
HU137	Ethylbenzene Naphthalene Styrene Isopropylbenzene (12.51) 1,3,5-Trimethylbenzene (12.99) p-Isopropyltoluene (13.54)	0.078 ug/L 0.36 ug/L 0.21 ug/L 0.26 ug/L 0.15 ug/L 0.15 ug/L	0.078J+ ug/L 0.50U ug/L 0.50U ug/L 0.26U ug/L 0.15U ug/L 0.15U ug/L
HU136	Ethylbenzene Naphthalene Styrene Isopropylbenzene (12.51) 1,3,5-Trimethylbenzene (12.99) p-Isopropyltoluene (13.54)	0.079 ug/L 0.37 ug/L 0.21 ug/L 0.26 ug/L 0.15 ug/L 0.16 ug/L	0.079J+ ug/L 0.50U ug/L 0.50U ug/L 0.26U ug/L 0.15U ug/L 0.16U ug/L
HU139	Ethylbenzene Naphthalene Styrene Isopropylbenzene (12.50) 1,3,5-Trimethylbenzene (12.99) p-Isopropyltoluene (13.54)	0.077 ug/L 0.36 ug/L 0.21 ug/L 0.26 ug/L 0.15 ug/L 0.15 ug/L	0.077J+ ug/L 0.50U ug/L 0.50U ug/L 0.26U ug/L 0.15U ug/L 0.15U ug/L

Sample	Analyte TIC (RT in minutes)	Reported Concentration	Modified Final Concentration
HU138	Ethylbenzene	0.079 ug/L	0.079J+ ug/L
	Naphthalene	0.36 ug/L	0.50U ug/L
	Styrene	0.21 ug/L	0.50U ug/L
	Isopropylbenzene (12.51)	0.26 ug/L	0.26U ug/L
	1,3,5-Trimethylbenzene (12.99)	0.15 ug/L	0.15U ug/L
	p-Isopropyltoluene (13.54)	0.16 ug/L	0.16U ug/L
HU142	Ethylbenzene	0.078 ug/L	0.078J+ ug/L
	Styrene	0.21 ug/L	0.50U ug/L
	Isopropylbenzene (12.51)	0.26 ug/L	0.26U ug/L
	1,3,5-Trimethylbenzene (12.99)	0.15 ug/L	0.15U ug/L
	p-Isopropyltoluene (13.54)	0.15 ug/L	0.15U ug/L
HU129	Ethylbenzene	0.079 ug/L	0.079J+ ug/L
	Naphthalene	0.36 ug/L	0.50U ug/L
	Styrene	0.21 ug/L	0.50U ug/L
	Isopropylbenzene (12.51)	0.26 ug/L	0.26U ug/L
	1,3,5-Trimethylbenzene (12.99)	0.15 ug/L	0.15U ug/L
	p-Isopropyltoluene (13.54)	0.16 ug/L	0.16U ug/L
HU143	Ethylbenzene	0.077 ug/L	0.077J+ ug/L
	Styrene	0.21 ug/L	0.50U ug/L
	Isopropylbenzene (12.51)	0.26 ug/L	0.26U ug/L
	1,3,5-Trimethylbenzene (12.99)	0.15 ug/L	0.15U ug/L
	p-Isopropyltoluene (13.54)	0.15 ug/L	0.15U ug/L

VI. Field Blanks

Samples HU136, HU138, and HU129 were identified as trip blanks. No contaminants were found with the following exceptions:

Blank ID	Collection Date	Analyte	Concentration	Associated Samples
HU136	06/23/22	Ethylbenzene	0.079 ug/L	HU137
		Naphthalene	0.37 ug/L	
		Styrene	0.21 ug/L	
HU138	06/23/22	Ethylbenzene	0.079 ug/L	HU139
		Naphthalene	0.36 ug/L	
		Styrene	0.21 ug/L	
HU129	06/23/22	Ethylbenzene	0.079 ug/L	HU142
		Naphthalene	0.36 ug/L	HU143
		Styrene	0.21 ug/L	

Sample HU143 was identified as an equipment blank. No contaminants were found with the following exceptions:

Blank ID	Collection Date	Analyte	Concentration	Associated Samples
HU143	06/23/22	Ethylbenzene Styrene	0.077 ug/L 0.21 ug/L	HU137 HU139

Sample HU142 was identified as a field blank. No contaminants were found with the following exceptions:

Blank ID	Collection Date	Analyte	Concentration	Associated Samples
HU142	06/23/22	Ethylbenzene Styrene	0.078 ug/L 0.21 ug/L	HU137 HU139

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 with the following exceptions:

Sample	Analyte	Reported Concentration	Modified Final Concentration
HU137	Ethylbenzene Naphthalene Styrene	0.078 ug/L 0.36 ug/L 0.21 ug/L	0.078J+ ug/L 0.50U ug/L 0.50U ug/L
HU139	Ethylbenzene Naphthalene Styrene	0.077 ug/L 0.36 ug/L 0.21 ug/L	0.077J+ ug/L 0.50U ug/L 0.50U ug/L
HU142	Ethylbenzene Styrene	0.078 ug/L 0.12 ug/L	0.078J+ ug/L 0.50U ug/L
HU143	Ethylbenzene Styrene	0.077 ug/L 0.21 ug/L	0.077J+ ug/L 0.50U ug/L

VII. Surrogates

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

VIII. Matrix Spike/Matrix Spike Duplicates

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

IX. Laboratory Control Samples

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

X. Field Duplicates

No field duplicates were identified in this SDG.

XI. Internal Standards

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

XII. Target Analyte 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
All samples in SDG 580-115250-1	All laboratory calibrated analytes reported as TICs	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 ICV %D, ending CCV %D, and TIC quantitation, data were qualified as estimated in seven samples.

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

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

Due to equipment and field blank contamination, data were qualified as not detected or estimated in two samples.

Red Hill Oily Waste Disposal Facility, CTO 18F0176
Volatiles - Data Qualification Summary - SDG 580-115250-1

Sample	Analyte	Flag	A or P	Reason (Code)
HU137 HU136 HU139 HU138 HU142 HU129 HU143	Bromomethane Chloromethane	UJ (all non-detects)	A	Initial calibration verification (%D) (c)
HU137 HU136 HU139 HU138 HU142 HU129 HU143	Bromomethane	UJ (all non-detects)	A	Continuing calibration (ending CCV %D) (c)
HU137 HU136 HU139 HU138 HU142 HU129 HU143	All laboratory calibrated analytes reported as TICs	J (all detects)	A	Tentatively Identified Compounds (TIC) quantitation (v)

Red Hill Oily Waste Disposal Facility, CTO 18F0176
Volatiles - Laboratory Blank Data Qualification Summary - SDG 580-115250-1

Sample	Analyte TIC (RT in minutes)	Modified Final Concentration	A or P	Code
HU137	Ethylbenzene Naphthalene Styrene Isopropylbenzene (12.51) 1,3,5-Trimethylbenzene (12.99) p-Isopropyltoluene (13.54)	0.078J+ ug/L 0.50U ug/L 0.50U ug/L 0.26U ug/L 0.15U ug/L 0.15U ug/L	A	b
HU136	Ethylbenzene Naphthalene Styrene Isopropylbenzene (12.51) 1,3,5-Trimethylbenzene (12.99) p-Isopropyltoluene (13.54)	0.079J+ ug/L 0.50U ug/L 0.50U ug/L 0.26U ug/L 0.15U ug/L 0.16U ug/L	A	b
HU139	Ethylbenzene Naphthalene Styrene Isopropylbenzene (12.50) 1,3,5-Trimethylbenzene (12.99) p-Isopropyltoluene (13.54)	0.077J+ ug/L 0.50U ug/L 0.50U ug/L 0.26U ug/L 0.15U ug/L 0.15U ug/L	A	b

Sample	Analyte TIC (RT in minutes)	Modified Final Concentration	A or P	Code
HU138	Ethylbenzene Naphthalene Styrene Isopropylbenzene (12.51) 1,3,5-Trimethylbenzene (12.99) p-Isopropyltoluene (13.54)	0.079J+ ug/L 0.50U ug/L 0.50U ug/L 0.26U ug/L 0.15U ug/L 0.16U ug/L	A	b
HU142	Ethylbenzene Styrene Isopropylbenzene (12.51) 1,3,5-Trimethylbenzene (12.99) p-Isopropyltoluene (13.54)	0.078J+ ug/L 0.50U ug/L 0.26U ug/L 0.15U ug/L 0.15U ug/L	A	b
HU129	Ethylbenzene Naphthalene Styrene Isopropylbenzene (12.51) 1,3,5-Trimethylbenzene (12.99) p-Isopropyltoluene (13.54)	0.079J+ ug/L 0.50U ug/L 0.50U ug/L 0.26U ug/L 0.15U ug/L 0.16U ug/L	A	b
HU143	Ethylbenzene Styrene Isopropylbenzene (12.51) 1,3,5-Trimethylbenzene (12.99) p-Isopropyltoluene (13.54)	0.077J+ ug/L 0.50U ug/L 0.26U ug/L 0.15U ug/L 0.15U ug/L	A	b

Red Hill Oily Waste Disposal Facility, CTO 18F0176
Volatiles - Field Blank Data Qualification Summary - SDG 580-115250-1

Sample	Analyte	Modified Final Concentration	A or P	Code
HU137	Ethylbenzene Naphthalene Styrene	0.078J+ ug/L 0.50U ug/L 0.50U ug/L	A	t, f
HU139	Ethylbenzene Naphthalene Styrene	0.077J+ ug/L 0.50U ug/L 0.50U ug/L	A	t, f
HU142	Ethylbenzene Styrene	0.078J+ ug/L 0.50U ug/L	A	t
HU143	Ethylbenzene Styrene	0.077J+ ug/L 0.50U ug/L	A	t

LDC #: 54723B1a

SDG #: 580-115250-1

Laboratory: Eurofins, Tacoma, WA

VALIDATION COMPLETENESS WORKSHEET

Stage 2B

Date: 8/21/22

Page: 1 of 1

Reviewer: EZ

2nd Reviewer: K

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

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 / SW	% RSD ≤ 15, r² ICV ≤ 20
IV.	Continuing calibration / ending	SW	CCV ≤ 20/SW
V.	Laboratory Blanks	SW	
VI.	Field blanks	SW	
VII.	Surrogate spikes	A	
VIII.	Matrix spike/Matrix spike duplicates	N	
IX.	Laboratory control samples	A	Lcs ID
X.	Field duplicates	N	
XI.	Internal standards	A	
XII.	Target analyte quantitation / TIC	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	HU137		580-115250-1	Water	06/23/22
+ 2 1	HU136	TB	580-115250-2	Water	06/23/22
+ 3 1	HU139		580-115250-3	Water	06/23/22
+ 4 1	HU138	TB	580-115250-4	Water	06/23/22
+ 5 1	HU142	FB	580-115250-5	Water	06/23/22
+ 6 1	HU129	TB	580-115250-6	Water	06/23/22
+ 7 1	HU143	EB	580-115250-7	Water	06/23/22
8					
9					

Notes:

1	MB 580-395127						
	MB 580-396115 A						

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 choride	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. Methyl cyclohexane	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.

LDC #: 54723B1a

VALIDATION FINDINGS WORKSHEET
Initial Calibration Verification

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 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 %D?

(C)

#	Date	Standard ID	Compound	Finding %D (Limit: ≤20.0% / 30%)	Associated Samples	Qualifications
	6/22/22 2024	ICV	B	22.4	All	J+ /µJ/A ND
	7/1/22 0308	ICV	A	28.9	All	J+ /µJ/A ND

LDC #: 54723B1a

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
	6/28/22	cev-closing	D	57.1 (≤ 50.0%)		All	J+/UJ/A ND
	0107						

LDC #: 54723B/a

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".

Y 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? (b)

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

Blank analysis date: 6/27/22

Conc. units: ug/L Associated Samples: All

Compound	Blank ID		Sample Identification							
	MB 580-395127		1	2	3	4	5	6	7	
KKK	0.211									
EE	0.0813		0.078 J+	0.079 J+	0.077 J+	0.079 J+	0.078 J+	0.079 J+	0.077 J+	
LLL	0.107									
MMM	0.431		0.36/0.50U	0.37/0.50U	0.36/0.50U	0.36/0.50U		0.36/0.50U		
FF	0.211		0.21/↓	0.21 ↓	0.21 ↓	0.21 ↓	0.21/0.50U	0.21/0.50U	0.21/0.50U	
GG	0.205									
SSS	0.205									

Blank analysis date: 6/27/22

Conc. units: ug/L Associated Samples: All

Compound	Blank ID		Sample Identification							
	↓		1	2	3	4	5	6	7	
TIC YY	0.264 (12.51)		0.26 (12.51)	0.26 (12.51)	0.26 (12.50)	0.26 (12.51)	0.26 (12.51)	0.26 (12.51)	0.26 (12.51)	
1,3,5-Trimethylbenzene	0.153 (12.99)		0.15 (12.99)	0.15 (12.99)	0.15 (12.99)	0.15 (12.99)	0.15 (12.99)	0.15 (12.99)	0.15 (12.99)	
GGG	0.162 (13.54)		0.15 (13.54)	0.16 (13.54)	0.15 (13.54)	0.16 (13.54)	0.15 (13.54)	0.16 (13.54)	0.15 (13.54)	
1,3,5-Trichlorobenzene NNN	0.0729 (14.65)									
NNN	0.222 (15.53)									

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 #: 54723B1a

VALIDATION FINDINGS WORKSHEET
Field Blanks

Reviewer: FT

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

~~Y~~ N N/A Were field blanks identified in this SDG? (#) (t)

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

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

Sampling date: 6/23/22

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

Compound	Blank ID	Sample Identification									
	2	1									
EE	0.079	0.078 J+									
MMM	0.37	0.36/0.504									
FF	0.21	0.21/0.504									

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

Sampling date: 6/23/22

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

~~(#)~~ (t)

Compound	Blank ID	Sample Identification									
	4	3									
EE	0.079	0.077 J+									
MMM	0.36	0.36/0.504									
FF	0.21	0.21/↓									

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 #: 54723B1a

VALIDATION FINDINGS WORKSHEET
Field Blanks

Reviewer: FT

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

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

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

(f)

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

Sampling date: 6/23/22

Field blank type: (circle one) Field Blank / Rinsate / Trip Blank / Other: TB Associated Samples: 5 7

Compound	Blank ID	Sample Identification								
	6	5	7							
EE	0.079	0.078 J+	0.077 J+							
MMM	0.36									
FF	0.21	0.21/0.50U	0.21/0.50U							

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

(f)

Sampling date: 6/23/22

Field blank type: (circle one) Field Blank / Rinsate / Trip Blank / Other: FB Associated Samples: 1, 3

Compound	Blank ID	Sample Identification								
	5	1	3		7					
EE	0.078	0.078 J+	0.077 J+		0.077 J+					
FF	0.21	0.21/0.50U	0.21/0.50U		0.21/0.50U					

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 #: 54723B1a

VALIDATION FINDINGS WORKSHEET
Field Blanks

Reviewer: FT

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

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

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

(f)

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

Sampling date: 6/23/22

Field blank type: (circle one) Field Blank / Rinsate / Trip Blank / Other: EB Associated Samples: 1, 3

Compound	Blank ID	Sample Identification								
	7	1	2							
EE	0.077	0.078J+	0.077J+							
FF	0.21	0.21/0.504	0.21/0.504							

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 #: 54723B1a

VALIDATION FINDINGS WORKSHEET
Target Analyte Quantitation

Reviewer: FT

METHOD: GCMS VOA EPA SW 846 Method 8260D

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

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

Y 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 laboratory calibrated analytes reported as Tentatively Identified Compounds (TICs)		Jdet/A (V)

Comments: See sample calculation verification worksheet for recalculations

LDC Report# 54723B2a

Laboratory Data Consultants, Inc.
Data Validation Report

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

LDC Report Date: October 18, 2022

Parameters: Semivolatiles

Validation Level: Stage 2B

Laboratory: Eurofins, Tacoma, WA

Sample Delivery Group (SDG): 580-115250-1

Sample Identification	Laboratory Sample Identification	Matrix	Collection Date
HU137	580-115250-1	Water	06/23/22
HU139	580-115250-3	Water	06/23/22
HU142	580-115250-5	Water	06/23/22
HU143	580-115250-7	Water	06/23/22

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.

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.

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

Sample HU143 was identified as an equipment blank. No contaminants were found.

Sample HU142 was identified as a field blank. No contaminants were found.

VII. Surrogates

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

VIII. Matrix Spike/Matrix Spike Duplicates

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

IX. Laboratory Control Samples

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

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

LCS ID (Associated Samples)	Analyte	RPD (Limits)	Flag	A or P
LCS/LCSD 580-395333 (All samples in SDG 580-115250-1)	Hexachlorobutadiene Hexachloroethane	38 (≤20) 23 (≤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 580-115250-1	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 TICs, data were qualified as presumptive and estimated in four samples.

Red Hill Oily Waste Disposal Facility, CTO 18F0176
Semivolatiles - Data Qualification Summary - SDG 580-115250-1

Sample	Analyte	Flag	A or P	Reason (Code)
HU137 HU139 HU142 HU143	All tentatively identified compounds (TIC)	NJ (all detects)	A	Target analyte quantitation (TICs) (v)

Red Hill Oily Waste Disposal Facility, CTO 18F0176
Semivolatiles - Laboratory Blank Data Qualification Summary - SDG 580-115250-1

No Sample Data Qualified in this SDG

Red Hill Oily Waste Disposal Facility, CTO 18F0176
Semivolatiles - Field Blank Data Qualification Summary - SDG 580-115250-1

No Sample Data Qualified in this SDG

LDC #: 54723B2a

VALIDATION COMPLETENESS WORKSHEET

Stage 2B

Date: 8/21/22

SDG #: 580-115250-1

Page: 1 of 1

Laboratory: Eurofins, Tacoma, WA

Reviewer:

2nd Reviewer:

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

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

	Validation Area		Comments
I.	Sample receipt/Technical holding times	A / A	
II.	GC/MS Instrument performance check	A	
III.	Initial calibration/ICV	A/A	%RSD ≤ 15, r ≥ 0.99 Kr ≤ 20
IV.	Continuing calibration | ending	A	CCV ≤ 20/20
V.	Laboratory Blanks	A	
VI.	Field blanks	ND	FB = 3 EB = 4
VII.	Surrogate spikes	SW	
VIII.	Matrix spike/Matrix spike duplicates	N	
IX.	Laboratory control samples	SW	LCS/D
X.	Field duplicates	N	
XI.	Internal standards	A	
XII.	Target analyte quantitation / TIC	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	HU137		580-115250-1	Water	06/23/22
2	HU139		580-115250-3	Water	06/23/22
3	HU142	FB	580-115250-5	Water	06/23/22
4	HU143	FB	580-115250-7	Water	06/23/22
5					
6					
7					
8					
9					

Notes:

	MB 580-395333						

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 #: 5472384a

VALIDATION FINDINGS WORKSHEET

Surrogate Recovery

Page: 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 58-395333	TPH	136 (50-134)	No qual
			( )	
			( )	
			( )	
			( )	
			( )	
			( )	
			( )	
			( )	
			( )	
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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 #: 54723B4a

VALIDATION FINDINGS WORKSHEET
Laboratory Control Samples (LCS)

Page: 1 of 1
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 (w)
	LCS 10 580-395333	U	( )	( )	38 (20)	All	Jdet/P ND
		K	( )	( )	23 (20)	↓	↓
			( )	( )	( )		
			( )	( )	( )		
			( )	( )	( )		
			( )	( )	( )		
			( )	( )	( )		
			( )	( )	( )		
			( )	( )	( )		
			( )	( )	( )		
			( )	( )	( )		
			( )	( )	( )		
			( )	( )	( )		
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			( )	( )	( )		
			( )	( )	( )		
			( )	( )	( )		
			( )	( )	( )		
			( )	( )	( )		
			( )	( )	( )		
			( )	( )	( )		

LDC #: 54723B2a

VALIDATION FINDINGS WORKSHEET
Target Analyte Quantitation

Reviewer: FT

METHOD: GCMS VOA EPA SW 846 Method 8260D

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

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

Y 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 Compounds (TICs)		NJ/A (V)

Comments: See sample calculation verification worksheet for recalculations

LDC Report# 54723B2b

Laboratory Data Consultants, Inc.
Data Validation Report

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

LDC Report Date: October 18, 2022

Parameters: Polynuclear Aromatic Hydrocarbons

Validation Level: Stage 2B

Laboratory: Eurofins, Tacoma, WA

Sample Delivery Group (SDG): 580-115250-1

Sample Identification	Laboratory Sample Identification	Matrix	Collection Date
HU137	580-115250-1	Water	06/23/22
HU139	580-115250-3	Water	06/23/22
HU142	580-115250-5	Water	06/23/22
HU143	580-115250-7	Water	06/23/22

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

Sample HU143 was identified as an equipment blank. No contaminants were found.

Sample HU142 was identified as a field blank. No contaminants were found.

VII. Surrogates

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

VIII. Matrix Spike/Matrix Spike Duplicates

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

IX. Laboratory Control Samples

Laboratory control samples (LCS) and laboratory control samples duplicates (LCSD) were analyzed as required by the method. 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 580-115250-1

No Sample Data Qualified in this SDG

Red Hill Oily Waste Disposal Facility, CTO 18F0176
Polynuclear Aromatic Hydrocarbons - Laboratory Blank Data Qualification Summary - SDG 580-115250-1

No Sample Data Qualified in this SDG

Red Hill Oily Waste Disposal Facility, CTO 18F0176
Polynuclear Aromatic Hydrocarbons - Field Blank Data Qualification Summary - SDG 580-115250-1

No Sample Data Qualified in this SDG

LDC #: 54723B2b

SDG #: 580-115250-1

Laboratory: Eurofins, Tacoma, WA

VALIDATION COMPLETENESS WORKSHEET

Stage 2B

Date: 8/21/22

Page: 1 of 1

Reviewer: EJ

2nd Reviewer: AC

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 ≤ 15, r² ICV ≤ 20
IV.	Continuing calibration pending	A	CCV ≤ 20/20
V.	Laboratory Blanks	A	
VI.	Field blanks	ND	FB = 3 EB = 4
VII.	Surrogate spikes	A	
VIII.	Matrix spike/Matrix spike duplicates	N	CS
IX.	Laboratory control samples	A	LCS/D
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	HU137	580-115250-1	Water	06/23/22
2	HU139	580-115250-3	Water	06/23/22
3	HU142 FB	580-115250-5	Water	06/23/22
4	HU143 EB	580-115250-7	Water	06/23/22
5				
6				
7				
8				
9				

Notes:

	MB 580-395333						

Laboratory Data Consultants, Inc.
Data Validation Report

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

LDC Report Date: October 3, 2022

Parameters: Metals

Validation Level: Stage 2B

Laboratory: Eurofins, Tacoma, WA

Sample Delivery Group (SDG): 580-115250-1

Sample Identification	Laboratory Sample Identification	Matrix	Collection Date
HU137	580-115250-1	Water	06/23/22
HU139	580-115250-3	Water	06/23/22

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 Magnesium Manganese Potassium Sodium	0.0794 mg/L 0.0615 mg/L 0.00280 mg/L 0.391 mg/L 0.319 mg/L	All samples in SDG 580-115250-1

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.

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. 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.

Red Hill Oily Waste Disposal Facility, CTO 18F0176
Metals - Data Qualification Summary - SDG 580-115250-1

No Sample Data Qualified in this SDG

Red Hill Oily Waste Disposal Facility, CTO 18F0176
Metals - Laboratory Blank Data Qualification Summary - SDG 580-115250-1

No Sample Data Qualified in this SDG

Red Hill Oily Waste Disposal Facility, CTO 18F0176
Metals - Field Blank Data Qualification Summary - SDG 580-115250-1

No Sample Data Qualified in this SDG

LDC #: 54723B4b

SDG #: 580-115250-1

Laboratory: Eurofins, Tacoma, WA

VALIDATION COMPLETENESS WORKSHEET

Stage 2B

Date: 9/28/22

Page: 1 of 1

Reviewer: AT

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	N	CS
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	HU137	580-115250-1	Water	06/23/22
2	HU139	580-115250-3	Water	06/23/22
3				
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15				

Notes:

LDC #: 54723B4a

VALIDATION FINDINGS WORKSHEET
Sample Specific Element Reference

Reviewer: ATV

All circled elements are applicable to each sample.

Sample ID	Matrix	Target Analyte List (TAL)
1,2	W	Al, Sb, As, Ba, Be, Cd, (Ca), Cr, Co, Cu, Fe, Pb, (Mg), (Mn), Hg, Ni, (K), Se, Ag, (Na), Tl, V, Zn, Mo, B, Sn, Ti, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Sn, Ti, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Sn, Ti, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Sn, Ti, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Sn, Ti, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Sn, Ti, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Sn, Ti, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Sn, Ti, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Sn, Ti, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Sn, Ti, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Sn, Ti, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Sn, Ti, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Sn, Ti, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Sn, Ti, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Sn, Ti, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Sn, Ti, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Sn, Ti, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Sn, Ti, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Sn, Ti, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Sn, Ti, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Sn, Ti, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Sn, Ti, ___ ___
Analysis Method		
ICP		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Sn, Ti, ___ ___
ICP-MS		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Sn, Ti, ___ ___
GFAA		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Sn, Ti, ___ ___

Comments: Mercury by CVAA if performed

LDC #: 54723B4b

VALIDATION FINDINGS WORKSHEET
PB/ICB/CCB QUALIFIED SAMPLES

METHOD: Trace metals (EPA SW 864 Method 6010B/6020/7000) Soil preparation factor applied: NA
Sample Concentration units, unless otherwise noted: ug/L Associated Samples: all

Analyte	Maximum PB[a] (mg/Kg)	Maximum PB[a] (mg/L)	Maximum ICB/CCB[a] (mg/L)	Action Level									
Ca			0.0794	397									
Mg			0.0615	307.5									
Mn			0.00280	14									
K			0.391	1955									
Na			0.319	1595									

Samples with analyte concentrations within five times the associated ICB, CCB or PB concentration are listed above with the identifications from the Validation Completeness Worksheet. These sample results were qualified as not detected, "U".
Note : a - The listed analyte concentration is the highest ICB, CCB, or PB detected in the analysis of each element.

Laboratory Data Consultants, Inc.
Data Validation Report

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

LDC Report Date: October 3, 2022

Parameters: Wet Chemistry

Validation Level: Stage 2B

Laboratory: Eurofins, Tacoma, WA

Sample Delivery Group (SDG): 580-115250-1

Sample Identification	Laboratory Sample Identification	Matrix	Collection Date
HU137	580-115250-1	Water	06/23/22
HU139	580-115250-3	Water	06/23/22
HU137MS	580-115250-1MS	Water	06/23/22
HU137DUP	580-115250-1DUP	Water	06/23/22

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 methods 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 (methods blank).

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

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

e MS/MSD or Duplicate RPD was high.

f Presumed contamination from FB or ER.

g ICP ICS results were unsatisfactory.

h Holding times were exceeded.

i Internal standard performance was unsatisfactory.

k Estimated Maximum Possible Concentration (HRGC/HRMS only)

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

m Result exceeded the calibration range.

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

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

q MS/MSD recovery was not within control limits.

s Surrogate recovery was not within control limits.

t Presumed contamination from trip blank.

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

w LCS/LCSD RPD was high.

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

I. Sample Receipt and Technical Holding Times

All samples were received in good condition.

All technical holding time requirements were met.

II. Initial Calibration

All criteria for the initial calibration were met.

III. Continuing Calibration

Continuing calibration frequency and analysis criteria were met.

IV. Laboratory Blanks

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

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

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

Red Hill Oily Waste Disposal Facility, CTO 18F0176
Wet Chemistry - Data Qualification Summary - SDG 580-115250-1

No Sample Data Qualified in this SDG

Red Hill Oily Waste Disposal Facility, CTO 18F0176
Wet Chemistry - Laboratory Blank Data Qualification Summary - SDG 580-115250-1

No Sample Data Qualified in this SDG

Red Hill Oily Waste Disposal Facility, CTO 18F0176
Wet Chemistry - Field Blank Data Qualification Summary - SDG 580-115250-1

No Sample Data Qualified in this SDG

LDC #: 54723B6

SDG #: 580-115250-1

Laboratory: Eurofins, Tacoma, WA

VALIDATION COMPLETENESS WORKSHEET

Stage 2B

Date: 9/28/22

Page: 1 of 1

Reviewer: ATV

2nd Reviewer: AC

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	A	3
VII.	Duplicate sample analysis	A	4
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	HU137	580-115250-1	Water	06/23/22
2	HU139	580-115250-3	Water	06/23/22
3	HU137MS	580-115250-1MS	Water	06/23/22
4	HU137DUP	580-115250-1DUP	Water	06/23/22
5				
6				
7				
8				
9				
10				
11				
12				
13				
14				

Notes:

LDC #: 54723BG

VALIDATION FINDINGS WORKSHEET
Sample Specific Analysis Reference

Reviewer: ATV

All circled methods are applicable to each sample.

Sample ID	Parameter
1,2	pH TDS Cl F NO_3 NO_2 SO_4 O-PO_4 (Alk) CN NH_3 TKN (TOC) Cr6+ ClO_4 (NO3/NO2-N) (DOC)
	pH TDS Cl F NO_3 NO_2 SO_4 O-PO_4 Alk CN NH_3 TKN TOC Cr6+ ClO_4
	pH TDS Cl F NO_3 NO_2 SO_4 O-PO_4 Alk CN NH_3 TKN TOC Cr6+ ClO_4
	pH TDS Cl F NO_3 NO_2 SO_4 O-PO_4 Alk CN NH_3 TKN TOC Cr6+ ClO_4
	pH TDS Cl F NO_3 NO_2 SO_4 O-PO_4 Alk CN NH_3 TKN TOC Cr6+ ClO_4
QC	pH TDS Cl F NO_3 NO_2 SO_4 O-PO_4 Alk CN NH_3 TKN TOC Cr6+ ClO_4
3,4	pH TDS Cl F NO_3 NO_2 SO_4 O-PO_4 Alk CN NH_3 TKN TOC Cr6+ ClO_4 (NO3/NO2-N)
	pH TDS Cl F NO_3 NO_2 SO_4 O-PO_4 Alk CN NH_3 TKN TOC Cr6+ ClO_4
	pH TDS Cl F NO_3 NO_2 SO_4 O-PO_4 Alk CN NH_3 TKN TOC Cr6+ ClO_4
	pH TDS Cl F NO_3 NO_2 SO_4 O-PO_4 Alk CN NH_3 TKN TOC Cr6+ ClO_4
	pH TDS Cl F NO_3 NO_2 SO_4 O-PO_4 Alk CN NH_3 TKN TOC Cr6+ ClO_4
	pH TDS Cl F NO_3 NO_2 SO_4 O-PO_4 Alk CN NH_3 TKN TOC Cr6+ ClO_4
	pH TDS Cl F NO_3 NO_2 SO_4 O-PO_4 Alk CN NH_3 TKN TOC Cr6+ ClO_4
	pH TDS Cl F NO_3 NO_2 SO_4 O-PO_4 Alk CN NH_3 TKN TOC Cr6+ ClO_4
	pH TDS Cl F NO_3 NO_2 SO_4 O-PO_4 Alk CN NH_3 TKN TOC Cr6+ ClO_4
	pH TDS Cl F NO_3 NO_2 SO_4 O-PO_4 Alk CN NH_3 TKN TOC Cr6+ ClO_4
	pH TDS Cl F NO_3 NO_2 SO_4 O-PO_4 Alk CN NH_3 TKN TOC Cr6+ ClO_4
	pH TDS Cl F NO_3 NO_2 SO_4 O-PO_4 Alk CN NH_3 TKN TOC Cr6+ ClO_4
	pH TDS Cl F NO_3 NO_2 SO_4 O-PO_4 Alk CN NH_3 TKN TOC Cr6+ ClO_4
	pH TDS Cl F NO_3 NO_2 SO_4 O-PO_4 Alk CN NH_3 TKN TOC Cr6+ ClO_4
	pH TDS Cl F NO_3 NO_2 SO_4 O-PO_4 Alk CN NH_3 TKN TOC Cr6+ ClO_4
	pH TDS Cl F NO_3 NO_2 SO_4 O-PO_4 Alk CN NH_3 TKN TOC Cr6+ ClO_4
	pH TDS Cl F NO_3 NO_2 SO_4 O-PO_4 Alk CN NH_3 TKN TOC Cr6+ ClO_4
	pH TDS Cl F NO_3 NO_2 SO_4 O-PO_4 Alk CN NH_3 TKN TOC Cr6+ ClO_4
	pH TDS Cl F NO_3 NO_2 SO_4 O-PO_4 Alk CN NH_3 TKN TOC Cr6+ ClO_4
	pH TDS Cl F NO_3 NO_2 SO_4 O-PO_4 Alk CN NH_3 TKN TOC Cr6+ ClO_4
	pH TDS Cl F NO_3 NO_2 SO_4 O-PO_4 Alk CN NH_3 TKN TOC Cr6+ ClO_4
	pH TDS Cl F NO_3 NO_2 SO_4 O-PO_4 Alk CN NH_3 TKN TOC Cr6+ ClO_4
	pH TDS Cl F NO_3 NO_2 SO_4 O-PO_4 Alk CN NH_3 TKN TOC Cr6+ ClO_4

Comments:

Laboratory Data Consultants, Inc.
Data Validation Report

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

LDC Report Date: October 13, 2022

Parameters: Gasoline Range Organics

Validation Level: Stage 2B

Laboratory: Eurofins, Tacoma, WA

Sample Delivery Group (SDG): 580-115250-1

Sample Identification	Laboratory Sample Identification	Matrix	Collection Date
HU137	580-115250-1	Water	06/23/22
HU136	580-115250-2	Water	06/23/22
HU139	580-115250-3	Water	06/23/22
HU138	580-115250-4	Water	06/23/22
HU142	580-115250-5	Water	06/23/22
HU129	580-115250-6	Water	06/23/22
HU143	580-115250-7	Water	06/23/22

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

Samples HU136, HU138, and HU129 were identified as trip blanks. No contaminants were found.

Sample HU143 was identified as an equipment blank. No contaminants were found.

Sample HU142 was identified as a field 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

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

IX. Laboratory Control Samples

Laboratory control samples (LCS) and laboratory control samples duplicates (LCSD) were analyzed as required by the method. Percent recoveries (%R) were within QC limits with the following exceptions:

LCS ID (Associated Samples)	Analyte	LCS %R (Limits)	LCSD %R (Limits)	Flag	A or P
LCS/LCSD 580-39617 (All samples in SDG 580-115250-1)	Gasoline range organics (C6-C12)	74 (78-122)	-	UJ (all non-detects)	P

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.

Due to LCS/LCSD %R, data were qualified as estimated in seven samples.

Red Hill Oily Waste Disposal Facility, CTO 18F0176
Gasoline Range Organics - Data Qualification Summary - SDG 580-115250-1

Sample	Analyte	Flag	A or P	Reason (Code)
HU137 HU136 HU139 HU138 HU142 HU129 HU143	Gasoline range organics (C6-C12)	UJ (all non-detects)	P	Laboratory control samples (%R) (l)

Red Hill Oily Waste Disposal Facility, CTO 18F0176
Gasoline Range Organics - Laboratory Blank Data Qualification Summary - SDG 580-115250-1

No Sample Data Qualified in this SDG

Red Hill Oily Waste Disposal Facility, CTO 18F0176
Gasoline Range Organics - Field Blank Data Qualification Summary - SDG 580-115250-1

No Sample Data Qualified in this SDG

LDC #: 54723B7

SDG #: 580-115250-1

Laboratory: Eurofins, Tacoma, WA

VALIDATION COMPLETENESS WORKSHEET

Stage 2B

Date: 8/21/22

Page: 1 of 1

Reviewer: B

2nd Reviewer: JL

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 / A	
II.	GC/MS Instrument performance check	A	
III.	Initial calibration/ICV	A / A	1st ICV ≤ 20
IV.	Continuing calibration	A	CCV ≤ 20/20
V.	Laboratory Blanks	A	
VI.	Field blanks	ND	TB = 2, 4, 6 FB = 5 EB = 7
VII.	Surrogate spikes	A	
VIII.	Matrix spike/Matrix spike duplicates	N	
IX.	Laboratory control samples	SW	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	HU137	580-115250-1	Water	06/23/22
2	HU136 TB	580-115250-2	Water	06/23/22
3	HU139	580-115250-3	Water	06/23/22
4	HU138 TB	580-115250-4	Water	06/23/22
5	HU142 FB	580-115250-5	Water	06/23/22
6	HU129 TB	580-115250-6	Water	06/23/22
7	HU143 EB	580-115250-7	Water	06/23/22
8				
9				

Notes:

	MB 580-396176						

VALIDATION FINDINGS WORKSHEET
Laboratory Control Samples (LCS)

METHOD: X GC __ HPLC

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

Y Were a laboratory control samples (LCS) and laboratory control sample duplicate (LCSD) analyzed for each matrix in this SDG?

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

Level IV/D Only

Y Was an LCS analyzed every 20 samples for each matrix or whenever a sample extraction was performed? (I)

#	LCS/LCSD ID	Compound	LCS %R (Limits)	LCSD %R (Limits)	RPD (Limits)	Associated Samples	Qualifications
	LCS/D 580-39617	Gasoline Range Organics (C6-C12)	74 (78-122)	( )	( )	all	J-UJ/A all ND
			( )	( )	( )		
			( )	( )	( )		
			( )	( )	( )		
			( )	( )	( )		
			( )	( )	( )		
			( )	( )	( )		
			( )	( )	( )		
			( )	( )	( )		
			( )	( )	( )		
			( )	( )	( )		
			( )	( )	( )		
			( )	( )	( )		
			( )	( )	( )		
			( )	( )	( )		
			( )	( )	( )		
			( )	( )	( )		
			( )	( )	( )		
			( )	( )	( )		
			( )	( )	( )		
			( )	( )	( )		
			( )	( )	( )		
			( )	( )	( )		
			( )	( )	( )		

Laboratory Data Consultants, Inc.
Data Validation Report

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

LDC Report Date: August 24, 2022

Parameters: Polychlorinated Dioxins/Dibenzofurans

Validation Level: Stage 2B

Laboratory: Eurofins, Tacoma, WA

Sample Delivery Group (SDG): 580-115250-1

Sample Identification	Laboratory Sample Identification	Matrix	Collection Date
HU137	580-115250-1	Water	06/23/22
HU139	580-115250-3	Water	06/23/22
HU142	580-115250-5	Water	06/23/22
HU143	580-115250-7	Water	06/23/22

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 410-273924	07/10/22	1,2,3,4,6,7,8-HpCDD	0.000000882 ug/L	All samples in SDG 580-115250-1
		1,2,3,4,6,7,8-HpCDF	0.000000394 ug/L	
		1,2,3,4,7,8-HxCDD	0.000000328 ug/L	
		1,2,3,4,7,8-HxCDF	0.000000699 ug/L	
		1,2,3,4,7,8,9-HpCDF	0.000000511 ug/L	
		1,2,3,6,7,8-HxCDD	0.000000385 ug/L	
		1,2,3,6,7,8-HxCDF	0.000000633 ug/L	
		1,2,3,7,8-PeCDD	0.000000619 ug/L	
		1,2,3,7,8-PeCDF	0.000000578 ug/L	
		1,2,3,7,8,9-HxCDD	0.000000476 ug/L	
		1,2,3,7,8,9-HxCDF	0.000000547 ug/L	
		2,3,4,6,7,8-HxCDF	0.000000404 ug/L	
		2,3,4,7,8-PeCDF	0.000000602 ug/L	
		OCDD	0.00000172 ug/L	
		OCDF	0.00000114 ug/L	
		Total HxCDD	0.00000119 ug/L	
		Total HxCDF	0.00000228 ug/L	
		Total HpCDD	0.000000882 ug/L	
		Total HpCDF	0.000000905 ug/L	
		Total PeCDD	0.000000619 ug/L	
		Total PeCDF	0.00000118 ug/L	
		Total PCDD/PCDF	0.00000992 ug/L	
		Total PCDD	0.00000441 ug/L	
		Total PCDF	0.00000551 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
HU137	1,2,3,4,6,7,8-HpCDD	0.0000017 ug/L	0.0000017U ug/L
	1,2,3,4,6,7,8-HpCDF	0.00000065 ug/L	0.00000065U ug/L
	1,2,3,4,7,8-HxCDD	0.00000030 ug/L	0.00000030U ug/L
	1,2,3,4,7,8-HxCDF	0.00000022 ug/L	0.00000022U ug/L
	1,2,3,4,7,8,9-HpCDF	0.00000027 ug/L	0.00000027U ug/L
	1,2,3,6,7,8-HxCDD	0.00000044 ug/L	0.00000044U ug/L
	1,2,3,6,7,8-HxCDF	0.00000039 ug/L	0.00000039U ug/L
	1,2,3,7,8,9-HxCDD	0.00000041 ug/L	0.00000041U ug/L
	1,2,3,7,8,9-HxCDF	0.00000045 ug/L	0.00000045U ug/L
	2,3,4,6,7,8-HxCDF	0.00000018 ug/L	0.00000018U ug/L
	OCDD	0.0000032 ug/L	0.0000032U ug/L
	OCDF	0.0000013 ug/L	0.0000013U ug/L
	Total HxCDD	0.0000012 ug/L	0.0000012J ug/L
	Total HxCDF	0.0000012 ug/L	0.0000012J ug/L
	Total HpCDD	0.0000017 ug/L	0.0000017J ug/L
	Total HpCDF	0.00000092 ug/L	0.00000092J ug/L
	Total PCDD/PCDF	0.0000095 ug/L	0.0000095J ug/L
	Total PCDD	0.0000061 ug/L	0.0000061J ug/L
	Total PCDF	0.00000342 ug/L	0.00000342J ug/L

Sample	Analyte	Reported Concentration	Modified Final Concentration
HU139	1,2,3,4,6,7,8-HpCDD	0.0000010 ug/L	0.0000010U ug/L
	1,2,3,4,6,7,8-HpCDF	0.00000058 ug/L	0.00000058U ug/L
	1,2,3,4,7,8-HxCDD	0.00000039 ug/L	0.00000039U ug/L
	1,2,3,4,7,8-HxCDF	0.00000031 ug/L	0.00000031U ug/L
	1,2,3,4,7,8,9-HpCDF	0.00000050 ug/L	0.00000050U ug/L
	1,2,3,6,7,8-HxCDF	0.00000016 ug/L	0.00000016U ug/L
	1,2,3,7,8-PeCDD	0.00000025 ug/L	0.00000025U ug/L
	1,2,3,7,8-PeCDF	0.00000047 ug/L	0.00000047U ug/L
	1,2,3,7,8,9-HxCDD	0.00000027 ug/L	0.00000027U ug/L
	1,2,3,7,8,9-HxCDF	0.00000028 ug/L	0.00000028U ug/L
	2,3,4,6,7,8-HxCDF	0.00000017 ug/L	0.00000017U ug/L
	OCDD	0.0000015 ug/L	0.0000015U ug/L
	OCDF	0.00000049 ug/L	0.00000049U ug/L
	Total HxCDD	0.00000066 ug/L	0.00000066J ug/L
	Total HxCDF	0.00000092 ug/L	0.00000092J ug/L
	Total HpCDD	0.0000010 ug/L	0.0000010J ug/L
	Total HpCDF	0.0000011 ug/L	0.0000011J ug/L
	Total PeCDD	0.00000025 ug/L	0.00000025J ug/L
	Total PeCDF	0.00000047 ug/L	0.00000047J ug/L
	Total PCDD/PCDF	0.0000064 ug/L	0.0000064J ug/L
	Total PCDD	0.0000034 ug/L	0.0000034J ug/L
	Total PCDF	0.0000030 ug/L	0.0000030J ug/L
HU142	1,2,3,4,6,7,8-HpCDD	0.00000090 ug/L	0.00000090U ug/L
	1,2,3,4,6,7,8-HpCDF	0.00000035 ug/L	0.00000035U ug/L
	1,2,3,4,7,8-HxCDD	0.00000036 ug/L	0.00000036U ug/L
	1,2,3,4,7,8-HxCDF	0.00000022 ug/L	0.00000022U ug/L
	1,2,3,6,7,8-HxCDD	0.00000037 ug/L	0.00000037U ug/L
	1,2,3,6,7,8-HxCDF	0.00000035 ug/L	0.00000035U ug/L
	1,2,3,7,8-PeCDF	0.00000046 ug/L	0.00000046U ug/L
	1,2,3,7,8,9-HxCDD	0.00000067 ug/L	0.00000067U ug/L
	1,2,3,7,8,9-HxCDF	0.00000021 ug/L	0.00000021U ug/L
	2,3,4,6,7,8-HxCDF	0.00000023 ug/L	0.00000023U ug/L
	OCDD	0.0000018 ug/L	0.0000018U ug/L
	OCDF	0.00000057 ug/L	0.00000057U ug/L
	Total HxCDD	0.0000014 ug/L	0.0000014J ug/L
	Total HxCDF	0.0000010 ug/L	0.0000010J ug/L
	Total HpCDD	0.00000090 ug/L	0.00000090J ug/L
	Total HpCDF	0.00000035 ug/L	0.00000035J ug/L
	Total PeCDF	0.00000046 ug/L	0.00000046J ug/L
	Total PCDD/PCDF	0.0000065 ug/L	0.0000065J ug/L
	Total PCDD	0.0000041 ug/L	0.0000041J ug/L
	Total PCDF	0.0000024 ug/L	0.0000024J ug/L

Sample	Analyte	Reported Concentration	Modified Final Concentration
HU143	1,2,3,4,6,7,8-HpCDD	0.000000049 ug/L	0.000000049U ug/L
	1,2,3,4,6,7,8-HpCDF	0.000000015 ug/L	0.000000015U ug/L
	1,2,3,4,7,8-HxCDD	0.000000015 ug/L	0.000000015U ug/L
	1,2,3,4,7,8-HxCDF	0.000000027 ug/L	0.000000027U ug/L
	1,2,3,4,7,8,9-HpCDF	0.0000000078 ug/L	0.0000000078U ug/L
	1,2,3,6,7,8-HxCDD	0.000000015 ug/L	0.000000015U ug/L
	1,2,3,6,7,8-HxCDF	0.0000000050 ug/L	0.0000000050U ug/L
	1,2,3,7,8-PeCDD	0.0000000051 ug/L	0.0000000051U ug/L
	1,2,3,7,8-PeCDF	0.000000030 ug/L	0.000000030U ug/L
	1,2,3,7,8,9-HxCDD	0.000000023 ug/L	0.000000023U ug/L
	1,2,3,7,8,9-HxCDF	0.000000021 ug/L	0.000000021U ug/L
	2,3,4,6,7,8-HxCDF	0.0000000097 ug/L	0.0000000097U ug/L
	2,3,4,7,8-PeCDF	0.000000012 ug/L	0.000000012U ug/L
	OCDD	0.00000013 ug/L	0.00000013U ug/L
	OCDF	0.000000048 ug/L	0.000000048U ug/L
	Total HxCDD	0.000000053 ug/L	0.000000053J ug/L
	Total HxCDF	0.000000063 ug/L	0.000000063J ug/L
	Total HpCDD	0.000000049 ug/L	0.000000049J ug/L
	Total HpCDF	0.000000023 ug/L	0.000000023J ug/L
	Total PeCDD	0.0000000051 ug/L	0.0000000051J ug/L
	Total PeCDF	0.000000042 ug/L	0.000000042J ug/L
	Total PCDD/PCDF	0.00000042 ug/L	0.00000042J ug/L
	Total PCDD	0.00000024 ug/L	0.00000024J ug/L
	Total PCDF	0.00000018 ug/L	0.00000018J ug/L

VI. Field Blanks

Sample HU143 was identified as an equipment blank. No contaminants were found with the following exceptions:

Blank ID	Collection Date	Analyte	Concentration	Associated Samples
HU143	06/23/22	1,2,3,4,6,7,8-HpCDD	0.000000049 ug/L	HU137
		1,2,3,4,6,7,8-HpCDF	0.000000015 ug/L	HU139
		1,2,3,4,7,8-HxCDD	0.000000015 ug/L	
		1,2,3,4,7,8-HxCDF	0.000000027 ug/L	
		1,2,3,4,7,8,9-HpCDF	0.0000000078 ug/L	
		1,2,3,6,7,8-HxCDD	0.000000015 ug/L	
		1,2,3,6,7,8-HxCDF	0.0000000050 ug/L	
		1,2,3,7,8-PeCDD	0.0000000051 ug/L	
		1,2,3,7,8-PeCDF	0.000000030 ug/L	
		1,2,3,7,8,9-HxCDD	0.000000023 ug/L	
		1,2,3,7,8,9-HxCDF	0.000000021 ug/L	
		2,3,4,6,7,8-HxCDF	0.0000000097 ug/L	
		2,3,4,7,8-PeCDF	0.000000012 ug/L	
		OCDD	0.00000013 ug/L	
		OCDF	0.000000048 ug/L	
		Total HxCDD	0.000000053 ug/L	
		Total HxCDF	0.000000063 ug/L	
		Total HpCDD	0.000000049 ug/L	
		Total HpCDF	0.000000023 ug/L	
		Total PeCDD	0.0000000051 ug/L	
		Total PeCDF	0.000000042 ug/L	
		Total PCDD/PCDF	0.00000042 ug/L	
		Total PCDD	0.00000024 ug/L	
		Total PCDF	0.00000018 ug/L	

Sample HU142 was identified as a field blank. No contaminants were found with the following exceptions:

Blank ID	Collection Date	Analyte	Concentration	Associated Samples
HU142	06/23/22	1,2,3,4,6,7,8-HpCDD	0.00000090 ug/L	HU137
		1,2,3,4,6,7,8-HpCDF	0.00000035 ug/L	HU139
		1,2,3,4,7,8-HxCDD	0.00000036 ug/L	
		1,2,3,4,7,8-HxCDF	0.00000022 ug/L	
		1,2,3,6,7,8-HxCDD	0.00000037 ug/L	
		1,2,3,6,7,8-HxCDF	0.00000035 ug/L	
		1,2,3,7,8-PeCDF	0.00000046 ug/L	
		1,2,3,7,8,9-HxCDD	0.00000067 ug/L	
		1,2,3,7,8,9-HxCDF	0.00000021 ug/L	
		2,3,4,6,7,8-HxCDF	0.00000023 ug/L	
		OCDD	0.0000018 ug/L	
		OCDF	0.00000057 ug/L	
		Total HxCDD	0.0000014 ug/L	
		Total HxCDF	0.0000010 ug/L	
		Total HpCDD	0.00000090 ug/L	
		Total HpCDF	0.00000035 ug/L	
		Total PeCDF	0.00000046 ug/L	
		Total PCDD/PCDF	0.0000065 ug/L	
		Total PCDD	0.0000041 ug/L	
		Total PCDF	0.0000024 ug/L	

Sample concentrations were compared to concentrations detected in the field blanks. The sample concentrations were either not detected or were significantly greater (>5X for contaminants) than the concentrations found in the associated field blanks with the following exceptions:

Sample	Analyte	Reported Concentration	Modified Final Concentration
HU137	1,2,3,4,6,7,8-HpCDD	0.0000017 ug/L	0.0000017U ug/L
	1,2,3,4,6,7,8-HpCDF	0.00000065 ug/L	0.00000065U ug/L
	1,2,3,4,7,8-HxCDD	0.00000030 ug/L	0.00000030U ug/L
	1,2,3,4,7,8-HxCDF	0.00000022 ug/L	0.00000022U ug/L
	1,2,3,4,7,8,9-HpCDF	0.00000027 ug/L	0.00000027U ug/L
	1,2,3,6,7,8-HxCDD	0.00000044 ug/L	0.00000044U ug/L
	1,2,3,6,7,8-HxCDF	0.00000039 ug/L	0.00000039U ug/L
	1,2,3,7,8,9-HxCDD	0.00000041 ug/L	0.00000041U ug/L
	1,2,3,7,8,9-HxCDF	0.00000045 ug/L	0.00000045U ug/L
	2,3,4,6,7,8-HxCDF	0.00000018 ug/L	0.00000018U ug/L
	OCDD	0.0000032 ug/L	0.0000032U ug/L
	OCDF	0.0000013 ug/L	0.0000013U ug/L
	Total HxCDD	0.0000012 ug/L	0.0000012J ug/L
	Total HxCDF	0.0000012 ug/L	0.0000012J ug/L
	Total HpCDD	0.0000017 ug/L	0.0000017J ug/L
	Total HpCDF	0.00000092 ug/L	0.00000092J ug/L
	Total PCDD/PCDF	0.0000095 ug/L	0.0000095J ug/L
	Total PCDD	0.0000061 ug/L	0.0000061J ug/L
	Total PCDF	0.00000342 ug/L	0.00000342J ug/L

Sample	Analyte	Reported Concentration	Modified Final Concentration
HU139	1,2,3,4,6,7,8-HpCDD	0.0000010 ug/L	0.0000010U ug/L
	1,2,3,4,6,7,8-HpCDF	0.00000058 ug/L	0.00000058U ug/L
	1,2,3,4,7,8-HxCDD	0.00000039 ug/L	0.00000039U ug/L
	1,2,3,4,7,8-HxCDF	0.00000031 ug/L	0.00000031U ug/L
	1,2,3,6,7,8-HxCDF	0.00000016 ug/L	0.00000016U ug/L
	1,2,3,7,8-PeCDF	0.00000047 ug/L	0.00000047U ug/L
	1,2,3,7,8,9-HxCDD	0.00000027 ug/L	0.00000027U ug/L
	1,2,3,7,8,9-HxCDF	0.00000028 ug/L	0.00000028U ug/L
	2,3,4,6,7,8-HxCDF	0.00000017 ug/L	0.00000017U ug/L
	OCDD	0.0000015 ug/L	0.0000015U ug/L
	OCDF	0.00000049 ug/L	0.00000049U ug/L
	Total HxCDD	0.00000066 ug/L	0.00000066J ug/L
	Total HxCDF	0.00000092 ug/L	0.00000092J ug/L
	Total HpCDD	0.0000010 ug/L	0.0000010J ug/L
	Total HpCDF	0.0000011 ug/L	0.0000011J ug/L
	Total PeCDF	0.00000047 ug/L	0.00000047J ug/L
	Total PCDD/PCDF	0.0000064 ug/L	0.0000064J ug/L
	Total PCDD	0.0000034 ug/L	0.0000034J ug/L
	Total PCDF	0.0000030 ug/L	0.0000030J ug/L

VII. Matrix Spike/Matrix Spike Duplicates

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

VIII. Laboratory Control Samples

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

IX. Field Duplicates

No field duplicates were identified in this SDG.

X. 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 580-115250-1	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 four samples.

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

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

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

Red Hill Oily Waste Disposal Facility, CTO 18F0176
Polychlorinated Dioxins/Dibenzofurans - Data Qualification Summary - SDG 580-115250-1

Sample	Analyte	Flag	A or P	Reason (Code)
HU137 HU139 HU142 HU143	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 580-115250-1

Sample	Analyte	Modified Final Concentration	A or P	Code
HU137	1,2,3,4,6,7,8-HpCDD	0.0000017U ug/L	A	b
	1,2,3,4,6,7,8-HpCDF	0.00000065U ug/L		
	1,2,3,4,7,8-HxCDD	0.00000030U ug/L		
	1,2,3,4,7,8-HxCDF	0.00000022U ug/L		
	1,2,3,4,7,8,9-HpCDF	0.00000027U ug/L		
	1,2,3,6,7,8-HxCDD	0.00000044U ug/L		
	1,2,3,6,7,8-HxCDF	0.00000039U ug/L		
	1,2,3,7,8,9-HxCDD	0.00000041U ug/L		
	1,2,3,7,8,9-HxCDF	0.00000045U ug/L		
	2,3,4,6,7,8-HxCDF	0.00000018U ug/L		
	OCDD	0.0000032U ug/L		
	OCDF	0.0000013U ug/L		
	Total HxCDD	0.0000012J ug/L		
	Total HxCDF	0.0000012J ug/L		
	Total HpCDD	0.0000017J ug/L		
	Total HpCDF	0.00000092J ug/L		
	Total PCDD/PCDF	0.0000095J ug/L		
	Total PCDD	0.0000061J ug/L		
	Total PCDF	0.00000342J ug/L		
HU139	1,2,3,4,6,7,8-HpCDD	0.0000010U ug/L	A	b
	1,2,3,4,6,7,8-HpCDF	0.00000058U ug/L		
	1,2,3,4,7,8-HxCDD	0.00000039U ug/L		
	1,2,3,4,7,8-HxCDF	0.00000031U ug/L		
	1,2,3,4,7,8,9-HpCDF	0.00000050U ug/L		
	1,2,3,6,7,8-HxCDF	0.00000016U ug/L		
	1,2,3,7,8-PeCDD	0.00000025U ug/L		
	1,2,3,7,8-PeCDF	0.00000047U ug/L		
	1,2,3,7,8,9-HxCDD	0.00000027U ug/L		
	1,2,3,7,8,9-HxCDF	0.00000028U ug/L		
	2,3,4,6,7,8-HxCDF	0.00000017U ug/L		
	OCDD	0.0000015U ug/L		
	OCDF	0.00000049U ug/L		
	Total HxCDD	0.00000066J ug/L		
	Total HxCDF	0.00000092J ug/L		
	Total HpCDD	0.0000010J ug/L		
	Total HpCDF	0.0000011J ug/L		
	Total PeCDD	0.00000025J ug/L		
	Total PeCDF	0.00000047J ug/L		
	Total PCDD/PCDF	0.0000064J ug/L		
	Total PCDD	0.0000034J ug/L		
	Total PCDF	0.0000030J ug/L		

Sample	Analyte	Modified Final Concentration	A or P	Code
HU142	1,2,3,4,6,7,8-HpCDD	0.00000090U ug/L	A	b
	1,2,3,4,6,7,8-HpCDF	0.00000035U ug/L		
	1,2,3,4,7,8-HxCDD	0.00000036U ug/L		
	1,2,3,4,7,8-HxCDF	0.00000022U ug/L		
	1,2,3,6,7,8-HxCDD	0.00000037U ug/L		
	1,2,3,6,7,8-HxCDF	0.00000035U ug/L		
	1,2,3,7,8-PeCDF	0.00000046U ug/L		
	1,2,3,7,8,9-HxCDD	0.00000067U ug/L		
	1,2,3,7,8,9-HxCDF	0.00000021U ug/L		
	2,3,4,6,7,8-HxCDF	0.00000023U ug/L		
	OCDD	0.0000018U ug/L		
	OCDF	0.00000057U ug/L		
	Total HxCDD	0.0000014J ug/L		
	Total HxCDF	0.0000010J ug/L		
	Total HpCDD	0.00000090J ug/L		
	Total HpCDF	0.00000035J ug/L		
	Total PeCDF	0.00000046J ug/L		
	Total PCDD/PCDF	0.0000065J ug/L		
	Total PCDD	0.0000041J ug/L		
	Total PCDF	0.0000024J ug/L		
HU143	1,2,3,4,6,7,8-HpCDD	0.000000049U ug/L	A	b
	1,2,3,4,6,7,8-HpCDF	0.000000015U ug/L		
	1,2,3,4,7,8-HxCDD	0.000000015U ug/L		
	1,2,3,4,7,8-HxCDF	0.000000027U ug/L		
	1,2,3,4,7,8,9-HpCDF	0.0000000078U ug/L		
	1,2,3,6,7,8-HxCDD	0.000000015U ug/L		
	1,2,3,6,7,8-HxCDF	0.0000000050U ug/L		
	1,2,3,7,8-PeCDD	0.0000000051U ug/L		
	1,2,3,7,8-PeCDF	0.000000030U ug/L		
	1,2,3,7,8,9-HxCDD	0.000000023U ug/L		
	1,2,3,7,8,9-HxCDF	0.000000021U ug/L		
	2,3,4,6,7,8-HxCDF	0.0000000097U ug/L		
	2,3,4,7,8-PeCDF	0.000000012U ug/L		
	OCDD	0.00000013U ug/L		
	OCDF	0.000000048U ug/L		
	Total HxCDD	0.000000053J ug/L		
	Total HxCDF	0.000000063J ug/L		
	Total HpCDD	0.000000049J ug/L		
	Total HpCDF	0.000000023J ug/L		
	Total PeCDD	0.0000000051J ug/L		
	Total PeCDF	0.000000042J ug/L		
	Total PCDD/PCDF	0.00000042J ug/L		
	Total PCDD	0.00000024J ug/L		
	Total PCDF	0.00000018J ug/L		

Red Hill Oily Waste Disposal Facility, CTO 18F0176
Polychlorinated Dioxins/Dibenzofurans - Field Blank Data Qualification Summary - SDG 580-115250-1

Sample	Analyte	Modified Final Concentration	A or P	Code
HU137	1,2,3,4,6,7,8-HpCDD	0.0000017U ug/L	A	f
	1,2,3,4,6,7,8-HpCDF	0.00000065U ug/L		
	1,2,3,4,7,8-HxCDD	0.00000030U ug/L		
	1,2,3,4,7,8-HxCDF	0.00000022U ug/L		
	1,2,3,4,7,8,9-HpCDF	0.00000027U ug/L		
	1,2,3,6,7,8-HxCDD	0.00000044U ug/L		
	1,2,3,6,7,8-HxCDF	0.00000039U ug/L		
	1,2,3,7,8,9-HxCDD	0.00000041U ug/L		
	1,2,3,7,8,9-HxCDF	0.00000045U ug/L		
	2,3,4,6,7,8-HxCDF	0.00000018U ug/L		
	OCDD	0.0000032U ug/L		
	OCDF	0.0000013U ug/L		
	Total HxCDD	0.0000012J ug/L		
	Total HxCDF	0.0000012J ug/L		
	Total HpCDD	0.0000017J ug/L		
	Total HpCDF	0.00000092J ug/L		
	Total PCDD/PCDF	0.0000095J ug/L		
	Total PCDD	0.0000061J ug/L		
	Total PCDF	0.00000342J ug/L		
HU139	1,2,3,4,6,7,8-HpCDD	0.0000010U ug/L	A	f
	1,2,3,4,6,7,8-HpCDF	0.00000058U ug/L		
	1,2,3,4,7,8-HxCDD	0.00000039U ug/L		
	1,2,3,4,7,8-HxCDF	0.00000031U ug/L		
	1,2,3,6,7,8-HxCDF	0.00000016U ug/L		
	1,2,3,7,8-PeCDF	0.00000047U ug/L		
	1,2,3,7,8,9-HxCDD	0.00000027U ug/L		
	1,2,3,7,8,9-HxCDF	0.00000028U ug/L		
	2,3,4,6,7,8-HxCDF	0.00000017U ug/L		
	OCDD	0.0000015U ug/L		
	OCDF	0.00000049U ug/L		
	Total HxCDD	0.00000066J ug/L		
	Total HxCDF	0.00000092J ug/L		
	Total HpCDD	0.0000010J ug/L		
	Total HpCDF	0.0000011J ug/L		
	Total PeCDF	0.00000047J ug/L		
	Total PCDD/PCDF	0.0000064J ug/L		
	Total PCDD	0.0000034J ug/L		
	Total PCDF	0.0000030J ug/L		

LDC #: 54723B21 **VALIDATION COMPLETENESS WORKSHEET** Date: 8/21/22
SDG #: 580-115250-1 Stage 2B Page: 1 of 1
Laboratory: Eurofins, Tacoma, WA Reviewer: PA
2nd Reviewer: PC

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 ≤ 20/3
V.	Laboratory Blanks	SW	
VI.	Field blanks	SW	FB = 3 EB = 4
VII.	Matrix spike/Matrix spike duplicates	N	CS
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 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	HU137	580-115250-1	Water	06/23/22
2	HU139	580-115250-3	Water	06/23/22
3	HU142 FB	580-115250-5	Water	06/23/22
4	HU143 EB	580-115250-7	Water	06/23/22
5				
6				
7				
8				
9				
10				

Notes:

	MB 410-273924						

VALIDATION FINDINGS WORKSHEET

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

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 #: 54723B21

VALIDATION FINDINGS WORKSHEET
Blanks

Reviewer: FT

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 Were all samples associated with a method blank?
Y Was a method blank performed for each matrix and whenever a sample extraction was performed? (b)
Y Was the method blank contaminated?

Blank extraction date: 7/10/22 **Blank analysis date:** 7/11/22 **Associated samples:** All
Conc. units: ug/L

Compound	Blank ID	Sample Identification								
	MB 410 -273924	5x	1	2	3	4				
F	0.000000882	0.000004410	0.0000017U	0.0000010U	0.00000090U	0.000000049U				
O	0.000000394	0.000001970	0.00000065U	0.00000058U	0.00000035U	0.000000015U				
C	0.000000328	0.000001640	0.00000030U	0.00000039U	0.00000036U	0.000000015U				
K	0.000000699	0.000003495	0.00000022U	0.00000031U	0.00000022U	0.000000027U				
P	0.000000511	0.000002555	0.00000027U	0.00000050U	-	0.0000000078U				
D	0.000000385	0.000001925	0.00000044U	-	0.00000037U	0.000000015U				
L	0.000000633	0.000003165	0.00000039U	0.00000016U	0.00000035U	0.0000000050U				
B	0.000000619	0.000003095	-	0.00000025U	-	0.0000000051U				
I	0.000000578	0.000002890	-	0.00000047U	0.00000046U	0.000000030U				
E	0.000000476	0.000002380	0.00000041U	0.00000027U	0.00000067U	0.000000023U				
N	0.000000547	0.000002735	0.00000045U	0.00000028U	0.00000021U	0.000000021U				
M	0.000000404	0.000002020	0.00000018U	0.00000017U	0.00000023U	0.0000000097U				
J	0.000000602	0.000003010	-	-	-	0.000000012U				
G	0.00000172	0.000008600	0.0000032U	0.0000015U	0.0000018U	0.00000013U				
Q	0.00000114	0.000005700	0.0000013U	0.00000049U	0.00000057U	0.000000048U				
T	0.00000119	0.000005950	0.0000012J	0.00000066J	0.0000014U	0.000000053J				
X	0.00000228	0.000011400	0.0000012J	0.00000092J	0.0000010U	0.000000063J				
U	0.000000882	0.000004410	0.0000017J	0.0000010J	0.00000090U	0.000000049J				
Y	0.000000905	0.000004525	0.00000092J	0.0000011J	0.00000035J	0.000000023J				
S	0.000000619	0.000003095	-	0.00000025J	-	0.0000000051J				

	MB 410 -273924	5x	1	2	3	4				
W	0.00000118	0.000005900	-	0.00000047J	0.00000046J	0.000000042J				
Total PCDD/PCDF	0.00000992	0.000049600	0.0000095J	0.0000064J	0.0000065J	0.00000042J				
Total PCDD	0.00000441	0.000022050	0.0000061J	0.0000034J	0.0000041J	0.00000024J				
Total PCDF	0.00000551	0.000027550	0.00000342J	0.0000030J	0.0000024J	0.00000018J				

54723B21

54723B21 MB 410 273924 AECOM Red Hill Oily

LDC #: 54723B21

VALIDATION FINDINGS WORKSHEET
Field Blanks

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 Were field blank midentified in this SDG?

Y Were target compounds detected in the field blank? (f)

Blank unit: ug/L Associated samples unit: ug/L

Sampling date: 6/23/22

Field Blank type: EB **Associated samples:** 1,2 > 5x

Compound	Blank ID	Sample Identification						
	4	5x						
F	0.000000049	0.000000245						
O	0.000000015	0.000000075						
C	0.000000015	0.000000075						
K	0.000000027	0.000000135						
P	0.0000000078	0.000000039						
D	0.000000015	0.000000075						
L	0.0000000050	0.000000025						
B	0.0000000051	0.000000026						
I	0.000000030	0.000000150						
E	0.000000023	0.000000115						
N	0.000000021	0.000000105						
M	0.0000000097	0.000000049						
J	0.000000012	0.000000060						
G	0.00000013	0.000000650						
Q	0.000000048	0.000000240						
T	0.000000053	0.000000265						
X	0.000000063	0.000000315						
U	0.000000049	0.000000245						
Y	0.000000023	0.000000115						
S	0.0000000051	0.000000026						

	4	5x						
W	0.000000042	0.000000210						
Total PCDD/PCDF	0.00000042	0.000002100						
Total PCDD	0.00000024	0.000001200						
Total PCDF	0.00000018	0.000000900						

54723B21 EB

54723B21 EB AECOM Red Hill Oily

LDC #: 54723B21

VALIDATION FINDINGS WORKSHEET
Field Blanks

Reviewer: FT

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 Were Were field blank identified in this SDG?
Y Were target compounds detected in the field blank? (f)

Blank Unit: ug/L Associated samples unit:ug/L
Sampling date: 6/23/22
Field blank type: FB **Associated samples: 1 2, 4**

Compound	Blank ID	Sample Identification							
	3	5x	1	2	4				
F	0.00000090	0.000004500	0.0000017U	0.0000010U	0.000000049U				
O	0.00000035	0.000001750	0.00000065U	0.00000058U	0.000000015U				
C	0.00000036	0.000001800	0.00000030U	0.00000039U	0.000000015U				
K	0.00000022	0.000001100	0.00000022U	0.00000031U	0.000000027U				
D	0.00000037	0.000001850	0.00000044U	-	0.000000015U				
L	0.00000035	0.000001750	0.00000039U	0.00000016U	0.0000000050U				
I	0.00000046	0.000002300	-	0.00000047U	0.000000030U				
E	0.00000067	0.000003350	0.00000041U	0.00000027U	0.000000023U				
N	0.00000021	0.000001050	0.00000045U	0.00000028U	0.000000021U				
M	0.00000023	0.000001150	0.00000018U	0.00000017U	0.0000000097U				
G	0.0000018	0.000009000	0.0000032U	0.0000015U	0.00000013U				
Q	0.00000057	0.000002850	0.0000013U	0.00000049U	0.000000048U				
T	0.0000014	0.000007000	0.0000012J	0.00000066J	0.000000053J				
X	0.0000010	0.000005000	0.0000012J	0.00000092J	0.000000063J				
U	0.00000090	0.000004500	0.0000017J	0.0000010J	0.000000049J				
Y	0.00000035	0.000001750	0.00000092J	0.0000011J	0.000000023J				
W	0.00000046	0.000002300	-	0.00000047J	0.000000042J				
Total PCDD/PCDF	0.0000065	0.000032500	0.0000095J	0.0000064J	0.00000042J				
Total PCDD	0.0000041	0.000020500	0.0000061J	0.0000034J	0.00000024J				
Total PCDF	0.0000024	0.000012000	0.00000342J	0.0000030J	0.00000018J				

54723B21 FB AECOM Red Hill Oily

LDC #: 54723B21

VALIDATION FINDINGS WORKSHEET
Target Analyte Quantitation and Reported CRQLs

Page: 1 of 1
Reviewer: FT

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 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	all compounds qualified "I" by the laboratory as EMPC		J (all) / A (K)

Comments: See sample calculation verification worksheet for recalculations

LDC Report# 54723B51

Laboratory Data Consultants, Inc.
Data Validation Report

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

LDC Report Date: August 24, 2022

Parameters: Methane

Validation Level: Stage 2B

Laboratory: Eurofins, Tacoma, WA

Sample Delivery Group (SDG): 580-115250-1

Sample Identification	Laboratory Sample Identification	Matrix	Collection Date
HU137	580-115250-1	Water	06/23/22
HU136	580-115250-2	Water	06/23/22
HU139	580-115250-3	Water	06/23/22
HU138	580-115250-4	Water	06/23/22

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

Samples HU136 and HU138 were identified as trip blanks. No contaminants were found.

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. 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.

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 580-115250-1

No Sample Data Qualified in this SDG

Red Hill Oily Waste Disposal Facility, CTO 18F0176
Methane - Laboratory Blank Data Qualification Summary - SDG 580-115250-1

No Sample Data Qualified in this SDG

Red Hill Oily Waste Disposal Facility, CTO 18F0176
Methane - Field Blank Data Qualification Summary - SDG 580-115250-1

No Sample Data Qualified in this SDG

LDC #: 54723B51 **VALIDATION COMPLETENESS WORKSHEET** Date: 8/21/22
SDG #: 580-115250-1 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 / ending	A	CCV ≤ 20/20
IV.	Laboratory Blanks	A	
V.	Field blanks	ND	TB = 2, 4
VI.	Surrogate spikes	A	
VII.	Matrix spike/Matrix spike duplicates	N	client
VIII.	Laboratory control samples	A	LCS/D
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	HU137	580-115250-1	Water	06/23/22
2	HU136 TB	580-115250-2	Water	06/23/22
3	HU139	580-115250-3	Water	06/23/22
4	HU138 TB	580-115250-4	Water	06/23/22
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Notes:

	MB 410-271107							

Laboratory Data Consultants, Inc.
Data Validation Report

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

LDC Report Date: October 3, 2022

Parameters: Wet Chemistry

Validation Level: Stage 2B

Laboratory: Eurofins, Tacoma, WA

Sample Delivery Group (SDG): 580-115346-1

Sample Identification	Laboratory Sample Identification	Matrix	Collection Date
HU108	580-115346-1	Water	06/28/22
HU108MS	580-115346-1MS	Water	06/28/22
HU108MSD	580-115346-1MSD	Water	06/28/22

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 methods 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 (methods 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 Oily Waste Disposal Facility, CTO 18F0176
Wet Chemistry - Data Qualification Summary - SDG 580-115346-1

No Sample Data Qualified in this SDG

Red Hill Oily Waste Disposal Facility, CTO 18F0176
Wet Chemistry - Laboratory Blank Data Qualification Summary - SDG 580-115346-1

No Sample Data Qualified in this SDG

Red Hill Oily Waste Disposal Facility, CTO 18F0176
Wet Chemistry - Field Blank Data Qualification Summary - SDG 580-115346-1

No Sample Data Qualified in this SDG

LDC #: 54723C6
SDG #: 580-115346-1
Laboratory: Eurofins, Tacoma, WA

VALIDATION COMPLETENESS WORKSHEET
Stage 2B

Date: 9/28/22
Page: 1 of 1
Reviewer: ATV
2nd Reviewer: A

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	(2,3)
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	HU108	580-115346-1	Water	06/28/22
2	HU108MS	580-115346-1MS	Water	06/28/22
3	HU108MSD	580-115346-1MSD	Water	06/28/22
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Notes:

LDC #: 54723C6

VALIDATION FINDINGS WORKSHEET
Sample Specific Analysis Reference

Reviewer: ATL

All circled methods are applicable to each sample.

Sample ID	Parameter
1	pH TDS (Cl) (F) (NO3) NO2 (SO4) O-PO4 Alk CN NH3 TKN TOC Cr6+ ClO4 (Br)
	pH TDS Cl F NO3 NO2 SO4 O-PO4 Alk CN NH3 TKN TOC Cr6+ ClO4
	pH TDS Cl F NO3 NO2 SO4 O-PO4 Alk CN NH3 TKN TOC Cr6+ ClO4
	pH TDS Cl F NO3 NO2 SO4 O-PO4 Alk CN NH3 TKN TOC Cr6+ ClO4
QC	pH TDS Cl F NO3 NO2 SO4 O-PO4 Alk CN NH3 TKN TOC Cr6+ ClO4
2,3	pH TDS (Cl) (F) (NO3) NO2 (SO4) O-PO4 Alk CN NH3 TKN TOC Cr6+ ClO4 (Br)
	pH TDS Cl F NO3 NO2 SO4 O-PO4 Alk CN NH3 TKN TOC Cr6+ ClO4
	pH TDS Cl F NO3 NO2 SO4 O-PO4 Alk CN NH3 TKN TOC Cr6+ ClO4
	pH TDS Cl F NO3 NO2 SO4 O-PO4 Alk CN NH3 TKN TOC Cr6+ ClO4
	pH TDS Cl F NO3 NO2 SO4 O-PO4 Alk CN NH3 TKN TOC Cr6+ ClO4
	pH TDS Cl F NO3 NO2 SO4 O-PO4 Alk CN NH3 TKN TOC Cr6+ ClO4
	pH TDS Cl F NO3 NO2 SO4 O-PO4 Alk CN NH3 TKN TOC Cr6+ ClO4
	pH TDS Cl F NO3 NO2 SO4 O-PO4 Alk CN NH3 TKN TOC Cr6+ ClO4
	pH TDS Cl F NO3 NO2 SO4 O-PO4 Alk CN NH3 TKN TOC Cr6+ ClO4
	pH TDS Cl F NO3 NO2 SO4 O-PO4 Alk CN NH3 TKN TOC Cr6+ ClO4
	pH TDS Cl F NO3 NO2 SO4 O-PO4 Alk CN NH3 TKN TOC Cr6+ ClO4
	pH TDS Cl F NO3 NO2 SO4 O-PO4 Alk CN NH3 TKN TOC Cr6+ ClO4
	pH TDS Cl F NO3 NO2 SO4 O-PO4 Alk CN NH3 TKN TOC Cr6+ ClO4
	pH TDS Cl F NO3 NO2 SO4 O-PO4 Alk CN NH3 TKN TOC Cr6+ ClO4
	pH TDS Cl F NO3 NO2 SO4 O-PO4 Alk CN NH3 TKN TOC Cr6+ ClO4
	pH TDS Cl F NO3 NO2 SO4 O-PO4 Alk CN NH3 TKN TOC Cr6+ ClO4
	pH TDS Cl F NO3 NO2 SO4 O-PO4 Alk CN NH3 TKN TOC Cr6+ ClO4
	pH TDS Cl F NO3 NO2 SO4 O-PO4 Alk CN NH3 TKN TOC Cr6+ ClO4
	pH TDS Cl F NO3 NO2 SO4 O-PO4 Alk CN NH3 TKN TOC Cr6+ ClO4
	pH TDS Cl F NO3 NO2 SO4 O-PO4 Alk CN NH3 TKN TOC Cr6+ ClO4
	pH TDS Cl F NO3 NO2 SO4 O-PO4 Alk CN NH3 TKN TOC Cr6+ ClO4
	pH TDS Cl F NO3 NO2 SO4 O-PO4 Alk CN NH3 TKN TOC Cr6+ ClO4
	pH TDS Cl F NO3 NO2 SO4 O-PO4 Alk CN NH3 TKN TOC Cr6+ ClO4

Comments: