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

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

October 5, 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 # 54721:

SDG #	Fraction
22F211 22F227 22F242 22F253	Wet Chemistry, Total Petroleum Hydrocarbons as Extractables, Ferrous Iron

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 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

524 pages-ADV

Attachment 1

90/10 2B/4 EDD

LDC# 54721 (AECOM - Honolulu, HI / Red Hill Oily Waste, CTO 18F0176)

LDC	SDG#	DATE REC'D	(3) DATE DUE	TPH-E (8015C)		SGCU TPH-E (8015C)		Fe II (3500 -FE B)		Si (4500-SIO2 C)		Diss. Si (4500-SIO2 C)																					
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	22F211	07/18/22	08/08/22	3	0	2	0	-	-	3	0	3	0																				
B	22F227	07/18/22	08/08/22	3	0	1	0	1	0	3	0	3	0																				
B	22F227	07/18/22	08/08/22	1	0	1	0	1	0	1	0	1	0																				
C	22F242	07/18/22	08/08/22	4	0	1	0	-	-	2	0	2	0																				
D	22F253	07/18/22	08/08/22	-	-	-	-	1	0	-	-	-	-																				
Total	T/SC			11	0	5	0	3	0	9	0	9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	37

Shaded cells indicate Stage 4 validation (all other cells are Stage 2B validation). These sample counts do not include MS/MSD, and DUPs V:\LOGIN\AECOM\Red Hill\54721ST-18F0176_Oily_EMAX.wpd

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: EMAX Laboratories, Inc., Torrance, CA

Sample Delivery Group (SDG): 22F211

Sample Identification	Laboratory Sample Identification	Matrix	Collection Date
HU128	22F211-01	Water	06/21/22
HU141	22F211-02	Water	06/21/22
HU133	22F211-03	Water	06/21/22
HU141MS	22F211-02MS	Water	06/21/22
HU141MSD	22F211-02MSD	Water	06/21/22
HU141DUP	22F211-02DUP	Water	06/21/22

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:

Silica, Dissolved Silica by Standard Method 4500-SIO2 C

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

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 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 22F211

No Sample Data Qualified in this SDG

Red Hill Oily Waste Disposal Facility, CTO 18F0176
Wet Chemistry - Laboratory Blank Data Qualification Summary - SDG 22F211

No Sample Data Qualified in this SDG

Red Hill Oily Waste Disposal Facility, CTO 18F0176
Wet Chemistry - Field Blank Data Qualification Summary - SDG 22F211

No Sample Data Qualified in this SDG

LDC #: 54721A6 **VALIDATION COMPLETENESS WORKSHEET** Date: 9/28/22
SDG #: 22F211 Stage 2B Page: 1 of 1
Laboratory: EMAX Laboratories, Inc., Torrance, CA Reviewer: ATV
2nd Reviewer: DE

METHOD: (Analyte) Silica, Dissolved Silica (SM4500-SIO2 C)

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	(4,5)
VII.	Duplicate sample analysis	A	6
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	HU128	22F211-01	Water	06/21/22
2	HU141	22F211-02	Water	06/21/22
3	HU133	22F211-03	Water	06/21/22
4	HU141MS	22F211-02MS	Water	06/21/22
5	HU141MSD	22F211-02MSD	Water	06/21/22
6	HU141DUP	22F211-02DUP	Water	06/21/22
7				
8				
9				
10				
11				
12				
13				
14				
15				

Notes:

LDC #: 54721A6

VALIDATION FINDINGS WORKSHEET
Sample Specific Analysis Reference

Reviewer: ATV

All circled methods are applicable to each sample.

Sample ID	Parameter
1,2,3	pH TDS Cl F NO_3 NO_2 SO_4 O-PO_4 Alk CN NH_3 TKN TOC Cr6+ ClO_4 (SiO2) (Dis SiO2)
	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
QC	pH TDS Cl F NO_3 NO_2 SO_4 O-PO_4 Alk CN NH_3 TKN TOC Cr6+ ClO_4
4,5,6	pH TDS Cl F NO_3 NO_2 SO_4 O-PO_4 Alk CN NH_3 TKN TOC Cr6+ ClO_4 (Dis SiO2)
	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: August 23, 2022

Parameters: Total Petroleum Hydrocarbons as Extractables

Validation Level: Stage 2B

Laboratory: EMAX Laboratories, Inc., Torrance, CA

Sample Delivery Group (SDG): 22F211

Sample Identification	Laboratory Sample Identification	Matrix	Collection Date
HU128	22F211-01	Water	06/21/22
HU141	22F211-02	Water	06/21/22
HU133	22F211-03	Water	06/21/22
HU141(SGCU)	22F211-02(SGCU)	Water	06/21/22
HU133(SGCU)	22F211-03(SGCU)	Water	06/21/22

Samples appended with "SGCU" underwent Silica Gel cleanup

Introduction

This Data Validation Report (DVR) presents data validation findings and results for the associated samples listed on the cover page. Data validation was performed in accordance with the 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:

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

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

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

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

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

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

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

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

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

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

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

Qualification Code Reference

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

b Presumed contamination from preparation (method blank).

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

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

e MS/MSD or Duplicate RPD was high.

f Presumed contamination from FB or ER.

g ICP ICS results were unsatisfactory.

h Holding times were exceeded.

i Internal standard performance was unsatisfactory.

k Estimated Maximum Possible Concentration (HRGC/HRMS only)

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

m Result exceeded the calibration range.

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

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

q MS/MSD recovery was not within control limits.

s Surrogate recovery was not within control limits.

t Presumed contamination from trip blank.

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

w LCS/LCSD RPD was high.

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

I. Sample Receipt and Technical Holding Times

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

All technical holding time requirements were met.

II. Initial Calibration and Initial Calibration Verification

An initial calibration was performed as required by the method.

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

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

III. Continuing Calibration

Continuing calibration was performed at the required frequencies.

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

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

IV. Laboratory Blanks

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

V. Field Blanks

No field blanks were identified in this SDG.

VI. Surrogates

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

VII. Matrix Spike/Matrix Spike Duplicates

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

VIII. Laboratory Control Samples

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

IX. Field Duplicates

No field duplicates were identified in this SDG.

X. Target Analyte Quantitation

Raw data were not reviewed for Stage 2B validation.

XI. Target Analyte Identification

Raw data were not reviewed for Stage 2B validation.

XII. Overall Assessment of Data

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

Red Hill Oily Waste Disposal Facility, CTO 18F0176
Total Petroleum Hydrocarbons as Extractables - Data Qualification Summary - SDG 22F211

No Sample Data Qualified in this SDG

Red Hill Oily Waste Disposal Facility, CTO 18F0176
Total Petroleum Hydrocarbons as Extractables - Laboratory Blank Data Qualification Summary - SDG 22F211

No Sample Data Qualified in this SDG

Red Hill Oily Waste Disposal Facility, CTO 18F0176
Total Petroleum Hydrocarbons as Extractables - Field Blank Data Qualification Summary - SDG 22F211

No Sample Data Qualified in this SDG

LDC #: 54721A8a **VALIDATION COMPLETENESS WORKSHEET** Date: 8/17/22
SDG #: 22F211 Stage 2B Page: 1 of 1
Laboratory: EMAX Laboratories, Inc., Torrance, CA Reviewer: EJ
2nd Reviewer: K

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

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

	Validation Area		Comments
I.	Sample receipt/Technical holding times	A / A	
II.	Initial calibration/ICV	A / A	%D/ICV ≤ 20
III.	Continuing calibration	A	CCV ≤ 20
IV.	Laboratory Blanks	A	
V.	Field blanks	N	
VI.	Surrogate spikes	A	
VII.	Matrix spike/Matrix spike duplicates	N	
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	HU128	22F211-01	Water	06/21/22
2	HU141	22F211-02	Water	06/21/22
3	HU133	22F211-03	Water	06/21/22
4	HU141(SGCU)	22F211-02(SGCU)	Water	06/21/22
5	HU133(SGCU)	22F211-03(SGCU)	Water	06/21/22
6				
7				
8				
9				
10				
11				
12				
13				

Notes:

	MBLK1W						

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: EMAX Laboratories, Inc., Torrance, CA

Sample Delivery Group (SDG): 22F227

Sample Identification	Laboratory Sample Identification	Matrix	Collection Date
HU139	22F227-01	Water	06/23/22
HU137**	22F227-02**	Water	06/23/22
HU110	22F227-03	Water	06/22/22
HU126**	22F227-04**	Water	06/22/22
HU119	22F227-05	Water	06/22/22
HU135	22F227-06	Water	06/22/22
HU139MS	22F227-01MS	Water	06/23/22
HU139MSD	22F227-01MSD	Water	06/23/22
HU139DUP	22F227-01DUP	Water	06/23/22

**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:

Ferrous Iron by Standard Method 3500-FE B
Silica, Dissolved Silica by Standard Method 4500-SIO2 C

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. 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.

Red Hill Bulk Storage Facility, CTO 18F0126
Wet Chemistry - Data Qualification Summary - SDG 22F227

No Sample Data Qualified in this SDG

Red Hill Bulk Storage Facility, CTO 18F0126
Wet Chemistry - Laboratory Blank Data Qualification Summary - SDG 22F227

No Sample Data Qualified in this SDG

Red Hill Bulk Storage Facility, CTO 18F0126
Wet Chemistry - Field Blank Data Qualification Summary - SDG 22F227

No Sample Data Qualified in this SDG

LDC #: 54721B6 **VALIDATION COMPLETENESS WORKSHEET** Date: 9/28/22
SDG #: 22F227 Stage 2B/4 Page: 1 of 1
Laboratory: EMAX Laboratories, Inc., Torrance, CA Reviewer: ATV
2nd Reviewer: AC

METHOD: (Analyte) Ferrous Iron (SM3500-FE B), Silica, Dissolved Silica (SM4500-SIO2 C)

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	(7,8)
VII.	Duplicate sample analysis	A	9
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	HU139	22F227-01	Water	06/23/22
2	HU137**	22F227-02**	Water	06/23/22
3	HU110	22F227-03	Water	06/22/22
4	HU126**	22F227-04**	Water	06/22/22
5	HU119	22F227-05	Water	06/22/22
6	HU135	22F227-06	Water	06/22/22
7	HU139MS	22F227-01MS	Water	06/23/22
8	HU139MSD	22F227-01MSD	Water	06/23/22
9	HU139DUP	22F227-01DUP	Water	06/23/22
10				
11				
12				
13				
14				
15				

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 #: 54721BG

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 (Fe2+)
3-6	pH TDS Cl F NO_3 NO_2 SO_4 O-PO_4 Alk CN NH_3 TKN TOC Cr6+ ClO_4 (SiO2) (SiO2 Dis)
	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
QC	pH TDS Cl F NO_3 NO_2 SO_4 O-PO_4 Alk CN NH_3 TKN TOC Cr6+ ClO_4
7,8,9	pH TDS Cl F NO_3 NO_2 SO_4 O-PO_4 Alk CN NH_3 TKN TOC Cr6+ ClO_4 (Fe2+)
	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 #: 54721BG

Validation Findings Worksheet
Initial and Continuing Calibration Calculation Verification

Page: 1 of 1
Reviewer: ATV

Method: Inorganics, Method See cover

The correlation coefficient (r) for the calibration of SiO2 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 = Found X 100 / 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	Standard	Conc. (mg/L)	Response	Recalculated r or r^2	Reported r or r^2	Acceptable (Y/N)
Initial calibration	SiO2 / SiO2 Dis	s1	0	0	*0.99948*	0.99974	Y
		s2	2	0.055			
		s3	5	0.131			
		s4	10	0.276			
		s5	15	0.402			
		s6	20	0.546			
		s7	25	0.696			
CCV1 Calibration verification	SiO2	FOUND 15.337	TRUE 15.000		102	102	Y
CCV4 Calibration verification	SiO2 Dis	14.250	15.000		95	95	Y
CCV1 Calibration verification	Fe2+	15.018	15.000		100	100	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 #: 54721B6

VALIDATION FINDINGS WORKSHEET
Level IV Recalculation Worksheet

Reviewer: ATV

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 = Found / True x 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 = |S-D| / (S+D)/2 x 100 Where, S = Original sample concentration
D = Duplicate sample concentration

Sample ID	Type of Analysis	Element	Found / S (units) mg/L	True / D (units) mg/L	Recalculated %R / RPD	Reported %R / RPD	Acceptable (Y/N)
LCS	Laboratory control sample	SiO2/Dis SiO2	16.496	15.00	110	110	Y
7	Matrix spike sample	Fe^{2+}	(SSR-SR) 14.014	15.000	93	93	Y
7|8	Duplicate sample	Fe^{2+}	14.196	14.014	1	1	Y

Comments: _____

LDC #: 54721BG

VALIDATION FINDINGS WORKSHEET
Sample Calculation Verification

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 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 SiO2 reported with a positive detect were recalculated and verified using the following equation:

Concentration = Recalculation: #4

$$5X \frac{0.262+0.0033}{0.0276} = 48.062$$

#	Sample ID	Analyte	Reported Concentration (mg/L)	Calculated Concentration (mg/L)	Acceptable (Y/N)
	2	Fe^{2+}	ND	ND	Y
	4	SiO2	48	48.062	Y
	4	Dis SiO2	41.5	41.540	Y

Note:

Laboratory Data Consultants, Inc.
Data Validation Report

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

LDC Report Date: August 23, 2022

Parameters: Total Petroleum Hydrocarbons as Extractables

Validation Level: Stage 2B & 4

Laboratory: EMAX Laboratories, Inc., Torrance, CA

Sample Delivery Group (SDG): 22F227

Sample Identification	Laboratory Sample Identification	Matrix	Collection Date
HU110	22F227-03	Water	06/22/22
HU126**	22F227-04**	Water	06/22/22
HU119	22F227-05	Water	06/22/22
HU135	22F227-06	Water	06/22/22
HU126(SGCU)**	22F227-04(SGCU)**	Water	06/22/22
HU135(SGCU)	22F227-06(SGCU)	Water	06/22/22

Samples appended with "SGCU" underwent Silica Gel cleanup
**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:

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

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

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

III. Continuing Calibration

Continuing calibration was performed at the required frequencies.

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

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

IV. Laboratory Blanks

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

V. Field Blanks

No field blanks were identified in this SDG.

VI. Surrogates

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

VII. Matrix Spike/Matrix Spike Duplicates

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

VIII. Laboratory Control Samples

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

IX. Field Duplicates

No field duplicates were identified in this SDG.

X. Target Analyte Quantitation

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

XI. 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.

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
Total Petroleum Hydrocarbons as Extractables - Data Qualification Summary - SDG 22F227

No Sample Data Qualified in this SDG

Red Hill Oily Waste Disposal Facility, CTO 18F0176
Total Petroleum Hydrocarbons as Extractables - Laboratory Blank Data Qualification Summary - SDG 22F227

No Sample Data Qualified in this SDG

Red Hill Oily Waste Disposal Facility, CTO 18F0176
Total Petroleum Hydrocarbons as Extractables - Field Blank Data Qualification Summary - SDG 22F227

No Sample Data Qualified in this SDG

LDC #: 54721B8a **VALIDATION COMPLETENESS WORKSHEET** Date: 8/17/22
SDG #: 22F227 Stage 2B/4 Page: 1 of 1
Laboratory: EMAX Laboratories, Inc., Torrance, CA Reviewer: T
2nd Reviewer: AL

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

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

	Validation Area		Comments
I.	Sample receipt/Technical holding times	A/A	
II.	Initial calibration/ICV	A/A	%RSD/r CV ≤ 20
III.	Continuing calibration pending	A	CCV ≤ 20/20
IV.	Laboratory Blanks	A	
V.	Field blanks	N	
VI.	Surrogate spikes	A	
VII.	Matrix spike/Matrix spike duplicates	N	
VIII.	Laboratory control samples	A	LCS/D
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.
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	HU110	22F227-03	Water	06/22/22
2	HU126**	22F227-04**	Water	06/22/22
3	HU119	22F227-05	Water	06/22/22
4	HU135	22F227-06	Water	06/22/22
5	HU126(SGCU)**	22F227-04(SGCU)**	Water	06/22/22
6	HU135(SGCU)	22F227-06(SGCU)	Water	06/22/22
7				
8				
9				
10				
11				
12				
13				

Notes:

	MBLKW						
	MBLKW SGC						

LDC #: 34721B8a

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?	NA		✓	
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 #: 54721B8a

VALIDATION FINDINGS WORKSHEET
Initial Calibration Calculation Verification

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 (500 std)	Recalculated CF (500 std)	Reported CF (initial)	Recalculated CF (intial)	Reported %RSD	Recalculated %RSD
1	ICAL	8/12/21	Diesel C_{10}-C_{24}	27380	27380	26318.7	26318.7	9.7	9.7
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 #: 54721B8a

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	Recalculated	Reported	Recalculated
					CF/ Conc. CCV	CF/ Conc. CCV	%D	%D
1	CCV	6/28/22 1311	Diesel C10-C24	500	581.25	581.25	16	16
2	CCV	6/28/22 1654	↓	↓	553.77	553.77	11	11
3	CCV	7/9/22 0139	↓	↓	574.33	574.33	15	15
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 #: 54721B8a

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: #5

Surrogate	Column/Detector	Surrogate Spiked	Surrogate Found	Percent Recovery	Percent Recovery	Percent Difference
				Reported	Recalculated	
Bromobenzene		100	84.494	85	85	0
Hexacosane		25	27.428	110	110	U

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 #: 54721B8a

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: DSF028WL/WC

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.
TPH Diesel Range	5000	5000	5540	5890	111	111	118	118	6	6

Comments: _____

LDC #: 54721B8a

VALIDATION FINDINGS WORKSHEET
Sample Calculation Verification

METHOD: ✓ GC __ HPLC

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

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

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. #2 : TPH- Diesel Range

Concentration = $\frac{565620 \quad (10) \quad (1000)}{260318.69795 \quad (960)}$ =

page 21 10/9/12

=2238.75 ug/L

#	Sample ID	Target analyte	Reported Concentrations (ug/L)	Recalculated Results Concentrations (ug/L)	Qualifications
	#2	TPH - Diesel Range	2200	2238.75	

Comments: _____

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: EMAX Laboratories, Inc., Torrance, CA

Sample Delivery Group (SDG): 22F242

Sample Identification	Laboratory Sample Identification	Matrix	Collection Date
HU139	22F242-01	Water	06/23/22
HU137	22F242-04	Water	06/23/22
HU139MS	22F242-01MS	Water	06/23/22
HU139MSD	22F242-01MSD	Water	06/23/22
HU139DUP	22F242-01DUP	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:

Silica, Dissolved Silica by Standard Method 4500-SIO2 C

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

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 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 22F242

No Sample Data Qualified in this SDG

Red Hill Oily Waste Disposal Facility, CTO 18F0176
Wet Chemistry - Laboratory Blank Data Qualification Summary - SDG 22F242

No Sample Data Qualified in this SDG

Red Hill Oily Waste Disposal Facility, CTO 18F0176
Wet Chemistry - Field Blank Data Qualification Summary - SDG 22F242

No Sample Data Qualified in this SDG

LDC #: 54721C6 **VALIDATION COMPLETENESS WORKSHEET** Date: 9/28/22
SDG #: 22F242 Stage 2B Page: 1 of 1
Laboratory: EMAX Laboratories, Inc., Torrance, CA Reviewer: ATV
2nd Reviewer:

METHOD: (Analyte) Silica, Dissolved Silica (SM4500-SIO2 C)

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	(3,4)
VII.	Duplicate sample analysis	A	5
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	HU139	22F242-01	Water	06/23/22
2	HU137	22F242-04	Water	06/23/22
3	HU139MS	22F242-01MS	Water	06/23/22
4	HU139MSD	22F242-01MSD	Water	06/23/22
5	HU139DUP	22F242-01DUP	Water	06/23/22
6				
7				
8				
9				
10				
11				
12				
13				
14				
15				

Notes:

LDC #: 54721CG

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 (SiO2) (SiO2 Dis)
	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
3,4,5	pH TDS Cl F NO_3 NO_2 SO_4 O-PO_4 Alk CN NH_3 TKN TOC Cr6+ ClO_4 (SiO2)
	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: August 23, 2022

Parameters: Total Petroleum Hydrocarbons as Extractables

Validation Level: Stage 2B

Laboratory: EMAX Laboratories, Inc., Torrance, CA

Sample Delivery Group (SDG): 22F242

Sample Identification	Laboratory Sample Identification	Matrix	Collection Date
HU139	22F242-01	Water	06/23/22
HU142	22F242-02	Water	06/23/22
HU143	22F242-03	Water	06/23/22
HU137	22F242-04	Water	06/23/22
HU139(SGCU)	22F242-01(SGCU)	Water	06/23/22

Samples appended with "SGCU" underwent Silica Gel cleanup

Introduction

This Data Validation Report (DVR) presents data validation findings and results for the associated samples listed on the cover page. Data validation was performed in accordance with the 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:

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

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

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

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

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

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

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

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

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

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

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

Qualification Code Reference

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

b Presumed contamination from preparation (method blank).

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

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

e MS/MSD or Duplicate RPD was high.

f Presumed contamination from FB or ER.

g ICP ICS results were unsatisfactory.

h Holding times were exceeded.

i Internal standard performance was unsatisfactory.

k Estimated Maximum Possible Concentration (HRGC/HRMS only)

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

m Result exceeded the calibration range.

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

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

q MS/MSD recovery was not within control limits.

s Surrogate recovery was not within control limits.

t Presumed contamination from trip blank.

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

w LCS/LCSD RPD was high.

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

I. Sample Receipt and Technical Holding Times

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

All technical holding time requirements were met.

II. Initial Calibration and Initial Calibration Verification

An initial calibration was performed as required by the method.

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

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

III. Continuing Calibration

Continuing calibration was performed at the required frequencies.

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

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

IV. Laboratory Blanks

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

V. Field Blanks

No field blanks were identified in this SDG.

VI. Surrogates

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

VII. Matrix Spike/Matrix Spike Duplicates

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

VIII. Laboratory Control Samples

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

IX. Field Duplicates

No field duplicates were identified in this SDG.

X. Target Analyte Quantitation

Raw data were not reviewed for Stage 2B validation.

XI. Target Analyte Identification

Raw data were not reviewed for Stage 2B validation.

XII. Overall Assessment of Data

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

Red Hill Oily Waste Disposal Facility, CTO 18F0176
Total Petroleum Hydrocarbons as Extractables - Data Qualification Summary - SDG 22F242

No Sample Data Qualified in this SDG

Red Hill Oily Waste Disposal Facility, CTO 18F0176
Total Petroleum Hydrocarbons as Extractables - Laboratory Blank Data Qualification Summary - SDG 22F242

No Sample Data Qualified in this SDG

Red Hill Oily Waste Disposal Facility, CTO 18F0176
Total Petroleum Hydrocarbons as Extractables - Field Blank Data Qualification Summary - SDG 22F242

No Sample Data Qualified in this SDG

LDC #: 54721C8a

VALIDATION COMPLETENESS WORKSHEET

SDG #: 22F242

Stage 2B

Laboratory: EMAX Laboratories, Inc., Torrance, CA

Date: 8/17/22

Page: 1 of 1

Reviewer: EJ

2nd Reviewer: AC

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

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

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

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

	Client ID	Lab ID	Matrix	Date
1	HU139	22F242-01	Water	06/23/22
2	HU142	22F242-02	Water	06/23/22
3	HU143	22F242-03	Water	06/23/22
4	HU137	22F242-04	Water	06/23/22
5	HU139(SGCU)	22F242-01(SGCU)	Water	06/23/22
6				
7				
8				
9				
10				
11				
12				
13				

Notes:

	MBLKW						
	MBLKW SGC						

Laboratory Data Consultants, Inc.
Data Validation Report

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

LDC Report Date: October 5, 2022

Parameters: Ferrous Iron

Validation Level: Stage 2B

Laboratory: EMAX Laboratories, Inc., Torrance, CA

Sample Delivery Group (SDG): 22F253

Sample Identification	Laboratory Sample Identification	Matrix	Collection Date
HU108	22F253-01	Water	06/28/22
HU108MS	22F253-01MS	Water	06/28/22
HU108MSD	22F253-01MSD	Water	06/28/22
HU108DUP	22F253-01DUP	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:

Ferrous Iron by Standard Method 3500-FE B

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 with the following exceptions:

Spike ID (Associated Samples)	Analyte	MS (%R) (Limits)	MSD (%R) (Limits)	Flag	A or P
HU108MS/MSD (HU108)	Ferrous Iron	58 (75-125)	57 (75-125)	UJ (all non-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 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.

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

Red Hill Oily Waste Disposal Facility, CTO 18F0176
Ferrous Iron - Data Qualification Summary - SDG 22F253

Sample	Analyte	Flag	A or P	Reason
HU108	Ferrous Iron	UJ (all non-detects)	A	Matrix spike/Matrix spike duplicate (%R) (q)

Red Hill Oily Waste Disposal Facility, CTO 18F0176
Ferrous Iron - Laboratory Blank Data Qualification Summary - SDG 22F253

No Sample Data Qualified in this SDG

Red Hill Oily Waste Disposal Facility, CTO 18F0176
Ferrous Iron - Field Blank Data Qualification Summary - SDG 22F253

No Sample Data Qualified in this SDG

LDC #: 54721D6 **VALIDATION COMPLETENESS WORKSHEET** Date: 9/28/22
SDG #: 22F253 Stage 2B Page: 1 of 1
Laboratory: EMAX Laboratories, Inc., Torrance, CA Reviewer: ATV
2nd Reviewer: AK

METHOD: (Analyte) Ferrous Iron (SM3500-FE B)

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	(2,3)
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	HU108	22F253-01	Water	06/28/22
2	HU108MS	22F253-01MS	Water	06/28/22
3	HU108MSD	22F253-01MSD	Water	06/28/22
4	HU108DUP	22F253-01DUP	Water	06/28/22
5				
6				
7				
8				
9				
10				
11				
12				
13				
14				
15				

Notes:

LDC #: 54721D6

VALIDATION FINDINGS WORKSHEET
Matrix Spike/Matrix Spike Duplicates

Reviewer: ATL

METHOD: Inorganics, EPA 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? If the sample concentration exceeded the spike concentration by a factor of 4 or more, no action was taken.

(Y) N N/A Were all duplicate sample relative percent differences (RPD) ≤ 20% for water samples and ≤35% for soil samples?

LEVEL IV ONLY:

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

#	MS/MSD ID	Matrix	Analyte	MS %Recovery	MSD %Recovery	RPD (Limits)	Associated Samples	Qualifications
	2/3	W	Fe2+	58 (75-125)	57 (75-125)		1	J-/UJ/A (non-detect)

Comments: