**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 13, 2022. Attachment 1 is a summary of the samples that were reviewed for the analysis.

**LDC Project # 54718:**

| SDG # | Fraction |
|---|---|
| 22F181<br>22F191<br>22F210 | Ferrous Iron, Wet Chemistry, Total Petroleum Hydrocarbons as Extractables |

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

151 pages-ADV

Attachment 1

**90/10 2B/4 EDD**

# LDC# 54718 (AECOM - Honolulu, HI / Red Hill Oily Waste, CTO 18F0176)

| LDC | SDG# | DATE REC'D | (3) DATE DUE | 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 | 22F181 | 07/13/22 | 08/03/22 | - | - | 1 | 0 | - | - | - | - | | | | | | | | | | | | | | | | | | | | | | |
| B | 22F191 | 07/13/22 | 08/03/22 | 3 | 0 | 4 | 0 | 2 | 0 | 2 | 0 | | | | | | | | | | | | | | | | | | | | | | |
| C | 22F210 | 07/13/22 | 08/03/22 | - | - | 4 | 0 | - | - | - | - | | | | | | | | | | | | | | | | | | | | | | |
| Total | T/SC | | | 3 | 0 | 9 | 0 | 2 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 16 |

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\54718ST-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:** September 13, 2022

**Parameters:** Ferrous Iron

**Validation Level:** Stage 4

**Laboratory:** EMAX Laboratories, Inc., Torrance, CA

**Sample Delivery Group (SDG):** 22F181

| Sample Identification | Laboratory Sample Identification | Matrix | Collection Date |
|---|---|---|---|
| HU115 | 22F181-01 | Water | 06/20/22 |
| HU115MS | 22F181-01MS | Water | 06/20/22 |
| HU115MSD | 22F181-01MSD | Water | 06/20/22 |
| HU115DUP | 22F181-01DUP | Water | 06/20/22 |

## Introduction

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

The analyses were performed by the following method:

Ferrous Iron by Standard Method 3500-Fe B

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

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

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

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

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

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

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

X (Exclusion of data recommended): The sample results (including non-detects) were affected by serious deficiencies in the ability to analyze the sample and to meet published 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

All target analyte quantitation met validation criteria.

## 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**
**Ferrous Iron - Data Qualification Summary - SDG 22F181**

No Sample Data Qualified in this SDG

**Red Hill Oily Waste Disposal Facility, CTO 18F0176**
**Ferrous Iron - Laboratory Blank Data Qualification Summary - SDG 22F181**

No Sample Data Qualified in this SDG

**Red Hill Oily Waste Disposal Facility, CTO 18F0176**
**Ferrous Iron - Field Blank Data Qualification Summary - SDG 22F181**

No Sample Data Qualified in this SDG

LDC #: 54718A6 **VALIDATION COMPLETENESS WORKSHEET** Date: 9/9/22
SDG #: 22F181 Stage 4 Page: 1 of 1
Laboratory: EMAX Laboratories, Inc., Torrance, CA Reviewer: LW
2nd Reviewer: AC

**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 | A | |
| VII. | Duplicate sample analysis | A | |
| VIII. | Laboratory control samples | A | LCS/LCSD |
| IX. | Field duplicates | N | |
| X. | Target Analyte Quantitation | A | |
| XI | Overall assessment of data | A | |

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

| | Client ID | Lab ID | Matrix | Date |
|---|---|---|---|---|
| 1 | HU115 | 22F181-01 | Water | 06/20/22 |
| 2 | HU115MS | 22F181-01MS | Water | 06/20/22 |
| 3 | HU115MSD | 22F181-01MSD | Water | 06/20/22 |
| 4 | HU115DUP | 22F181-01DUP | Water | 06/20/22 |
| 5 | | | | |
| 6 | | | | |
| 7 | | | | |
| 8 | | | | |
| 9 | | | | |
| 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. Sample Result Verification** | | | | |
| 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? | | | √ | |

All elements are applicable to each sample as noted below.

| Sample ID | Target Analyte List |
|---|---|
| 1 | Ferrous Iron |
| QC | |
| 2-4 | Ferrous Iron |
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METHOD: Inorganics

The correlation coefficient (r) for the calibration of Fe(2+) were recalculated.
Calibration date:
An initial or continuing calibration verification percent recovery (%R) was recalculated for each type of analysis using the following formula:
%R = (Found/True) x 100
Found = concentration of each analyte measured in the analysis of the ICV or CCV solution
True = concentration of each analyte in the ICV or CCV source

| Type of Analysis | Analyte | Standard | Concentration (mg/L) | Area | Recalculated r or $r^2$ | Reported r or $r^2$ | Acceptable (Y/N) |
|---|---|---|---|---|---|---|---|
| Initial Calibration | Fe(2+) | s1 | 0 | 0 | 0.999946 | 0.999946 | Y |
| | | s2 | 1 | 0.022 | | | |
| | | s3 | 10 | 0.224 | | | |
| | | s4 | 15 | 0.327 | | | |
| | | s5 | 20 | 0.438 | | | |
| | | s6 | 25 | 0.55 | | | |
| | | s7 | | | | | |
| | | s8 | | | | | |
| | | s9 | | | | | |
| | | s10 | | | | | |
| | | s11 | | | | | |
| | | s12 | | | | | |

| Type of Analysis | Analyte | Found (mg/L) | True (mg/L) | | Recalculated r or $r^2$ | Reported r or $r^2$ | Acceptable (Y/N) |
|---|---|---|---|---|---|---|---|
| Calibration verification | Fe(2+) | 15.062 | 15 | | 100 | 100 | Y |
| Calibration verification | Fe(2+) | 15.199 | 15 | | 101 | 101 | Y |
| | | | | | | | |

METHOD: Inorganics

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

| Sample ID | Type of Analysis | Element | Found/S | True/D | Recalculated %R/RPD | Reported %R/RPD | Acceptable (Y/N) |
|---|---|---|---|---|---|---|---|
| LCS1W | LCS | Fe | 15.269 | 15.0 | 102 | 101 | Y |
| 2 | MS | Fe | 15.224 | 15.24 | 100 | 101 | Y |
| 3 | Duplicate | Fe | 15.269 | 15.224 | 0.295 | 0 | Y |

VALIDATION FINDINGS CHECKLIST
Sample Calculation Verification



METHOD: Inorganics

Analytes were recalculated and verified using the following equation:

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

| Sample ID | Analyte | Raw Data (mg/L) | Dilution | Initial Volume (mL) | Final Volume (mL) | Reported Result (mL) | Recalculated Result (mL) | Acceptable (Y/N) |
|---|---|---|---|---|---|---|---|---|
| 1 | Fe(2+) | 0 | 1 | 10 | 10 | 0.109 | 0 | Y |
| | | ND | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
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# Laboratory Data Consultants, Inc.
# Data Validation Report

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

**LDC Report Date:** September 13, 2022

**Parameters:** Wet Chemistry

**Validation Level:** Stage 2B

**Laboratory:** EMAX Laboratories, Inc., Torrance, CA

**Sample Delivery Group (SDG):** 22F191

| Sample Identification | Laboratory Sample Identification | Matrix | Collection Date |
|---|---|---|---|
| HU115 | 22F191-01 | Water | 06/20/22 |
| HU123 | 22F191-02 | Water | 06/20/22 |
| HU128 | 22F191-04 | Water | 06/20/22 |
| HU141 | 22F191-05 | Water | 06/20/22 |
| HU133 | 22F191-06 | Water | 06/20/22 |
| HU141MS | 22F191-05MS | Water | 06/20/22 |
| HU141MSD | 22F191-05MSD | Water | 06/20/22 |
| HU141DUP | 22F191-05DUP | Water | 06/20/22 |

## Introduction

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

The analyses were performed by the following methods:

Ferrous Iron by Standard Method 3500-Fe B
Silica and 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 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

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 22F191**

No Sample Data Qualified in this SDG

**Red Hill Oily Waste Disposal Facility, CTO 18F0176**
**Wet Chemistry - Laboratory Blank Data Qualification Summary - SDG 22F191**

No Sample Data Qualified in this SDG

**Red Hill Oily Waste Disposal Facility, CTO 18F0176**
**Wet Chemistry - Field Blank Data Qualification Summary - SDG 22F191**

No Sample Data Qualified in this SDG

LDC #: 54718B6 **VALIDATION COMPLETENESS WORKSHEET** Date: 9/9/22
SDG #: 22F191 Stage 2B Page: 1 of 1
Laboratory: EMAX Laboratories, Inc., Torrance, CA Reviewer: LW
2nd Reviewer: M

**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 | |
| VII. | Duplicate sample analysis | A | |
| VIII. | Laboratory control samples | A | LCS/LCSD |
| IX. | Field duplicates | N | |
| X. | Target Analyte Quantitation | N | |
| XI | Overall assessment of data | A | |

Note: A = Acceptable; 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 | HU115 | 22F191-01 | Water | 06/20/22 |
| 2 | HU123 | 22F191-02 | Water | 06/20/22 |
| 3 | HU128 | 22F191-04 | Water | 06/20/22 |
| 4 | HU141 | 22F191-05 | Water | 06/20/22 |
| 5 | HU133 | 22F191-06 | Water | 06/20/22 |
| 6 | HU141MS | 22F191-05MS | Water | 06/20/22 |
| 7 | HU141MSD | 22F191-05MSD | Water | 06/20/22 |
| 8 | HU141DUP | 22F191-05DUP | Water | 06/20/22 |
| 9 | | | | |
| 10 | | | | |
| 11 | | | | |
| 12 | | | | |
| 13 | | | | |
| 14 | | | | |
| 15 | | | | |

Notes:

Sample Specific Element Reference


All elements are applicable to each sample as noted below.

| Sample ID | Target Analyte List |
|---|---|
| 1,2 | Silica, Dissolved Silica |
| 3-5 | Ferrous Iron |
| | |
| QC | |
| 6,7 | Ferrous Iron |
| 8 | Ferrous Iron |
| | |
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**LDC Report#** 54718B8a

# Laboratory Data Consultants, Inc.
# Data Validation Report

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

**LDC Report Date:** August 17, 2022

**Parameters:** Total Petroleum Hydrocarbons as Extractables

**Validation Level:** Stage 2B

**Laboratory:** EMAX Laboratories, Inc., Torrance, CA

**Sample Delivery Group (SDG):** 22F191

| Sample Identification | Laboratory Sample Identification | Matrix | Collection Date |
|---|---|---|---|
| HU115 | 22F191-01 | Water | 06/20/22 |
| HU123 | 22F191-02 | Water | 06/20/22 |
| HU124 | 22F191-03 | Water | 06/20/22 |
| HU115MS | 22F191-01MS | Water | 06/20/22 |
| HU115MSD | 22F191-01MSD | Water | 06/20/22 |

## Introduction

This Data Validation Report (DVR) presents data validation findings and results for the associated samples listed on the cover page. Data validation was performed in accordance with the Final Site Assessment Work Plan, Red Hill Oily Waste Disposal Facility, Pearl Harbor HI FISC Site 22, Joint Base Pearl Harbor-Hickam, Oahu, Hawaii (February 2021), the U.S. Department of Defense (DoD) Quality Systems Manual (QSM) for Environmental Laboratories, Version 5.3 (2019), the DoD General Validation Guidelines (November 2019), and the U.S. Department of Defense (DoD) Data Validation Guidelines Module 4: Data Validation Procedure for Organic Analysis by GC (March 2021). Where specific guidance was not available, the data has been evaluated in a conservative manner consistent with industry standards using professional experience.

The analyses were performed by the following method:

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

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

## VIII. Laboratory Control Samples

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

## IX. Field Duplicates

Samples HU123 and HU124 were identified as field duplicates. No results were detected in any of the samples.

## 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 22F191**

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 22F191**

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 22F191**

No Sample Data Qualified in this SDG

LDC #: 54718B8a **VALIDATION COMPLETENESS WORKSHEET** Date: 8/17/22
SDG #: 22F191 Stage 2B Page: 1 of 1
Laboratory: EMAX Laboratories, Inc., Torrance, CA Reviewer: FJ
2nd Reviewer: [illegible]

**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~~ A | |
| VIII. | Laboratory control samples | A | LCS/D |
| IX. | Field duplicates | ND | D = 2, 3 |
| 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 | HU115 | | 22F191-01 | Water | 06/20/22 |
| 2 | HU123 | D | 22F191-02 | Water | 06/20/22 |
| 3 | HU~~1224~~ 124 | D | 22F191-03 | Water | 06/20/22 |
| 4 | HU115MS | | 22F191-01MS | Water | 06/20/22 |
| 5 | HU115MSD | | 22F191-01MSD | Water | 06/20/22 |
| 6 | | | | | |
| 7 | | | | | |
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# 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):** 22F210

| Sample Identification | Laboratory Sample Identification | Matrix | Collection Date |
|---|---|---|---|
| HU110 | 22F210-01 | Water | 06/22/22 |
| HU126 | 22F210-02 | Water | 06/22/22 |
| HU119 | 22F210-03 | Water | 06/22/22 |
| HU135 | 22F210-04 | Water | 06/22/22 |
| HU110MS | 22F210-01MS | Water | 06/22/22 |
| HU110MSD | 22F210-01MSD | Water | 06/22/22 |
| HU110DUP | 22F210-01DUP | Water | 06/22/22 |

## 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 method and project quality control criteria. The presence or absence of the analyte cannot be substantiated by the data provided. Exclusion of the data is recommended.

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

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

Qualification Code Reference

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

b Presumed contamination from preparation (method blank).

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

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

e MS/MSD or Duplicate RPD was high.

f Presumed contamination from FB or ER.

g ICP ICS results were unsatisfactory.

h Holding times were exceeded.

i Internal standard performance was unsatisfactory.

k Estimated Maximum Possible Concentration (HRGC/HRMS only)

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

m Result exceeded the calibration range.

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

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

q MS/MSD recovery was not within control limits.

s Surrogate recovery was not within control limits.

t Presumed contamination from trip blank.

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

w LCS/LCSD RPD was high.

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

## I. Sample Receipt and Technical Holding Times

All samples were received in good condition.

All technical holding time requirements were met.

## II. Initial Calibration

All criteria for the initial calibration were met.

## III. Continuing Calibration

Continuing calibration frequency and analysis criteria were met.

## IV. Laboratory Blanks

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

## V. Field Blanks

No field blanks were identified in this SDG.

## VI. Matrix Spike/Matrix Spike Duplicates

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

## VII. Duplicate Sample Analysis

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**
**Ferrous Iron - Data Qualification Summary - SDG 22F210**

No Sample Data Qualified in this SDG

**Red Hill Oily Waste Disposal Facility, CTO 18F0176**
**Ferrous Iron - Laboratory Blank Data Qualification Summary - SDG 22F210**

No Sample Data Qualified in this SDG

**Red Hill Oily Waste Disposal Facility, CTO 18F0176**
**Ferrous Iron - Field Blank Data Qualification Summary - SDG 22F210**

No Sample Data Qualified in this SDG

LDC #: 54718C6 **VALIDATION COMPLETENESS WORKSHEET** Date: 9/9/22
SDG #: 22F210 Stage 2B Page: 1 of 1
Laboratory: EMAX Laboratories, Inc., Torrance, CA Reviewer: VN
2nd Reviewer: [illegible]

**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 | A | |
| VII. | Duplicate sample analysis | A | |
| VIII. | Laboratory control samples | A | LCS/LCSD |
| IX. | Field duplicates | N | |
| X. | Target Analyte Quantitation | N | |
| XI | Overall assessment of data | A | |

Note: A = Acceptable; 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 | HU110 | 22F210-01 | Water | 06/22/22 |
| 2 | HU126 | 22F210-02 | Water | 06/22/22 |
| 3 | HU119 | 22F210-03 | Water | 06/22/22 |
| 4 | HU135 | 22F210-04 | Water | 06/22/22 |
| 5 | HU110MS | 22F210-01MS | Water | 06/22/22 |
| 6 | HU110MSD | 22F210-01MSD | Water | 06/22/22 |
| 7 | HU110DUP | 22F210-01DUP | Water | 06/22/22 |
| 8 | | | | |
| 9 | | | | |
| 10 | | | | |
| 11 | | | | |
| 12 | | | | |
| 13 | | | | |
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| 15 | | | | |

Notes:

All elements are applicable to each sample as noted below.

| Sample ID | Target Analyte List |
|---|---|
| 1-4 | Ferrous Iron |
| | |
| QC | |
| 5,6 | Ferrous Iron |
| 7 | Ferrous Iron |
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