



DATA VALIDATION REPORT

Red Hill Bulk Fuel Storage Facility
Joint Base Pearl Harbor-Hickam
CV 23F0104

SDG: 580-132538-1
Eurofins Savannah

Prepared by
ENVIRONMENTAL DATA SERVICES, LTD.

Prepared for
AECOM Environmental

Released: 10/25/23

Data Validators and Peer Reviewers:

A handwritten signature in black ink, appearing to read "Diane Waldschmidt".

Diane Waldschmidt

A handwritten signature in black ink, appearing to read "Gretchen Phipps".

Gretchen Phipps

A handwritten signature in black ink, appearing to read "Dina Manov".

Dina Manov

A handwritten signature in black ink, appearing to read "Larry Lewis".

Larry Lewis

A handwritten signature in black ink, appearing to read "Paloma Hoelzle".

Paloma Hoelzle



EXECUTIVE NARRATIVE

Sample Delivery Groups: 580-132538-1
Laboratory: Eurofins, Savannah
Site: Red Hill Bulk Storage Facility, CV 23F0104
Sampling dates: 10/05/2023 and 10/06/2023
Number of Samples: 6
Test Method: SW-846 8015C
Analysis: 2-(2-Butoxyethoxy)ethanol

Quality Assurance Project Plan: Sampling and Analysis Plan, Investigation and Remediation of Releases and Groundwater Protection and Evaluation, Red Hill Bulk Fuel Storage Facility, Joint Base Pearl Harbor-Hickam, O’ahu, Hawai’i (Revision 01, April 2017); PFAS-Specific Sampling and Analysis plan, Red Hill Bulk Fuel Storage Facility, Adit 6, Joint Base Pearl Harbor-Hickam, O’Ahu, Hawai’i (November 30, 2022) (SAP).

Validation Guidelines: United States Department of Defense Data Validation Guidelines Module 4: Data Validation Procedure for Organic Analysis by GC, Environmental Data Quality Workgroup, March 9, 2021; United States Department of Defense (DOD) General Data Validation Guidelines Environmental Data Quality Workgroup (EDQW), November 2019. United States Department of Defense Data Validation Guidelines Modules 1, 2, 3, and 4 Revised Table for Sample Qualification in the Presence of Blank Contamination, February 09, 2022.

Client Sample Identification	Laboratory Sample Identification	Matrix	Validation Stage
AF-RHMW16-WGN01LF-2310	580-132538-1	water	S4VEM
AF-RHMW04-WGN01LF-2310	580-132538-2	water	S4VEM
AF-RHMW02-WGN01LF-2310	580-132538-3	water	S4VEM
AF-RHMW02-WGFD01LF-2310	580-132538-4	water	S4VEM
AF-RHMW03-WGN01LF-2310	580-132538-5	water	S4VEM
AF-RHMW06-WGN01LF-2310	580-132538-6	water	S4VEM

Table 1 provides a summary of the major and minor data quality issues identified in this data set. All data are acceptable except those results which have been qualified with “X”, rejected. Data validation qualifiers along with associated descriptions are provided in Table 2. All data qualification related to this group of samples is detailed on the attached sheets.

All data users should note two facts. First, an “X” flag means that the associated value is unusable due to significant quality control (QC) problems, the data is invalid and provides no information as to whether the compound is present or not. “X” values should not appear on any data tables even as a last resort. Second, no analyte concentration, even if it passed all QC tests, is guaranteed to be accurate. Strict QC serves to increase confidence in data, but any value potentially contains error.

DATA ASSESSMENT

1. NARRATIVE AND COMPLETENESS REVIEW

The case narrative was reviewed, and the data package was checked for completeness. No discrepancies were noted.

2. SAMPLE DELIVERY AND CONDITION

The samples arrived at the laboratory in acceptable condition. Proper custody was documented.

3. HOLDING TIME

The amount of an analyte in a sample can change with time due to chemical instability, degradation, volatilization, etc. If the specified holding time is exceeded, the data may not be valid. Those analytes detected in the samples whose holding time has been exceeded will be qualified as estimated, "J". The non-detect results will be flagged as not detected at an estimated quantitation limit, "UJ", unless the holding time is grossly exceeded (by more than two times the holding time specified), in which case non-detect results are flagged "X", rejected. Qualifications were applied to the samples and analytes as shown below.

No problems were found for this criterion.

4. CALIBRATION

Satisfactory instrument calibration is established to ensure that the instrument can produce acceptable quantitative data. An initial calibration demonstrates that the instrument can give acceptable performance at the beginning of an experimental sequence. The continuing calibration checks document that the instrument is giving satisfactory daily performance.

Percent Relative Standard Deviation and Percent Difference

Percent relative standard deviation (%RSD) is calculated from the initial calibration and is used to indicate the stability of the specific compound response factor over increasing concentration. Percent difference (%D) compares the response factor of the continuing calibration check to the mean response factor (RRF) from the initial calibration. Percent difference is a measure of the instrument's daily performance. If the %D exceeds 20% for any analyte, qualify all associated positive results "J" and non-detects "UJ". If %RSD and %D grossly exceed QC criteria, non-detect data may be qualified "X".

A multi-point initial calibration curve was used for the target analyte. The initial calibration demonstrated instrumental linearity. The %RSD was within validation guidelines.

Continuing calibrations were analyzed at the proper frequencies and the observed %D values met quality control criteria with the following exception. The %D value for 2-(2-butoxyethoxy) ethanol was outside acceptance limits in one continuing calibration associated with all samples in this sample delivery group (SDG). The associated sample results reported for the impacted analyte were non-detect and has been qualified estimated "UJ" on this basis.

5. BLANK CONTAMINATION

Quality assurance (QA) blanks, i.e., method, trip, field, or rinse blanks are prepared to identify any contamination which may have been introduced into the samples during sample preparation or field activity. Method blanks measure laboratory contamination. Field, equipment and rinse blanks measure cross-contamination of samples during field operations.

A) Method blank contamination

No problems were found for this criterion.

B) Field/Equipment blank contamination

No samples were submitted as field/equipment blanks in association with the samples in this SDG.

6. SURROGATES / SYSTEM MONITORING COMPOUNDS

All samples are spiked with surrogate/system monitoring compounds (SMC) prior to sample preparation to evaluate overall laboratory performance and efficiency of the analytical technique. If the measured surrogate/SMC concentrations were outside contract specifications, qualifications were applied to the samples and analytes as shown below.

No surrogates were used for this analysis.

7. COMPOUND IDENTIFICATION

The retention times (RTs) of reported compounds must fall within the calculated retention time windows for chromatographic column.

Retention Time

Target compound identifications were reviewed at the Stage 4 level. No anomalies were identified.

Relative Percent Difference

No positive results were reported for the samples in this SDG.

8. COMPOUND QUANTIFICATION

Analyte quantitation was reviewed at the Stage 4 level. No anomalies were identified.

Manual integrations were reviewed at the Stage 4 level. No anomalies were identified.

9. MATRIX SPIKE / MATRIX SPIKE RECOVERY

Matrix spike / matrix spike duplicate (MS/MSD) data is generated to determine the long-term precision and accuracy of the analytical method in various matrices. The MS/MSD data may be used in conjunction with other quality control criteria for additional qualification of data.

Sample AF-RHMW16-WGN01LF-2310 was submitted for MS/MSD pair evaluation in association with this SDG. Upon evaluation all precision and accuracy indicators were favorable.

10. LABORATORY CONTROL SAMPLES

The Laboratory Control Sample (LCS) serves as a monitor of the overall performance of each step during the analysis, including the sample preparation. Aqueous/water, soil/sediment, wipe, and filter LCSs shall be analyzed for each analyte utilizing the same sample preparations, analytical methods, and quality assurance/quality control (QA/QC) procedures as employed for the samples. All LCS percent recoveries must fall within the control limits. Qualifications were applied to the samples and analytes as shown below.

No problems were found for this criterion.

11. INTERNAL STANDARDS PERFORMANCE:

Internal standard performance criteria are meant to ensure that the gas chromatograph (GC) sensitivity and response are stable during every experimental run.

The internal standard area count must not vary by more than a factor of two from the associated continuing calibration standard. The retention time of the internal standard must not vary by more than ± 10 seconds from the associated continuing calibration standard. The area count must be within a (50-200%) range of the associated standard. If the area count is greater than 200%, non-detected results are not qualified and positive results are flagged as estimated with potential negative bias, "J-". If the area count is less than 50%, positive results are flagged as estimated with potential positive bias, "J+", and non-detected results are flagged "UJ". If the area count is less than 20%, positive results and non-detected results will be classified as unusable "X". Qualifications were applied to the samples and analytes as shown below.

No problems were found for this criterion.

12. FIELD DUPLICATE

Field duplicates may be taken and analyzed as an indication of overall precision. These analyses measure both field and laboratory precision. A control limit of 30% for the Relative Percent Difference (RPD) shall be used for original and duplicate sample values greater than the LOQ. A control limit of a difference between results no more than the LOQ shall be used if either the sample or duplicate value is less than the LOQ. For field duplicate analyses that do not meet the technical criteria, the action was applied to only the parent sample and its duplicate.

Samples AF-RHMW02-WGN01LF-2310 and AF-RHMW02-WGFD01LF-2310 were submitted as a field duplicate pair in association with this SDG. Adequate field precision was demonstrated.

13. DILUTIONS, RE-EXTRACTIONS & REANALYSIS

Samples may be re-analyzed for dilution, re-extraction and for other QC reasons. In such cases, the best result values are used.

No dilutions, re-extractions, or other re-analyses were performed. The level of quantitation (LOQ) specified in the SAP for the analytes reported have been achieved.

14. OTHER PROBLEMS

None.

Table 1 Major and Minor Findings

	Were acceptance criteria met?		
	Yes	No	
2-(2-Butoxyethoxy)ethanol		Major	Minor
Holding Time	x		
Calibration			x
Method Blank	x		
Field/Equipment Blank	NA		
Surrogates/System Monitoring Compounds	NA		
Compound Identification	x		
Compound Quantitation	x		
Matrix Spike/Matrix Spike Duplicate	x		
Internal Standards	x		
Field Duplicate	x		
Laboratory Control Samples	x		
Other Quality Control Data out of Specification	x		

Major = Major data quality issue identified resulting in rejection of data.

Minor = Minor data quality issue identified resulting in the qualification of data. Data qualification should be used to inform the data users of data limitations.

NA = Not applicable

Table 2 Data Validation Qualifiers

Data Qualifier	Definition
U	The analyte was analyzed for but was not detected above the level of the reported sample quantitation limit.
J	The result is an estimated quantity. The associated numerical value is the approximate concentration of the analyte in the sample.
J+	The result is an estimated quantity, but the result may be biased high.
J-	The result is an estimated quantity, but the result may be biased low.
UJ	The analyte was analyzed for but was not detected. The reported quantitation limit is approximate and may be inaccurate or imprecise.
X	The data are unusable. The sample results are rejected due to serious deficiencies in meeting QC criteria. The analyte may or may not be present in the sample.
N	The analysis indicates the presence of an analyte for which there is presumptive evidence to make a tentative identification.
NJ	The analyte was tentatively identified, and the associated numerical value represents its approximate concentration.

Data Qualification Reason Codes	
Reason Code	Reason Code Description
A	Serial dilution
A1	Ambient Blank
B	The analyte was found in an associated blank as well as in the sample.
B2	CCB
B3	CCB - Neg
B4	Grinding Blank
C	LCS Recovery
C1	Reference Recovery
C2	Reference Recovery RPD
D	MS RPD
D1	Lab Replicate RPD
D2	No precision available
D3	Field Duplicate RPD
D4	Field Triplicate RSD
D5	Laboratory Triplicate RSD
F	Field Blank
F1	Hydrocarbon pattern does not match standard
G1	Initial Calibration RRF
G2	Initial Calibration RSD/r²/r
G3	ICV RRF
H1	Test Hold Time
H2	Prep Hold Time
I	Surrogate recovery outside project limits.
J	CRA/CRI Recovery
K	An analyte (non-common laboratory artifact) was detected in the sample at a concentration less than 5X the concentration detected in the associated method blank.
L	Lab Blank
L1	Lab Blank - Neg
M	MS Recovery
M2	Post Spike
N	Blank - No Action
O	ICS
P	Sample preservation/collection requirement not met.
P1	Column RPD
P2	Improper preparation/extraction
Q	Encore sample holding time exceeded by more than 2X.
Q1	Material Blank

Q2	Encore sample holding time exceeded by less than 2X.
R	Exceeds Linear Calibration Range
S	Internal standard
T	Trip Blank
TI	Tentatively Identified Compound
TR	Trace Level Detect
U	Receipt Temperature
V	Equipment Blank
V1	ICV
V2	CCV
V3	CCV RRF
V4	Sample Receipt Condition
V5	Ending Continuing Calibration Verification
V6	Low Level Calibration Verification
V7	Interference Check Sample A
V8	Interference Check Sample AB
V9	Interference Check Sample A - Negative
W	Column breakdown (pesticides/8270)
X	Raised reporting limit
Y	Cooler temperature greater than 10 degreeec C.
Y1	False Positive
Y2	Data rejected due to radiological anomolies
Y3	Non-accredited analyte/compound. Accreditation not offered at time of analyses for the analyte/compound by the stated method and matrix.
Y4	Performance Check - Degradation of DDT
Y5	Extracted Internal Standard
Y6	Analyte not confirmed on second column.
Y7	Signal to Noise Ratio not met
Z	LCS RPD
Z1	Non-accredited analyte/compound
Z1	Data rejected, more valid data available.
Z2	Detection Level not met uncertainty greater than DL
Z4	MDA Greater than RDL.
Z5	Ion Ratio
Z6	Samples were analyzed past the 12 hour time period from the Tune or opening CCV.

Calculation Documentation

Final Sample Result Calculation
 Red Hill
 PFAS
 method 8015 DAI
 Eurofins Seattle

on column result (ug/ml) x (final volume(ml)/initial sample amount (mL)) x dilution factor = calculated result

Sample	Analyte	On column results (ug/ml)	Final Prep Volume (ml)	Initial Sample amount (mL)	Dilution Factor	Calculate result (mg/L)	Reported Result (mg/L)
580-132538-1	2-(2-Butoxyethoxy)ethanol	0	1	1	1	0	3.0U
580-132538-2	2-(2-Butoxyethoxy)ethanol	0	1	1	1	0	3.0U
580-132538-3	2-(2-Butoxyethoxy)ethanol	0	1	1	1	0	3.0U
580-132538-4	2-(2-Butoxyethoxy)ethanol	0	1	1	1	0	3.0U
580-132538-5	2-(2-Butoxyethoxy)ethanol	0	1	1	1	0	3.0U
580-132538-6	2-(2-Butoxyethoxy)ethanol	0	1	1	1	0	3.0U
LCS	2-(2-Butoxyethoxy)ethanol	21.1	1	1	1	21.1	21.1

Low standard Calculation

Sample calculation for results in Column G

Sample ID

AF-RHMW16-WGN01LF-2310

2-(2-Butoxyethoxy)ethanol

Compound

Low standard conc. (ng/ml)	5
Sample amount (mL)	1
Extraction Volume (ml)	1
Dilution	1
AECOM calculated conc. (mg/L)	5.000 %D=
Lab reported conc. (mg/L)	5 0.0

AF-RHMW16-WGN01LF-2310			
COMPOUND	CONC. of Low Cal Std and ISC Std (ug/ml)	LOQ (mg/L)	Calculated LOQ (mg/L)
2-(2-Butoxyethoxy)ethanol	5.00	5.0	5.000

Data Validation Worksheet

DATA VALIDATION GC (8015C)

DOD

Validator: KB

Date Validated: 10/24/23

Reviewer: PMH

Date Reviewed: 10/25/2023

Project: Red Hill Bulk Storage Facility, CV 23F0104

SDG: 580-132538-1

LAB: Eurofins, Savannah

Samples Collected: 10/5/2023 and 10/6/2023

Sample Receipt and Case Narrative Review

- ✓ Traffic reports, chain-of-custody forms or SDG narrative do not indicate any problems with sample receipt, condition of the samples, analytical problems or special circumstances affecting the quality of the data.

No problems found

Holding Times

- ✓ Aqueous samples extracted within 7 days of collection and analyzed within 40 days of extraction
- ✓ Solid samples extracted within 14 days of collection and analyzed within 40 days of extraction
- ✓ There is no specific holding time for PCB samples
- ✓ If temp of receipt is >6° but ≤15% qualify J-/UJ
- ✓ If temp >15°C qualify X
- ✓ If holding time is exceeded qualify J-/UJ
- ✓ If holding time is grossly exceeded (>2X) qualify J-/X

14-day holding time used for 8015C DAI

Samples collected on 10/05/23 and 10/06/23

Samples analyzed on 10/12/23

all ok

ICAL (Form VI)

- ✓ %RSD \leq 20% or $r > 0.995$ or $R^2 > 0.990$
- ✓ minimum 5 standards for linear; minimum 6 standards for quadratic
- ✓ 5-pt calibration for multicomponent analytes
- ✓ If %RSD $> 20\%$ or $r < 0.995$ or $r^2 < 0.990$ qualify J/UJ
- ✓ If %RSD $> 40\%$ or $r < 0.95$ or $r^2 < 0.90$ qualify X

Inst: CVGG2

IC 680-797719/12 09/13/2023 15:35

ICV/CCV (from VII/Analysis Run Log)

- ✓ ICV after ICAL; all %Ds within $\pm 20\%$
- ✓ CCVs before sample, every 10 samples
- ✓ all ICV/CCV %D $\pm 20\%$
- ✓ RTs within established window
- ✓ if %D is high then qualify J+
- ✓ if %D is low then qualify J-/UJ
- ✓ if %D is $> 50\%$ then qualify X

Inst: CVGG2

ICV 680-797719/13 09/13/2023 15:59 1 1GI12013.D J&W DB WAX 0.45(mm) ok

CCVIS 680-802272/4 10/12/2023 11:44 1 1IJ12004.D J&W DB WAX 0.45(mm) ok

LCS 680-802272/5 10/12/2023 12:07 1 1IJ12005.D J&W DB WAX 0.45(mm)
LCS 680-802272/6 10/12/2023 12:30 1 1IJ12006.D J&W DB WAX 0.45(mm)
MB 680-802272/8 10/12/2023 13:16 1 1IJ12008.D J&W DB WAX 0.45(mm)

CCV 680-802272/23 10/12/2023 19:31 1 1IJ12023.D J&W DB WAX 0.45(mm)

Out \downarrow 21.8% sample ND Q UJ (V2) agree w ADR

580-132538-1 AF-RHMW16-WGN01LF-2310 10/12/2023 21:49 1 1IJ12029.D J&W DB WAX 0.45(mm)
580-132538-2 AF-RHMW04-WGN01LF-2310 10/12/2023 22:12 1 1IJ12030.D J&W DB WAX 0.45(mm)
580-132538-3 AF-RHMW02-WGN01LF-2310 10/12/2023 22:35 1 1IJ12031.D J&W DB WAX 0.45(mm)
580-132538-4 AF-RHMW02-WGFD01LF-2310 10/12/2023 22:58 1 1IJ12032.D J&W DB WAX 0.45(mm)
580-132538-5 AF-RHMW03-WGN01LF-2310 10/12/2023 23:21 1 1IJ12033.D J&W DB WAX 0.45(mm)
580-132538-6 AF-RHMW06-WGN01LF-2310 10/12/2023 23:44 1 1IJ12034.D J&W DB WAX 0.45(mm)
580-132538-1 MS AF-RHMW16-WGN01LF-2310 MS 10/13/2023 00:52 1 1IJ12037.D J&W DB WAX 0.45(mm)
580-132538-1 MSD AF-RHMW16-WGN01LF-2310 MSD 10/13/2023 01:15 1 1IJ12038.D J&W DB WAX 0.45(mm)

CCV 680-802272/38 10/13/2023 02:01 1 1IJ12040.D J&W DB WAX 0.45(mm) ok

Surrogate (Form II)

- ✓ if acceptance criteria is not defined by project, use limits in Table C below
- ✓ RTs within range of 5 pt

- ✓ do not evaluate for if diluted out
- ✓ if surrogate recovery <10% then qualify J-/X
- ✓ if surrogate recovery is low but >10% then qualify J-/UJ
- ✓ if surrogate recovery is high then qualify J+

No surrogate used

LCS (Form III)

- ✓ one per prep batch
- ✓ used QAPP 50-150, RPD 50
- ✓ if recovery low then qualify J-/X
- ✓ if recovery is high then qualify J+
- ✓ if LCS/LCSD RPD is out then qualify detects J, do not qualify NDs

	LCS %R	LCSD %R	RPD
LCS/LCSD 680-802272	ok	ok	ok

MS/MSD (Form III)

- ✓ one per prep batch
- ✓ used QAPP 50-150, RPD 50
- ✓ MS/MSD RPD ≤ 30%
- ✓ if MS recovery <10% then qualify J-/X
- ✓ if MS recovery is low but >10% then qualify J-/UJ
- ✓ if MS recovery is high then qualify J+
- ✓ if MS/MSD RPD is out then qualify detects J, do not qualify NDs

	MS	MSD	RPD	
AF-RHMW16-WGN01LF-2310	ok	ok	ok	sample 1

Blanks (Form IV/Form1)

- ✓ method blank – analyzed one per prep batch

Method Blank

MB 680-802272/8 ND

Field/Equipment Blank

None

Internal Standard Areas and RTs (Form VIII)

- ✓ areas within -50% to +100% of ICAL midpoint standard
- ✓ RTs within 30 seconds of midpoint standard
- ✓ if IS recovery is >200% then detects qualify J (do not qualify NDs)
- ✓ if IS recovery is <50% but >20% then qualify J/UJ
- ✓ if IS recovery is <20% or RT out then qualify X

Internal standard used – n-Heptyl Alcohol all ok

Identification Summary / Second Column Confirmation (Form X)

- ✓ present for all positive results
- ✓ RTs within range for both columns (not applicable for single column 8015C)
- ✓ RPD ≤ 40% Single col analyses NA
- ✓ if RPD >40% then qualify J Single col analyses NA

ok

Sample Data (Form I)

- ✓ Chromatogram acceptable
- ✓ manual integrations acceptable

ok

Field Duplicates

- ✓ no criteria per QSM; use project specific criteria when available in QAPP
- ✓ per Module 4: if RPD > QAPP limit qualify J, no Q for non-detects
- ✓ See field duplicate worksheet

use 30% for aqueous and solids

AF-RHMW12A-WGN01LF-2304W4

AF-RHMW12A-WGFD01LF-2304W4 all ok

Data Validation Report for 5801325381

Facility: RH Fire Suppression System
Event: AFFF Assessment Sampling GW 2023 October
SDG: 5801325381
Guidance Document: RHS PFAS UFP-QAPP
Prime Contractor: AECOM, Honolulu, HI
Project Manager: Kristin Rutherford
Contract Laboratory(ies): Eurofins Environment Testing TestAmerica, Savannah, GA
Data Review Contractor: Environmental Data Services Ltd.
Data Review Level: S4VEM
Primary Data Reviewer: Dina Manov, Technical Specialist
Date Submitted: October 25, 2023

Field Sample ID	Lab Sample ID	Matrix	Type/Type Code	SW8015C
AF-RHMW02-WGFD01LF-2310	580-132538-4	Water	Field Duplicate/FD	X
AF-RHMW02-WGN01LF-2310	580-132538-3	Water	Field Sample/N	X
AF-RHMW03-WGN01LF-2310	580-132538-5	Water	Field Sample/N	X
AF-RHMW04-WGN01LF-2310	580-132538-2	Water	Field Sample/N	X
AF-RHMW06-WGN01LF-2310	580-132538-6	Water	Field Sample/N	X
AF-RHMW16-WGN01LF-2310	580-132538-1	Water	Field Sample/N	X

Data Validation Report for 5801325381

This report assesses the analytical data quality associated with the analyses listed on the preceding cover page at S4VEM data validation level. This assessment has been made through a combination of automated data review (ADR) and supplemental manual review, the details of which are described below. The approach taken in the review of this data set is consistent with the requirements contained in the RHS PFAS UFP-QAPP and the additional guidance documents incorporated by reference to the extent possible. Where definitive guidance is not provided, results have been evaluated in a conservative manner using professional judgment.

Sample collection was managed and directed by AECOM, Honolulu, HI; analyses were performed by Eurofins Environment Testing TestAmerica, Savannah, GA and were reported under sample delivery group (SDG) 5801325381. Data have been evaluated electronically based on electronic data deliverables (EDDs) provided by the laboratory, and hard copy data summary forms have also been reviewed during this effort and compared to the automated review output by the reviewers whose signatures appear on the following page. Findings based on the automated data submission and manual data verification processes are detailed in the ADR narrative and throughout this report.

All quality control (QC) elements associated with this SDG have been reviewed by a project chemist in accordance with the requirements defined for the project. This review is documented in the attached Data Review Checklists. The QC elements listed below were supported by the electronic deliverable and were evaluated using ADR processes.

- Continuing Calibration Verification
- Field Duplicate RPD
- Lab Blank
- LCS Recovery
- LCS RPD
- MS Recovery
- MS RPD
- Prep Hold Time
- Surrogate
- Test Hold Time

Results of the ADR process were subsequently reviewed and updated as applicable by the data review chemists identified on the signature page. Quality control elements that were not included in the electronic deliverable were reviewed manually and findings are documented within this report. Summaries of findings and associated qualified results are documented throughout this report.

A total of 6 results (100.00%) out of the 6 results (sample and field QC samples) reported are qualified based on review and 0 results (0.00%) have been rejected or deemed a serious deficiency (X qualifier). Trace values, defined as results that are qualified as estimated because they fall between the detection limit and the reporting limit/limit of quantitation, are not counted as qualified results in the above count. The qualified results are detailed throughout this report and discussed in the narrative below, where appropriate.

Data Validation Report for 5801325381

Narrative Comments

Analytical Method	Data Reviewer Comment
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SW8015C	No additional comments; see Checklist for detail.
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October 25, 2023

Reviewed by Dina Manov, Technical Specialist, Environmental Data Services Ltd.

As the Reviewer, I certify that I have performed a data review process in accordance with the requirements of the project guidance document, and have compared the electronic data to the laboratory's hard copy report and have verified the consistency of the reported sample results and method quality control data between the two deliverables.

Data Validation Report for 5801325381

Quality Control Outliers for test method SW8015C, Continuing Calibration Verification

Compliance requirements for satisfactory continuing calibration are established to ensure that the instrument is capable of producing acceptable qualitative and quantitative data. Continuing calibration is performed to verify and evaluate instrument performance during sample analysis. Summary forms were evaluated against project acceptance criteria, and any associated qualified results, are listed below.

Sample ID/ Lab Sample ID	Analyte	Result	Warning Limits	Control Limits	Units	Qualifier	Reason Code	Comment
CCV68080227223 (CV)	2-(2- Butoxyethoxy)etha nol	78.0	80 - 120	50 - 150	percent	J/UJ	V2	

Where two qualifiers are listed, such as 'J/UJ', the first applies to positive results, and the second to non-detect results. Upper and Lower Warning and Control Limits are abbreviated UWL, LWL, UCL, and LCL in the Comment field.

Qualified Results associated with the Continuing Calibration Verification for SW8015C

FieldSample ID	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
AF-RHMW02- WGF01LF-2310 580-132538-4	FD	2-(2-Butoxyethoxy)ethanol	5.00	3.00 U Q	3.00 UJ		mg/l	V2
AF-RHMW02- WGN01LF-2310 580-132538-3	N	2-(2-Butoxyethoxy)ethanol	5.00	3.00 U Q	3.00 UJ		mg/l	V2
AF-RHMW03- WGN01LF-2310 580-132538-5	N	2-(2-Butoxyethoxy)ethanol	5.00	3.00 U Q	3.00 UJ		mg/l	V2
AF-RHMW04- WGN01LF-2310 580-132538-2	N	2-(2-Butoxyethoxy)ethanol	5.00	3.00 U Q	3.00 UJ		mg/l	V2
AF-RHMW06- WGN01LF-2310 580-132538-6	N	2-(2-Butoxyethoxy)ethanol	5.00	3.00 U Q	3.00 UJ		mg/l	V2
AF-RHMW16- WGN01LF-2310 580-132538-1	N	2-(2-Butoxyethoxy)ethanol	5.00	3.00 U M Q	3.00 UJ		mg/l	V2

Analytes not found in project samples are reported as not detected at the limit of detection (LOD) unless blank contamination occurs and then the sample may be reported as not detected at the (LOD) or (LOQ) based on the sample concentration and the validation guidance. In instances where no LOD is provided, results are reported down to the LOQ.

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Table of All Qualified Results

Test Method: SW8015C		Extraction Method: METHOD						
FieldSample ID / LabSample ID	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
AF-RHMW02-WGFD01LF-2310 580-132538-4	FD	2-(2-Butoxyethoxy)ethanol	5.00	3.00 U Q	3.00 UJ		mg/l	V2
AF-RHMW02-WGN01LF-2310 580-132538-3	N	2-(2-Butoxyethoxy)ethanol	5.00	3.00 U Q	3.00 UJ		mg/l	V2
AF-RHMW03-WGN01LF-2310 580-132538-5	N	2-(2-Butoxyethoxy)ethanol	5.00	3.00 U Q	3.00 UJ		mg/l	V2
AF-RHMW04-WGN01LF-2310 580-132538-2	N	2-(2-Butoxyethoxy)ethanol	5.00	3.00 U Q	3.00 UJ		mg/l	V2
AF-RHMW06-WGN01LF-2310 580-132538-6	N	2-(2-Butoxyethoxy)ethanol	5.00	3.00 U Q	3.00 UJ		mg/l	V2
AF-RHMW16-WGN01LF-2310 580-132538-1	N	2-(2-Butoxyethoxy)ethanol	5.00	3.00 U M Q	3.00 UJ		mg/l	V2

Analytes not found in project samples are reported as not detected at the limit of detection (LOD) unless blank contamination occurs and then the sample may be reported as not detected at the (LOQ) based on the sample concentration.
 In instances where no LOD is provided, results are reported down to the LOQ.
 Trace values are not included in the qualified results table unless additional reason codes are associated.

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Results with Modified Qualifiers

No qualifiers associated with this sample delivery group were modified manually.

Reason Code Definitions

Code	Definition
V2	CCV

Flag Code and Definitions

Flag	Definition
J	Estimated Value
N	The analysis indicates the presence of an analyte for which there was presumptive evidence to make a tentative identification.
NJ	The analyte has been tentatively identified or presumptively as present and the associated numerical value was the estimated concentration in the sample.
R	The data are rejected due to deficiencies in meeting QC criteria and may not be used for decision making.
U	Undetected: The analyte was analyzed for, but not detected.
UJ	The analyte was not detected; however, the result is estimated due to discrepancies in meeting certain analyte-specific quality control criteria.
X	Result may require rejection; PDT attention required

Bias

-	The result may be biased low
+	The result may be biased high

Note - The bias field is a separate field; however, it is an integral part of the final flag (qualifier) on the sample result

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Review Questions

Method: SW8015C (Nonhalogenated Organics by Gas Chromatography)

Review Questions	Yes	No	NA	Comment
Were there discrepancies between the COC and the samples received?				
Were there discrepancies between the COC and the sample labels?				
Were samples relinquished properly on the COC?				
Were all samples properly preserved?				
Were sampling dates/times, date and time of laboratory receipt of samples, and sample conditions upon receipt at the laboratory (including preservation, pH, and temperature) documented?				
Were sample results reported with percent moisture correction if required?				
Were analytical methods performed and analysis dates present?				
Were all requested target analytes reported?				
Were QAPP specified Project Quantitation Limit Goals achieved? (The laboratory LOQ is compared to the QAPP Project Quantitation Goal)				
Were holding times met?				
Were trip blanks analyzed at the proper frequency and in control?				
Were field blanks analyzed at the proper frequency and in control?				
Were equipment blanks analyzed at the proper frequency and in control?				
Was a method blank prepared and analyzed with each batch?				
Were target analytes in the method blank less than DL?				
Was an LCS/LCSD pair prepared and analyzed with each batch?				
Were LCS/LCSD recoveries within project acceptance limits?				
Was the LCS/LCSD RPD within project acceptance limits?				
Was a MS/MSD pair prepared with each batch?				
Were MS/MSD recoveries within project acceptance limits?				
Was the MS/MSD RPD within project acceptance limits?				
If ISM was used for sample collection, were laboratory triplicates analyzed and within project acceptance limits?				
Were surrogate recoveries within project acceptance limits?				
Were field replicates (duplicates, triplicates, etc.) analyzed at the proper frequency and in control?				
Were reported sample concentrations within calibration range?				
Were Instrument Performance Checks (Degradation Checks) performed and within acceptance criteria?				
Was the Calibration within project acceptance criteria?				
Was a ICV performed after each ICAL prior to sample analysis and within project acceptance criteria?				

Data Validation Report for 5801325381

Review Questions

Method: SW8015C (Nonhalogenated Organics by Gas Chromatography)

Review Questions	Yes	No	NA	Comment
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Were CCVs run at the required frequency and within project acceptance criteria?

Were internal standard retention times and area criteria within method requirements?

Were internal standards spiked for every sample, standard, and QC sample?

Were instrument run logs present and filled out appropriately?

Were sample preparation sheets present and filled out appropriately?

Was a Cleanup Procedure required (Cleanup Recovery Checks) verified and within acceptance limits?

Was a Second Column/Detector used and the column difference within acceptance limits?

Were certificates of standard traceability and documentation of standard solution preparation provided?

Were recalculation of QC Elements and Sample Results performed?

For internal standard calibration, were Relative Retention Times (RRTs) within ± 0.06 RRT units and updated with the latest daily CCV?

Were chromatograms checked for peak integration when manually integrated?

Were chromatograms checked for correct baseline/peak integration and possible interferences?

Have all Laboratory Case Narrative comments/findings been addressed in the data review process?

Were DoD QSM corrective actions followed if deviations were noted?

Were any data recommended for exclusion in the data validation process?