

Western Refining Southwest LLC D/B/A Marathon Gallup Refinery 2022 Annual Groundwater Monitoring Report

## Appendix D - 2022 Data Validation Reports

- **Appendix D-1.** 1<sup>st</sup> **Quarter Data Validation Reports**
- Appendix D-2. 2<sup>nd</sup> Quarter Data Validation Reports
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Western Refining Southwest LLC D/B/A Marathon Gallup Refinery 2022 Annual Groundwater Monitoring Report

Appendix D-1. 1<sup>st</sup> Quarter Data Validation Reports



Client: Marathon Oil	Laboratory: Hall Environmental Analysis Laboratory		
Project Name: Western Refining Southwest, Q1 GW Sampling	Sample Matrix: Groundwater		
Project Number: 697-080-002 Task: 0006	Sample Start Date: 03/18/2022		
Date Validated: 07/05/2022	Sample End Date: 03/18/2022		
Parameters Included:			
<ul> <li>Volatile Organic Compounds (VOCs) by Environmental P Waste (SW-846) Method 8260B</li> </ul>	rotection Agency (EPA) Test Methods for Evaluating Solid		
<ul> <li>1,2-Dibromoethane (EDB) by EPA Method 504.1</li> </ul>			
<ul> <li>Semivolatile Organic Compounds (SVOCs) by SW-846 M Monitoring (SIM)</li> </ul>	ethod 8270C and Method 8270C with Selected Ion		
<ul> <li>Total Petroleum Hydrocarbons (TPH) Gasoline Range Organics (GRO) by SW-846 Method 8015D</li> </ul>			
<ul> <li>TPH Diesel Range Organics (DRO) and Motor Oil Range Organics (MRO) by SW-846 Method 8015D Modified</li> </ul>			
<ul> <li>Total and Dissolved Metals by EPA Method 200.7 and Method 200.8</li> </ul>			
<ul> <li>Total and Dissolved Mercury by EPA Method 245.1</li> </ul>			
<ul> <li>Chemical Oxygen Demand by EPA Method 410.4</li> </ul>			
<ul> <li>Cyanide by Standard Methods for the Examination of Water</li> </ul>	ter and Wastewater (SM) Method 4500 CN E		
<ul> <li>Biochemical Oxygen Demand (BOD) by SM Method 5210</li> </ul>	В		
<ul> <li>E.Coli by SM Method 9223B</li> </ul>			
Laboratory Project ID: 2203A72			
Data Validator: Daran O'Hollearn, Lead Project Scientist			
Reviewer: Mike Phillips, Senior Chemist			

### DATA EVALUATION CRITERIA SUMMARY

A Tier II Data Validation was performed by Trihydro Corporation's Chemical Data Evaluation Services Group on the analytical data report packages generated by Hall Environmental Analysis Laboratory of Albuquerque, New Mexico, with additional data from Pace Analytical National of Mount Juliet, Tennessee evaluating samples from the Marathon Oil site, located in Gallup, New Mexico.

Precision, accuracy, method compliance, and completeness of this data package were assessed during this data review. Precision was determined by evaluating the calculated relative percent difference (RPD) values from:

- Field duplicate pairs
- Laboratory duplicate pairs
- Matrix spike (MS) and matrix spike duplicate (MSD) pairs
- Laboratory control sample (LCS) and laboratory control sample duplicate (LCSD) pairs

Laboratory accuracy was established by reviewing the demonstrated percent recoveries (%R) of the following items to verify that data are not biased.

- MS/MSD samples
- LCS/LCSD samples
- Organic system monitoring compounds (surrogates)



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Field accuracy was established by collecting and analyzing the following samples to monitor for possible ambient or cross contamination during sampling and transportation.

- Trip blanks
- Field blanks
- Equipment blanks

Method compliance was established by reviewing sample integrity, holding times, detection limits, surrogate recoveries, laboratory blanks, initial and continuing calibrations (where applicable), and the LCS/LCSD percent recoveries against method-specific requirements.

Completeness was evaluated by determining the overall ratio of the number of samples and analyses planned versus the number of samples with valid analyses. Determination of completeness included a review of the chain-of-custody (CoC), laboratory analytical methods, and other laboratory and field documents associated with this analytical data set.

Client Sample ID	Laboratory Sample Number
EB 3-18-22	2203A72-001
East LDU	2203A72-002
West LDU	2203A72-003
STP-1 to EP-2	2203A72-004
FB 3-18-22	2203A72-005
DUP 3-18-22	2203A72-006
Trip Blank	2203A72-007

#### SAMPLE NUMBERS TABLE





The laboratory data were reviewed to evaluate compliance with the methods and the quality of the reported data. Assessment of CoC completeness is included in Item 3 of the Data Validation Checklist. A check mark ( $\checkmark$ ) indicates that the referenced validation criteria were deemed acceptable, whereas a crossed circle ( $\otimes$ ) indicates validation criteria for which the data have been qualified by the data validator. An empty circle (O) indicates that the specified criterion does not apply to the reviewed data. Details are noted in the tables below.

#### Validation Criteria

- ✓ Data Completeness
- ✓ CoC Documentation (Item 3)
- ✓ Holding Times and Preservation (Items 6 and 7)
- O Initial and Continuing Calibrations (Items 9 and 10)
- ⊗ Laboratory Blanks (Items 11 and 12)
- ✓ MS/MSD (Items 13 and 14)
- ✓ LCS/LCSD (Items 15 and 16)
- System Monitoring Compounds (i.e., Surrogates) (Item 17)
- 8 Field, Equipment, and Trip Blanks (Items 18 and 19)
- ⊗ Field Duplicates (Items 20 and 21)
- ✓ Laboratory Duplicates (Item 22)

### **Guidance References**

Chemical data validation was conducted in accordance with the United States Environmental Protection Agency (USEPA) Contract Laboratory Program (CLP) National Functional Guidelines for the analyses listed below, or by the appropriate method if not covered in the National Functional Guidelines.

- Data for organic analyses were evaluated according to validation criteria set forth in the USEPA CLP National Functional Guidelines for Organic Superfund Methods Data Review, document number EPA-540-R-20-005, November 2020 with additional reference to the USEPA CLP National Functional Guidelines for Organic Data Review, document number EPA 540/R-99/008, October 1999.
- Data for inorganic analyses were evaluated according to validation criteria set forth in the USEPA CLP National Functional Guidelines for Inorganic Superfund Methods Data Review, document number EPA-540-R-20-006, November 2020 with additional reference to the USEPA CLP National Functional Guidelines for Inorganic Data Review, document number EPA 540-R-04-004, October 2004.
- Review of field duplicates was conducted according to the USEPA Region I New England Environmental Data Review Supplement for Region 1 Data Review Elements and Superfund Specific Guidance/Procedures, EQADR-Supplement2, September 2020.
- Trihydro Data Validation Variance Documentation, April 2022.



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#### **OVERALL DATA PACKAGE ASSESSMENT**

Based on a data validation review, the data are acceptable as delivered. Data qualified by the laboratory are discussed in Item 2 of the Validation Criteria Checklist.

The purpose of validating data and assigning qualifiers is to assist in proper data interpretation. Data that are not qualified meet the site data quality objectives. If values are assigned qualifiers other than an R (rejected, data not usable), the data may be used for site evaluation; however, consideration should be given to the reasons for qualification when interpreting sample concentrations. Data points that are assigned an R qualifier should not be used for site evaluation purposes.

If applicable, text was identified in **bold font** in the Validation Criteria Checklist to indicate that further action and/or qualification of the data were required. Data may have been qualified with J data flags by the laboratory if the result was greater than or equal to the method detection limit (MDL) but less than the reporting limit (RL). These laboratory-applied J flags were preserved, if present, and included in the Data Qualification Summary table at the end of this report. If applicable, data validation qualifiers were added for the items noted with crossed circles in the Validation Criteria section above. Please see the Data Qualification Summary table at the end of this report.

If data would be qualified with more than one flag, one qualifier was assigned based on the severity; however, all reasons for qualification were retained. Data that would be qualified with both J+ and J- flags were evaluated based on validation criteria and assigned the appropriate flag. The hierarchy of qualifiers from the most to least severe is as follows:

Data qualifiers used during this validation are included in the following table.

<u>Qualifier</u>	Definition
J	Estimated concentration
J-	The result is an estimated concentration, but may be biased low
J+	The result is an estimated concentration, but may be biased high
UJ	Estimated reporting limit
U	Evaluated to be undetected at the reporting limit
JB	Estimated concentration due to blank contamination

#### **Data Completeness**

The analyses were performed as requested on the CoC records. The associated samples were received by the laboratory and analyzed properly unless otherwise noted in the Criteria Checklist below. The complete data package consisted of 363 data points. The data completeness calculation does not include any submitted blank sample results. The data completeness measure for this data package is calculated to be 100% and is acceptable.



VALIDATION CRITERIA CHECKLIST						
1. Wa	1. Was the report free of non-conformances identified by the laboratory? No					
Comme	Comments: The laboratory noted the following analytical non-conformance related to this data set					
Method	8270: "S" fl	agged surrogates denote low surrogate rec	overies due to matrix interferences	/sample dilution.		
2. We	<ol> <li>Were the data free of data qualification flags and/or notes used by the laboratory?</li> <li>No</li> </ol>					
Comme	ents: The lab	poratory used the following data gualification	n flags with this data set.			
D – Sar	mple diluted	due to matrix.	5			
E – Esti of samp	imated value	<ul> <li>This laboratory flag was applied only to G not required.</li> </ul>	C sample results in the laboratory	report, and qualification		
H – Hol	ding times fo	or preparation or analysis exceeded.				
J – Ana	lyte detected	below quantitation limits				
J6 – Th	e sample ma	atrix interfered with the ability to make any a	ccurate determination; spike value	is low.		
P1 – RF	PD value not	applicable for sample concentrations less t	han 5 times the reporting limit.			
S – % F	Recovery out	side of range due to dilution or matrix interf	erence.			
* – Valu	le exceeds n	naximum contaminant level.				
3. We	ere sample C	COC forms and custody procedures complete	e?	Yes		
Comments: The CoC records from field to laboratory were complete, and custody was maintained as evidenced by field and laboratory personnel signatures, dates, and times of receipt. Custody seals were not present or required since the samples were delivered to the laboratory by courier, and custody was maintained at all times.						
4. Were detection limits in accordance with the quality assurance project plan (QAPP), Yes permit, or method, or indicated as acceptable?						
Comments: The detection limits appeared to be acceptable. The following dilutions were applied.						
	Method     Sample(s)     Analyte(s)     Dilution					
l	245.1	East LDU	Total Mercury	5		
l	200.8	East LDU, West LDU, DUP 3-18-22	Total and Dissolved Metals	5		
	200.7	East LDU	Total and Dissolved Chromium	10		
	200.7	East LDU	Total and Dissolved Nickel	10		
	9223B	STP-1 to EP-2	E.Coli	10		
	8015	East LDU	GRO, DRO MRO	10		
	8260B	East LDU	VOCs	10		
l	8270C	East LDU, STP-1 to EP-2, DUP 3-18-22	SVOCs	10		
5. Were the reported analytical methods and constituents in compliance with the No QAPP, permit, or CoC?						
Comments: The reported analytical methods were in compliance with the CoC, and the laboratory reported the requested constituents in accordance with the CoC, with the following exceptions.						
The CoC requested total and dissolved metals using Method 200.7; however, the laboratory analyzed the samples using both Method 200.7 and Method 200.8. This substituted analytical method, Method 200.8, met similar sensitivity, accuracy, and precision goals and, therefore, was an acceptable replacement.						
The CoC requested cyanide using Method 335.4; however, the laboratory analyzed the samples using Method 4500 CN E. This substituted analytical method met similar sensitivity, accuracy, and precision goals and, therefore, was an acceptable						

replacement.

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VALIDATION CRITERIA CHECKLIST					
6. Were samples receiv	6. Were samples received in good condition within method-specified requirements? Yes				
Comments: Samples we temperature range of 4°C	ere received on C ± 2°C at 2.1°C	ice, in good condition, c, 2.3°C, and 2.4°C as	and with the co noted on the C	oler temperatures w oC and the <i>Sample I</i>	ithin the recommended Log-in Check List.
Samples transferred to P range at 2.3°C as noted o	ace National we	ere received in good co	ondition with the	e cooler temperature	within the recommended
7. Were samples extraction technical holding time	cted/digested a nes?	nd analyzed within met	thod-specified of	or	Yes
Comments: The samples	s were extracte	d/digested and analyze	ed within metho	d-specific holding tin	nes.
8. Were reported units method(s)? Specify	appropriate for if wet or dry un	the sample matrix/mat its were used for soil.	rices and analy	tical	Yes
Comments: The results most probable number per requested.	were reported ir er 100 mL (MPN	n concentration units of N/100mL), which were	f micrograms p acceptable for	er liter (µg/L), milligra the sample matrix ar	ams per liter (mg/L), and nd the analyses
9. Did the laboratory pr	ovide any spec	ific initial and/or continu	uing calibration	results?	No
Comments: Initial and co	ontinuing calibra	ation data were not incl	uded as part of	f this data set.	
10. If initial and/or continuing calibration results were provided, were the results within N/A acceptable limits?					N/A
Comments: Initial and co	Comments: Initial and continuing calibration data were not included as part of this data set.				
11. Was the total number of laboratory blank samples prepared equal to at least 5% of Yes the total number of samples or analyzed as required by the method?					Yes
Comments: The total number of laboratory blank samples prepared was equal to at least 5% of the total number of samples.					
12. Were target analytes	s reported as no	ot detected in the labora	atory blanks?		No
Comments: Target analy	/tes were report	ed as not detected in t	he laboratory b	lanks, with the follow	ving exceptions.
Method Analyte Batch Concentration					
	245.1	Total Mercury	66396	0.00014 mg/L	
	8260B	Chloromethane	R86666	0.66 µg/L	
	8015D GRO G86666 0.040 mg/L				
Detections of chloromethane and GRO in the associated samples that were less than the blank results and/or less than the applicable reporting limits were assigned U qualifiers. Detections of GRO in the associated samples that were greater than the reporting limits but less than or equal to 10 times the blank results were assigned JB qualifiers. Non-detections of the identified analytes in the associated samples and detections that were above the					

reporting limit and greater than ten times the blank concentration did not require qualification.



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### VALIDATION CRITERIA CHECKLIST

13. Was the total number of MS samples prepared equal to at least 5% of the total number of samples or analyzed as required by the method?

Yes

Comments: The total number of matrix spike samples prepared was equal to at least 5% of the total number of samples, although MS samples were not prepared/reported for all analyses and/or batches. The matrix spike sample source for each analytical batch in this sample set has been indicated below.

<u>Method</u>	<u>Analytes</u>	<u>Batch</u>	MS Sample Source
200.7	Total Metals	66643	Not Prepared
200.7	Dissolved Metals	A86607	EB 3-18-22
200.7	Dissolved Metals	A87332	Not Prepared
200.8	Total Metals	66341	Not Prepared
200.8	Dissolved Metals	A86633	Not Prepared
200.8	Dissolved Metals	B86624	STP-1 to EP-2
245.1	Dissolved and Total Mercury	66396	Not Prepared
410.4	COD	WG1836817	Not Associated
504.1	EDB	66262	Not Prepared
4500CN E	Cyanide	WG1836405	Not Associated
4500CN E	Cyanide	WG1836836	Not Associated
5210B	BOD	66272	Not Prepared
8015D	TPH DRO and MRO	66372	Not Prepared
8015D	TPH GRO	G86666	West LDU
8260B	VOCs	R86666	East LDU
8270C	SVOCs	66282	Not Prepared
8270C	SVOCs	66355	Not Prepared
8270C SIM	SVOCs	R86694	Not Prepared
8270C SIM	SVOCs	R86800	Not Prepared
9223B	E.Coli	66276	Not Prepared

Not Associated – The MS sample source was not associated with this project. Not Prepared – Matrix spikes were not prepared/reported for this batch.

14. For MS/MSDs prepared from project samples, were percent recoveries and RPDs Yes within data validation or laboratory quality control (QC) limits?

Comments: The MS/MSD percent recoveries and RPDs for project samples were within data validation and laboratory QC limits.

The percent recoveries and RPD values for MS/MSDs prepared from non-project samples were evaluated and considered, but data were not qualified based on those results since matrix similarity to project samples could not be guaranteed.

15. Was the total number of LCSs analyzed equal to at least 5% of the total number of Yes samples or analyzed as required by the method?

Comments: The total number of LCS samples analyzed was equal to at least 5% of the total number of samples.

16. Were LCS/LCSD percent recoveries and LCS/LCSD RPDs within data validation or laboratory QC limits?

Comments: The LCS and LCSD percent recoveries and LCS/LCSD RPDs were within data validation and laboratory QC limits.



Yes

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### VALIDATION CRITERIA CHECKLIST

17. Were surrogate recoveries within laboratory QC limits?

Comments: Surrogate recoveries were within laboratory QC limits, with the following exceptions.

<u>Method</u>	Surrogate	Sample	<u>Surrogate</u> <u>Recovery</u>	QC Limits
8270C	2-Fluorophenol	East LDU	10.1%	29.4-87.7%
8270C	Phenol-d₅	East LDU	25.0%	28.5-64.7%
8270C	2,4,6-Tribromophenol	East LDU	15.7%	18.6-129%
8015D	DNOP	DUP 3-18-22	159%	42.2-138%

The associated target analytes in the sample East LDU with surrogate recoveries that were less than lower laboratory QC limits were qualified as UJ if not detected and J- if detected due to evidence of potential low bias. The associated target analytes in the sample DUP 3-18-22 with a surrogate recovery that was greater than the upper laboratory QC limit were detections and were qualified as J+ due to evidence of potential high bias.

Since Method 8270 surrogate associations were not available from the laboratory, qualification was assigned to all of the target analytes in a given fraction (acid or base/neutral) when two or more surrogates from the same fraction (acid or base/neutral) were outside the acceptance range. This condition did not exist for the samples West LDU and DUP 3-18-22, and qualification of sample data was not required.

The DRO and MRO results for sample East LDU were not qualified based on the surrogate non-conformance in the Method 8015D analysis since the applied dilution of 10 times resulted in a surrogate concentration below routinely calibrated levels, and that result was deemed unreliable and possibly inaccurate.

The SVOC results for sample STP-1 to EP-2 were not qualified based on the surrogate non-conformances in the Method 8070C analyses since the applied dilutions of 10 times resulted in surrogate concentrations below routinely calibrated levels, and those results were deemed unreliable and possibly inaccurate. Qualification of sample data was not required based on surrogate non-conformances in QC samples as the environmental samples were evaluated based on their specific surrogate recoveries.

18. Were the number of trip blank, field blank, and/or equipment blank samples collected equal to at least 10% of the total number of samples or as required by the project guidelines, QAPP, SAP, or permit?

Yes

No

Comments: The number of trip, field, and equipment blanks collected was equal to at least 10% of the number of samples. One trip blank sample, Trip Blank, one field blank sample, FB 3-18-22, and one equipment blank sample, EB 3-18-22, were collected as part of this sample set.



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				ATION CRITERIA CHE	CKLIST		
19. Were ta equipm	19. Were target analytes reported as not detected in the trip blank, field blank, and/or No equipment blank samples?						
Comments: exceptions.	Comments: Target analytes were not detected in the trip blank, field blank, and equipment blank samples with the following exceptions.					h the following	
	Blank S	ample ID	Method	Analyte		Concentration	
	Trip	Blank	8260B	Chlorometh	ane	0.67 µg/L	
	Trip	Blank	8015	GRO		0.035 mg/L	
	FB 3-	-18-22	8015	GRO		0.032 mg/L	
	EB 3	-18-22	200.7	Dissolved	Zinc	0.0068 mg/L	
	EB 3-	-18-22	8260B	Chlorometh	ane	0.67 µg/L	
	EB 3-	-18-22	8015D	GRO		0.034 mg/L	
	EB 3-	-18-22	8015D	DRO		0.023 mg/L	
equal to the dissolved zit times the bl The chloron qualification	equal to the reporting limits but less than 10 times the blank results were assigned JB qualifiers. Non-detections of dissolved zinc in the associated samples and detections of DRO that were above the reporting limit and greater than ten times the blank concentration did not require qualification. The chloromethane and GRO results were previously qualified due to laboratory blank contamination; therefore, additional qualification due to the trip, field, and equipment blank contamination was not required.						
20. Was th numbe Comments: 18-22 was o	<ul> <li>20. Was the number of field duplicates collected equal to at least 10% of the total number of samples or as required by the project guidelines, QAPP, SAP, or permit?</li> <li>Comments: The number of field duplicates collected was equal to at least 10% of the number of samples. Sample DUP 3-18-22 was collected as a field duplicate of sample West LDU.</li> </ul>						
21. Were field duplicate RPD values within data validation QC limits (soil 0-50%, water No 0-30%, or air 0-25%)?							
Comments: As indicated in the Field Duplicate Summary Table at the end of this report, field duplicate RPD values were within data validation QC limits of 0-30% for water samples, with the following exception. The RPD value could not be calculated for 1,4-dioxane for the field duplicate pair West LDU and DUP 3-18-22 since the analyte was detected in the parent sample and was undetected in the duplicate sample. As the detection in the parent sample was greater than two times the reporting limit, 1,4-dioxane was qualified as J and UJ for the parent and duplicate samples, respectively.							
22. For lab laborat	22. For laboratory duplicates prepared from project samples, were RPDs within N/A laboratory QC limits?					A Contraction of the second se	
Comments: summarized	Laboratory du d in the followir	uplicates wer ng table.	e prepared	for these analyses and	d the laboratory	duplicate sample sou	rces are
	Method	Analy	tes	<u>Batch</u>	Labor	Laboratory Duplicate	
-	410.4	COI	)	WG1836817	<u>Sa</u> No	Sample Source	
-	4500CN E	Cvani	de	WG1836405	No	t Associated	
-	4500CN E	Cyani	de	WG1836836	DUP 3-18	-22, Not Associated	
Not Associate	ed – The laborate	ory duplicate s	ample sourc	e was not associated with	this project.	,	
The RPD fo	r the laborator	y duplicate p	repared fro	m a project sample wa	s not applicable	e since the results for	one or both
measureme	nts were within	n 5 times the	reporting li	mit.	music -t - ·		
I NE KPD Va	aues for the lal	boratory dup	licate samp	es prepared from non	-project sample	s were evaluated and	considered,
			icac reaults	Since matrix Similarity	to project samp	nes could not be guar	

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VALIDATION CRITERIA CHECKLIST		
23. Were the following data relationships realistic?		
• Target analytes were reported by more than one method (e.g., 8260/8270, EPH/8270)?	N/A	
Comments: Target analytes were not reported by more than one method in this data set.		
<ul> <li>Both total and dissolved metals analyses were performed, and the total metals results were greater than or equal to the dissolved metals results?</li> </ul>	No	

Comments: The following table contains the exceptions in which the dissolved metals results exceeded the total metals results. The EPA has not provided guidance or requirements for the evaluation, validation, and qualification of dissolved metals results that exceed the corresponding total metals results. Therefore, qualification of results was not performed based on these data.

Sample ID	Analyte	<u>Total Result</u> (mg/L)	Dissolved Result (mg/L)
East LDU	Mercury	ND	0.00010
DUP 3-18-22	Barium	0.068	0.069
DUP 3-18-22	Beryllium	ND	0.00090
East LDU	Cadmium	0.013	0.031
West LDU	Cadmium	0.0047	0.012
DUP 3-18-22	Cadmium	0.0055	0.013
East LDU	Chromium	7.0	7.7
East LDU	Cobalt	0.10	0.12
West LDU	Cobalt	0.0061	0.013
DUP 3-18-22	Cobalt	0.0069	0.014
East LDU	Lead	ND	0.0014
East LDU	Nickel	7.3	8.1
West LDU	Nickel	0.81	0.89
DUP 3-18-22	Nickel	0.83	0.88
STP-1 to EP-2	Silver	ND	0.0014
East LDU	Vanadium	0.14	0.16
West LDU	Vanadium	0.066	0.071
DUP 3-18-22	Vanadium	0.067	0.069
EB 3-18-22	Zinc	ND	0.0068
West LDU	Zinc	ND	0.0080
DUP 3-18-22	Zinc	ND	0.012

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Client Sample ID: West LDU Field Duplicate Sample ID: DUP 3-18-22				
Analyte	Method	Laboratory Result	Duplicate Result	Relative Percent Difference (RPD)
Barium, Dissolved	E 200.7	0.068 mg/L	0.069 mg/L	1.5%
Barium, Total	E 200.7	0.066 mg/L	0.068 mg/L	3.0%
Beryllium, Dissolved	E 200.7	ND (0.0020 mg/L)	0.00090 mg/L	DL
Cadmium, Dissolved	E 200.7	0.012 mg/L	0.013 mg/L	8.0%
Cadmium, Total	E 200.7	0.0047 mg/L	0.0055 mg/L	15.7%
Chromium, Dissolved	E 200.7	0.14 mg/L	0.14 mg/L	0.0%
Chromium, Total	E 200.7	0.32 mg/L	0.32 mg/L	0.0%
Cobalt, Dissolved	E 200.7	0.013 mg/L	0.014 mg/L	7.4%
Cobalt, Total	E 200.7	0.0061 mg/L	0.0069 mg/L	12.3% +/-RL
Nickel, Dissolved	E 200.7	0.89 mg/L	0.88 mg/L	1.1%
Nickel, Total	E 200.7	0.81 mg/L	0.83 mg/L	2.4%
Vanadium, Dissolved	E 200.7	0.071 mg/L	0.069 mg/L	2.9% +/-RL
Vanadium, Total	E 200.7	0.066 mg/L	0.067 mg/L	1.5% +/-RL
Zinc, Dissolved	E 200.7	0.0080 mg/L	0.012 mg/L	40.0% +/-RL
Arsenic, Total	E200.8	0.00068 mg/L	0.00064 mg/L	6.1% +/-RL
TPH DRO	SW8015	2.0 mg/L	2.4 mg/L	18.2%
TPH GRO	SW8015	0.28 mg/L	0.27 mg/L	3.6%
TPH ORO	SW8015	ND (0.080 mg/L)	0.12 mg/L	DL
1,1-Dichloroethene	SW8260B	0.53 µg/L	ND (1.0 µg/L)	DL
1,2,4-Trimethylbenzene	SW8260B	0.51 µg/L	0.46 µg/L	10.3% +/-RL
1,3,5-Trimethylbenzene	SW8260B	4.8 µg/L	4.7 µg/L	2.1%
Benzene	SW8260B	13 µg/L	12 µg/L	8.0%
Chloromethane	SW8260B	0.83 µg/L	0.85 µg/L	2.4% +/-RL
Ethylbenzene	SW8260B	6.0 µg/L	5.8 µg/L	3.4%
Isopropylbenzene	SW8260B	0.94 µg/L	0.90 µg/L	4.3% +/-RL
MTBE	SW8260B	4.9 µg/L	4.8 µg/L	2.1%
n-Propylbenzene	SW8260B	0.65 µg/L	0.59 µg/L	9.7% +/-RL
p-Isopropyltoluene	SW8260B	0.36 µg/L	0.36 µg/L	0.0% +/-RL
sec-Butylbenzene	SW8260B	0.25 µg/L	0.22 µg/L	12.8% +/-RL
Toluene	SW8260B	0.82 µg/L	0.70 µg/L	15.8% +/-RL
Trichloroethene	SW8260B	0.58 µg/L	ND (1.0 µg/L)	DL
Xylenes, Total	SW8260B	0.52 μg/L	0.51 µg/L	1.9% +/-RL
1,4-Dioxane	SW8270C	8.0 µg/L	ND (10 μg/L)	DL
Naphthalene	SW8270C	0.16 µg/L	ND (1.0 µg/L)	DL
Pyrene	SW8270C	0.16 µg/L	ND (2.0 µg/L)	DL

### FIELD DUPLICATE SUMMARY

Field duplicate RPD control limits are not to exceed 30% for water as established by USEPA Region I - New England Environmental Data Review Supplement for Region 1 Data Review Elements and Superfund Specific Guidance/Procedures, EQADR-Supplement2, September 2020.



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DL – Indicates that the analyte was detected in one of the duplicate samples and was undetected in the other sample, and therefore an RPD could not be calculated. Data were not qualified since the detection was within two times the reporting limit. Non-detected results are indicated above with the applicable reporting limit as ND (RL).

+/-RL – Indicates that the detections in both of the samples were within two times the reporting limit. Qualification of data was not required.

The RPD value could not be calculated for 1,4-dioxane for the field duplicate pair West LDU and DUP 3-18-22 since the analyte was detected in the parent sample and was undetected in the duplicate sample. As the detection in the parent sample was greater than two times the reporting limit, 1,4-dioxane was qualified as J and UJ for the parent and duplicate samples, respectively.



Abbreviation	Reason
EBD	Equipment blank detection
ERPD-FD	High field duplicate RPD.
HT-AN	Sample was analyzed outside of the method holding time.
LR-SUR	The surrogate percent recovery was less than the lower acceptable limit indicating a possible low bias.
HR-SUR	The surrogate percent recovery was greater than the upper acceptable limit indicating a possible high bias.
MBD	Method blank detection
MDLRL	Flagged by the laboratory: The result was greater than the MDL but less than the RL.

### DATA QUALIFICATION SUMMARY

Analyte	Method	Field Sample ID	Lab Sample ID	Result	Limit	Units	Reviewer Qualifier	DV Flag Reasons
1,1-Dichloroethene	SW8260B	West LDU	2203a72-003a	0.53	1.0	µg/L	J	MDLRL
1,2,4-Trimethylbenzene	SW8260B	West LDU	2203a72-003a	0.51	1.0	µg/L	J	MDLRL
1,2,4-Trimethylbenzene	SW8260B	DUP 3-18-22	2203a72-006a	0.46	1.0	µg/L	J	MDLRL
1,4-Dioxane	SW8270C	West LDU	2203a72-003c	8.0	1.0	µg/L	J	ERPD-FD
1,4-Dioxane	SW8270C	DUP 3-18-22	2203a72-006c	ND	10	µg/L	UJ	ERPD-FD
2,4,6-Trichlorophenol	SW8270C	East LDU	2203a72-002c	ND	5.0	µg/L	UJ	LR-SUR
2,4-Dimethylphenol	SW8270C	East LDU	2203a72-002c	5.7	5.0	µg/L	J-	LR-SUR
2,4-Dinitrophenol	SW8270C	East LDU	2203a72-002c	ND	5.0	µg/L	UJ	LR-SUR
2-Butanone	SW8260B	East LDU	2203a72-002a	27	100	µg/L	J	MDLRL
2-Methylphenol	SW8270C	East LDU	2203a72-002c	7.7	5.0	µg/L	J-	LR-SUR
3,4-Methylphenol	SW8270C	East LDU	2203a72-002c	7.1	5.0	µg/L	J-	LR-SUR
Acetone	SW8260B	STP-1 to EP-2	2203a72-004a	3.4	10	µg/L	J	MDLRL
Arsenic, Dissolved	E200.8	East LDU	2203A72-002E	0.00087	0.0050	mg/L	J	MDLRL
Arsenic, Total	E200.8	East LDU	2203A72-002D	0.0012	0.0050	mg/L	J	MDLRL
Arsenic, Total	E200.8	West LDU	2203A72-003D	0.00068	0.0050	mg/L	J	MDLRL



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Analyte	Method	Field Sample ID	Lab Sample ID	Result	Limit	Units	Reviewer Qualifier	DV Flag Reasons
Arsenic, Total	E200.8	DUP 3-18-22	2203A72-006D	0.00064	0.0050	mg/L	J	MDLRL
Beryllium, Dissolved	E 200.7	DUP 3-18-22	2203A72-006E	0.0009	0.0020	mg/L	J	MDLRL
Chloromethane	SW8260B	EB 3-18-22	2203a72-001a	0.67	3.0	µg/L	U	MBD, MDLRL
Chloromethane	SW8260B	East LDU	2203a72-002a	7.0	30	µg/L	U	MBD, MDLRL
Chloromethane	SW8260B	West LDU	2203a72-003a	0.83	3.0	µg/L	U	MBD, MDLRL
Chloromethane	SW8260B	STP-1 to EP-2	2203a72-004a	0.69	3.0	µg/L	U	MBD, MDLRL
Chloromethane	SW8260B	DUP 3-18-22	2203a72-006a	0.85	3.0	µg/L	U	MBD, MDLRL
Chloromethane	SW8260B	Trip Blank	2203a72-007a	0.67	3.0	µg/L	U	MBD, MDLRL
Cobalt, Dissolved	E 200.7	STP-1 to EP-2	2203A72-004E	0.0028	0.0060	mg/L	J	MDLRL
Cobalt, Total	E 200.7	STP-1 to EP-2	2203A72-004D	0.0042	0.0060	mg/L	J	MDLRL
Isopropylbenzene	SW8260B	East LDU	2203a72-002a	8.1	10	µg/L	J	MDLRL
Isopropylbenzene	SW8260B	West LDU	2203a72-003a	0.94	1.0	µg/L	J	MDLRL
Isopropylbenzene	SW8260B	DUP 3-18-22	2203a72-006a	0.90	1.0	µg/L	J	MDLRL
Lead, Dissolved	E200.8	East LDU	2203A72-002E	0.0014	0.0025	mg/L	J	MDLRL
Lead, Total	E200.8	STP-1 to EP-2	2203A72-004D	0.00017	0.00050	mg/L	J	MDLRL
Mercury, Dissolved	E245.1	East LDU	2203A72-002E	0.00010	0.00020	mg/L	J	MDLRL
n-Butylbenzene	SW8260B	East LDU	2203a72-002a	3.0	30	µg/L	J	MDLRL
n-Propylbenzene	SW8260B	West LDU	2203a72-003a	0.65	1.0	µg/L	J	MDLRL
n-Propylbenzene	SW8260B	DUP 3-18-22	2203a72-006a	0.59	1.0	µg/L	J	MDLRL
Phenol	SW8270C	East LDU	2203a72-002c	5.9	5.0	µg/L	J-	LR-SUR
p-Isopropyltoluene	SW8260B	East LDU	2203a72-002a	3.2	10	µg/L	J	MDLRL
p-Isopropyltoluene	SW8260B	West LDU	2203a72-003a	0.36	1.0	µg/L	J	MDLRL
p-Isopropyltoluene	SW8260B	DUP 3-18-22	2203a72-006a	0.36	1.0	µg/L	J	MDLRL
Pyrene	SW8270C	West LDU	2203a72-003c	0.16	0.20	µg/L	J	MDLRL
sec-Butylbenzene	SW8260B	East LDU	2203a72-002a	3.1	10	µg/L	J	MDLRL
sec-Butylbenzene	SW8260B	West LDU	2203a72-003a	0.25	1.0	µg/L	J	MDLRL
sec-Butylbenzene	SW8260B	DUP 3-18-22	2203a72-006a	0.22	1.0	µg/L	J	MDLRL



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Analyte	Method	Field Sample ID	Lab Sample ID	Result	Limit	Units	Reviewer Qualifier	DV Flag Reasons
Selenium, Dissolved	E200.8	STP-1 to EP-2	2203A72-004E	0.00084	0.0010	mg/L	J	MDLRL
Silver, Dissolved	E 200.7	STP-1 to EP-2	2203A72-004E	0.0014	0.0050	mg/L	J	MDLRL
Toluene	SW8260B	West LDU	2203a72-003a	0.82	1.0	µg/L	J	MDLRL
Toluene	SW8260B	DUP 3-18-22	2203a72-006a	0.70	1.0	µg/L	J	MDLRL
TPH DRO	SW8015	EB 3-18-22	2203A72-001C	0.023	0.064	mg/L	J	MDLRL
TPH DRO	SW8015	DUP 3-18-22	2203a72-006C	2.40	0.64	mg/L	J+	HR-SUR
TPH ORO	SW8015	DUP 3-18-22	2203a72-006C	0.12	0.08	mg/L	J+	HR-SUR
TPH GRO	SW8015	West LDU	2203a72-003a	0.28	0.050	mg/L	JB	MBD
TPH GRO	SW8015	DUP 3-18-22	2203a72-006a	0.27	0.050	mg/L	JB	MBD
TPH GRO	SW8015	EB 3-18-22	2203a72-001a	0.034	0.050	mg/L	U	MBD, MDLRL
TPH GRO	SW8015	STP-1 to EP-2	2203a72-004a	0.044	0.050	mg/L	U	MBD, MDLRL
TPH GRO	SW8015	FB 3-18-22	2203a72-005a	0.032	0.050	mg/L	U	MBD, MDLRL
TPH GRO	SW8015	Trip Blank	2203a72-007a	0.035	0.050	mg/L	U	MBD, MDLRL
Trichloroethene	SW8260B	West LDU	2203a72-003a	0.58	1.0	ug/L	J	MDLRL
Xylenes, Total	SW8260B	West LDU	2203a72-003a	0.52	1.5	ug/L	J	MDLRL
Xylenes, Total	SW8260B	DUP 3-18-22	2203a72-006a	0.51	1.5	ug/L	J	MDLRL
Zinc, Dissolved	E 200.7	STP-1 to EP-2	2203A72-004E	0.029	0.010	mg/L	JB	EBD
Zinc, Dissolved	E 200.7	DUP 3-18-22	2203A72-006E	0.012	0.010	mg/L	JB	EBD
Zinc, Dissolved	E 200.7	West LDU	2203A72-003E	0.0080	0.010	mg/L	U	EBD, MDLRL
Zinc, Dissolved	E 200.7	EB 3-18-22	2203A72-001E	0.0068	0.010	mg/L	J	MDLRL



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Client: Marathon Oil	Laboratory: Hall Environmental Analysis Laboratory					
Project Name: Western Refining Southwest, Q1 GW Sampling	Sample Matrix: Groundwater					
Project Number: 697-080-002 Task: 0006	Sample Start Date: 03/22/2022					
Date Validated: 07/13/2022	Sample End Date: 03/22/2022					
Parameters Included:						
<ul> <li>Volatile Organic Compounds (VOCs) by Environmental P Waste (SW-846) Method 8260B</li> </ul>	rotection Agency (EPA) Test Methods for Evaluating Solid					
<ul> <li>1,2-Dibromoethane (EDB) by EPA Method 504.1</li> </ul>						
<ul> <li>Semivolatile Organic Compounds (SVOCs) by SW-846 Method 8270C and Method 8270C with Selected Ion Monitoring (SIM)</li> </ul>						
<ul> <li>Total Petroleum Hydrocarbons (TPH) Gasoline Range Or</li> </ul>	ganics (GRO) by SW-846 Method 8015D					
<ul> <li>TPH Diesel Range Organics (DRO) and Motor Oil Range</li> </ul>	Organics (MRO) by SW-846 Method 8015D Modified					
<ul> <li>Total and Dissolved Metals by EPA Method 200.7 and Method</li> </ul>	ethod 200.8					
<ul> <li>Total and Dissolved Mercury by EPA Method 245.1</li> </ul>						
<ul> <li>Cyanide by Standard Methods for the Examination of Wat</li> </ul>	ter and Wastewater (SM) Method 4500 CN E					
Laboratory Project ID: 2203B95	Laboratory Project ID: 2203B95					
Data Validator: Daran O'Hollearn, Lead Project Scientist						
Reviewer: Mike Phillips, Senior Chemist						

### DATA EVALUATION CRITERIA SUMMARY

A Tier II Data Validation was performed by Trihydro Corporation's Chemical Data Evaluation Services Group on the analytical data report packages generated by Hall Environmental Analysis Laboratory of Albuquerque, New Mexico, with additional data from Pace Analytical National of Mount Juliet, Tennessee evaluating samples from the Marathon Oil site, located in Gallup, New Mexico.

Precision, accuracy, method compliance, and completeness of this data package were assessed during this data review. Precision was determined by evaluating the calculated relative percent difference (RPD) values from:

- Field duplicate pairs
- Laboratory duplicate pairs
- Matrix spike (MS) and matrix spike duplicate (MSD) pairs
- Laboratory control sample (LCS) and laboratory control sample duplicate (LCSD) pairs

Laboratory accuracy was established by reviewing the demonstrated percent recoveries (%R) of the following items to verify that data are not biased.

- MS/MSD samples
- LCS/LCSD samples
- Organic system monitoring compounds (surrogates)



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Field accuracy was established by collecting and analyzing the following samples to monitor for possible ambient or cross contamination during sampling and transportation.

- Trip blanks
- Field blanks
- Equipment blanks

Method compliance was established by reviewing sample integrity, holding times, detection limits, surrogate recoveries, laboratory blanks, initial and continuing calibrations (where applicable), and the LCS/LCSD percent recoveries against method-specific requirements.

Completeness was evaluated by determining the overall ratio of the number of samples and analyses planned versus the number of samples with valid analyses. Determination of completeness included a review of the chain-of-custody (CoC), laboratory analytical methods, and other laboratory and field documents associated with this analytical data set.

Client Sample ID	Laboratory Sample Number
EB 3-22-22	2203B95-001
OW-70	2203B95-002
OW-12A	2203B95-003
KA-3	2203B95-004
NAPIS-3	2203B95-005
NAPIS-2	2203B95-006
OAPIS-1	2203B95-007
DUP-3-22-22	2203B95-008
FB-3-22-22	2203B95-009
Trip Blank	2203B95-010

### SAMPLE NUMBERS TABLE





The laboratory data were reviewed to evaluate compliance with the methods and the quality of the reported data. Assessment of CoC completeness is included in Item 3 of the Data Validation Checklist. A check mark ( $\checkmark$ ) indicates that the referenced validation criteria were deemed acceptable, whereas a crossed circle ( $\otimes$ ) indicates validation criteria for which the data have been qualified by the data validator. An empty circle (O) indicates that the specified criterion does not apply to the reviewed data. Details are noted in the tables below.

#### Validation Criteria

- ✓ Data Completeness
- ✓ CoC Documentation (Item 3)
- ✓ Holding Times and Preservation (Items 6 and 7)
- O Initial and Continuing Calibrations (Items 9 and 10)
- ⊗ Laboratory Blanks (Items 11 and 12)
- ⊗ MS/MSD (Items 13 and 14)
- ⊗ LCS/LCSD (Items 15 and 16)
- System Monitoring Compounds (i.e., Surrogates and Internal Standards) (Item 17)
- 8 Field, Equipment, and Trip Blanks (Items 18 and 19)
- ⊗ Field Duplicates (Items 20 and 21)
- ✓ Laboratory Duplicates (Item 22)

### **Guidance References**

Chemical data validation was conducted in accordance with the United States Environmental Protection Agency (USEPA) Contract Laboratory Program (CLP) National Functional Guidelines for the analyses listed below, or by the appropriate method if not covered in the National Functional Guidelines.

- Data for organic analyses were evaluated according to validation criteria set forth in the USEPA CLP National Functional Guidelines for Organic Superfund Methods Data Review, document number EPA-540-R-20-005, November 2020 with additional reference to the USEPA CLP National Functional Guidelines for Organic Data Review, document number EPA 540/R-99/008, October 1999.
- Data for inorganic analyses were evaluated according to validation criteria set forth in the USEPA CLP National Functional Guidelines for Inorganic Superfund Methods Data Review, document number EPA-540-R-20-006, November 2020 with additional reference to the USEPA CLP National Functional Guidelines for Inorganic Data Review, document number EPA 540-R-04-004, October 2004.
- Review of field duplicates was conducted according to the USEPA Region I New England Environmental Data Review Supplement for Region 1 Data Review Elements and Superfund Specific Guidance/Procedures, EQADR-Supplement2, September 2020.
- Trihydro Data Validation Variance Documentation, April 2022.



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### **OVERALL DATA PACKAGE ASSESSMENT**

Based on a data validation review, the data are acceptable as delivered. Data qualified by the laboratory are discussed in Item 2 of the Validation Criteria Checklist.

The purpose of validating data and assigning qualifiers is to assist in proper data interpretation. Data that are not qualified meet the site data quality objectives. If values are assigned qualifiers other than an R (rejected, data not usable), the data may be used for site evaluation; however, consideration should be given to the reasons for qualification when interpreting sample concentrations. Data points that are assigned an R qualifier should not be used for site evaluation purposes.

If applicable, text was identified in **bold font** in the Validation Criteria Checklist to indicate that further action and/or qualification of the data were required. Data may have been qualified with J data flags by the laboratory if the result was greater than or equal to the method detection limit (MDL) but less than the reporting limit (RL). These laboratory-applied J flags were preserved, if present, and included in the Data Qualification Summary table at the end of this report. If applicable, data validation qualifiers were added for the items noted with crossed circles in the Validation Criteria section above. Please see the Data Qualification Summary table at the end of this report.

If data would be qualified with more than one flag, one qualifier was assigned based on the severity; however, all reasons for qualification were retained. Data that would be qualified with both J+ and J- flags were evaluated based on validation criteria and assigned the appropriate flag. The hierarchy of qualifiers from the most to least severe is as follows:

Data qualifiers used during this validation are included in the following table.

<u>Qualifier</u>	Definition
J	Estimated concentration
J+	The result is an estimated concentration, but may be biased high
J-	The result is an estimated concentration, but may be biased low
UJ	Estimated reporting limit
U	Evaluated to be undetected at the reporting limit
JB	Estimated concentration due to blank contamination

### **Data Completeness**

The analyses were performed as requested on the CoC records. The associated samples were received by the laboratory and analyzed properly unless otherwise noted in the Criteria Checklist below. The complete data package consisted of 630 data points. The data completeness calculation does not include any submitted blank sample results. Data points were not rejected. The data completeness measure for this data package is calculated to be 100% and is acceptable.



			RITERIA CHECKI IST						
1 Was the r									
Comments: 11	ne laboratory	roted the following analytical no	on-conformance related to this d	ata set.					
Method 8270C Insufficient sar	<u>SIM</u> : The c nple extract	hrysene-d₁₂ internal standard are remained for reanalysis.  This sa	ea count for only the equipment mple is non-detect for all PAH c	blank was slightly ompounds.	out of range.				
Method 8270C	: "S" flagge	d surrogates denote low surrogat	te recoveries due to matrix inter	ferences/sample d	lilution.				
1-methylphthal concentration f	ene was rep or sample N	oorted by EPA Method 8270 inste IAPIS-2.	ad of EPA Method 8270 SIM be	ecause of its eleva	ted				
2. Were the data free of data qualification flags and/or notes used by the laboratory? No If no, define.									
Comments: Th	ne laboratory	y used the following data qualifica	ation flags with this data set.						
E – Estimated qualification of	value. This sample data	laboratory flag was applied only a a was not required.	to QC sample and surrogate res	sults in the laborate	ory report, and				
J – Analyte det	ected below	quantitation limits							
J3 – The asso	ciated batch	QC was outside the established	quality control range for precisio	on.					
J6 – The samp	le matrix inte	erfered with the ability to make ar	ny accurate determination; spike	e value is low.					
R – RPD outsi	R – RPD outside of range.								
S – % Recover	y outside of	range due to dilution or matrix in	terference.						
* – Value exce	eds maximu	m contaminant level.							
3. Were sam	ple CoC for	ms and custody procedures comp	olete?	Yes	3				
Comments: Th and laboratory samples were	ne CoC reco personnel s delivered to	rds from field to laboratory were ignatures, dates, and times of rec the laboratory by courier, and cu	complete, and custody was mai ceipt. Custody seals were not p stody was maintained at all time	ntained as evidend resent or required es.	ced by field since the				
4. Were dete	ction limits i	n accordance with the quality ass	surance project plan (QAPP),	Yes	6				
permit, or	method, or i	ndicated as acceptable?							
Comments: Th	ne detection	limits appeared to be acceptable	e. The following dilutions were a	pplied.					
	Method	Sample(s)	Analyte(s)	Dilution Factor					
	200.7	OW-12A, NAPIS-3, NAPIS-2	Total and Dissolved Barium	5					
	200.8	OAPIS-1	Dissolved Metals	5					
	200.8	OW-12A, KA-3, OAPIS-1	Total Metals	5					
	8015D	OAPIS-1	GRO, DRO MRO	5					
	8260B	OAPIS-1	VOCs	5					
	200.7	NAPIS-2	Total Barium	10					
	8015D	NAPIS-2	GRO	10					
	8260B	OW-12A	Select VOCs	10					
L	8260B	NAPIS-2	VOCs	10					

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VALIDATION CRITERIA CHECKLIST	
5. Were the reported analytical methods and constituents in compliance with the QAPP, permit, or CoC?	No
Comments: The reported analytical methods were in compliance with the CoC, and the laboratory reports constituents in accordance with the CoC, with the following exceptions.	orted the requested
The CoC requested total and dissolved metals using Method 200.7; however, the laboratory analyzed t both Method 200.7 and Method 200.8. This substituted analytical method, Method 200.8, met similar s and precision goals and, therefore, was an acceptable replacement.	he samples using ensitivity, accuracy,
The CoC requested cyanide using Method 335.4; however, the laboratory analyzed the samples using This substituted analytical method met similar sensitivity, accuracy, and precision goals and, therefore, replacement.	Method 4500 CN E. was an acceptable
6. Were samples received in good condition within method-specified requirements?	No
Comments: Samples were received on ice, in good condition, and with the cooler temperatures outside temperature range of 4°C ± 2°C between 0.1°C and 0.9°C as noted on the CoC and the <i>Sample Log-in</i> Samples transferred to Pace National were received in good condition with the cooler temperature outs recommended range at 1.9°C as noted on the CoC. The cooler temperatures below 2.0°C were judged since the laboratory did not report the sample containers as broken or frozen.	e the recommended <i>Check List.</i> ide the d as acceptable
7. Were samples extracted/digested and analyzed within method-specified or technical holding times?	Yes
Comments: The samples were extracted/digested and analyzed within method-specific holding times.	
8. Were reported units appropriate for the sample matrix/matrices and analytical method(s)? Specify if wet or dry units were used for soil.	Yes
Comments: The results were reported in concentration units of micrograms per liter ( $\mu$ g/L) and milligram which were acceptable for the sample matrix and the analyses requested.	ms per liter (mg/L),
9. Did the laboratory provide any specific initial and/or continuing calibration results?	No
Comments: Initial and continuing calibration data were not included as part of this data set.	
10. If initial and/or continuing calibration results were provided, were the results within acceptable limits?	N/A
Comments: Initial and continuing calibration data were not included as part of this data set.	
11. Was the total number of laboratory blank samples prepared equal to at least 5% of the total number of samples or analyzed as required by the method?	Yes
Comments: The total number of laboratory blank samples prepared was equal to at least 5% of the total samples.	al number of



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#### VALIDATION CRITERIA CHECKLIST 12. Were target analytes reported as not detected in the laboratory blanks? No Comments: Target analytes were reported as not detected in the laboratory blanks, with the following exceptions. Method Batch Concentration Analyte **Total Mercury** 245.1 66396 0.00014 mg/L DRO 8015D 66385 0.044 mg/L 8260B Chloromethane R86734 0.66 µg/L 8015D GRO G86734 0.041 mg/L Detections of chloromethane and GRO in the associated samples that were less than the blank results and/or less than the applicable reporting limits were assigned U qualifiers. Detections of GRO in the associated samples that were greater than the reporting limits but less than or equal to 10 times the blank results were assigned JB qualifiers. Non-detections of the identified analytes in the associated samples and detections that were above the reporting limit and greater than ten times the blank concentration did not require qualification. Yes 13. Was the total number of MS samples prepared equal to at least 5% of the total number of samples or analyzed as required by the method? Comments: The total number of matrix spike samples prepared was equal to at least 5% of the total number of samples, although MS samples were not prepared/reported for all analyses and/or batch. The matrix spike sample source for each analytical batch in this sample set has been indicated below. Method Analytes Batch MS Sample Source 200.7 **Total Metals** 66643 Not Prepared 200.7 Total Metals 66644 Not Prepared 200.7 **Dissolved Metals** B86739 Not Prepared 200.8 Total Metals 66440 EB 3-22-22 200.8 EB 3-22-22, OW-70 **Dissolved Metals** B86714 245.1 **Total Mercury** 66396 DUP-3-22-22 245.1 **Dissolved Mercury** 66455 Not Prepared 504.1 EDB Not Prepared 66393 4500CN E Cyanide WG1838531 Not Associated, OW-12A 4500CN E Cyanide WG1839312 Not Associated 8015D TPH DRO and MRO 66372 Not Prepared 8015D TPH DRO and MRO 66385 Not Prepared 8015D TPH GRO G86734 **OW-12A** 8260B VOCs R86734 OW-70 8260B VOCs R86760 Not Prepared 8270C SVOCs 66355 Not Prepared 8270C SIM **SVOCs** R86800 Not Prepared Not Associated - The MS sample source was not associated with this project. Not Prepared – Matrix spikes were not prepared/reported for this batch.



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	VALIDATION CRITERIA CHECKLIST								
14. For M withir	14. For MS/MSDs prepared from project samples, were percent recoveries and RPDs within data validation or laboratory quality control (QC) limits?       No								
Comment limits, with	Comments: The MS/MSD percent recoveries and RPDs for project samples were within data validation and laboratory QC limits, with the following exception.								
The MSD was dete	recovery for GRO in M cted in the associated	/lethod 801 samples, a	5D batch G86 and these resu	734 was outside Ilts were qualifie	e the QC limits of 70 ed as J- due to poss	-130% at 64.3% sible low bias.	6. GRO		
The perce but data v	ent recoveries and RPD vere not qualified based	values for N on those re	MS/MSDs prep esults since ma	ared from non-pro trix similarity to p	oject samples were e roject samples could	evaluated and co not be guarante	onsidered, eed.		
15. Was samp	the total number of LCS les or analyzed as requ	s analyzed ired by the	equal to at leas method?	st 5% of the total	number of	Yes			
Comment	s: The total number of l	LCS sample	es analyzed wa	is equal to at leas	st 5% of the total num	nber of samples.			
16. Were labor	LCS/LCSD percent rec atory QC limits?	overies and	LCS/LCSD R	PDs within data v	alidation or	No			
Comment limits, with	s: The LCS and LCSD the following exceptior	percent rec ıs.	overies and LC	S/LCSD RPDs w	vere within data valid	ation and labora	atory QC		
Method	Analyte	<u>Batch</u>	LCS Recovery	LCSD Recovery	LCS/LCSD QC	LCS/LCSD RPD	RPD QC		
200.7	Dissolved Cadmium	B86739	132%		70-130%				
200.7	Total Nickel	66643	69.0%		70-130%				
200.7	Total Nickel	66644	67.0%		70-130%				
8015D	DRO	66385	107%	Acceptable	31.7%-75.4%	56.8%	20%		
The associated high bias. The DRO high bias Associated concentration flag due f	The associated sample results were non-detections for dissolved cadmium and did not require qualification due to potential high bias. The DRO results were detections in the associated samples, and these results were qualified as J+ due to potential high bias. These associated DRO results were also qualified as J due to evidence of poor precision. Associated samples with detections for total nickel were qualified with J- flags to indicate estimated concentrations, and the associated sample EB 3-22-22 with a non-detection for total nickel was qualified with a UJ flag due to potential nickel was qualified with a UJ flag to non-detection for total nickel w								
17. Were	surrogate recoveries w	ithin labora	tory QC limits?			No			
Comment	s: Surrogate recoveries	s were withi	n laboratory Q(	C limits, with the f	ollowing exceptions.				
Since Mel target ana base/neut sample da	Since Method 8270 surrogate associations were not available from the laboratory, qualification was assigned to all of the target analytes in a given fraction (acid or base/neutral) when two or more surrogates from the same fraction (acid or base/neutral) were outside the acceptance range. This condition did not exist for the sample OW-12A, and qualification of sample data was not required.								
The 8270 associate results w	The 8270C SIM internal standard chrysene-d <sub>12</sub> was outside the acceptance range in sample EB 3-22-22. The associated analytes (benzo(a)anthracene, chrysene, and pyrene) were not detected in sample EB 3-22-22, and the results were assigned UJ qualifiers.								
Qualification of sample data was not required based on surrogate non-conformances in QC samples as the environmental samples were evaluated based on their specific surrogate recoveries.									
<b>7</b> Te	ihudro								

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### VALIDATION CRITERIA CHECKLIST

18. Were the number of trip blank, field blank, and/or equipment blank samples collected equal to at least 10% of the total number of samples or as required by the project guidelines, QAPP, SAP, or permit?

Comments: The number of trip, field, and equipment blanks collected was equal to at least 10% of the number of samples. One trip blank sample, Trip Blank, one field blank sample, FB-3-22-22, and one equipment blank sample, EB 3-22-22, were collected as part of this sample set.

19. Were target analytes reported as not detected in the trip blank, field blank, and/or equipment blank samples?

No

Yes

Comments: Target analytes were not detected in the trip blank, field blank, and equipment blank samples with the following exceptions.

Blank Sample ID	<u>Method</u>	<u>Analyte</u>	<u>Concentration</u>
Trip Blank	8260B	Chloromethane	0.70 µg/L
FB-3-22-22	8260B	1,2-Dichloroethane	0.42 μg/L
FB-3-22-22	8260B	2-Butanone	4.6 μg/L
FB-3-22-22	8260B	Chloromethane	0.76 µg/L
Blank Sample ID	Method	Analyte	<u>Concentration</u>
EB 3-22-22	200.7	Dissolved Zinc	0.0065 mg/L
EB 3-22-22	200.8	Total Lead	0.00027 mg/L
EB 3-22-22	8015D	DRO	0.026 mg/L
EB 3-22-22	8015D	GRO	0.034 mg/L
EB 3-22-22	8260B	2-Butanone	6.1 µg/L
EB 3-22-22	8260B	Chloromethane	0.88 µg/L

Detections of 1,2-dichloroethane, 2-butanone, and dissolved zinc in the associated samples that were less than the applicable reporting limits were assigned U qualifiers. Detections of dissolved zinc and total lead in the associated samples that were greater than the reporting limits but less than 10 times the blank results were assigned JB qualifiers. Non-detections of the identified analytes in the associated samples and detections that were above the reporting limit and greater than ten times the blank concentration did not require qualification.

The chloromethane and GRO results were previously qualified due to laboratory blank contamination in batches R86734 and G86734; therefore, additional qualification due to the trip, field, and equipment blank contamination was not required.

20. Was the number of field duplicates collected equal to at least 10% of the total number of samples or as required by the project guidelines, QAPP, SAP, or permit?

Comments: The number of field duplicates collected was equal to at least 10% of the number of samples. Sample DUP-3-22-22 was collected as a field duplicate of sample OW-70.



Yes

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### VALIDATION CRITERIA CHECKLIST

21. Were field duplicate RPD values within data validation QC limits (soil 0-50%, water 0-30%, or air 0-25%)?

Comments: As indicated in the Field Duplicate Summary Table at the end of this report, field duplicate RPD values were within data validation QC limits of 0-30% for water samples, with the following exceptions.

RPD values could not be calculated for acenaphthene and anthracene for the field duplicate pair OW-70 and DUP-3-22-22 since the analytes were detected in the duplicate sample and were undetected in the parent sample. As the detections in the duplicate sample were greater than two times the reporting limits, acenaphthene and anthracene were qualified as J and UJ for the duplicate and parent samples, respectively.

The RPD value for naphthalene exceeded the data validation limit of 30% at 36.4%, which was evidence of poor precision. The naphthalene results were qualified as J for samples OW-70 and DUP-3-22-22.

22. For laboratory duplicates prepared from project samples, were RPDs within laboratory QC limits?

Yes

No

Comments: Laboratory duplicates were prepared for these analyses, and the laboratory duplicate sample sources are summarized in the following table.

<u>Method</u>	<u>Analytes</u>	<u>Batch</u>	Laboratory Duplicate Sample Source
4500CN E	Cyanide	WG1838531	Not Associated, EB 3-22-22
4500CN E	Cyanide	WG1839312	Not Associated, DUP-3-22-22

Not Associated - The laboratory duplicate sample source was not associated with this project.

The RPDs for the laboratory duplicates prepared from project samples were not applicable since the results for one or both measurements were within 5 times the reporting limit.

The RPD values for the laboratory duplicate samples prepared from non-project samples were evaluated and considered, but data were not qualified based on these results since matrix similarity to project samples could not be guaranteed.



VALIDATION CRITERIA CHECKLIST	
23. Were the following data relationships realistic?	
• Target analytes were reported by more than one method (e.g., 8260/8270, EPH/8270)?	N/A
Comments: Target analytes were not reported by more than one method in this data set.	
<ul> <li>Both total and dissolved metals analyses were performed, and the total metals results were greater than or equal to the dissolved metals results?</li> </ul>	No

Comments: The following table contains the exceptions in which the dissolved metals results exceeded the total metals results. The EPA has not provided guidance or requirements for the evaluation, validation, and qualification of dissolved metals results that exceed the corresponding total metals results. Therefore, qualification of results was not performed based on these data.

Sample ID	Analyte	<u>Total Result</u> (mg/L)	Dissolved Result (mg/L)
OW-70	Antimony	ND	0.00049
OW-12A	Antimony	ND	0.00070
KA-3	Arsenic	0.00077	0.00087
OAPIS-1	Cobalt	0.010	0.011
OAPIS-1	Lead	0.0055	0.0059
OW-70	Nickel	0.047	0.048
KA-3	Nickel	0.022	0.027
NAPIS-3	Nickel	0.025	0.028
NAPIS-2	Nickel	0.053	0.056
DUP-3-22-22	Nickel	0.046	0.048
EB 3-22-22	Zinc	ND	0.0065
KA-3	Zinc	0.0075	0.012
OAPIS-1	Zinc	0.019	0.025



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FIELD D	UPLICATE	SUMMARY
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Client Sample ID: OW-70 Field Duplicate Sample ID: DUP-3-22-22									
Analyte	Method	Laboratory Result	Duplicate Result	Relative Percent Difference (RPD)					
Barium, Dissolved	E 200.7	0.54 mg/L	0.55 mg/L	1.8%					
Barium, Total	E 200.7	0.92 mg/L	0.83 mg/L	10.3%					
Chromium, Total	E 200.7	0.010 mg/L	0.0081 mg/L	21.0% +/-RL					
Cobalt, Dissolved	E 200.7	0.0070 mg/L	0.0078 mg/L	10.8% +/-RL					
Cobalt, Total	E 200.7	0.011 mg/L	0.010 mg/L	9.5% +/-RL					
Nickel, Dissolved	E 200.7	0.048 mg/L	0.048 mg/L	0.0%					
Nickel, Total	E 200.7	0.047 mg/L	0.046 mg/L	2.2%					
Vanadium, Dissolved	E 200.7	0.0035 mg/L	0.0037 mg/L	5.6% +/-RL					
Vanadium, Total	E 200.7	0.018 mg/L	0.015 mg/L	18.2% +/-RL					
Zinc, Dissolved	E 200.7	0.0086 mg/L	0.010 mg/L	15.1% +/-RL					
Zinc, Total	E 200.7	0.014 mg/L	0.012 mg/L	15.4% +/-RL					
Antimony, Dissolved	E200.8	0.00049 mg/L	ND (0.0010 mg/L)	DL					
Arsenic, Dissolved	E200.8	0.0015 mg/L	0.0013 mg/L	14.3% +/-RL					
Arsenic, Total	E200.8	0.0038 mg/L	0.0034 mg/L	11.1%					
Lead, Dissolved	E200.8	0.00019 mg/L	0.00014 mg/L	30.3% +/-RL					
Lead, Total	E200.8	0.0038 mg/L	0.0029 mg/L	26.9%					
Selenium, Total	E200.8	0.00072 mg/L	0.00070 mg/L	2.8% +/-RL					
TPH DRO	SW8015	1.1 mg/L	1.1 mg/L	0.0%					
TPH GRO	SW8015	0.67 mg/L	0.69 mg/L	2.9%					
TPH ORO	SW8015	0.067 mg/L	0.058 mg/L	14.4% +/-RL					
1,1-Dichloroethane	SW8260B	0.77 µg/L	0.80 µg/L	3.8% +/-RL					
1,2,4-Trimethylbenzene	SW8260B	0.36 µg/L	0.40 µg/L	10.5% +/-RL					
1,2-Dichloroethane	SW8260B	16 µg/L	17 μg/L	6.1%					
Benzene	SW8260B	4.8 μg/L	5.0 µg/L	4.1%					
Isopropylbenzene	SW8260B	20 µg/L	20 µg/L	0.0%					
MTBE	SW8260B	50 µg/L	51 µg/L	2.0%					
n-Butylbenzene	SW8260B	0.97 µg/L	0.96 µg/L	1.0% +/-RL					
n-Propylbenzene	SW8260B	0.97 µg/L	0.92 µg/L	5.3% +/-RL					
sec-Butylbenzene	SW8260B	4.3 μg/L	4.2 µg/L	2.4%					
Toluene	SW8260B	ND (1.0 µg/L)	0.21 µg/L	DL					
Xylenes, Total	SW8260B	1.6 µg/L	1.8 µg/L	11.8% +/-RL					
Acenaphthene	SW8270C	ND (0.10 μg/L)	0.22 µg/L	DL					
Anthracene	SW8270C	ND (0.10 μg/L)	0.26 µg/L	DL					
Naphthalene	SW8270C	0.18 μg/L	0.26 µg/L	36.4%					
Phenanthrene	SW8270C	0.80 µg/L	1.0 µg/L	22.2%					
Pyrene	SW8270C	ND (0.20 µg/L)	0.26 µg/L	DL					

Field duplicate RPD control limits are not to exceed 30% for water as established by USEPA Region I - New England Environmental Data Review Supplement for Region 1 Data Review Elements and Superfund Specific Guidance/Procedures, EQADR-Supplement2, September 2020.



DL – Indicates that the analyte was detected in one of the duplicate samples and was undetected in the other sample, and therefore an RPD could not be calculated. Data were not qualified since the detection was within two times the reporting limit. Non-detected results are indicated above with the applicable reporting limit as ND (RL).

+/-RL – Indicates that the detections in both of the samples were within two times the reporting limit. Qualification of data was not required.

RPD values could not be calculated for acenaphthene and anthracene for the field duplicate pair OW-70 and DUP-3-22-22 since the analytes were detected in the duplicate sample and were undetected in the parent sample. As the detections in the duplicate sample were greater than two times the reporting limits, acenaphthene and anthracene were qualified as J and UJ for the duplicate and parent samples, respectively.

The RPD value for naphthalene exceeded the data validation limit of 30% at 36.4%, which was evidence of poor precision. The naphthalene results were qualified as J for samples OW-70 and DUP-3-22-22.



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### DATA QUALIFICATION SUMMARY

Abbreviation	Reason
EBD	Equipment blank detection
ERPD-FD	High field duplicate RPD.
ERPD-LCS	The LCS/LCSD RPD exceeded the upper acceptable limit indicating poor precision.
FBD	Field blank detection
HR-LCS	The LCS and/or LCSD percent recovery was greater than the upper acceptable limit indicating a possible high bias.
LIS	The internal standard area count is less than 50% of the area of the 12-hour standard.
LR-LCS	The LCS and/or LCSD percent recovery was less than the lower acceptable limit indicating a possible low bias.
LR-MS	The MS and/or MSD percent recovery was less than the lower acceptable limit indicating possible matrix interference.
MBD	Method blank detection
MDLRL	Flagged by the laboratory: The result was greater than the MDL but less than the RL.

Analyte	Method	Field Sample ID	Lab Sample ID	Result	Limit	Units	Reviewer Qualifier	DV Flag Reasons
1,1-Dichloroethane	SW8260B	OW-70	2203b95-002a	0.77	1.0	µg/L	J	MDLRL
1,1-Dichloroethane	SW8260B	OAPIS-1	2203b95-007a	2.8	5.0	µg/L	J	MDLRL
1,1-Dichloroethane	SW8260B	DUP-3-22-22	2203b95-008a	0.80	1.0	µg/L	J	MDLRL
1,1-Dichloroethene	SW8260B	OW-12A	2203b95-003a	0.62	1.0	µg/L	J	MDLRL
1,2,4-Trimethylbenzene	SW8260B	OW-70	2203b95-002a	0.36	1.0	µg/L	J	MDLRL
1,2,4-Trimethylbenzene	SW8260B	KA-3	2203b95-004a	0.61	1.0	µg/L	J	MDLRL
1,2,4-Trimethylbenzene	SW8260B	NAPIS-3	2203b95-005a	0.22	1.0	µg/L	J	MDLRL
1,2,4-Trimethylbenzene	SW8260B	NAPIS-2	2203b95-006a	2.0	10	µg/L	J	MDLRL
1,2,4-Trimethylbenzene	SW8260B	DUP-3-22-22	2203b95-008a	0.40	1.0	µg/L	J	MDLRL
1,2-Dichloroethane	SW8260B	OW-12A	2203b95-003a	0.47	1.0	µg/L	U	FBD, MDLRL
1,2-Dichloroethane	SW8260B	KA-3	2203b95-004a	0.42	1.0	µg/L	U	FBD, MDLRL
1,2-Dichloroethane	SW8260B	NAPIS-3	2203b95-005a	0.42	1.0	µg/L	U	FBD, MDLRL



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Analyte	Method	Field Sample ID	Lab Sample ID	Result	Limit	Units	Reviewer Qualifier	DV Flag Reasons
1,2-Dichloroethane	SW8260B	FB-3-22-22	2203b95-009a	0.42	1.0	µg/L	J	MDLRL
1,3,5-Trimethylbenzene	SW8260B	KA-3	2203b95-004a	0.48	1.0	µg/L	J	MDLRL
2,4-Dimethylphenol	SW8270C	NAPIS-2	2203B95-006C	4.1	5.0	µg/L	J	MDLRL
2-Butanone	SW8260B	EB 3-22-22	2203b95-001a	6.1	10	µg/L	U	FBD, MDLRL
2-Butanone	SW8260B	OW-12A	2203b95-003a	2.4	10	µg/L	U	FBD, MDLRL
2-Butanone	SW8260B	FB-3-22-22	2203b95-009a	4.6	10	µg/L	J	MDLRL
Acenaphthene	SW8270C	DUP-3-22-22	2203b95-008c	0.22	0.10	µg/L	J	ERPD-FD
Acenaphthene	SW8270C	OW-70	2203b95-002c	ND	0.10	µg/L	UJ	ERPD-FD
Anthracene	SW8270C	DUP-3-22-22	2203b95-008c	0.26	0.10	µg/L	J	ERPD-FD
Anthracene	SW8270C	OW-70	2203b95-002c	ND	0.10	µg/L	UJ	ERPD-FD
Antimony, Dissolved	E200.8	OW-70	2203B95-002E	0.00049	0.0010	mg/L	J	MDLRL
Antimony, Dissolved	E200.8	OW-12A	2203B95-003E	0.00070	0.0010	mg/L	J	MDLRL
Arsenic, Dissolved	E200.8	KA-3	2203B95-004E	0.00087	0.0010	mg/L	J	MDLRL
Arsenic, Dissolved	E200.8	OAPIS-1	2203B95-007E	0.0050	0.0050	mg/L	J	MDLRL
Arsenic, Total	E200.8	KA-3	2203B95-004D	0.00077	0.0050	mg/L	J	MDLRL
Benzo(a)anthracene	SW8270C	EB 3-22-22	2203b95-001c	ND	0.10	µg/L	UJ	LIS
Chloromethane	SW8260B	EB 3-22-22	2203b95-001a	0.88	3.0	µg/L	U	MBD, MDLRL
Chloromethane	SW8260B	OW-12A	2203b95-003a	2.7	3.0	µg/L	U	MBD, MDLRL
Chloromethane	SW8260B	KA-3	2203b95-004a	0.70	3.0	µg/L	U	MBD, MDLRL
Chloromethane	SW8260B	NAPIS-3	2203b95-005a	0.72	3.0	µg/L	U	MBD, MDLRL
Chloromethane	SW8260B	NAPIS-2	2203b95-006a	6.7	30	µg/L	U	MBD, MDLRL
Chloromethane	SW8260B	FB-3-22-22	2203b95-009a	0.76	3.0	µg/L	U	MBD, MDLRL
Chloromethane	SW8260B	Trip Blank	2203b95-010a	0.70	3.0	µg/L	U	MBD, MDLRL
Chrysene	SW8270C	EB 3-22-22	2203b95-001c	ND	0.10	µg/L	UJ	LIS
Cobalt, Dissolved	E 200.7	OW-12A	2203B95-003E	0.0053	0.0060	mg/L	J	MDLRL
Cobalt, Dissolved	E 200.7	NAPIS-3	2203B95-005E	0.0027	0.0060	mg/L	J	MDLRL
Cobalt, Total	E 200.7	NAPIS-3	2203B95-005D	0.0038	0.0060	mg/L	J	MDLRL



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Analyte	Method	Field Sample ID	Lab Sample ID	Result	Limit	Units	Reviewer Qualifier	DV Flag Reasons
Cobalt, Total	E 200.7	NAPIS-2	2203B95-006D	0.0036	0.0060	mg/L	J	MDLRL
Ethylbenzene	SW8260B	OW-12A	2203b95-003a	0.56	1.0	µg/L	J	MDLRL
lsopropylbenzene	SW8260B	OW-12A	2203b95-003a	0.84	1.0	µg/L	J	MDLRL
lsopropylbenzene	SW8260B	NAPIS-2	2203b95-006a	9.4	10	µg/L	J	MDLRL
Lead, Dissolved	E200.8	OW-70	2203B95-002E	0.00019	0.00050	mg/L	J	MDLRL
Lead, Dissolved	E200.8	OW-12A	2203B95-003E	0.00041	0.00050	mg/L	J	MDLRL
Lead, Dissolved	E200.8	KA-3	2203B95-004E	0.00027	0.00050	mg/L	J	MDLRL
Lead, Dissolved	E200.8	NAPIS-2	2203B95-006E	0.00026	0.00050	mg/L	J	MDLRL
Lead, Dissolved	E200.8	DUP-3-22-22	2203B95-008E	0.00014	0.00050	mg/L	J	MDLRL
Lead, Total	E200.8	NAPIS-3	2203B95-005D	0.0013	0.00050	mg/L	JB	EBD
Lead, Total	E200.8	EB 3-22-22	2203B95-001D	0.00027	0.00050	mg/L	J	MDLRL
Lead, Total	E200.8	KA-3	2203B95-004D	0.00052	0.00050	mg/L	JB	EBD
Naphthalene	SW8270C	OW-70	2203b95-002c	0.18	0.10	µg/L	J	ERPD-FD
Naphthalene	SW8270C	DUP-3-22-22	2203b95-008c	0.26	0.10	µg/L	J	ERPD-FD
n-Butylbenzene	SW8260B	OW-70	2203b95-002a	0.97	3.0	µg/L	J	MDLRL
n-Butylbenzene	SW8260B	NAPIS-3	2203b95-005a	0.32	3.0	µg/L	J	MDLRL
n-Butylbenzene	SW8260B	DUP-3-22-22	2203b95-008a	0.96	3.0	µg/L	J	MDLRL
Nickel, Dissolved	E 200.7	OW-12A	2203B95-003E	0.0086	0.010	mg/L	J	MDLRL
Nickel, Total	E 200.7	OW-70	2203B95-002D	0.047	0.010	mg/L	J-	LR-LCS
Nickel, Total	E 200.7	OW-12A	2203B95-003D	0.014	0.010	mg/L	J-	LR-LCS
Nickel, Total	E 200.7	KA-3	2203B95-004D	0.022	0.010	mg/L	J-	LR-LCS
Nickel, Total	E 200.7	NAPIS-3	2203B95-005D	0.025	0.010	mg/L	J-	LR-LCS
Nickel, Total	E 200.7	NAPIS-2	2203B95-006D	0.053	0.010	mg/L	J-	LR-LCS
Nickel, Total	E 200.7	OAPIS-1	2203B95-007D	0.16	0.010	mg/L	J-	LR-LCS
Nickel, Total	E 200.7	DUP-3-22-22	2203B95-008D	0.046	0.010	mg/L	J-	LR-LCS
Nickel, Total	E 200.7	EB 3-22-22	2203B95-001D	ND	0.010	mg/L	UJ	LR-LCS
n-Propylbenzene	SW8260B	OW-70	2203b95-002a	0.97	1.0	µg/L	J	MDLRL



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Analyte	Method	Field Sample ID	Lab Sample ID	Result	Limit	Units	Reviewer Qualifier	DV Flag Reasons
n-Propylbenzene	SW8260B	KA-3	2203b95-004a	0.69	1.0	µg/L	J	MDLRL
n-Propylbenzene	SW8260B	NAPIS-2	2203b95-006a	8.2	10	µg/L	J	MDLRL
n-Propylbenzene	SW8260B	DUP-3-22-22	2203b95-008a	0.92	1.0	µg/L	J	MDLRL
Phenol	SW8270C	NAPIS-3	2203B95-005C	4.2	5.0	µg/L	J	MDLRL
Pyrene	SW8270C	NAPIS-3	2203b95-005c	0.18	0.20	µg/L	J	MDLRL
Pyrene	SW8270C	EB 3-22-22	2203b95-001c	ND	0.20	µg/L	UJ	LIS
sec-Butylbenzene	SW8260B	OW-12A	2203b95-003a	0.42	1.0	µg/L	J	MDLRL
sec-Butylbenzene	SW8260B	KA-3	2203b95-004a	0.25	1.0	µg/L	J	MDLRL
sec-Butylbenzene	SW8260B	NAPIS-3	2203b95-005a	0.73	1.0	µg/L	J	MDLRL
Selenium, Dissolved	E200.8	OW-12A	2203B95-003E	0.00052	0.0010	mg/L	J	MDLRL
Selenium, Dissolved	E200.8	NAPIS-2	2203B95-006E	0.00046	0.0010	mg/L	J	MDLRL
Selenium, Total	E200.8	OW-70	2203B95-002D	0.00072	0.0010	mg/L	J	MDLRL
Selenium, Total	E200.8	OW-12A	2203B95-003D	0.0022	0.0050	mg/L	J	MDLRL
Selenium, Total	E200.8	NAPIS-3	2203B95-005D	0.00062	0.0010	mg/L	J	MDLRL
Selenium, Total	E200.8	NAPIS-2	2203B95-006D	0.00062	0.0010	mg/L	J	MDLRL
Selenium, Total	E200.8	DUP-3-22-22	2203B95-008D	0.00070	0.0010	mg/L	J	MDLRL
Toluene	SW8260B	DUP-3-22-22	2203b95-008a	0.21	1.0	µg/L	J	MDLRL
TPH DRO	SW8015	EB 3-22-22	2203B95-001C	0.026	0.064	mg/L	J	MDLRL
TPH DRO	SW8015	NAPIS-3	2203B95-005C	0.65	0.064	mg/L	J+	ERPD-LCS, HR-LCS
TPH DRO	SW8015	NAPIS-2	2203B95-006C	2.4	0.064	mg/L	J+	ERPD-LCS, HR-LCS
TPH DRO	SW8015	OAPIS-1	2203B95-007C	7.0	0.32	mg/L	J+	ERPD-LCS, HR-LCS
TPH DRO	SW8015	DUP-3-22-22	2203B95-008C	1.1	0.064	mg/L	J+	ERPD-LCS, HR-LCS
TPH GRO	SW8015	OW-70	2203b95-002a	0.67	0.050	mg/L	J-	LR-MS
TPH GRO	SW8015	OW-12A	2203b95-003a	5.2	0.050	mg/L	J-	LR-MS
TPH GRO	SW8015	NAPIS-3	2203b95-005a	0.69	0.050	mg/L	J-	LR-MS
TPH GRO	SW8015	NAPIS-2	2203b95-006a	3.5	0.50	mg/L	J-	LR-MS
TPH GRO	SW8015	OAPIS-1	2203b95-007a	0.56	0.25	mg/L	J-	LR-MS



Analyte	Method	Field Sample ID	Lab Sample ID	Result	Limit	Units	Reviewer Qualifier	DV Flag Reasons
TPH GRO	SW8015	DUP-3-22-22	2203b95-008a	0.69	0.050	mg/L	J-	LR-MS
TPH GRO	SW8015	KA-3	2203b95-004a	0.31	0.050	mg/L	JB	LR-MS, MBD
TPH GRO	SW8015	EB 3-22-22	2203b95-001a	0.034	0.050	mg/L	U	LR-MS, MBD, MDLRL
TPH ORO	SW8015	OW-70	2203B95-002C	0.067	0.080	mg/L	J	MDLRL
TPH ORO	SW8015	OAPIS-1	2203B95-007C	0.96	0.40	mg/L	J+	ERPD-LCS, HR-LCS
TPH ORO	SW8015	NAPIS-3	2203B95-005C	0.091	0.080	mg/L	J+	ERPD-LCS, HR-LCS
TPH ORO	SW8015	NAPIS-2	2203B95-006C	0.16	0.080	mg/L	J+	ERPD-LCS, HR-LCS
TPH ORO	SW8015	DUP-3-22-22	2203B95-008C	0.058	0.080	mg/L	J+	ERPD-LCS, HR-LCS, MDLRL
Trichloroethene	SW8260B	KA-3	2203b95-004a	0.30	1.0	µg/L	J	MDLRL
Vanadium, Dissolved	E 200.7	OW-70	2203B95-002E	0.0035	0.050	mg/L	J	MDLRL
Vanadium, Dissolved	E 200.7	OW-12A	2203B95-003E	0.0027	0.050	mg/L	J	MDLRL
Vanadium, Dissolved	E 200.7	KA-3	2203B95-004E	0.017	0.050	mg/L	J	MDLRL
Vanadium, Dissolved	E 200.7	OAPIS-1	2203B95-007E	0.024	0.050	mg/L	J	MDLRL
Vanadium, Dissolved	E 200.7	DUP-3-22-22	2203B95-008E	0.0037	0.050	mg/L	J	MDLRL
Vanadium, Total	E 200.7	OW-70	2203B95-002D	0.018	0.050	mg/L	J	MDLRL
Vanadium, Total	E 200.7	OW-12A	2203B95-003D	0.034	0.050	mg/L	J	MDLRL
Vanadium, Total	E 200.7	KA-3	2203B95-004D	0.019	0.050	mg/L	J	MDLRL
Vanadium, Total	E 200.7	NAPIS-3	2203B95-005D	0.0068	0.050	mg/L	J	MDLRL
Vanadium, Total	E 200.7	NAPIS-2	2203B95-006D	0.011	0.050	mg/L	J	MDLRL
Vanadium, Total	E 200.7	OAPIS-1	2203B95-007D	0.029	0.050	mg/L	J	MDLRL
Vanadium, Total	E 200.7	DUP-3-22-22	2203B95-008D	0.015	0.050	mg/L	J	MDLRL
Xylenes, Total	SW8260B	KA-3	2203b95-004a	0.85	1.50	µg/L	J	MDLRL
Zinc, Dissolved	E 200.7	KA-3	2203B95-004E	0.012	0.010	mg/L	JB	EBD
Zinc, Dissolved	E 200.7	OAPIS-1	2203B95-007E	0.025	0.010	mg/L	JB	EBD
Zinc, Dissolved	E 200.7	DUP-3-22-22	2203B95-008E	0.010	0.010	mg/L	JB	EBD
Zinc, Dissolved	E 200.7	OW-70	2203B95-002E	0.0086	0.010	mg/L	U	EBD, MDLRL
Zinc, Dissolved	E 200.7	OW-12A	2203B95-003E	0.0091	0.010	mg/L	U	EBD, MDLRL



Analyte	Method	Field Sample ID	Lab Sample ID	Result	Limit	Units	Reviewer Qualifier	DV Flag Reasons
Zinc, Dissolved	E 200.7	NAPIS-3	2203B95-005E	0.0056	0.010	mg/L	U	EBD, MDLRL
Zinc, Dissolved	E 200.7	NAPIS-2	2203B95-006E	0.0080	0.010	mg/L	U	EBD, MDLRL
Zinc, Dissolved	E 200.7	EB 3-22-22	2203B95-001E	0.0065	0.010	mg/L	J	MDLRL
Zinc, Total	E 200.7	KA-3	2203B95-004D	0.0075	0.010	mg/L	J	MDLRL
Zinc, Total	E 200.7	NAPIS-3	2203B95-005D	0.0083	0.010	mg/L	J	MDLRL




Client: Marathon Oil	Laboratory: Hall Environmental Analysis Laboratory			
Project Name: Western Refining Southwest, Q1 GW Sampling	Sample Matrix: Groundwater			
Project Number: 697-080-002 Task: 0006	Sample Start Date: 03/23/2022			
Date Validated: 07/11/2022	Sample End Date: 03/23/2022			
Parameters Included:				
<ul> <li>Volatile Organic Compounds (VOCs) by Environmental P Waste (SW-846) Method 8260B</li> </ul>	rotection Agency (EPA) Test Methods for Evaluating Solid			
<ul> <li>1,2-Dibromoethane (EDB) by EPA Method 504.1</li> </ul>				
<ul> <li>Semivolatile Organic Compounds (SVOCs) by SW-846 Method 8270C and Method 8270C with Selected Ion Monitoring (SIM)</li> </ul>				
<ul> <li>Total Petroleum Hydrocarbons (TPH) Gasoline Range Or</li> </ul>	ganics (GRO) by SW-846 Method 8015D			
<ul> <li>TPH Diesel Range Organics (DRO) and Motor Oil Range</li> </ul>	Organics (MRO) by SW-846 Method 8015D Modified			
<ul> <li>Total and Dissolved Metals by EPA Method 200.7 and Method</li> </ul>	ethod 200.8			
<ul> <li>Total and Dissolved Mercury by EPA Method 245.1</li> </ul>				
<ul> <li>Cyanide by Standard Methods for the Examination of Wat</li> </ul>	ter and Wastewater (SM) Method 4500 CN E			
Laboratory Project ID: 2203C69				
Data Validator: Daran O'Hollearn, Lead Project Scientist				
Reviewer: Mike Phillips, Senior Chemist				

### DATA EVALUATION CRITERIA SUMMARY

A Tier II Data Validation was performed by Trihydro Corporation's Chemical Data Evaluation Services Group on the analytical data report packages generated by Hall Environmental Analysis Laboratory of Albuquerque, New Mexico, with additional data from Pace Analytical National of Mount Juliet, Tennessee evaluating samples from the Marathon Oil site, located in Gallup, New Mexico.

Precision, accuracy, method compliance, and completeness of this data package were assessed during this data review. Precision was determined by evaluating the calculated relative percent difference (RPD) values from:

- Field duplicate pairs
- Laboratory duplicate pairs
- Matrix spike (MS) and matrix spike duplicate (MSD) pairs
- Laboratory control sample (LCS) and laboratory control sample duplicate (LCSD) pairs

Laboratory accuracy was established by reviewing the demonstrated percent recoveries (%R) of the following items to verify that data are not biased.

- MS/MSD samples
- LCS/LCSD samples
- Organic system monitoring compounds (surrogates)

Field accuracy was established by collecting and analyzing the following samples to monitor for possible ambient or cross contamination during sampling and transportation.



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- Trip blanks
- Field blanks
- Equipment blanks

Method compliance was established by reviewing sample integrity, holding times, detection limits, surrogate recoveries, laboratory blanks, initial and continuing calibrations (where applicable), and the LCS/LCSD percent recoveries against method-specific requirements.

Completeness was evaluated by determining the overall ratio of the number of samples and analyses planned versus the number of samples with valid analyses. Determination of completeness included a review of the chain-of-custody (CoC), laboratory analytical methods, and other laboratory and field documents associated with this analytical data set.

Client Sample ID	Laboratory Sample Number
EB-3-23-22	2203C69-001
OW-54	2203C69-002
OW-66	2203C69-003
OW-55	2203C69-004
OW-13	2203C69-005
OW-56	2203C69-006
OW-59	2203C69-007
OW-60	2203C69-008
MKTF-16	2203C69-009
DUP-3-23-22	2203C69-010
FB-3-23-22	2203C69-011
Trip Blank	2203C69-012

#### SAMPLE NUMBERS TABLE





The laboratory data were reviewed to evaluate compliance with the methods and the quality of the reported data. Assessment of CoC completeness is included in Item 3 of the Data Validation Checklist. A check mark ( $\checkmark$ ) indicates that the referenced validation criteria were deemed acceptable, whereas a crossed circle ( $\otimes$ ) indicates validation criteria for which the data have been qualified by the data validator. An empty circle (O) indicates that the specified criterion does not apply to the reviewed data. Details are noted in the tables below.

#### Validation Criteria

- ✓ Data Completeness
- ✓ CoC Documentation (Item 3)
- ✓ Holding Times and Preservation (Items 6 and 7)
- O Initial and Continuing Calibrations (Items 9 and 10)
- ⊗ Laboratory Blanks (Items 11 and 12)
- ⊗ MS/MSD (Items 13 and 14)
- ⊗ LCS/LCSD (Items 15 and 16)
- System Monitoring Compounds (i.e., Surrogates and Internal Standards) (Item 17)
- 8 Field, Equipment, and Trip Blanks (Items 18 and 19)
- ✓ Field Duplicates (Items 20 and 21)
- ✓ Laboratory Duplicates (Item 22)

### **Guidance References**

Chemical data validation was conducted in accordance with the United States Environmental Protection Agency (USEPA) Contract Laboratory Program (CLP) National Functional Guidelines for the analyses listed below, or by the appropriate method if not covered in the National Functional Guidelines.

- Data for organic analyses were evaluated according to validation criteria set forth in the USEPA CLP National Functional Guidelines for Organic Superfund Methods Data Review, document number EPA-540-R-20-005, November 2020 with additional reference to the USEPA CLP National Functional Guidelines for Organic Data Review, document number EPA 540/R-99/008, October 1999.
- Data for inorganic analyses were evaluated according to validation criteria set forth in the USEPA CLP National Functional Guidelines for Inorganic Superfund Methods Data Review, document number EPA-540-R-20-006, November 2020 with additional reference to the USEPA CLP National Functional Guidelines for Inorganic Data Review, document number EPA 540-R-04-004, October 2004.
- Review of field duplicates was conducted according to the USEPA Region I New England Environmental Data Review Supplement for Region 1 Data Review Elements and Superfund Specific Guidance/Procedures, EQADR-Supplement2, September 2020.
- Trihydro Data Validation Variance Documentation, April 2022.



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### OVERALL DATA PACKAGE ASSESSMENT

Based on a data validation review, the data are acceptable as delivered. Data qualified by the laboratory are discussed in Item 2 of the Validation Criteria Checklist.

The purpose of validating data and assigning qualifiers is to assist in proper data interpretation. Data that are not qualified meet the site data quality objectives. If values are assigned qualifiers other than an R (rejected, data not usable), the data may be used for site evaluation; however, consideration should be given to the reasons for qualification when interpreting sample concentrations. Data points that are assigned an R qualifier should not be used for site evaluation purposes.

If applicable, text was identified in **bold font** in the Validation Criteria Checklist to indicate that further action and/or qualification of the data were required. Data may have been qualified with J data flags by the laboratory if the result was greater than or equal to the method detection limit (MDL) but less than the reporting limit (RL). These laboratory-applied J flags were preserved, if present, and included in the Data Qualification Summary table at the end of this report. If applicable, data validation qualifiers were added for the items noted with crossed circles in the Validation Criteria section above. Please see the Data Qualification Summary table at the end of this report.

If data would be qualified with more than one flag, one qualifier was assigned based on the severity; however, all reasons for qualification were retained. Data that would be qualified with both J+ and J- flags were evaluated based on validation criteria and assigned the appropriate flag. The hierarchy of qualifiers from the most to least severe is as follows:

Data qualifiers used during this validation are included in the following table.

<u>Qualifier</u>	Definition
J	Estimated concentration
J+	The result is an estimated concentration, but may be biased high
J-	The result is an estimated concentration, but may be biased low
UJ	Estimated reporting limit
U	Evaluated to be undetected at the reporting limit
JB	Estimated concentration due to blank contamination
R	Rejected, data not usable

### **Data Completeness**

The analyses were performed as requested on the CoC records. The associated samples were received by the laboratory and analyzed properly unless otherwise noted in the Criteria Checklist below. The complete data package consisted of 779 data points. The data completeness calculation does not include any submitted blank sample results. One data point was rejected. The data completeness measure for this data package is calculated to be 99.87% and is acceptable.



VALIDATION CRITERIA CHECKLIST					
1. Was th	he report free o	of non-conformances identified by	y the laboratory?	No	
Comments: The laboratory noted the following analytical non-conformance related to this data set.					
Naphthalene was reported by EPA Method 8270 instead of EPA Method 8270 SIM because of its elevated concentration for sample OW-55.					
Naphthaler 8270 SIM b	ne, 1-methylna because of the	phthalene, and 2-methylnaphthal ir elevated concentrations for the	lene were reported by EPA Method 82 following sample: OW-66.	70 instead of EPA Metho	bc
"S" flagged	l surrogates de	enote low surrogate recoveries du	ue to matrix interferences/sample diluti	on.	
2. Were If no, o	the data free o define.	f data qualification flags and/or n	otes used by the laboratory?	No	
Comments	: The laborato	ory used the following data qualifi	cation flags with this data set.		
B – Analyte	e detected in th	ne associated method blank.			
E – Estima <i>qualificatio</i>	ited value. <i>Thi</i> n of sample da	s laboratory flag was applied only ta was not required.	y to QC sample and surrogate results	in the laboratory report, a	and
J – Analyte	e detected belo	w quantitation limits			
J3 – The a	ssociated batc	h QC was outside the established	d quality control range for precision.		
J6 – The s	ample matrix ir	nterfered with the ability to make	any accurate determination; spike valu	ie is low.	
R – RPD o	utside of range	9.			
S – % Rec	overy outside o	of range due to dilution or matrix	interference.		
D – Sample	e diluted due to	o matrix.			
* – Value e	exceeds maxim	um contaminant level.			
3. Were	sample CoC fo	orms and custody procedures cor	nplete?	Yes	
Comments and laborat samples w	: The CoC rec tory personnel ere delivered to	cords from field to laboratory were signatures, dates, and times of r o the laboratory by courier, and c	e complete, and custody was maintain eceipt. Custody seals were not preser custody was maintained at all times.	ed as evidenced by field nt or required since the	
4. Were o	detection limits , or method, or	in accordance with the quality as r indicated as acceptable?	ssurance project plan (QAPP),	Yes	
Comments	: The detectio	n limits appeared to be acceptab	le. The following dilutions were applie	d.	
Γ	Method	Sample(s)	Analyte(s)	Dilution Factor	
	200.7	OW-66	Total and Dissolved Barium	5	
-	200.7	OW-60	Total Barium	5	
	200.8	Multiple Samples	Select Total and Dissolved Metals	5	
	8015D	OW-54	GRO	5	
	8260B	OW-54	Select VOCs	5	
	200.8	OW-66, OW-55, OW-59	Select Total and Dissolved Metals	10	
	8015D	OW-66	DRO and MRO	10	
	8260B	MKTF-16	Benzene	10	
	8260B	DUP-3-23-22	МТВЕ	10	
	8270C	OW-66	SVOCs	10	
	200.8	OW-56	Dissolved Antimony	20	
	8015D	OW-66, OW-55	GRO	50	



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VALIDATION CRITERIA CHECKLIST							
	<u>Method</u>	<u>Sample(s)</u>	<u>Analyte(s)</u>	Dilution Factor			
	8260B	OW-54	МТВЕ	50			
	8260B	OW-66, OW-55	Select VOCs	50			
	8260B	OW-66	Benzene and Toluene	500			
	8260B	OW-55	Benzene	500			
5. Were QAPI	<ol> <li>Were the reported analytical methods and constituents in compliance with the No QAPP, permit, or CoC?</li> <li>Commentation The reported analytical methods were in compliance with the CoC, and the laboratory reported the requested</li> </ol>						
constituer	its in accordanc	e with the CoC, with the following	exceptions.		quootou		
The CoC both Meth and precis The CoC This subs	requested total a od 200.7 and M sion goals and, t requested cyani tituted analytica	and dissolved metals using Metho lethod 200.8. This substituted an therefore, was an acceptable repl de using Method 335.4; however	od 200.7; however, the laboratory ana alytical method, Method 200.8, met si acement. , the laboratory analyzed the samples couracy, and precision goals and, the	llyzed the samples imilar sensitivity, a using Method 45 refore, was an ac	s using ccuracy, 00 CN E.		
replaceme	ent.	nioaloa niotoniniai oonolavity, a					
6. Were	samples receiv	ed in good condition within metho	od-specified requirements?	No			
Comment recomment <i>Check Lis</i> recomment since the	s: Samples wei nded temperatur <i>t</i> . Samples tran nded range at 2 laboratory did no	re received on ice, in good conditi re range of 4°C ± 2°C between 0. Isferred to Pace National were rec .7°C as noted on the CoC. The c ot report the sample containers as	on, and with the cooler temperatures 3°C and 2.3°C as noted on the CoC a ceived in good condition with the coole ooler temperatures below 2.0°C were s broken or frozen.	both within and ou and the <i>Sample Lo</i> er temperature wit judged as accept	utside the bg-in thin the able		
7. Were techr	samples extrac	ted/digested and analyzed within es?	method-specified or	Yes			
Comment	s: The samples	were extracted/digested and ana	alyzed within method-specific holding	times.			
8. Were methe	reported units a od(s)? Specify i	appropriate for the sample matrix/ if wet or dry units were used for so	matrices and analytical oil.	Yes			
Comment which wer	s: The results v e acceptable fo	vere reported in concentration uni r the sample matrix and the analy	ts of micrograms per liter (μg/L) and r ses requested.	milligrams per liter	(mg/L),		
9. Did th	ne laboratory pro	ovide any specific initial and/or co	ntinuing calibration results?	No			
Comment	s: Initial and co	ntinuing calibration data were not	included as part of this data set.				
10. If initi accep	al and/or contin otable limits?	uing calibration results were provi	ded, were the results within	N/A			
Comment	s: Initial and co	ntinuing calibration data were not	included as part of this data set.				
11. Was the to	the total number tal number of sa	r of laboratory blank samples prep amples or analyzed as required b	pared equal to at least 5% of y the method?	Yes			
Comment samples.	s: The total nur	nber of laboratory blank samples	prepared was equal to at least 5% of	the total number of	of		



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VALIDATION CRITERIA CHECKLIST							
12. Were target analytes reported as not detected in the laboratory blanks? No							
Comments: Target analytes were reported as not detected in the laboratory blanks, with the following exceptions							
	Method Analyte Batch Cor						
	8015D	DRO	66385	0.044 mg/L			
	8015D	DRO	66409	0.040 mg/L			
	8015D	MRO 6640		0.099 mg/L			
	8260B	Chloromethane	R86734	0.66 µg/L			
	8260B	Carbon disulfide	R86760	0.87 µg/L			
	8260B	Chloromethane	R86760	0.69 µg/L			
	8260B	Trichloroethene	R86760	0.34 µg/L			
	8260B	Vinyl Chloride	R86760	0.47 µg/L			
	8270 SIM	Pyrene	R87058	0.16 µg/L			
	8015D	GRO	G86734	0.041 mg/L			

Detections of DRO, chloromethane, and GRO in the associated samples that were less than the blank results and/or less than the applicable reporting limits were assigned U qualifiers. Detections of DRO, MRO, and GRO in the associated samples that were greater than the reporting limits but less than or equal to 10 times the blank results were assigned JB qualifiers. Non-detections of the identified analytes in the associated samples and detections that were above the reporting limit and greater than ten times the blank concentration did not require qualification.

13. Was the total number of MS samples prepared equal to at least 5% of the total Yes number of samples or analyzed as required by the method?

Comments: The total number of matrix spike samples prepared was equal to at least 5% of the total number of samples, although MS samples were not prepared/reported for all analyses and/or batches. The matrix spike sample source for each analytical batch in this sample set has been indicated below.

	<u>Method</u>	<u>Analytes</u>	<u>Batch</u>	MS Sample Source			
	200.7	Total Metals	66644	OW-54, OW-66			
	200.7	Dissolved Metals	B86825	Not Prepared			
	200.8	Total Metals	66472	EB-3-23-22			
	200.8	<b>Dissolved Metals</b>	B86714	Not Prepared			
	245.1	Total Mercury	66425	EB-3-23-22			
	245.1	Dissolved Mercury	66456	Not Prepared			
	504.1	EDB	66393	Not Prepared			
	504.1	EDB	66394	Not Prepared			
	4500CN E	Cyanide	WG1839312	EB-3-23-22, OW-56			
	8015D	TPH DRO and MRO	66385	Not Prepared			
	8015D	TPH DRO and MRO	66409	Not Prepared			
	8015D	TPH GRO	G86734	Not Prepared			
	8260B	VOCs	R86734	Not Prepared			
	8260B	VOCs	R86760	Not Prepared			
	8270C	SVOCs	66392	Not Prepared			
	8270C SIM	SVOCs	R86913	Not Prepared			
	8270C SIM	SVOCs	R87058	Not Prepared			
1	Na tuis a mile a success a structure and a structure start for the interval						

Not Prepared – Matrix spikes were not prepared/reported for this batch.



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	VALIDATION CRITERIA CHECKLIST							
14. For MS/MSDs prepared from project samples, were percent recoveries and RPDs No within data validation or laboratory quality control (QC) limits?								
Comments: Th limits, with the f	Comments: The MS/MSD percent recoveries and RPDs for project samples were within data validation and laboratory QC limits, with the following exceptions.							
Method	<u>Method</u> <u>Analyte</u> <u>Batch</u> <u>MS</u> <u>MSD</u> <u>MS/MSD</u> <u>MS/MSD</u> <u>RPD QC</u> <u>DC Limits</u> <u>RPD QC</u>							
4500 CN E	Cyanide	Cvanide         WG1839312         Acceptable         28.4%         75-125%         110%         20%						
4500 CN E	Cyanide	WG1839312	Acceptable	73.1%	75-125%	29.5%	20%	
limits for both all of the association since multiple be arbitrary. T qualified as R samples were In addition, bo precision.	of the MS/MSD pairs, b ciated samples in the b MS/MSD pairs were an herefore, only the pare to indicate rejected (no qualified as J- if detect th MS/MSD pairs exhib	but the MSD rep atch would typ alyzed for this ent sample EB- ot usable) data ared and UJ if no ited MS/MSD F	covery for one bically be qualit batch, the dete 3-23-22 used fo based on evide bt detected. RPDs that excee	of the pairs wa fied based on ermination of t or the MS/MSD ence of extrem	as less than 3 the MS/MSD r patch sample pair that reco e low bias. T atory QC limit	0%. The re esults. Ho association overed at 28 he remaining t indicating	esults for wever, ns would 8.4% was ng poor	
15. Was the to samples or Comments: Th	tal number of LCSs anal analyzed as required by e total number of LCS sa	yzed equal to at / the method? amples analyzed	t least 5% of the d was equal to a	total number of the total number of total	f e total number	Yes of samples		
16. Were LCS/ laboratory	LCSD percent recoverie QC limits?	s and LCS/LCS	D RPDs within o	data validation	or	No		
Comments: Th limits, with the f	e LCS and LCSD percer ollowing exceptions.	nt recoveries an	d LCS/LCSD RF	PDs were withir	n data validatio	n and labor	atory QC	
Method	<u>Analyte</u>	<u>Batch</u>	<u>LCS</u> <u>Recovery</u>	<u>LCSD</u> <u>Recovery</u>	LCS/LCSD QC Limits	LCS / LCSD RPD	RPD QC Limits	
200.7	Total Nickel	66644	67.0%		70-130%			
8015D	DRO	66385	107%	Acceptable	31.7-75.4%	56.8%	20%	
8270C SIM	Phenanthrene	R87058	Acceptable	Acceptable	38.2-93.9%	30.4%	27.9%	
8270C SIM	Pyrene	R87058	Acceptable	Acceptable	51-113%	29.5%	20%	
8270C SIM	Benzo(a)anthracene	R87058	Acceptable	Acceptable	51-147%	26.2%	24.1%	
8270C SIM	Chrysene	R87058	Acceptable	Acceptable	55.3-115%	33.0%	20%	
8270C SIM 8270C SIM	Benzo(b)fluoranthen Indeno(1,2,3-cd) pyrene	e K87058 R87058	Acceptable Acceptable	Acceptable	44.4-136% 31.4-165%	34.5% 35.2%	24.5% 21.1%	

Total nickel results were assigned J- qualifiers in associated samples due to evidence of potential low bias, except the non-detect results for associated samples EB-3-23-22 and OW-13 which were assigned UJ qualifiers.

DRO was in the associated samples, and these results were qualified as J+ due to potential high bias. These associated DRO results were also qualified due to evidence of poor precision.

The Method 8270C SIM analytes with LCS/LCSD RPD values that were above the QC limits were not detected in the associated samples. These results were qualified as UJ due to evidence of poor precision.



17. Were surrogate recoveries within laboratory QC limits?

No

Comments: Surrogate recoveries were within laboratory QC limits, with the following exceptions.

Method	<u>Surrogate</u>	<u>Sample</u>	<u>Surrogate</u> <u>Recovery</u>	QC Limits
8015D MOD	DNOP	OW-56	147%	42.2-138%
8270C	2-Fluorophenol	OW-59	19.4%	29.4-87.7%
8270C	2,4,6-Tribromophenol	OW-59	6.62%	18.6-129%

The target analytes DRO and MRO associated with the Method 8015 surrogate DNOP were detected in sample OW-56, and these results were assigned J+ qualifiers due to possible high bias.

The acid fraction target analytes associated with the identified non-compliant Method 8270C surrogate recoveries were not detected in sample OW-59. Normally, if a surrogate recovered below 10%, the associated analytes would be qualified as R, but one of the acid surrogates was acceptable and the recovery for the other acid surrogate was low but not below 10%. The associated acid fraction analytes were not detected in sample OW-59 and the results were assigned UJ qualifiers due to the evidence of low bias.

The SVOC results and the DRO and MRO results for sample OW-66 were not qualified based on the surrogate nonconformances in the Method 8270C and Method 8015D Modified analyses since the applied dilutions of 10 times resulted in surrogate concentrations below routinely calibrated levels, and those results were deemed unreliable and possibly inaccurate.

Since Method 8270C SIM surrogate associations were not available from the laboratory, qualification was assigned to all of the target analytes in a given fraction (acid or base/neutral) when two or more surrogates from the same fraction (acid or base/neutral) were outside the acceptance range. This condition did not exist for the samples OW-66 and OW-55, and qualification of sample data was not required.

Since Method 8270C surrogate associations were not available from the laboratory, qualification was assigned to all of the target analytes in a given fraction (acid or base/neutral) when two or more surrogates from the same fraction (acid or base/neutral) were outside the acceptance range. This condition did not exist for the sample OW-13, and qualification of sample data was not required.

Qualification of sample data was not required based on surrogate non-conformances in QC samples as the environmental samples were evaluated based on their specific surrogate recoveries.

18. Were the number of trip blank, field blank, and/or equipment blank samples collected equal to at least 10% of the total number of samples or as required by the project guidelines, QAPP, SAP, or permit?

Yes

Comments: The number of trip, field, and equipment blanks collected was equal to at least 10% of the number of samples. One trip blank sample, Trip Blank, one field blank sample, FB-3-23-22, and one equipment blank sample, EB-3-23-22, were collected as part of this sample set.



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19. Were target analytes reported as not detected in the trip blank, field blank, and/or equipment blank samples?

No

Comments: Target analytes were not detected in the trip blank, field blank, and equipment blank samples with the following exceptions.

Blank Sample ID	<u>Method</u>	Analyte	<u>Concentration</u>
Trip Blank	8260B	Chloromethane	0.69 µg/L
FB-3-23-22	8260B	2-Butanone	5.2 μg/L
FB-3-23-22	8260B	Chloromethane	0.80 µg/L
EB-3-23-22	200.7	Dissolved Nickel	0.0035 mg/L
Blank Sample ID	<u>Method</u>	Analyte	<u>Concentration</u>
EB-3-23-22	200.7	Dissolved Zinc	0.0063 mg/L
EB-3-23-22	8015D	DRO	0.033 mg/L
EB-3-23-22	8015D	GRO	0.034 mg/L
EB-3-23-22	8260B	2-Butanone	5.0 µg/L
EB-3-23-22	8260B	Chloromethane	0.70 µg/L

Detections of 2-butanone, dissolved nickel, and dissolved zinc in the associated samples that were less than the blank results and/or less than the applicable reporting limits were assigned U qualifiers. Detections of dissolved nickel and dissolved zinc in the associated samples that were greater than the reporting limits but less than 10 times the blank results were assigned JB qualifiers. Non-detections of the identified analytes in the associated samples and detections that were above the reporting limit and greater than ten times the blank concentration did not require qualification.

The DRO, chloromethane, and GRO results were previously qualified due to laboratory blank contamination in batches 66385, R86734, R86760, and G86734; therefore, additional qualification due to the trip, field, and equipment blank contamination was not required.

20. Was the number of field duplicates collected equal to at least 10% of the total number of samples or as required by the project guidelines, QAPP, SAP, or permit?

Yes

Yes

Comments: The number of field duplicates collected was equal to at least 10% of the number of samples. Sample DUP-3-23-22 was collected as a field duplicate of sample OW-54.

21. Were field duplicate RPD values within data validation QC limits (soil 0-50%, water 0-30%, or air 0-25%)?

Comments: As indicated in the Field Duplicate Summary Table at the end of this report, field duplicate RPD values were within data validation QC limits of 0-30% for water samples.



VALIDATION CRITERIA CHECKLIST								
22. For labo	22. For laboratory duplicates prepared from project samples, were RPDs within data N/A validation or laboratory QC limits?							
Comments: Laboratory duplicates were prepared for these analyses, and the laboratory duplicate sample sources are								
summarized	in the following table.		-					
	Method         Analytes         Batch         Laboratory Duplicate           Sample Source         Sample Source							
	4500CN E Cyanide WG1839312 Not Associated		ciated					
	4500CN E	Cyanide	WG1839312	OW-	13			
Not Associate	ed – The laboratory duplicate	e sample source was not	associated with th	s project.		•		
The RPD for	the laboratory duplicate	prepared from a proje	ect sample was n	ot applicable s	ince the res	sults for one or both		
measuremei	nts were within 5 times th	e reporting limit.	d from a non nr	via et e emple ur	aa ayalyata	d and considered but		
data were no	ot qualified based on this	result since matrix si	milarity to project	samples could	as evaluate I not be qua	and considered, but		
23. Were th	e following data relations	hips realistic?	many to project		The bo gue			
• Tar	get analytes were report	ed by more than one i	method (e.g., 826	60/8270,		N/A		
EP	H/8270)?							
Comments:	Target analytes were no	t reported by more the	an one method ir	this data set.				
<ul> <li>Bot</li> </ul>	th total and dissolved me	tals analyses were pe	rformed and the	total metals		No		
res	ults were greater than or	equal to the dissolved	d metals results?					
	Ū	·						
Comments:	The following table conta	ains the exceptions in	which the dissol	ved metals res	ults exceed	ed the total metals		
results. The	EPA has not provided g	uidance or requireme	nts for the evalua	ition, validation	i, and qualif	ication of dissolved		
hased on the	is inal exceed the corres	ponding total metals r	esuits. Therefore	e, qualification	or results w	as not performed		
			Т	otal Result	Dissolve	d Result		
	Sample ID	Analyte	<u> </u>	<u>(mg/L)</u>	<u>(mg</u>	<u>1/L)</u>		
	OW-54	Antimony		ND	0.00	047		
	DUP-3-23-22	Antimony	,	ND	0.00	051		
	OW-13	Barium		0.020	0.0	25		
	OW-54	Cobalt		0.078	0.0	86		
	OW-56	Cobalt		0.0069	0.00	)74		
	OW-59	Cobalt		0.0043	0.00	)50		
	DUP-3-23-22	Cobalt		0.081	0.0	85		
	EB-3-23-22	Nickel		ND	0.00	035		
	OW-54	Nickel		0.24	0.2	27		
	OW-66	Nickel		0.33	0.3	37		
	OW-55	Nickel		0.24	0.2	26		
	OW-13	Nickel		ND	0.00	)33		
	OW-56	Nickel		0.072	0.00	83		
	OW 50	Nickel		0.037	0.0	42		
		Nickel		0.001	0.0	7		
	DUP-3-23-22			0.20	0.2	-1		
	EB-3-23-22	∠inc		ND	0.00	500		

Zinc

Zinc

Zinc

ND

0.010

0.0064



0.0084

0.012

0.0091

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OW-13

OW-56

OW-59

Client Sample ID: OW-54 Field Duplicate Sample ID: DUP-3-23-22						
Analyte	Method	Laboratory Result	Duplicate Result	Relative Percent Difference (RPD)		
Barium, Dissolved	E 200.7	0.20 mg/L	0.20 mg/L	0.0%		
Barium, Total	E 200.7	0.39 mg/L	0.41 mg/L	5.0%		
Chromium, Total	E 200.7	0.0064 mg/L	0.0053 mg/L	18.8% +/-RL		
Cobalt, Dissolved	E 200.7	0.086 mg/L	0.085 mg/L	1.2%		
Cobalt, Total	E 200.7	0.078 mg/L	0.081 mg/L	3.8%		
Nickel, Dissolved	E 200.7	0.27 mg/L	0.27 mg/L	0.0%		
Nickel, Total	E 200.7	0.24 mg/L	0.26 mg/L	8.0%		
Vanadium, Total	E 200.7	0.015 mg/L	0.015 mg/L	0.0% +/-RL		
Zinc, Dissolved	E 200.7	0.017 mg/L	0.018 mg/L	5.7% +/-RL		
Zinc, Total	E 200.7	0.031 mg/L	0.026 mg/L	17.5%		
Antimony, Dissolved	E200.8	0.00047 mg/L	0.00051 mg/L	8.2% +/-RL		
Arsenic, Dissolved	E200.8	0.0081 mg/L	0.0091 mg/L	11.6%		
Arsenic, Total	E200.8	0.0098 mg/L	0.0091 mg/L	7.4%		
Lead, Dissolved	E200.8	0.0064 mg/L	0.0076 mg/L	17.1%		
Lead, Total	E200.8	0.023 mg/L	0.020 mg/L	14.0%		
Selenium, Total	E200.8	0.0012 mg/L	0.00086 mg/L	33.0% +/-RL		
Mercury, Total	E245.1	0.00014 mg/L	ND (0.00020 mg/L)	DL		
Cyanide, Total	E335.4	0.00527 mg/L	ND (0.00500 mg/L)	DL		
TPH DRO	SW8015	2.2 mg/L	2.3 mg/L	4.4%		
TPH GRO	SW8015	2.0 mg/L	1.9 mg/L	5.1%		
TPH ORO	SW8015	0.13 mg/L	0.16 mg/L	20.7% +/-RL		
1,1-Dichloroethane	SW8260B	ND (5.0 µg/L)	0.63 µg/L	DL		
1,2,4-Trimethylbenzene	SW8260B	4.2 µg/L	4.5 µg/L	6.9%		
1,2-Dichloroethane	SW8260B	2.3 µg/L	0.68 µg/L	108.7% +/-RL		
Benzene	SW8260B	12 µg/L	12 µg/L	0.0%		
Chloroform	SW8260B	1.6 µg/L	ND (1.0 µg/L)	DL		
Chloromethane	SW8260B	3.9 µg/L	1.8 µg/L	73.7% +/-RL		
Ethylbenzene	SW8260B	13 µg/L	13 µg/L	0.0%		
Isopropylbenzene	SW8260B	ND (5.0 µg/L)	0.46 µg/L	DL		
MTBE	SW8260B	1,300 µg/L	1,200 µg/L	8.0%		
n-Propylbenzene	SW8260B	1.2 µg/L	1.2 µg/L	0.0% +/-RL		
sec-Butylbenzene	SW8260B	ND (5.0 µg/L)	0.58 µg/L	DL		
Toluene	SW8260B	ND (5.0 µg/L)	0.36 µg/L	DL		
Vinyl Chloride	SW8260B	ND (5.0 µg/L)	0.46 µg/L	DL		
Xylenes, Total	SW8260B	2.0 µg/L	2.4 µg/L	18.2% +/-RL		

#### FIELD DUPLICATE SUMMARY

Field duplicate RPD control limits are not to exceed 30% for water as established by USEPA Region I - New England Environmental Data Review Supplement for Region 1 Data Review Elements and Superfund Specific Guidance/Procedures, EQADR-Supplement2, September 2020.

DL - Indicates that the analyte was detected in one of the duplicate samples and was undetected in the other sample, and



therefore an RPD could not be calculated. Data were not qualified since the detection was within two times the reporting limit. Non-detected results are indicated above with the applicable reporting limit as ND (RL).

+/-RL – Indicates that the detections in both of the samples were within two times the reporting limit. Qualification of data was not required.



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Abbreviation	Reason
EBD	Equipment blank detection
ERPD-LCS	The LCS/LCSD RPD exceeded the upper acceptable limit indicating poor precision.
ERPD-MS	The MS/MSD RPD exceeded the upper acceptable limit indicating poor precision.
FBD	Field blank detection
HR-LCS	The LCS and/or LCSD percent recovery was greater than the upper acceptable limit indicating a possible high bias.
LR-LCS	The LCS and/or LCSD percent recovery was less than the lower acceptable limit indicating a possible low bias.
LR-MS	The MS and/or MSD percent recovery was less than the lower acceptable limit indicating possible matrix interference.
LR-SUR	The surrogate percent recovery was less than the lower acceptable limit indicating a possible low bias.
HR-SUR	The surrogate percent recovery was greater than the upper acceptable limit indicating a possible high bias.
MBD	Method blank detection
MDLRL	Flagged by the laboratory: The result was greater than the MDL but less than the RL.

#### DATA QUALIFICATION SUMMARY

Analyte	Method	Field Sample ID	Lab Sample ID	Result	Limit	Units	Reviewer Qualifier	DV Flag Reasons
1,1,1-Trichloroethane	SW8260B	MKTF-16	2203c69-009a	0.61	1.0	µg/L	J	MDLRL
1,1-Dichloroethane	SW8260B	OW-66	2203c69-003a	27	50	µg/L	J	MDLRL
1,1-Dichloroethane	SW8260B	OW-56	2203c69-006a	0.58	1.0	µg/L	J	MDLRL
1,1-Dichloroethane	SW8260B	DUP-3-23-22	2203c69-010a	0.63	1.0	µg/L	J	MDLRL
1,2,4-Trimethylbenzene	SW8260B	OW-54	2203c69-002a	4.2	5.0	µg/L	J	MDLRL
1,2,4-Trimethylbenzene	SW8260B	OW-56	2203c69-006a	0.22	1.0	µg/L	J	MDLRL
1,2-Dichloroethane	SW8260B	OW-54	2203c69-002a	2.3	5.0	µg/L	J	MDLRL
1,2-Dichloroethane	SW8260B	OW-66	2203c69-003a	21	50	µg/L	J	MDLRL
1,2-Dichloroethane	SW8260B	OW-13	2203c69-005a	0.76	1.0	µg/L	J	MDLRL
1,2-Dichloroethane	SW8260B	DUP-3-23-22	2203c69-010a	0.68	1.0	µg/L	J	MDLRL
1,3,5-Trimethylbenzene	SW8260B	MKTF-16	2203c69-009a	0.61	1.0	µg/L	J	MDLRL
1,4-Dioxane	SW8270C	OW-60	2203c69-008c	0.24	1.0	µg/L	J	MDLRL



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Analyte	Method	Field Sample ID	Lab Sample ID	Result	Limit	Units	Reviewer Qualifier	DV Flag Reasons
1-Methylnaphthalene	SW8270C	OW-66	2203C69-003C	25	50	µg/L	J	MDLRL
2,4,6-Trichlorophenol	SW8270C	OW-59	2203C69-007C	ND	5.0	µg/L	UJ	LR-SUR
2,4-Dimethylphenol	SW8270C	OW-59	2203C69-007C	ND	5.0	µg/L	UJ	LR-SUR
2,4-Dimethylphenol	SW8270C	OW-66	2203C69-003C	22	50	µg/L	J	MDLRL
2,4-Dinitrophenol	SW8270C	OW-59	2203C69-007C	ND	5.0	µg/L	UJ	LR-SUR
2-Butanone	SW8260B	EB-3-23-22	2203c69-001a	5.0	10	µg/L	U	FBD, MDLRL
2-Butanone	SW8260B	FB-3-23-22	2203c69-011a	5.2	10	µg/L	J	MDLRL
2-Methylnaphthalene	SW8270C	OW-66	2203C69-003C	46	50	µg/L	J	MDLRL
2-Methylphenol	SW8270C	OW-59	2203C69-007C	ND	5.0	µg/L	UJ	LR-SUR
2-Methylphenol	SW8270C	OW-66	2203C69-003C	25	50	µg/L	J	MDLRL
3,4-Methylphenol	SW8270C	OW-59	2203C69-007C	ND	5.0	µg/L	UJ	LR-SUR
3,4-Methylphenol	SW8270C	OW-66	2203C69-003C	40	50	µg/L	J	MDLRL
Antimony, Dissolved	E200.8	OW-54	2203C69-002E	0.00047	0.0010	mg/L	J	MDLRL
Antimony, Dissolved	E200.8	DUP-3-23-22	2203C69-010E	0.00051	0.0010	mg/L	J	MDLRL
Arsenic, Dissolved	E200.8	OW-13	2203C69-005E	0.00074	0.0010	mg/L	J	MDLRL
Arsenic, Dissolved	E200.8	OW-59	2203C69-007E	0.0047	0.010	mg/L	J	MDLRL
Arsenic, Dissolved	E200.8	OW-60	2203C69-008E	0.0013	0.0050	mg/L	J	MDLRL
Arsenic, Total	E200.8	OW-13	2203C69-005D	0.00075	0.0010	mg/L	J	MDLRL
Benzene	SW8260B	OW-13	2203c69-005a	0.29	1.0	µg/L	J	MDLRL
Benzene	SW8260B	OW-56	2203c69-006a	0.91	1.0	µg/L	J	MDLRL
Benzo(a)anthracene	SW8270C	MKTF-16	2203c69-009c	ND	0.10	µg/L	UJ	ERPD-LCS
Benzo(a)anthracene	SW8270C	DUP-3-23-22	2203c69-010c	ND	0.10	µg/L	UJ	ERPD-LCS
Benzo(b)fluoranthene	SW8270C	MKTF-16	2203c69-009c	ND	0.10	µg/L	UJ	ERPD-LCS
Benzo(b)fluoranthene	SW8270C	DUP-3-23-22	2203c69-010c	ND	0.10	µg/L	UJ	ERPD-LCS
Bis(2-ethylhexyl)phthalate	SW8270C	OW-55	2203C69-004C	4.6	10	µg/L	J	MDLRL
Chloroform	SW8260B	OW-54	2203c69-002a	1.6	5.0	µg/L	J	MDLRL
Chloroform	SW8260B	OW-55	2203c69-004a	11	50	µg/L	J	MDLRL



Analyte	Method	Field Sample ID	Lab Sample ID	Result	Limit	Units	Reviewer Qualifier	DV Flag Reasons
Chloromethane	SW8260B	EB-3-23-22	2203c69-001a	0.70	3.0	µg/L	U	MBD, MDLRL
Chloromethane	SW8260B	OW-54	2203c69-002a	3.9	15	µg/L	U	MBD, MDLRL
Chloromethane	SW8260B	OW-66	2203c69-003a	54	150	µg/L	U	MBD, MDLRL
Chloromethane	SW8260B	OW-55	2203c69-004a	40	150	µg/L	U	MBD, MDLRL
Chloromethane	SW8260B	OW-56	2203c69-006a	1.6	3.0	µg/L	U	MBD, MDLRL
Chloromethane	SW8260B	OW-59	2203c69-007a	0.66	3.0	µg/L	U	MBD, MDLRL
Chloromethane	SW8260B	OW-60	2203c69-008a	0.70	3.0	µg/L	U	MBD, MDLRL
Chloromethane	SW8260B	MKTF-16	2203c69-009a	0.78	3.0	µg/L	U	MBD, MDLRL
Chloromethane	SW8260B	DUP-3-23-22	2203c69-010a	1.8	3.0	µg/L	U	MBD, MDLRL
Chloromethane	SW8260B	FB-3-23-22	2203c69-011a	0.80	3.0	µg/L	U	MBD, MDLRL
Chloromethane	SW8260B	Trip Blank	2203c69-012a	0.69	3.0	µg/L	U	MBD, MDLRL
Chromium, Dissolved	E 200.7	OW-60	2203C69-008E	0.0044	0.0060	mg/L	J	MDLRL
Chromium, Total	E 200.7	OW-59	2203C69-007D	0.0028	0.0060	mg/L	J	MDLRL
Chromium, Total	E 200.7	DUP-3-23-22	2203C69-010D	0.0053	0.0060	mg/L	J	MDLRL
Chrysene	SW8270C	MKTF-16	2203c69-009c	ND	0.10	µg/L	UJ	ERPD-LCS
Chrysene	SW8270C	DUP-3-23-22	2203c69-010c	ND	0.10	µg/L	UJ	ERPD-LCS
Cobalt, Dissolved	E 200.7	OW-66	2203C69-003E	0.0053	0.0060	mg/L	J	MDLRL
Cobalt, Dissolved	E 200.7	OW-59	2203C69-007E	0.0050	0.0060	mg/L	J	MDLRL
Cobalt, Dissolved	E 200.7	OW-60	2203C69-008E	0.0027	0.0060	mg/L	J	MDLRL
Cobalt, Total	E 200.7	OW-59	2203C69-007D	0.0043	0.0060	mg/L	J	MDLRL
Cyanide, Total	E335.4	OW-54	2203C69-002F	0.00527	0.00500	mg/L	J-	ERPD-MS, LR-MS
Cyanide, Total	E335.4	OW-66	2203C69-003F	0.00756	0.00500	mg/L	J-	ERPD-MS, LR-MS
Cyanide, Total	E335.4	OW-59	2203C69-007F	0.0191	0.00500	mg/L	J-	ERPD-MS, LR-MS
Cyanide, Total	E335.4	OW-60	2203C69-008F	0.00928	0.00500	mg/L	J-	ERPD-MS, LR-MS
Cyanide, Total	E335.4	EB-3-23-22	2203C69-001F	ND	0.00500	mg/L	R	ERPD-MS, LR-MS
Cyanide, Total	E335.4	OW-55	2203C69-004F	ND	0.00500	mg/L	UJ	ERPD-MS, LR-MS
Cyanide, Total	E335.4	OW-13	2203C69-005F	ND	0.00500	mg/L	UJ	ERPD-MS, LR-MS



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Analyte	Method	Field Sample ID	Lab Sample ID	Result	Limit	Units	Reviewer Qualifier	DV Flag Reasons
Cyanide, Total	E335.4	OW-56	2203C69-006F	ND	0.00500	mg/L	UJ	ERPD-MS, LR-MS
Cyanide, Total	E335.4	DUP-3-23-22	2203C69-010F	ND	0.00500	mg/L	UJ	ERPD-MS, LR-MS
Indeno(1,2,3-cd)pyrene	SW8270C	MKTF-16	2203c69-009c	ND	0.30	µg/L	UJ	ERPD-LCS
Indeno(1,2,3-cd)pyrene	SW8270C	DUP-3-23-22	2203c69-010c	ND	0.30	µg/L	UJ	ERPD-LCS
Isopropylbenzene	SW8260B	OW-66	2203c69-003a	17	50	µg/L	J	MDLRL
Isopropylbenzene	SW8260B	OW-55	2203c69-004a	23	50	µg/L	J	MDLRL
Isopropylbenzene	SW8260B	DUP-3-23-22	2203c69-010a	0.46	1.0	µg/L	J	MDLRL
Lead, Dissolved	E200.8	OW-56	2203C69-006E	0.00015	0.00050	mg/L	J	MDLRL
Lead, Dissolved	E200.8	OW-59	2203C69-007E	0.00061	0.0050	mg/L	J	MDLRL
Lead, Total	E200.8	OW-13	2203C69-005D	0.000067	0.0005	mg/L	J	MDLRL
Lead, Total	E200.8	OW-59	2203C69-007D	0.0020	0.0025	mg/L	J	MDLRL
Mercury, Total	E245.1	OW-54	2203C69-002D	0.00014	0.0002	mg/L	J	MDLRL
Mercury, Total	E245.1	OW-59	2203C69-007D	0.00013	0.0002	mg/L	J	MDLRL
Naphthalene	SW8270C	MKTF-16	2203c69-009c	0.08	0.10	µg/L	J	MDLRL
n-Butylbenzene	SW8260B	OW-66	2203c69-003a	13	150	µg/L	J	MDLRL
n-Butylbenzene	SW8260B	MKTF-16	2203c69-009a	0.29	3.0	µg/L	J	MDLRL
Nickel, Dissolved	E 200.7	OW-60	2203C69-008E	0.012	0.010	mg/L	JB	EBD
Nickel, Dissolved	E 200.7	OW-13	2203C69-005E	0.0033	0.010	mg/L	U	EBD, MDLRL
Nickel, Dissolved	E 200.7	EB-3-23-22	2203C69-001E	0.0035	0.010	mg/L	J	MDLRL
Nickel, Total	E 200.7	OW-54	2203C69-002D	0.24	0.010	mg/L	J-	LR-LCS
Nickel, Total	E 200.7	OW-66	2203C69-003D	0.33	0.010	mg/L	J-	LR-LCS
Nickel, Total	E 200.7	OW-55	2203C69-004D	0.24	0.010	mg/L	J-	LR-LCS
Nickel, Total	E 200.7	OW-56	2203C69-006D	0.072	0.010	mg/L	J-	LR-LCS
Nickel, Total	E 200.7	OW-59	2203C69-007D	0.037	0.010	mg/L	J-	LR-LCS
Nickel, Total	E 200.7	OW-60	2203C69-008D	0.084	0.010	mg/L	J-	LR-LCS
Nickel, Total	E 200.7	DUP-3-23-22	2203C69-010D	0.26	0.010	mg/L	J-	LR-LCS
Nickel, Total	E 200.7	EB-3-23-22	2203C69-001D	ND	0.010	mg/L	UJ	LR-LCS



Analyte	Method	Field Sample ID	Lab Sample ID	Result	Limit	Units	Reviewer Qualifier	DV Flag Reasons	
Nickel, Total	E 200.7	OW-13	2203C69-005D	ND	0.010	mg/L	UJ	LR-LCS	
n-Propylbenzene	SW8260B	OW-54	2203c69-002a	1.2	5.0	µg/L	J	MDLRL	
Phenanthrene	SW8270C	MKTF-16	2203c69-009c	ND	0.10	µg/L	UJ	ERPD-LCS	
Phenanthrene	SW8270C	DUP-3-23-22	2203c69-010c	ND	0.10	µg/L	UJ	ERPD-LCS	
Phenol	SW8270C	OW-59	2203C69-007C	ND	5.0	µg/L	UJ	LR-SUR	
Phenol	SW8270C	OW-66	2203C69-003C	46	50	µg/L	J	MDLRL	
p-Isopropyltoluene	SW8260B	MKTF-16	2203c69-009a	0.21	1.0	µg/L	J	MDLRL	
Pyrene	SW8270C	MKTF-16	2203c69-009c	ND	0.20	µg/L	UJ	ERPD-LCS	
Pyrene	SW8270C	DUP-3-23-22	2203c69-010c	ND	0.20	µg/L	UJ	ERPD-LCS	
sec-Butylbenzene	SW8260B	DUP-3-23-22	2203c69-010a	0.58	1.0	µg/L	J	MDLRL	
Selenium, Total	E200.8	OW-56	2203C69-006D	0.00082	0.0010	mg/L	J	MDLRL	
Selenium, Total	E200.8	OW-59	2203C69-007D	0.0020	0.0050	mg/L	J	MDLRL	
Selenium, Total	E200.8	DUP-3-23-22	2203C69-010D	0.00086	0.001	mg/L	J	MDLRL	
Toluene	SW8260B	DUP-3-23-22	2203c69-010a	0.36	1.0	µg/L	J	MDLRL	
TPH DRO	SW8015	OW-54	2203C69-002C	2.2	0.064	mg/L	J+	ERPD-LCS, HR-LCS	
TPH DRO	SW8015	OW-66	2203C69-003C	6.6	0.64	mg/L	J+	ERPD-LCS, HR-LCS	
TPH DRO	SW8015	OW-55	2203C69-004C	3.6	0.064	mg/L	J+	ERPD-LCS, HR-LCS	
TPH DRO	SW8015	OW-56	2203C69-006C	1.1	0.064	mg/L	J+	ERPD-LCS, HR-LCS, HR-SUR	
TPH DRO	SW8015	OW-59	2203C69-007C	0.49	0.064	mg/L	J+	ERPD-LCS, HR-LCS	
TPH DRO	SW8015	OW-60	2203C69-008C	0.092	0.064	mg/L	JB	ERPD-LCS, HR-LCS, MBD	
TPH DRO	SW8015	EB-3-23-22	2203C69-001C	0.033	0.064	mg/L	U	ERPD-LCS, HR-LCS, MBD, MDLRL	
TPH DRO	SW8015	OW-13	2203C69-005C	0.036	0.064	mg/L	U	ERPD-LCS, HR-LCS, MBD, MDLRL	
TPH GRO	SW8015	OW-13	2203c69-005a	0.15	0.050	mg/L	JB	MBD	
TPH GRO	SW8015	OW-60	2203c69-008a	0.066	0.050	mg/L	JB	MBD	
TPH GRO	SW8015	EB-3-23-22	2203c69-001a	0.034	0.050	mg/L	U	MBD, MDLRL	
TPH ORO	SW8015	DUP-3-23-22	2203C69-010C	0.16	0.080	mg/L	JB	MBD	



Analyte	Method	Field Sample ID	Lab Sample ID	Result	Limit	Units	Reviewer Qualifier	DV Flag Reasons
TPH ORO	SW8015	OW-56	2203C69-006C	0.24	0.080	mg/L	J+	HR-SUR
Vanadium, Dissolved	E 200.7	OW-66	2203C69-003E	0.0029	0.050	mg/L	J	MDLRL
Vanadium, Dissolved	E 200.7	OW-55	2203C69-004E	0.0039	0.050	mg/L	J	MDLRL
Vanadium, Dissolved	E 200.7	OW-56	2203C69-006E	0.0033	0.050	mg/L	J	MDLRL
Vanadium, Dissolved	E 200.7	OW-59	2203C69-007E	0.0034	0.050	mg/L	J	MDLRL
Vanadium, Dissolved	E 200.7	OW-60	2203C69-008E	0.011	0.050	mg/L	J	MDLRL
Vanadium, Total	E 200.7	OW-54	2203C69-002D	0.015	0.050	mg/L	J	MDLRL
Vanadium, Total	E 200.7	OW-66	2203C69-003D	0.034	0.050	mg/L	J	MDLRL
Vanadium, Total	E 200.7	OW-55	2203C69-004D	0.023	0.050	mg/L	J	MDLRL
Vanadium, Total	E 200.7	OW-13	2203C69-005D	0.0025	0.050	mg/L	J	MDLRL
Vanadium, Total	E 200.7	OW-56	2203C69-006D	0.0083	0.050	mg/L	J	MDLRL
Vanadium, Total	E 200.7	OW-59	2203C69-007D	0.012	0.050	mg/L	J	MDLRL
Vanadium, Total	E 200.7	DUP-3-23-22	2203C69-010D	0.015	0.050	mg/L	J	MDLRL
Vinyl Chloride	SW8260B	MKTF-16	2203c69-009a	0.65	1.0	µg/L	J	MDLRL
Vinyl Chloride	SW8260B	DUP-3-23-22	2203c69-010a	0.46	1.0	µg/L	J	MDLRL
Xylenes, Total	SW8260B	OW-54	2203c69-002a	2.0	7.5	µg/L	J	MDLRL
Zinc, Dissolved	E 200.7	OW-54	2203C69-002E	0.017	0.010	mg/L	JB	EBD
Zinc, Dissolved	E 200.7	OW-55	2203C69-004E	0.011	0.010	mg/L	JB	EBD
Zinc, Dissolved	E 200.7	OW-56	2203C69-006E	0.012	0.010	mg/L	JB	EBD
Zinc, Dissolved	E 200.7	OW-60	2203C69-008E	0.011	0.010	mg/L	JB	EBD
Zinc, Dissolved	E 200.7	DUP-3-23-22	2203C69-010E	0.018	0.010	mg/L	JB	EBD
Zinc, Dissolved	E 200.7	OW-66	2203C69-003E	0.0081	0.010	mg/L	U	EBD, MDLRL
Zinc, Dissolved	E 200.7	OW-13	2203C69-005E	0.0084	0.010	mg/L	U	EBD, MDLRL
Zinc, Dissolved	E 200.7	OW-59	2203C69-007E	0.0091	0.010	mg/L	U	EBD, MDLRL
Zinc, Dissolved	E 200.7	EB-3-23-22	2203C69-001E	0.0063	0.010	mg/L	J	MDLRL
Zinc, Total	E 200.7	OW-59	2203C69-007D	0.0064	0.010	mg/L	J	MDLRL





Client: Marathon Oil	Laboratory: Hall Environmental Analysis Laboratory					
Project Name: Western Refining Southwest, Q1 GW Sampling	Sample Matrix: Groundwater					
Project Number: 697-080-002 Task: 0006	Sample Start Date: 03/24/2022					
Date Validated: 06/282022	Sample End Date: 03/24/2022					
Parameters Included:						
<ul> <li>Volatile Organic Compounds (VOCs) by Environmental Protection Agency (EPA) Test Methods for Evaluating Solid Waste (SW-846) Method 8260B</li> </ul>						
<ul> <li>1,2-Dibromoethane (EDB) by EPA Method 504.1</li> </ul>						
<ul> <li>Semivolatile Organic Compounds (SVOCs) by SW-846 M Monitoring (SIM)</li> </ul>	lethod 8270C and Method 8270C with Selected Ion					
<ul> <li>Total Petroleum Hydrocarbons (TPH) Gasoline Range Or</li> </ul>	ganics (GRO) by SW-846 Method 8015D					
<ul> <li>TPH Diesel Range Organics (DRO) and Motor Oil Range</li> </ul>	Organics (MRO) by SW-846 Method 8015D Modified					
<ul> <li>Total and Dissolved Metals by EPA Method 200.7 and Method</li> </ul>	ethod 200.8					
<ul> <li>Total and Dissolved Mercury by EPA Method 245.1</li> </ul>						
<ul> <li>Cyanide by Standard Methods for the Examination of Water</li> </ul>	ter and Wastewater (SM) Method 4500 CN E					
Laboratory Project ID: 2203D54						
Data Validator: Daran O'Hollearn, Lead Project Scientist						
Reviewer: Mike Phillips, Senior Chemist						

### DATA EVALUATION CRITERIA SUMMARY

A Tier II Data Validation was performed by Trihydro Corporation's Chemical Data Evaluation Services Group on the analytical data report packages generated by Hall Environmental Analysis Laboratory of Albuquerque, New Mexico, with additional data from Pace Analytical National of Mount Juliet, Tennessee evaluating samples from the Marathon Oil site, located in Gallup, New Mexico.

Precision, accuracy, method compliance, and completeness of this data package were assessed during this data review. Precision was determined by evaluating the calculated relative percent difference (RPD) values from:

- Field duplicate pairs
- Laboratory duplicate pairs
- Matrix spike (MS) and matrix spike duplicate (MSD) pairs
- Laboratory control sample (LCS) and laboratory control sample duplicate (LCSD) pairs

Laboratory accuracy was established by reviewing the demonstrated percent recoveries (%R) of the following items to verify that data are not biased.

- MS/MSD samples
- LCS/LCSD samples
- Organic system monitoring compounds (surrogates)

Field accuracy was established by collecting and analyzing the following samples to monitor for possible ambient or cross contamination during sampling and transportation.

Trip blanks





- Field blanks
- Equipment blanks

Method compliance was established by reviewing sample integrity, holding times, detection limits, surrogate recoveries, laboratory blanks, initial and continuing calibrations (where applicable), and the LCS/LCSD percent recoveries against method-specific requirements.

Completeness was evaluated by determining the overall ratio of the number of samples and analyses planned versus the number of samples with valid analyses. Determination of completeness included a review of the chain-of-custody (CoC), laboratory analytical methods, and other laboratory and field documents associated with this analytical data set.

Client Sample ID	Laboratory Sample Number
EB-3-24-22	2203D54-001
OW-30	2203D54-002
OW-64	2203D54-003
OW-14	2203D54-004
STP-1-NW	2203D54-005
MKTF-44	2203D54-006
DUP-3-24-22	2203D54-007
FB-3-24-22	2203D54-008
Trip Blank	2203D54-009

#### SAMPLE NUMBERS TABLE





The laboratory data were reviewed to evaluate compliance with the methods and the quality of the reported data. Assessment of CoC completeness is included in Item 3 of the Data Validation Checklist. A check mark ( $\checkmark$ ) indicates that the referenced validation criteria were deemed acceptable, whereas a crossed circle ( $\otimes$ ) indicates validation criteria for which the data have been qualified by the data validator. An empty circle (O) indicates that the specified criterion does not apply to the reviewed data. Details are noted in the tables below.

#### Validation Criteria

- ✓ Data Completeness
- ✓ CoC Documentation (Item 3)
- ✓ Holding Times and Preservation (Items 6 and 7)
- O Initial and Continuing Calibrations (Items 9 and 10)
- ⊗ Laboratory Blanks (Items 11 and 12)
- ⊗ MS/MSD (Items 13 and 14)
- ⊗ LCS/LCSD (Items 15 and 16)
- System Monitoring Compounds (i.e., Surrogates and Internal Standards) (Item 17)
- 8 Field, Equipment, and Trip Blanks (Items 18 and 19)
- ✓ Field Duplicates (Items 20 and 21)
- ✓ Laboratory Duplicates (Item 22)

### **Guidance References**

Chemical data validation was conducted in accordance with the United States Environmental Protection Agency (USEPA) Contract Laboratory Program (CLP) National Functional Guidelines for the analyses listed below, or by the appropriate method if not covered in the National Functional Guidelines.

- Data for organic analyses were evaluated according to validation criteria set forth in the USEPA CLP National Functional Guidelines for Organic Superfund Methods Data Review, document number EPA-540-R-20-005, November 2020 with additional reference to the USEPA CLP National Functional Guidelines for Organic Data Review, document number EPA 540/R-99/008, October 1999.
- Data for inorganic analyses were evaluated according to validation criteria set forth in the USEPA CLP National Functional Guidelines for Inorganic Superfund Methods Data Review, document number EPA-540-R-20-006, November 2020 with additional reference to the USEPA CLP National Functional Guidelines for Inorganic Data Review, document number EPA 540-R-04-004, October 2004.
- Review of field duplicates was conducted according to the USEPA Region I New England Environmental Data Review Supplement for Region 1 Data Review Elements and Superfund Specific Guidance/Procedures, EQADR-Supplement2, September 2020.
- Trihydro Data Validation Variance Documentation, April 2022.



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### OVERALL DATA PACKAGE ASSESSMENT

Based on a data validation review, the data are acceptable as delivered. Data qualified by the laboratory are discussed in Item 2 of the Validation Criteria Checklist.

The purpose of validating data and assigning qualifiers is to assist in proper data interpretation. Data that are not qualified meet the site data quality objectives. If values are assigned qualifiers other than an R (rejected, data not usable), the data may be used for site evaluation; however, consideration should be given to the reasons for qualification when interpreting sample concentrations. Data points that are assigned an R qualifier should not be used for site evaluation purposes.

If applicable, text was identified in **bold font** in the Validation Criteria Checklist to indicate that further action and/or qualification of the data were required. Data may have been qualified with J data flags by the laboratory if the result was greater than or equal to the method detection limit (MDL) but less than the reporting limit (RL). These laboratory-applied J flags were preserved, if present, and included in the Data Qualification Summary table at the end of this report. If applicable, data validation qualifiers were added for the items noted with crossed circles in the Validation Criteria section above. Please see the Data Qualification Summary table at the end of this report.

If data would be qualified with more than one flag, one qualifier was assigned based on the severity; however, all reasons for qualification were retained. Data that would be qualified with both J+ and J- flags were evaluated based on validation criteria and assigned the appropriate flag. The hierarchy of qualifiers from the most to least severe is as follows:

Data qualifiers used during this validation are included in the following table.

<u>Qualifier</u>	Definition
J	Estimated concentration
J+	The result is an estimated concentration, but may be biased high
J-	The result is an estimated concentration, but may be biased low
UJ	Estimated reporting limit
U	Evaluated to be undetected at the reporting limit
JB	Estimated concentration due to blank contamination

### **Data Completeness**

The analyses were performed as requested on the CoC records. The associated samples were received by the laboratory and analyzed properly unless otherwise noted in the Criteria Checklist below. The complete data package consisted of 540 data points. The data completeness calculation does not include any submitted blank sample results. Data points were not rejected. The data completeness measure for this data package is calculated to be 100% and is acceptable.



	VALIDATION CRITERIA CHECKLIST							
1. Was t	1. Was the report free of non-conformances identified by the laboratory? No							
Comment	s: The laborate	ory noted the following analytical n	on-conformance related to this data se	et.				
"S" flagge dilution.	d denote that tl	ne surrogate recoveries are outsid	e of the standard limits due to matrix i	nterferences/samp	ble			
2. Were If no,	2. Were the data free of data qualification flags and/or notes used by the laboratory? No If no, define.							
Comment	s: The laborate	ory used the following data qualific	ation flags with this data set.					
B – Analyt	te detected in t	he associated method blank.						
D – Samp	le diluted due t	o matrix.						
E – Estima qualificatio	ated value. Th on of sample da	is laboratory flag was applied only ata was not required.	to QC sample and surrogate results in	n the laboratory re	port, and			
J – Analyt	e detected belo	ow quantitation limits.						
J3 – The a	associated bate	h QC was outside the established	quality control range for precision.					
J6 – The s	sample matrix i	nterfered with the ability to make a	any accurate determination; spike value	e is low.				
R – RPD o	outside of rang	е.						
S – % Red	covery outside	of range due to dilution or matrix ir	nterference.					
* – Value	exceeds maxin	num contaminant level.						
3. Were	sample CoC fo	orms and custody procedures com	plete?	Yes				
Comments and labora samples v	s: The CoC re atory personnel vere delivered t	cords from field to laboratory were l signatures, dates, and times of re to the laboratory by courier, and cu	complete, and custody was maintaine eceipt. Custody seals were not presen ustody was maintained at all times.	ed as evidenced by t or required since	y field the			
4. Were permi	detection limits it, or method, o	s in accordance with the quality as r indicated as acceptable?	surance project plan (QAPP),	Yes				
Comment	s: The detection	on limits appeared to be acceptable	e. The following dilutions were applied	d.				
F	<u>Method</u>	Sample(s)	<u>Analyte(s)</u>	Dilution Factor				
F	200.7	OW-14	Total and Dissolved Barium	5				
F	200.8	STP-1-NW, MKTF-44	Select Total and Dissolved Metals	5				
F	504.1	Multiple Samples	EDB	5				
F	8015D	OW-14	DRO and MRO	10				
F	8015D	OW-14	GRO	20				
F	8260B	OW-14	Ethylbenzene	50				
F	8260B	OW-30, OW-14, DUP-3-24-22	MTBE	50				
	8260B	OW-14	Benzene	1,000				



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VALIDATION CRITERIA CHECKLIST	
<ol> <li>Were the reported analytical methods and constituents in compliance with the QAPP, permit, or CoC?</li> </ol>	No
Comments: The reported analytical methods were in compliance with the CoC, and the laboratory rep constituents in accordance with the CoC, with the following exceptions.	ported the requested
The CoC requested total and dissolved metals using Method 200.7; however, the laboratory analyzed both Method 200.7 and Method 200.8. This substituted analytical method, Method 200.8, met similar and precision goals and, therefore, was an acceptable replacement.	the samples using sensitivity, accuracy,
The CoC requested cyanide using Method 335.4; however, the laboratory analyzed the samples using This substituted analytical method met similar sensitivity, accuracy, and precision goals and, therefore replacement.	g Method 4500 CN E. e, was an acceptable
6. Were samples received in good condition within method-specified requirements?	Yes
Comments: Samples were received on ice, in good condition, and with the cooler temperatures within temperature range of $4^{\circ}C \pm 2^{\circ}C$ at 2.9°C, 3.5°C, and 4.0°C as noted on the CoC and the <i>Sample Log</i> Samples transferred to Pace National were received in good condition with the cooler temperature wit range at 3.7°C as noted on the CoC.	n the recommended - <i>in Check List.</i> hin the recommended
7. Were samples extracted/digested and analyzed within method-specified or technical holding times?	Yes
Comments: The samples were extracted/digested and analyzed within method-specific holding times	
<ol> <li>Were reported units appropriate for the sample matrix/matrices and analytical method(s)? Specify if wet or dry units were used for soil.</li> </ol>	Yes
Comments: The results were reported in concentration units of micrograms per liter ( $\mu$ g/L) and milligr which were acceptable for the sample matrix and the analyses requested.	ams per liter (mg/L),
9. Did the laboratory provide any specific initial and/or continuing calibration results?	No
Comments: Initial and continuing calibration data were not included as part of this data set.	
10. If initial and/or continuing calibration results were provided, were the results within acceptable limits?	N/A
Comments: Initial and continuing calibration data were not included as part of this data set.	
11. Was the total number of laboratory blank samples prepared equal to at least 5% of the total number of samples or analyzed as required by the method?	Yes
Comments: The total number of laboratory blank samples prepared was equal to at least 5% of the to samples.	otal number of
12. Were target analytes reported as not detected in the laboratory blanks?	No
Comments: Target analytes were reported as not detected in the laboratory blanks, with the following	exceptions.

<u>Method</u>	od <u>Analyte</u> <u>Batch</u>		Concentration
8015D	DRO	66409	0.040 mg/L
8015D	MRO	66409	0.099 mg/L
8260B	Chloroform	A86942	0.21 μg/L
8270 SIM	Pyrene	R87058	0.16 µg/L

Detections of the identified analytes in the associated samples that were less than the blank results and/or less than the applicable reporting limits were assigned U qualifiers. Detections of the identified analytes in the associated samples that were greater than the reporting limits but less than or equal to 10 times the blank results were assigned JB qualifiers. Non-detections of the identified analytes in the associated samples and detections that were above the reporting limit and greater than ten times the blank concentration did not require qualification.



13. Was the total number of MS samples prepared equal to at least 5% of the total number of samples or analyzed as required by the method?

Yes

Comments: The total number of matrix spike samples prepared was equal to at least 5% of the total number of samples, although MS samples were not prepared/reported for all analyses and/or batch. The matrix spike sample source for each analytical batch in this sample set has been indicated below.

<u>Method</u>	<u>Analytes</u>	<u>Batch</u>	MS Sample Source
200.7	Total Metals	66644	Not Prepared
200.7	Dissolved Metals	A87332	DUP-3-24-22
200.7	Dissolved Metals	C86825	OW-30, EB-3-24-22
200.8	Total Metals	66472	Not Prepared
200.8	Total Metals	66473	MKTF-44
200.8	Dissolved Metals	B86786	Not Prepared
245.1	Total Mercury	66425	Not Prepared
245.1	Dissolved Mercury	66456	Not Prepared
504.1	EDB	66394	Trip Blank
4500CN E	Cyanide	WG1841516	OW-30, Not Associated
8015D	TPH DRO and MRO	66409	Not Prepared
8015D	TPH GRO	A86911	EB-3-24-22
8015D	TPH GRO	B86939	Not Prepared
8260B	VOCs	A86942	Not Prepared
8260B	VOCs	A86972	Not Prepared
8260B	VOCs	A87014	Not Prepared
8270C	SVOCs	66423	Not Prepared
8270C SIM	SVOCs	R87058	Not Prepared

Not Associated – The MS sample source was not associated with this project. Not Prepared – Matrix spikes were not prepared/reported for this batch.

14. For MS/MSDs prepared from project samples, were percent recoveries and RPDs within data validation or laboratory quality control (QC) limits?

No

Comments: The MS/MSD percent recoveries and RPDs for project samples were within data validation and laboratory QC limits, with the following exceptions.

The MS and MSD recoveries for total antimony in Method 200.8 batch 66473 were outside the QC limits of 75-125% at 58.8% and 54.9%, respectively. Total antimony was not detected in the associated samples, and these results were qualified as UJ due to evidence of potential low bias.

The MS recovery for cyanide in Method 4500 CN E batch WG1841516 was outside the laboratory QC limits of 90-110% at 89.9%. However, the recovery was within data validation limits of 75-125%. Validation action was not required.

The percent recoveries and RPD values for MS/MSDs prepared from non-project samples were evaluated and considered but data were not qualified based on those results since matrix similarity to project samples could not be guaranteed.

15. Was the total number of LCSs analyzed equal to at least 5% of the total number of Yes samples or analyzed as required by the method?

Comments: The total number of LCS samples analyzed was equal to at least 5% of the total number of samples



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16. Were LCS/LCSD percent recoveries and LCS/LCSD RPDs within data validation or laboratory QC limits?

Comments: The LCS and LCSD percent recoveries and LCS/LCSD RPDs were within data validation and laboratory QC limits, with the following exceptions.

Method	Analyte	<u>Batch</u>	<u>LCS</u> <u>Recovery</u>	<u>LCSD</u> <u>Recovery</u>	LCS/LCSD QC Limits	LCS/LCSD RPD	RPD QC Limits
200.7	Total Nickel	66644	67.0%		70-130%		
8270C SIM	Phenanthrene	R87058	Acceptable	Acceptable	38.2-93.9%	30.4%	27.9%
8270C SIM	Pyrene	R87058	Acceptable	Acceptable	51-113%	29.5%	20%
8270C SIM	Benzo(a)anthracene	R87058	Acceptable	Acceptable	51-147%	26.2%	24.1%
8270C SIM	Chrysene	R87058	Acceptable	Acceptable	55.3-115%	33.0%	20%
8270C SIM	Benzo(b)fluoranthene	R87058	Acceptable	Acceptable	44.4-136%	34.5%	24.5%
8270C SIM	Indeno(1,2,3-cd)pyrene	R87058	Acceptable	Acceptable	31.4-165%	35.2%	21.1%

Associated samples with detections for total nickel were qualified with J- flags due to possible low bias., and the associated samples with non-detections for total nickel were qualified with a UJ flag due to possible low bias.

The analytes with LCS/LCSD RPD values that were above the QC limit that were not detected in the associated samples were qualified as UJ due to evidence of poor precision. The detected phenanthrene and pyrene results were qualified as J due to evidence of poor precision.

17. Were surrogate recoveries within laboratory QC limits?

No

Yes

No

Comments: Surrogate recoveries were within laboratory QC limits, with the following exceptions.

The Method 8015D surrogate BFB was recovered in sample OW-64 above the acceptance limits of 70-130% at 317%. The target analyte, GRO, associated with this surrogate that was detected in sample OW-64 was assigned a J+ qualifier due to evidence of potential high bias.

The DRO and MRO results for sample OW-14 were not qualified based on the surrogate non-conformance in the Method 8015D analysis since the applied dilution of 10 times resulted in a surrogate concentration below routinely calibrated levels, and this result was deemed unreliable and possibly inaccurate.

Since Method 8270C surrogate associations were not available from the laboratory, qualification was assigned to all of the target analytes in a given fraction (acid or base/neutral) when two or more surrogates from the same fraction (acid or base/neutral) were outside the acceptance range. This condition did not exist for the sample OW-14, and qualification of sample data was not required.

Qualification of sample data was not required based on surrogate non-conformances in QC samples as the environmental samples were evaluated based on their specific surrogate recoveries.

18. Were the number of trip blank, field blank, and/or equipment blank samples collected equal to at least 10% of the total number of samples or as required by the project guidelines, QAPP, SAP, or permit?

Comments: The number of trip, field, and equipment blanks collected was equal to at least 10% of the number of samples. One trip blank sample, Trip Blank, one field blank sample, FB-3-24-22, and one equipment blank sample, EB-3-24-22, were collected as part of this sample set.



19. Were target analytes reported as not detected in the trip blank, field blank, and/or equipment blank samples?

No

Comments: Target analytes were not detected in the trip blank, field blank, and equipment blank samples with the following exceptions.

Blank Sample ID	<u>Method</u>	<u>Analyte</u>	<u>Concentration</u>		
Trip Blank	8260B	Benzene	0.57 μg/L		
Trip Blank	8260B	Chloroform	0.20 µg/L		
FB-3-24-22	8260B	2-Butanone	6.2 μg/L		
FB-3-24-22	8260B	Benzene	0.75 μg/L		
FB-3-24-22	8260B	Ethylbenzene	0.25 μg/L		
EB-3-24-22	200.7	Dissolved Zinc	0.0071 mg/L		
EB-3-24-22	8015D	DRO	0.027 mg/L		
EB-3-24-22	8015D	MRO	0.09 mg/L		
EB-3-24-22	8260B	2-Butanone	9.2 µg/L		

Detections of the identified analytes in the associated samples that were less than the blank results and/or less than the applicable reporting limits were assigned U qualifiers. Detections of dissolved zinc in the associated samples that were greater than the reporting limits but less than 10 times the blank results were assigned JB qualifiers. Non-detections of the identified analytes in the associated samples and detections that were above the reporting limit and greater than ten times the blank concentration did not require qualification.

The chloroform, DRO, and MRO results were previously qualified due to laboratory blank contamination in batches A86942, 66409, and 66409, respectively; therefore, additional qualification due to the trip, field, and equipment blank contamination was not required.

20. Was the number of field duplicates collected equal to at least 10% of the total number of samples or as required by the project guidelines, QAPP, SAP, or permit?

Yes

Comments: The number of field duplicates collected was equal to at least 10% of the number of samples. Sample DUP-3-24-22 was collected as a field duplicate of sample OW-30.

21. Were field duplicate RPD values within data validation QC limits (soil 0-50%, water 0-30%, or air 0-25%)?

Yes

Comments: As indicated in the Field Duplicate Summary Table at the end of this report, field duplicate RPD values were within data validation QC limits of 0-30% for water samples.



VALIDATION CRITERIA CHECKLIST										
22. For laboratory duplicates prepared from project samples, were RPDs within N/A laboratory QC limits?										
Comments: Laboratory duplicates were prepared for these analyses, and the laboratory duplicate sample sources are summarized in the following table.										
	Method	<u>Analytes</u>	<u>Batch</u>	<u>Laboratory Duplicate</u> <u>Sample Source</u>						
	4500CN E	Cyanide	WG1841516	EB-3-24-22						
	4500CN E	Cyanide	WG1841516	Not Associated						
Not Associated – The laborato	ry duplicate sam	ple source wa	s not associated w	ith this project.						
The RPD for the laboratory measurements were non-de	duplicate prep etections.	ared from a	project sample w	as not applicable since the	e cyanide results for both					
The RPD value for the labo data were not qualified bas	ratory duplicat ed on this resu	e sample pre Ilt since matr	epared from a nor ix similarity to pro	n-project sample was eval bject samples could not be	uated and considered, but guaranteed.					
23. Were the following data	a relationships	realistic?								
<ul> <li>Target analytes we EPH/8270)?</li> </ul>	ere reported by	y more than o	one method (e.g.	, 8260/8270,	N/A					
Comments: Target analytes were not reported by more than one method in this data set.										
<ul> <li>Both total and dissolved metals analyses were performed, and the total metals No results were greater than or equal to the dissolved metals results?</li> </ul>										



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Comments: The following table contains the exceptions in which the dissolved metals results exceeded the total metals results. The EPA has not provided guidance or requirements for the evaluation, validation, and qualification of dissolved metals results that exceed the corresponding total metals results. Therefore, qualification of results was not performed based on these data.

Sample ID	<u>Analyte</u>	<u>Total Result</u> (mg/L)	<u>Dissolved Result</u> (mg/L)
OW-30	Arsenic	0.00066	0.00084
OW-64	Arsenic	0.0023	0.0024
DUP-3-24-22	Arsenic	0.00071	0.00073
OW-30	Barium	0.14	0.16
OW-64	Barium	0.32	0.33
DUP-3-24-22	Barium	0.14	0.16
OW-30	Cobalt	0.0042	0.0046
OW-14	Cobalt	0.0049	0.0050
OW-30	Nickel	0.082	0.085
OW-14	Nickel	0.086	0.089
DUP-3-24-22	Nickel	0.084	0.085
STP-1-NW	Selenium	0.0057	0.0063
STP-1-NW	Silver	ND	0.0024
EB-3-24-22	Zinc	ND	0.0071
OW-30	Zinc	ND	0.0052
OW-64	Zinc	ND	0.0081
OW-14	Zinc	ND	0.0091
DUP-3-24-22	Zinc	ND	0.0080



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Client Sample ID: OW-30 Field Duplicate Sample ID: DUP-3-24-22										
Analyte	Analyte Method Laboratory Result Duplicate Result Difference									
Barium, Dissolved	E 200.7	0.16 mg/L	0.16 mg/L	0.0%						
Barium, Total	E 200.7	0.14 mg/L	0.14 mg/L	0.0%						
Cobalt, Dissolved	E 200.7	0.0046 mg/L	0.0052 mg/L	12.2% +/-RL						
Cobalt, Total	E 200.7	0.0042 mg/L	0.0052 mg/L	21.3% +/-RL						
Nickel, Dissolved	E 200.7	0.085 mg/L	0.085 mg/L	0.0%						
Nickel, Total	E 200.7	0.082 mg/L	0.084 mg/L	2.4%						
Zinc, Dissolved	E 200.7	0.0052 mg/L	0.0080 mg/L	42.4% +/-RL						
Arsenic, Dissolved	E200.8	0.00084 mg/L	0.00073 mg/L	14.0% +/-RL						
Arsenic, Total	E200.8	0.00066 mg/L	0.00071 mg/L	7.3% +/-RL						
Lead, Dissolved	E200.8	0.00053 mg/L	0.00055 mg/L	3.7% +/-RL						
Lead, Total	E200.8	0.00087 mg/L	0.00088 mg/L	1.1% +/-RL						
Cyanide, Total	4500 CN E	0.00562 mg/L	0.00726 mg/L	25.5% +/-RL						
TPH DRO	SW8015	0.74 mg/L	0.89 mg/L	18.4%						
TPH GRO	SW8015	1.4 mg/L	1.3 mg/L	7.4%						
TPH ORO	SW8015	0.11 mg/L	0.095 mg/L	14.6% +/-RL						
1,2,4-Trimethylbenzene	SW8260B	0.54 µg/L	0.26 µg/L	70.0% +/-RL						
1,2-Dichloroethane	SW8260B	0.42 µg/L	0.42 µg/L	0.0% +/-RL						
Acetone	SW8260B	3.1 μg/L	2.9 µg/L	6.7% +/-RL						
Ethylbenzene	SW8260B	ND (1.0 µg/L)	0.34 µg/L	DL						
MTBE	SW8260B	1,400 µg/L	1,400 µg/L	0.0%						
Toluene	SW8260B	0.20 µg/L	ND (1.0 µg/L)	DL						
Xylenes, Total	SW8260B	0.85 µg/L	ND (1.5 µg/L)	DL						

#### FIELD DUPLICATE SUMMARY

Field duplicate RPD control limits are not to exceed 30% for water as established by USEPA Region I - New England Environmental Data Review Supplement for Region 1 Data Review Elements and Superfund Specific Guidance/Procedures, EQADR-Supplement2, September 2020.

DL – Indicates that the analyte was detected in one of the duplicate samples and was undetected in the other sample, and therefore an RPD could not be calculated. Data were not qualified since the detection was within two times the reporting limit. Non-detected results are indicated above with the applicable reporting limit as ND (RL).

+/-RL – Indicates that the detections in both of the samples were within two times the reporting limit. Qualification of data was not required.



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## DATA QUALIFICATION SUMMARY

Abbreviation	Reason
EBD	Equipment blank detection
ERPD-LCS	The LCS/LCSD RPD exceeded the upper acceptable limit indicating poor precision.
FBD	Field blank detection
HR-SUR	The surrogate percent recovery was greater than the upper acceptable limit indicating a possible high bias.
LR-LCS	The LCS and/or LCSD percent recovery was less than the lower acceptable limit indicating a possible low bias.
LR-MS	The MS and/or MSD percent recovery was less than the lower acceptable limit indicating possible matrix interference.
MBD	Method blank detection
MDLRL	Flagged by the laboratory: The result was greater than the MDL but less than the RL.
TBD	Trip blank detection

Analyte	Method	Field Sample ID	Lab Sample ID	Result	Limit	Units	Reviewer Qualifier	DV Flag Reasons
1,1-Dichloroethane	SW8260B	OW-14	2203d54-004a	0.38	1.0	µg/L	J	MDLRL
1,2,4-Trimethylbenzene	SW8260B	OW-30	2203d54-002a	0.54	1.0	µg/L	J	MDLRL
1,2,4-Trimethylbenzene	SW8260B	STP-1-NW	2203d54-005a	0.18	1.0	µg/L	J	MDLRL
1,2,4-Trimethylbenzene	SW8260B	DUP-3-24-22	2203d54-007a	0.26	1.0	µg/L	J	MDLRL
1,2-Dichloroethane	SW8260B	OW-30	2203d54-002a	0.42	1.0	µg/L	J	MDLRL
1,2-Dichloroethane	SW8260B	OW-14	2203d54-004a	0.80	1.0	µg/L	J	MDLRL
1,2-Dichloroethane	SW8260B	DUP-3-24-22	2203d54-007a	0.42	1.0	µg/L	J	MDLRL
1,3,5-Trimethylbenzene	SW8260B	OW-14	2203d54-004a	0.47	1.0	µg/L	J	MDLRL
1,4-Dioxane	SW8270C	STP-1-NW	2203d54-005c	0.14	1.0	µg/L	J	MDLRL
2-Butanone	SW8260B	EB-3-24-22	2203d54-001a	9.2	10	µg/L	U	FBD, MDLRL
2-Butanone	SW8260B	FB-3-24-22	2203d54-008a	6.2	10	µg/L	J	MDLRL
Acetone	SW8260B	OW-30	2203d54-002a	3.1	10	µg/L	J	MDLRL
Acetone	SW8260B	OW-64	2203d54-003a	4.4	10	µg/L	J	MDLRL



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Analyte	Method	Field Sample ID	Lab Sample ID	Result	Limit	Units	Reviewer Qualifier	DV Flag Reasons
Acetone	SW8260B	DUP-3-24-22	2203d54-007a	2.9	10	µg/L	J	MDLRL
Antimony, Total	E200.8	MKTF-44	2203D54-006D	ND	0.0050	mg/L	UJ	LR-MS
Antimony, Total	E200.8	DUP-3-24-22	2203D54-007D	ND	0.0010	mg/L	UJ	LR-MS
Arsenic, Dissolved	E200.8	OW-30	2203D54-002E	0.00084	0.0010	mg/L	J	MDLRL
Arsenic, Dissolved	E200.8	STP-1-NW	2203D54-005E	0.0024	0.0050	mg/L	J	MDLRL
Arsenic, Dissolved	E200.8	DUP-3-24-22	2203D54-007E	0.00073	0.0010	mg/L	J	MDLRL
Arsenic, Total	E200.8	OW-30	2203D54-002D	0.00066	0.0010	mg/L	J	MDLRL
Arsenic, Total	E200.8	DUP-3-24-22	2203D54-007D	0.00071	0.0010	mg/L	J	MDLRL
Benzene	SW8260B	Trip Blank	2203d54-009a	0.57	1.0	µg/L	J	MDLRL
Benzene	SW8260B	STP-1-NW	2203D54-005A	0.44	1.0	µg/L	U	MDLRL, TBD
Benzene	SW8260B	FB-3-24-22	2203d54-008a	0.75	1.0	µg/L	U	MDLRL, TBD
Benzo(a)anthracene	SW8270C	EB-3-24-22	2203d54-001c	ND	0.10	µg/L	UJ	ERPD-LCS
Benzo(a)anthracene	SW8270C	OW-30	2203d54-002c	ND	0.10	µg/L	UJ	ERPD-LCS
Benzo(a)anthracene	SW8270C	OW-64	2203d54-003c	ND	0.10	µg/L	UJ	ERPD-LCS
Benzo(a)anthracene	SW8270C	OW-14	2203d54-004c	ND	0.10	µg/L	UJ	ERPD-LCS
Benzo(a)anthracene	SW8270C	STP-1-NW	2203d54-005c	ND	0.10	µg/L	UJ	ERPD-LCS
Benzo(a)anthracene	SW8270C	MKTF-44	2203d54-006c	ND	0.10	µg/L	UJ	ERPD-LCS
Benzo(a)anthracene	SW8270C	DUP-3-24-22	2203d54-007c	ND	0.10	µg/L	UJ	ERPD-LCS
Benzo(b)fluoranthene	SW8270C	EB-3-24-22	2203d54-001c	ND	0.10	µg/L	UJ	ERPD-LCS
Benzo(b)fluoranthene	SW8270C	OW-30	2203d54-002c	ND	0.10	µg/L	UJ	ERPD-LCS
Benzo(b)fluoranthene	SW8270C	OW-64	2203d54-003c	ND	0.10	µg/L	UJ	ERPD-LCS
Benzo(b)fluoranthene	SW8270C	OW-14	2203d54-004c	ND	0.10	µg/L	UJ	ERPD-LCS
Benzo(b)fluoranthene	SW8270C	STP-1-NW	2203d54-005c	ND	0.10	µg/L	UJ	ERPD-LCS
Benzo(b)fluoranthene	SW8270C	MKTF-44	2203d54-006c	ND	0.10	µg/L	UJ	ERPD-LCS
Benzo(b)fluoranthene	SW8270C	DUP-3-24-22	2203d54-007c	ND	0.10	µg/L	UJ	ERPD-LCS
Chloroform	SW8260B	OW-64	2203d54-003a	0.47	1.0	µg/L	U	MBD, MDLRL
Chloroform	SW8260B	Trip Blank	2203d54-009a	0.20	1.0	µg/L	U	MBD, MDLRL



Analyte	Method	Field Sample ID	Lab Sample ID	Result	Limit	Units	Reviewer Qualifier	DV Flag Reasons
Chromium, Dissolved	E 200.7	MKTF-44	2203D54-006E	0.0029	0.006	mg/L	J	MDLRL
Chrysene	SW8270C	EB-3-24-22	2203d54-001c	ND	0.10	µg/L	UJ	ERPD-LCS
Chrysene	SW8270C	OW-30	2203d54-002c	ND	0.10	µg/L	UJ	ERPD-LCS
Chrysene	SW8270C	OW-64	2203d54-003c	ND	0.10	µg/L	UJ	ERPD-LCS
Chrysene	SW8270C	OW-14	2203d54-004c	ND	0.10	µg/L	UJ	ERPD-LCS
Chrysene	SW8270C	STP-1-NW	2203d54-005c	ND	0.10	µg/L	UJ	ERPD-LCS
Chrysene	SW8270C	MKTF-44	2203d54-006c	ND	0.10	µg/L	UJ	ERPD-LCS
Chrysene	SW8270C	DUP-3-24-22	2203d54-007c	ND	0.10	µg/L	UJ	ERPD-LCS
Cobalt, Dissolved	E 200.7	OW-30	2203D54-002E	0.0046	0.0060	mg/L	J	MDLRL
Cobalt, Dissolved	E 200.7	OW-14	2203D54-004E	0.0050	0.0060	mg/L	J	MDLRL
Cobalt, Dissolved	E 200.7	DUP-3-24-22	2203D54-007E	0.0052	0.0060	mg/L	J	MDLRL
Cobalt, Total	E 200.7	OW-30	2203D54-002D	0.0042	0.0060	mg/L	J	MDLRL
Cobalt, Total	E 200.7	OW-14	2203D54-004D	0.0049	0.0060	mg/L	J	MDLRL
Cobalt, Total	E 200.7	STP-1-NW	2203D54-005D	0.0037	0.0060	mg/L	J	MDLRL
Cobalt, Total	E 200.7	DUP-3-24-22	2203D54-007D	0.0052	0.0060	mg/L	J	MDLRL
Ethylbenzene	SW8260B	MKTF-44	2203d54-006a	0.61	1.0	µg/L	U	FBD, MDLRL
Ethylbenzene	SW8260B	DUP-3-24-22	2203d54-007a	0.34	1.0	µg/L	U	FBD, MDLRL
Ethylbenzene	SW8260B	FB-3-24-22	2203d54-008a	0.25	1.0	µg/L	J	MDLRL
Indeno(1,2,3-cd)pyrene	SW8270C	EB-3-24-22	2203d54-001c	ND	0.30	µg/L	UJ	ERPD-LCS
Indeno(1,2,3-cd)pyrene	SW8270C	OW-30	2203d54-002c	ND	0.30	µg/L	UJ	ERPD-LCS
Indeno(1,2,3-cd)pyrene	SW8270C	OW-64	2203d54-003c	ND	0.30	µg/L	UJ	ERPD-LCS
Indeno(1,2,3-cd)pyrene	SW8270C	OW-14	2203d54-004c	ND	0.30	µg/L	UJ	ERPD-LCS
Indeno(1,2,3-cd)pyrene	SW8270C	STP-1-NW	2203d54-005c	ND	0.30	µg/L	UJ	ERPD-LCS
Indeno(1,2,3-cd)pyrene	SW8270C	MKTF-44	2203d54-006c	ND	0.30	µg/L	UJ	ERPD-LCS
Indeno(1,2,3-cd)pyrene	SW8270C	DUP-3-24-22	2203d54-007c	ND	0.30	µg/L	UJ	ERPD-LCS
Lead, Dissolved	E200.8	MKTF-44	2203D54-006E	0.000090	0.00050	mg/L	J	MDLRL
Lead, Total	E200.8	OW-14	2203D54-004D	0.000097	0.00050	mg/L	J	MDLRL



Analyte	Method	Field Sample ID	Lab Sample ID	Result	Limit	Units	Reviewer Qualifier	DV Flag Reasons
Lead, Total	E200.8	STP-1-NW	2203D54-005D	0.0010	0.00250	mg/L	J	MDLRL
n-Butylbenzene	SW8260B	OW-64	2203d54-003a	0.98	3.0	µg/L	J	MDLRL
n-Butylbenzene	SW8260B	OW-14	2203d54-004a	2.7	3.0	µg/L	J	MDLRL
Nickel, Total	E 200.7	OW-30	2203D54-002D	0.082	0.010	mg/L	J-	LR-LCS
Nickel, Total	E 200.7	OW-14	2203D54-004D	0.086	0.010	mg/L	J-	LR-LCS
Nickel, Total	E 200.7	DUP-3-24-22	2203D54-007D	0.084	0.010	mg/L	J-	LR-LCS
Nickel, Total	E 200.7	EB-3-24-22	2203D54-001D	ND	0.010	mg/L	UJ	LR-LCS
Nickel, Total	E 200.7	OW-64	2203D54-003D	ND	0.010	mg/L	UJ	LR-LCS
Nickel, Total	E 200.7	STP-1-NW	2203D54-005D	ND	0.010	mg/L	UJ	LR-LCS
Nickel, Total	E 200.7	MKTF-44	2203D54-006D	0.0042	0.010	mg/L	J-	LR-LCS, MDLRL
n-Propylbenzene	SW8260B	STP-1-NW	2203d54-005a	0.28	1.0	µg/L	J	MDLRL
Phenanthrene	SW8270C	OW-64	2203d54-003c	0.94	0.10	µg/L	J	ERPD-LCS
Phenanthrene	SW8270C	OW-14	2203d54-004c	0.22	0.10	µg/L	J	ERPD-LCS
Phenanthrene	SW8270C	EB-3-24-22	2203d54-001c	ND	0.10	µg/L	UJ	ERPD-LCS
Phenanthrene	SW8270C	OW-30	2203d54-002c	ND	0.10	µg/L	UJ	ERPD-LCS
Phenanthrene	SW8270C	STP-1-NW	2203d54-005c	ND	0.10	µg/L	UJ	ERPD-LCS
Phenanthrene	SW8270C	MKTF-44	2203d54-006c	ND	0.10	µg/L	UJ	ERPD-LCS
Phenanthrene	SW8270C	DUP-3-24-22	2203d54-007c	ND	0.10	µg/L	UJ	ERPD-LCS
p-Isopropyltoluene	SW8260B	OW-64	2203d54-003a	0.30	1.0	µg/L	J	MDLRL
p-Isopropyltoluene	SW8260B	OW-14	2203d54-004a	0.43	1.0	µg/L	J	MDLRL
Pyrene	SW8270C	EB-3-24-22	2203d54-001c	ND	0.20	µg/L	UJ	ERPD-LCS
Pyrene	SW8270C	OW-30	2203d54-002c	ND	0.20	µg/L	UJ	ERPD-LCS
Pyrene	SW8270C	OW-14	2203d54-004c	ND	0.20	µg/L	UJ	ERPD-LCS
Pyrene	SW8270C	MKTF-44	2203d54-006c	ND	0.20	µg/L	UJ	ERPD-LCS
Pyrene	SW8270C	DUP-3-24-22	2203d54-007c	ND	0.20	µg/L	UJ	ERPD-LCS
Pyrene	SW8270C	OW-64	2203d54-003c	0.44	0.20	µg/L	JB	ERPD-LCS, MBD
Pyrene	SW8270C	STP-1-NW	2203d54-005c	0.16	0.20	µg/L	U	ERPD-LCS, MBD, MDLRL



Analyte	Method	Field Sample ID	Lab Sample ID	Result	Limit	Units	Reviewer Qualifier	DV Flag Reasons
Selenium, Total	E200.8	OW-64	2203D54-003D	0.00039	0.0010	mg/L	J	MDLRL
Silver, Dissolved	E 200.7	STP-1-NW	2203D54-005E	0.0024	0.0050	mg/L	J	MDLRL
Toluene	SW8260B	OW-30	2203d54-002a	0.20	1.0	µg/L	J	MDLRL
Toluene	SW8260B	OW-64	2203d54-003a	0.22	1.0	µg/L	J	MDLRL
TPH DRO	SW8015	STP-1-NW	2203D54-005C	0.19	0.064	mg/L	JB	MBD
TPH DRO	SW8015	EB-3-24-22	2203D54-001C	0.027	0.064	mg/L	U	MBD, MDLRL
TPH DRO	SW8015	MKTF-44	2203D54-006C	0.028	0.064	mg/L	U	MBD, MDLRL
TPH GRO	SW8015	OW-64	2203D54-003a	0.66	0.050	mg/L	J+	HR-SUR
TPH ORO	SW8015	OW-30	2203D54-002C	0.11	0.080	mg/L	JB	MBD
TPH ORO	SW8015	EB-3-24-22	2203D54-001C	0.090	0.080	mg/L	U	MBD
TPH ORO	SW8015	DUP-3-24-22	2203D54-007C	0.095	0.080	mg/L	U	MBD
Vanadium, Dissolved	E 200.7	OW-64	2203D54-003E	0.0035	0.050	mg/L	J	MDLRL
Vanadium, Dissolved	E 200.7	STP-1-NW	2203D54-005E	0.034	0.050	mg/L	J	MDLRL
Vanadium, Total	E 200.7	OW-64	2203D54-003D	0.0061	0.050	mg/L	J	MDLRL
Vanadium, Total	E 200.7	STP-1-NW	2203D54-005D	0.034	0.050	mg/L	J	MDLRL
Xylenes, Total	SW8260B	OW-30	2203d54-002a	0.85	1.5	µg/L	J	MDLRL
Zinc, Dissolved	E 200.7	STP-1-NW	2203D54-005E	0.012	0.010	mg/L	JB	EBD
Zinc, Dissolved	E 200.7	MKTF-44	2203D54-006E	0.012	0.010	mg/L	JB	EBD
Zinc, Dissolved	E 200.7	EB-3-24-22	2203D54-001E	0.0071	0.010	mg/L	J	MDLRL
Zinc, Dissolved	E 200.7	OW-30	2203D54-002E	0.0052	0.010	mg/L	U	EBD, MDLRL
Zinc, Dissolved	E 200.7	OW-64	2203D54-003E	0.0081	0.010	mg/L	U	EBD, MDLRL
Zinc, Dissolved	E 200.7	OW-14	2203D54-004E	0.0091	0.010	mg/L	U	EBD, MDLRL
Zinc, Dissolved	E 200.7	DUP-3-24-22	2203D54-007E	0.0080	0.010	mg/L	U	EBD, MDLRL



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Client: Marathon Oil	Laboratory: Hall Environmental Analysis Laboratory				
Project Name: Western Refining Southwest, Quarterly GW	Sample Matrix: Groundwater				
Project Number: 697-080-002 Task: 0006	Sample Start Date: 03/08/2022				
Date Validated: 03/31/2022 revised 11/16/2022	Sample End Date: 03/08/2022				
Parameters Included:					
<ul> <li>Volatile Organic Compounds (VOC) by Environmental Pro Waste (SW-846) Method 8260B</li> </ul>	otection Agency (EPA) Test Methods for Evaluating Solid				
<ul> <li>1,2-Dibromoethane (EDB) by EPA Method 504.1</li> </ul>					
<ul> <li>Semivolatile Organic Compounds (SVOC) by SW-846 Me Monitoring (SIM)</li> </ul>	thod 8270C and Method 8270C with Selected Ion				
<ul> <li>Total Petroleum Hydrocarbons (TPH) Gasoline Range Org</li> </ul>	ganics (GRO) by SW-846 Method 8015D				
<ul> <li>TPH Diesel Range Organics (DRO) and Motor Oil Range</li> </ul>	Organics (MRO) by SW-846 Method 8015D Modified				
<ul> <li>Total and Dissolved Metals by EPA Method 200.7 and Me</li> </ul>	thod 200.8				
<ul> <li>Total and Dissolved Mercury by EPA Method 245.1</li> </ul>					
<ul> <li>Cyanide by Standard Methods for the Examination of Wat</li> </ul>	er and Wastewater (SM) Method 4500 CN E				
Laboratory Project ID: 2203496					
Data Validator: Daran O'Hollearn, Lead Project Scientist	Data Validator: Daran O'Hollearn, Lead Project Scientist				
Reviewer: Mike Phillips, Senior Chemist and Charles Ballek, Sen	ior Chemist				

#### DATA EVALUATION CRITERIA SUMMARY

A Tier II Data Validation was performed by Trihydro Corporation's Chemical Data Evaluation Services Group on the analytical data report packages generated by Hall Environmental Analysis Laboratory of Albuquerque, New Mexico, with additional data from Pace Analytical National of Mount Juliet, Tennessee evaluating samples from the Marathon Oil site, located in Gallup, New Mexico.

Precision, accuracy, method compliance, and completeness of this data package were assessed during this data review. Precision was determined by evaluating the calculated relative percent difference (RPD) values from:

- Field duplicate pairs
- Laboratory duplicate pairs
- Matrix spike (MS) and matrix spike duplicate (MSD) pairs
- Laboratory control sample (LCS) and laboratory control sample duplicate (LCSD) pairs

Laboratory accuracy was established by reviewing the demonstrated percent recoveries (%R) of the following items to verify that data are not biased.

- MS/MSD samples
- LCS/LCSD samples
- Organic system monitoring compounds (surrogates)



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Field accuracy was established by collecting and analyzing the following samples to monitor for possible ambient or cross contamination during sampling and transportation.

- Trip blanks
- Field blanks
- Equipment blanks

Method compliance was established by reviewing sample integrity, holding times, detection limits, surrogate recoveries, laboratory blanks, initial and continuing calibrations (where applicable), and the LCS/LCSD percent recoveries against method-specific requirements.

Completeness was evaluated by determining the overall ratio of the number of samples and analyses planned versus the number of samples with valid analyses. Determination of completeness included a review of the chain-of-custody (CoC), laboratory analytical methods, and other laboratory and field documents associated with this analytical data set.

Client Sample ID	Laboratory Sample Number		
EB-3-8-22	2203496-001		
BW-5C	2203496-002		
BW-5B	2203496-003		
OW-50	2203496-004		
OW-52	2203496-005 2203496-006		
OW-29			
MKTF-43	2203496-007		
OW-10	2203496-008		
DUP-3-8-22	2203496-009		
FB 3-8-22	2203496-010		
Trip Blank	2203496-011		

#### SAMPLE NUMBERS TABLE

This data validation report was revised to incorporate data from a re-issued laboratory report with changes in analytes, results, and quality control information.



The laboratory data were reviewed to evaluate compliance with the methods and the quality of the reported data. Assessment of CoC completeness is included in Item 3 of the Data Validation Checklist. A check mark ( $\checkmark$ ) indicates that the referenced validation criteria were deemed acceptable, whereas a crossed circle ( $\otimes$ ) indicates validation criteria for which the data have been qualified by the data validator. An empty circle ( $\bigcirc$ ) indicates that the specified criterion does not apply to the reviewed data. Details are noted in the tables below.

#### Validation Criteria

- ✓ Data Completeness
- ✓ CoC Documentation (Item 3)
- ✓ Holding Times and Preservation (Items 6 and 7)
- O Initial and Continuing Calibrations (Items 9 and 10)
- ⊗ Laboratory Blanks (Items 11 and 12)
- ✓ MS/MSD (Items 13 and 14)
- ⊗ LCS/LCSD (Items 15 and 16)
- System Monitoring Compounds (i.e., Surrogates) (Item 17)
- 8 Field, Equipment, and Trip Blanks (Items 18 and 19)
- ⊗ Field Duplicates (Items 20 and 21)
- ✓ Laboratory Duplicates (Item 22)
- ✓ Data Relationships (Item 23)

#### **Guidance References**

Chemical data validation was conducted in accordance with the United States Environmental Protection Agency (USEPA) Contract Laboratory Program (CLP) National Functional Guidelines for the analyses listed below, or by the appropriate method if not covered in the National Functional Guidelines.

- Data for organic analyses were evaluated according to validation criteria set forth in the USEPA CLP National Functional Guidelines for Organic Superfund Methods Data Review, document number EPA-540-R-20-005, November 2020 with additional reference to the USEPA CLP National Functional Guidelines for Organic Data Review, document number EPA 540/R-99/008, October 1999.
- Data for inorganic analyses were evaluated according to validation criteria set forth in the USEPA CLP National Functional Guidelines for Inorganic Superfund Methods Data Review, document number EPA-540-R-20-006, November 2020 with additional reference to the USEPA CLP National Functional Guidelines for Inorganic Data Review, document number EPA 540-R-04-004, October 2004.
- Review of field duplicates was conducted according to the USEPA Region I New England Environmental Data Review Supplement for Region 1 Data Review Elements and Superfund Specific Guidance/Procedures, EQADR-Supplement2, September 2020.
- Trihydro Data Validation Variance Documentation, February 2021.



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#### **OVERALL DATA PACKAGE ASSESSMENT**

Based on a data validation review, the data are acceptable as delivered. Data qualified by the laboratory are discussed in Item 2 of the Validation Criteria Checklist.

The purpose of validating data and assigning qualifiers is to assist in proper data interpretation. Data that are not qualified meet the site data quality objectives. If values are assigned qualifiers other than an R (rejected, data not usable), the data may be used for site evaluation; however, consideration should be given to the reasons for qualification when interpreting sample concentrations. Data points that are assigned an R qualifier should not be used for site evaluation purposes.

If applicable, text was identified in **bold font** in the Validation Criteria Checklist to indicate that further action and/or qualification of the data were required. Data may have been qualified with J data flags by the laboratory if the result was greater than or equal to the method detection limit (MDL) but less than the reporting limit (RL). These laboratory-applied J flags were preserved, if present, and included in the Data Qualification Summary table at the end of this report. If applicable, data validation qualifiers were added for the items noted with crossed circles in the Validation Criteria section above. Please see the Data Qualification Summary table at the end of this report.

If data would be qualified with more than one flag, one qualifier was assigned based on the severity; however, all reasons for qualification were retained. Data that would be qualified with both J+ and J- flags were evaluated based on validation criteria and assigned the appropriate flag. The hierarchy of qualifiers from the most to least severe is as follows:

R > JB/U > NJ > J+/J- > J/UJ

Data qualifiers used during this validation are included in the following table.

<u>Qualifier</u>	Definition
J	Estimated concentration
JB	Estimated concentration due to blank contamination
UJ	Estimated reporting limit
U	Evaluated to be undetected at the reporting limit
R	Rejected, data not usable

#### **Data Completeness**

The analyses were performed as requested on the CoC records. The associated samples were received by the laboratory and analyzed properly unless otherwise noted in the Criteria Checklist below. The complete data package consisted of 728 data points. The data completeness calculation does not include any submitted blank sample results. Sixty-eight data points were rejected. The data completeness measure for this data package is calculated to be 90.66% and is acceptable.



		VALIDATION				
1. Was the	e report free	of non-conformances identified	by the laboratory?	No		
Comments: The laboratory noted the following analytical non-conformance related to this data set.						
Method 8270: Samples with "S" flagged surrogates were reextracted and reanalyzed to confirm the original data.						
<ol> <li>Were the data free of data qualification flags and/or notes used by the laboratory?</li> <li>No</li> <li>If no. define.</li> </ol>						
Comments: The laboratory used the following data qualification flags with this data set.						
.I – Analyte detected below quantitation limits						
– The ider	ntification of t	he analyte is acceptable; the re	ported value is an estimate.			
6 – The sa	mple matrix i	nterfered with the ability to mak	' e anv accurate determination: spike v	alue is low.		
– % RPD	is outside of	range.	, , , , , , , , , , , , , , , , , , ,			
– % Reco	very outside	of range due to dilution or matr	ix interference.			
Were o		orms and custody proceduros o	omnlete?	Vac		
		orms and custody procedures c	יסוווטופוב י	162		
permit,	or method, o	r indicated as acceptable?	assurance project plan (QAFF),	lied		
omments.	Method	Sample(s)		Dilution Factor		
	200.7	MKTE-43	Select Dissolved Metals	5		
	200.8	Multiple Samples	Select Total and Dissolved Metals	5		
	8015D	OW-29	GRO	5		
	200.8	BW-5B	Barium (Total and Dissolved)	10		
	000.0					
	200.8	MK1F-43	Select Total Metals	10		
	200.8	MKTF-43 MKTF-43	Select Total Metals Select Dissolved Metals	10 20		
	200.8 200.8 200.8	MKTF-43 MKTF-43 BW-5C, DUP-3-8-22	Select Total Metals Select Dissolved Metals Total Barium	10 20 50		
	200.8 200.8 200.8 8260B	MKTF-43 MKTF-43 BW-5C, DUP-3-8-22 OW-29	Select Total Metals Select Dissolved Metals Total Barium MTBE	10 20 50 100		
Were th QAPP, omments: onstituents he CoC rea sing both N	200.8 200.8 200.8 8260B ne reported a permit, or Co The reported in accordance quested total Aethod 200.7	MKTF-43 MKTF-43 BW-5C, DUP-3-8-22 OW-29 nalytical methods and constitue pC? d analytical methods were in co ce with the CoC, with the follow and dissolved metals using onl and Method 200.8. This subst	Select Total Metals Select Dissolved Metals Total Barium MTBE ents in compliance with the ompliance with the CoC, and the labor ing exceptions. ly Method 200.7; however, the laborat tituted analytical method, Method 200.	10         20         50         100         No         atory reported the requester         tory analyzed the samples         .8, met similar sensitivity,		

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VALIDATION CRITERIA CHECKLIST						
6. Were samples received in good condition within method-specified requirements? No						
Comments: Samples were received on ice, in good condition, and with the cooler temperatures outside the recommended temperature range of 4°C ± 2°C between 0.0°C and 1.6°C as noted on the CoC and the <i>Sample Log-in Check List</i> . The cooler temperatures below 2.0°C were judged as acceptable since the laboratory did not report the sample containers as broken or frozen.						
Samples transferred to Pace National were received in good condition with the cooler temperature within the recom- range at 5.8°C as noted on the CoC.	mended					
7. Were samples extracted/digested and analyzed within method-specified or Yes technical holding times?						
Comments: The samples were extracted/digested and analyzed within method-specific holding times.						
8. Were reported units appropriate for the sample matrix/matrices and analytical Yes method(s)? Specify if wet or dry units were used for soil.						
Comments: The results were reported in concentration units of micrograms per liter ( $\mu$ g/L) and milligrams per liter ( $\mu$ which were acceptable for the sample matrix and the analyses requested.	mg/L),					
9. Did the laboratory provide any specific initial and/or continuing calibration results? No						
Comments: Initial and continuing calibration data were not included as part of this data set.						
10. If initial and/or continuing calibration results were provided, were the results within N/A acceptable limits?						
Comments: Initial and continuing calibration data were not included as part of this data set.						
11. Was the total number of laboratory blank samples prepared equal to at least 5% of the total number of samples or analyzed as required by the method?Yes						
Comments: The total number of laboratory blank samples prepared was equal to at least 5% of the total number of samples.						
12. Were target analytes reported as not detected in the laboratory blanks? No						
Comments: Target analytes were reported as not detected in the laboratory blanks, with the following exceptions.						
DRO was detected in the laboratory blank for Method 8015D batch 66084 at a concentration of 0.030 mg/L. DRO results in the associated samples that were less than the laboratory reporting limit were assigned U qualifiers. DRO results greater than the laboratory reporting limit but less than 10 times the blank concentration were qualified assigned JB qualifiers. Non-detections of DRO in the associated samples and results greater than ten times the blank concentration did not require qualification. GRO was detected in the laboratory blank for Method 8015D batch R86565 at a concentration of 0.042 mg/L. GRO results in the associated samples that were less than the laboratory reporting limit were assigned U qualifiers.						
GRO results greater than the laboratory reporting limit but less than 10 times the blank concentration were qualified assigned JB qualifiers. GRO results greater than ten times the blank concentration did not require quali	ification.					



#### VALIDATION CRITERIA CHECKLIST

13. Was the total number of MS samples prepared equal to at least 5% of the total number of samples or analyzed as required by the method?

Yes

Comments: The total number of matrix spike samples prepared was equal to at least 5% of the total number of samples, although MS samples were not prepared/reported for all analyses and/or batch. The matrix spike sample source for each analytical batch in this sample set has been indicated below.

Method	<u>Analytes</u>	<u>Batch</u>	MS Sample Source	
200.7	Dissolved Metals	C86413	EB-3-8-22	
200.8	Total Metals	66151	Not Prepared	
200.8	Total Metals	66191	EB-3-8-22, OW-50	
200.8	Dissolved Antimony	A86624	Not Prepared	
200.8	Dissolved Metals	B86418	Not Prepared	
200.8	Dissolved Metals	B86537	EB-3-8-22, OW-52	
200.8	Dissolved Metals	B86600	OW-10, DUP-3-8-22	
200.8	Dissolved Metals	C86418	Not Prepared	
245.1	Total Mercury	66216	OW-52	
245.1	Dissolved Mercury	66259	Not Prepared	
504.1	EDB	66148	Not Prepared	
4500CN E	Cyanide	WG1831850	Not Associated, EB-3-8-22	
4500CN E	Cyanide	WG1832545	Not Associated, DUP-3-8-22	
8015D	TPH DRO and MRO	66084	Not Prepared	
8015D	GRO	R86565	EB-3-8-22	
8260B	VOC	B86433	BW-5C	
8260B	MTBE	B86459	Not Prepared	
8270C SIM	SVOC	66057	Not Prepared	
8270C	SVOC	66091	Not Prepared	

Not Associated – The MS sample source was not associated with this project. Not Prepared – Matrix spikes were not prepared/reported for this batch.

14. For MS/MSDs prepared from project samples, were percent recoveries and RPDs within data validation or laboratory quality control (QC) limits?

Yes

Comments: The MS/MSD percent recoveries and RPDs for project samples were within data validation and laboratory QC limits.

The percent recoveries and RPD values for MS/MSDs prepared from non-project samples were evaluated and considered, but data were not qualified based on those results since matrix similarity to project samples could not be guaranteed.

15. Was the total number of LCSs analyzed equal to at least 5% of the total number of Yes samples or analyzed as required by the method?

Comments: The total number of LCS samples analyzed was equal to at least 5% of the total number of samples.



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VALIDATION CRITERIA CHECKLIST									
16. Were LCS/LCSD percent recoveries and LCS/LCSD RPDs within data validation or No laboratory QC limits?									
Comments: The LCS and LCSD percent recoveries and LCS/LCSD RPDs were within data validation and laboratory QC limits, with the following exceptions.									
	Method         Analyte         Batch         LCS/LCSD         RPD QC           Limits         Limits         Limits         Limits         Limits         Limits								
	8270	SIM Naphthalene	66057	40.0%	25.6%				
	8270	SIM 1-Methylnaphthalene	66057	38.9%	25.0%				
	8270	SIM 2-Methylnaphthalene	66057	37.7%	25.0%				
	8270	SIM Acenaphthene	66057	31.4%	27.8%				
The identifi due to evid	ied analytes ence of poor	were not detected in the asso r precision.	ciated samples, a	nd the results v	vere assigned U.	l qualifiers			
17. Were s	urrogate reco	veries within laboratory QC limit	s?		No				
Comments:	Surrogate re	coveries were within laboratory	QC limits, with the	following except	tions.				
	Method	Surrogate	Sample	Surrogati Recover	<u>e</u> <u>QC Limits</u>				
	8270C	2-Fluorophenol	EB-3-8-22	29.0%	29.4-87.7%				
	8270C	Phenol-d₅	EB-3-8-22	21.9%	28.5-64.7%				
	8270C	Nitrobenzene-d₅	EB-3-8-22 36.89		36.9-103%				
	8270C	2-Fluorobiphenyl	EB-3-8-22 36.7		38.1-99.9%				
	8270C	2-Fluorophenol	OW-50	0.0%	29.4-87.7%				
	8270C	Phenol-d₅	OW-50	1.7%	28.5-64.7%				
	8270C	Nitrobenzene-d₅	OW-50	0.0%	36.9-103%				
	8270C	2-Fluorobiphenyl	OW-50	11.5%	38.1-99.9%				
	8270C	2-Fluorophenol	OW-52	1.4%	29.4-87.7%				
	8270C	Phenol-d₅	OW-52	2.1%	28.5-64.7%				
	8270C	Nitrobenzene-d₅	OW-52	2.0%	36.9-103%				
	8270C	2-Fluorobiphenyl	OW-52	5.4%	38.1-99.9%				
	8270C	2-Fluorophenol	OW-29 2.1%		29.4-87.7%				
	8270C	Phenol-d₅	OW-29 6.9%		28.5-64.7%				
	8270C	Nitrobenzene-d₅	OW-29	3.1%	36.9-103%				
	8270C	2-Fluorobiphenyl	OW-29	15.5%	38.1-99.9%				
	8270C	2-Fluorophenol	MKTF-43	0.0%	29.4-87.7%				
	8270C	Phenol-d₅	MKTF-43	2.1%	28.5-64.7%				
	8270C	2,4,6-Tribromophenol	MKTF-43	2.3%	18.6-129%				
	8270C	Nitrobenzene-d₅	MKTF-43	0.0%	36.9-103%				
	8270C	2-Fluorobiphenyl	MKTF-43	3.0%	38.1-99.9%				
	8270C	2-Fluorophenol	OW-10	0.0%	29.4-87.7%				
	8270C	Phenol-d₅	OW-10	1.3%	28.5-64.7%				
	8270C	Nitrobenzene-d₅	OW-10	0.0%	36.9-103%				
	8270C	2-Fluorobiphenyl	OW-10	3.4%	38.1-99.9%				
	8270C	2-Fluorophenol	DUP-3-8-22	0.0%	29.4-87.7%				
8270C		Phenol-d₅	DUP-3-8-22	DUP-3-8-22 2.0%					

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VALIDATION CRITERIA CHECKLIST						
	<u>Method</u>	Surrogate	<u>Sample</u>	<u>Surrogate</u> <u>Recovery</u>	QC Limits	
8270CNitrobenzene-d₅8270C2-Fluorobiphenyl		DUP-3-8-22	0.0%	36.9-103%		
		2-Fluorobiphenyl	DUP-3-8-22	8.3%	38.1-99.9%	

Since Method 8270C surrogate associations were not available from the laboratory, qualification was assigned to all of the target analytes in a given fraction (acid or base/neutral) when two or more surrogates from the same fraction (acid or base/neutral) were outside the acceptance range.

The target analytes associated with surrogate recoveries that were less than the lower laboratory QC limits were not detected in the affected samples, and these results were qualified as UJ due to evidence of potential low bias.

The target analytes associated with surrogate recoveries that were less than 10% were qualified as R if not detected in the identified samples indicating rejected results, data not usable. For samples OW-50 and OW-29, two of three base/neutral extractable surrogates were recovered above 10%, and these undetected associated results were qualified as UJ.

Qualification of sample data was not required based on surrogate non-conformances in QC samples as the environmental samples were evaluated based on their specific surrogate recoveries.

Were the number of trip blank, field blank, and/or equipment blank samples
 Yes collected equal to at least 10% of the total number of samples or as required by the project guidelines, QAPP, SAP, or permit?

Comments: The number of trip, field, and equipment blanks collected was equal to at least 10% of the number of samples. One trip blank sample, Trip Blank, one field blank sample, FB 3-8-22, and one equipment blank sample, EB-3-8-22, were collected as part of this sample set.

19. Were target analytes reported as not detected in the trip blank, field blank, and/or No equipment blank samples?

Comments: Target analytes were not detected in the trip blank, field blank, and equipment blank samples with the following exceptions.

Blank Sample ID	<u>Method</u>	Method Analyte C	
EB-3-8-22	8260B	Chloromethane	0.47 µg/L
EB-3-8-22	8015D	Gasoline Range Organics (GRO)	0.040 mg/L
EB-3-8-22	200.8	Dissolved Chromium	0.00027 mg/L
EB-3-8-22	245.1	Dissolved Mercury	0.00010 mg/L
EB-3-8-22	200.7	Dissolved Zinc	0.0054 mg/L

Detections of the identified analytes in the associated samples that were less than the blank results and/or less than the applicable reporting limits were assigned U qualifiers. The detection of dissolved zinc in the associated sample OW-29 that was greater than the reporting limit but less than 10 times the blank result was assigned a JB qualifier. Non-detections of the identified analytes in the associated samples did not require qualification.

The GRO results for the samples in batch R86565 were previously qualified due to a laboratory blank detection; therefore, additional qualification due to the equipment blank contamination was not required.

20. Was the number of field duplicates collected equal to at least 10% of the total number of samples or as required by the project guidelines, QAPP, SAP, or permit?

Yes

Comments: The number of field duplicates collected was equal to at least 10% of the number of samples.

Sample DUP-3-8-22 was collected as a field duplicate of sample West BW-5C.



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#### VALIDATION CRITERIA CHECKLIST

21. Were field duplicate RPD values within data validation QC limits (soil 0-50%, water 0-30%, or air 0-25%)?

Comments: As indicated in the Field Duplicate Summary Table at the end of this report, field duplicate RPD values were within data validation QC limits of 0-30% for water samples, with the following exception.

An RPD value could not be calculated for dissolved nickel for the field duplicate pair BW-5C and DUP-3-8-22 since the analyte was detected in the parent sample and was undetected in the duplicate sample. As the detection in the parent sample was greater than two times the reporting limit, dissolved nickel was qualified as J and UJ for the parent and duplicate samples, respectively.

22. For laboratory duplicates prepared from project samples, were RPDs within laboratory QC limits?

N/A

No

Comments: Laboratory duplicates were prepared for these analyses, and the laboratory duplicate sample sources are summarized in the following table.

<u>Method</u>	Analytes	<u>Batch</u>	Laboratory Duplicate Sample Source
4500CN E	Cyanide	WG1831850	Not Associated
4500CN E	Cyanide	WG1832545	Not Associated, OW-10

The RPD for the laboratory duplicate prepared from a project sample could not be calculated because both measurements were reported as not detected.

The RPD values for laboratory duplicate samples prepared from non-project samples were evaluated and considered, but data were not qualified based on these results since matrix similarity to project samples could not be guaranteed.



VALIDATION CRITERIA CHECKLIST					
23. Were the following data relationships realistic and acceptable?					
<ul> <li>Target analytes were reported by more than one method (e.g., 8260/8270, EPH/8270), and the results were in agreement?</li> </ul>	Yes				
Comments: Target analytes were not reported by more than one method in this data set, with th The target analyte 1,2-dibromoethane (EDB) was reported from analyses by both Method 8260B analyte was reported as not detected by both methods. Qualification of data was not required.	e following exception. 3 and Method 504.1. This				
<ul> <li>Both total and dissolved metals analyses were performed, and the total metals results were greater than or equal to the dissolved metals results?</li> </ul>	No				

Comments: The total metals concentrations were greater than or equal to the dissolved fractions, with the following exceptions.

Sample ID	<u>Analyte</u>	<u>Total</u> <u>Result</u>	<u>Dissolved</u> <u>Result</u>	Reporting Limit	<u>Units</u>	<u>RPD</u>
EB-3-8-22	Mercury	ND	0.00010	0.00020	mg/L	♦
BW-5B	Mercury	ND	0.00010	0.00020	mg/L	♦
OW-52	Arsenic	0.00075	0.00079	0.0010	mg/L	*
OW-52	Barium	0.035	0.043	0.0010	mg/L	20.5%
OW-10	Barium	0.049	0.051	0.0010 / 0.0050	mg/L	4.0%
MKTF-43	Cadmium	ND	0.0030	0.0050 / 0.010	mg/L	♦
EB-3-8-22	Chromium	ND	0.00027	0.0010	mg/L	♦
OW-50	Chromium	ND	0.00025	0.0010	mg/L	♦
MKTF-43	Cobalt	0.0021	0.023	0.010 / 0.030	mg/L	*
OW-10	Cobalt	ND	0.0032	0.0010 / 0.0060	mg/L	♦
BW-5B	Nickel	0.0029	0.011	0.0010	mg/L	*
BW-5B	Selenium	0.00076	0.0011	0.0010	mg/L	*
OW-52	Vanadium	0.0067	0.011	0.0010 / 0.050	mg/L	*
EB-3-8-22	Zinc	ND	0.0054	0.010	mg/L	♦
BW-5B	Zinc	ND	0.0074	0.010	mg/L	♦
OW-50	Zinc	ND	0.0086	0.010	mg/L	♦
OW-52	Zinc	ND	0.0049	0.010	mg/L	♦
OW-29	Zinc	ND	0.010	0.010	mg/L	♦
MKTF-43	Zinc	ND	0.020	0.10 / 0.050	mg/L	♦
OW-10	Zinc	ND	0.0094	0.010	mg/L	♦

----- RPD could not be calculated.

♦ = One or both of the detections were less than 5 times the applicable reporting limits, and qualification of data was not required.

The differences for the corresponding analytical results were within five times the applicable reporting limits, and validation action was not required, or the RPDs between the results were less than 30% indicating that the data were within the measurement uncertainty for the methods, and qualification of results was not required based on the analytical inconsistencies.



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Client Sample ID: BW-5C Field Dunlicate Sample ID: DUP-3-8-22								
Analyte	Method	Laboratory Result	Duplicate Result	Relative Percent Difference (RPD)				
1,1-Dichloroethane	SW8260B	0.82 µg/L	0.81 µg/L	1.2% +/-RL				
1,2-Dichloroethane	SW8260B	0.68 µg/L	0.67 µg/L	1.5% +/-RL				
МТВЕ	SW8260B	24 µg/L	25 µg/L	4.1%				
1,4-Dioxane	SW8270C	2.2 µg/L	2.4 µg/L	8.7%				
TPH GRO	SW8015	0.062 mg/L	0.060 mg/L	3.3% +/-RL				
TPH DRO	SW8015	0.069 mg/L	0.071 mg/L	2.9% +/-RL				
Mercury, Dissolved	E245.1	0.00014 mg/L	0.00012 mg/L	15.4% +/-RL				
Mercury, Total	E245.1	0.00042 mg/L	0.00042 mg/L	0.0%				
Arsenic, Dissolved	E200.8	0.00043 mg/L	ND (0.0050 mg/L)	DL				
Arsenic, Total	E200.8	0.0026 mg/L	0.0025 mg/L	3.9%				
Barium, Dissolved	E200.8	0.11 mg/L	0.12 mg/L	8.7%				
Barium, Total	E200.8	1.6 mg/L	1.6 mg/L	0.0%				
Beryllium, Total	E200.8	0.0016 mg/L	0.0022 mg/L	31.6% +/-RL				
Chromium, Dissolved	E200.8	0.00048 mg/L	0.0015 mg/L	103.0% +/-RL				
Chromium, Total	E200.8	0.045 mg/L	0.049 mg/L	8.5%				
Cobalt, Total	E200.8	0.011 mg/L	0.012 mg/L	8.7%				
Lead, Total	E200.8	0.014 mg/L	0.014 mg/L	0.0%				
Nickel, Dissolved	E200.8	0.0025 mg/L	ND (0.0050 mg/L)	DL				
Nickel, Total	E200.8	0.033 mg/L	0.035 mg/L	5.9%				
Selenium, Dissolved	E200.8	0.00045 mg/L	ND (0.0050 mg/L)	DL				
Selenium, Total	E200.8	0.003 mg/L	0.0027 mg/L	10.5%				
Silver, Total	E200.8	0.0003 mg/L	0.00033 mg/L	9.5% +/-RL				
Vanadium, Total	E200.8	0.041 mg/L	0.049 mg/L	17.8%				
Zinc, Total	E200.8	0.041 mg/L	0.046 mg/L	11.5%				
Cobalt, Dissolved	E 200.7	ND (0.0060 mg/L)	0.0035 mg/L	DL				
Zinc, Dissolved	E 200.7	0.0073 mg/L	0.0069 mg/L	5.6% +/-RL				

#### FIELD DUPLICATE SUMMARY

Field duplicate RPD control limits are not to exceed 30% for water as established by USEPA Region I - New England Environmental Data Review Supplement for Region 1 Data Review Elements and Superfund Specific Guidance/Procedures, EQADR-Supplement2, September 2020.

DL – Indicates that the analyte was detected in one of the duplicate samples and was undetected in the other sample, and therefore an RPD could not be calculated. Data were not qualified since the detection was within two times the reporting limit. Non-detected results are indicated above with the applicable reporting limit as ND (RL).

+/-RL – Indicates that the detections in both of the samples were within two times the reporting limit. Qualification of data was not required.

An RPD value could not be calculated for dissolved nickel for the field duplicate pair BW-5C and DUP-3-8-22 since the analyte was detected in the parent sample and was undetected in the duplicate sample. As the detection in the parent sample was greater than two times the reporting limit, dissolved nickel was qualified as J and UJ for the parent and duplicate samples, respectively.



Abbreviation	Reason
EBD	Equipment blank detection
ERPD-FD	High field duplicate RPD.
ERPD-LCS	The LCS/LCSD RPD exceeded the upper acceptable limit indicating poor precision.
LR-SUR	The surrogate percent recovery was less than the lower acceptable limit indicating a possible low bias.
MBD	Method blank detection
MDLRL	Flagged by the laboratory: The result was greater than the MDL but less than the RL.

DATA QUALIFICATION SUMMARY

#### Reviewer **Field Sample ID DV Flag Reasons** Analyte Method Lab Sample ID Result Limit Units Qualifier MDLRL 1.1-Dichloroethane SW8260B BW-5C 2203496-002a 0.82 1.0 µg/L J SW8260B 2203496-003a 0.54 µg/L MDLRL 1,1-Dichloroethane BW-5B 1.0 J 0.73 µg/L MDLRL 1,1-Dichloroethane SW8260B **OW-10** 2203496-008a 1.0 J 1,1-Dichloroethane SW8260B DUP-3-8-22 2203496-009a 0.81 1.0 µg/L J MDLRL 1,1-Dichloroethene SW8260B **OW-10** 2203496-008a 0.47 1.0 µg/L J MDLRL µg/L MDLRL 1,2-Dichloroethane SW8260B BW-5C 2203496-002a 0.68 1.0 J SW8260B 2203496-003a 0.49 µg/L MDLRL 1,2-Dichloroethane BW-5B 1.0 J SW8260B OW-50 2203496-004a 0.52 1.0 µg/L MDLRL 1,2-Dichloroethane J J MDLRL 1,2-Dichloroethane SW8260B OW-52 2203496-005a 0.51 1.0 µg/L MDLRL 1,2-Dichloroethane SW8260B **OW-29** 2203496-006a 0.53 1.0 µg/L J 1,2-Dichloroethane SW8260B **OW-10** 2203496-008a 0.51 1.0 µg/L J MDLRL 1,2-Dichloroethane SW8260B DUP-3-8-22 2203496-009a 0.67 1.0 µg/L MDLRL J 1,4-Dichlorobenzene SW8270C OW-52 2203496-005C ND 5.0 µg/L R LR-SUR µg/L R LR-SUR 1,4-Dichlorobenzene SW8270C MKTF-43 2203496-007C ND 5.0 1,4-Dichlorobenzene SW8270C OW-10 2203496-008C ND 5.0 µg/L R LR-SUR R 1,4-Dichlorobenzene SW8270C DUP-3-8-22 2203496-009C ND 5.0 µg/L LR-SUR

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Analyte	Method	Field Sample ID	Lab Sample ID	Result	Limit	Units	Reviewer Qualifier	DV Flag Reasons
1,4-Dichlorobenzene	SW8270C	EB-3-8-22	2203496-001C	ND	5.0	µg/L	UJ	LR-SUR
1,4-Dichlorobenzene	SW8270C	OW-50	2203496-004C	ND	5.0	µg/L	UJ	LR-SUR
1,4-Dichlorobenzene	SW8270C	OW-29	2203496-006C	ND	5.0	µg/L	UJ	LR-SUR
1,4-Dioxane	SW8270C	BW-5B	2203496-003c	0.42	1.0	µg/L	J	MDLRL
1,4-Dioxane	SW8270C	OW-29	2203496-006c	0.64	1.0	µg/L	J	MDLRL
1-Methylnaphthalene	SW8270C	EB-3-8-22	2203496-001c	ND	0.10	µg/L	UJ	ERPD-LCS
1-Methylnaphthalene	SW8270C	BW-5C	2203496-002c	ND	0.10	µg/L	UJ	ERPD-LCS
1-Methylnaphthalene	SW8270C	BW-5B	2203496-003c	ND	0.10	µg/L	UJ	ERPD-LCS
1-Methylnaphthalene	SW8270C	OW-50	2203496-004c	ND	0.10	µg/L	UJ	ERPD-LCS
1-Methylnaphthalene	SW8270C	OW-52	2203496-005c	ND	0.10	µg/L	UJ	ERPD-LCS
1-Methylnaphthalene	SW8270C	OW-29	2203496-006c	ND	0.10	µg/L	UJ	ERPD-LCS
1-Methylnaphthalene	SW8270C	MKTF-43	2203496-007c	ND	0.10	µg/L	UJ	ERPD-LCS
1-Methylnaphthalene	SW8270C	OW-10	2203496-008c	ND	0.10	µg/L	UJ	ERPD-LCS
1-Methylnaphthalene	SW8270C	DUP-3-8-22	2203496-009c	ND	0.10	µg/L	UJ	ERPD-LCS
2,4,6-Trichlorophenol	SW8270C	OW-50	2203496-004C	ND	5.0	µg/L	R	LR-SUR
2,4,6-Trichlorophenol	SW8270C	OW-52	2203496-005C	ND	5.0	µg/L	R	LR-SUR
2,4,6-Trichlorophenol	SW8270C	OW-29	2203496-006C	ND	5.0	µg/L	R	LR-SUR
2,4,6-Trichlorophenol	SW8270C	MKTF-43	2203496-007C	ND	5.0	µg/L	R	LR-SUR
2,4,6-Trichlorophenol	SW8270C	OW-10	2203496-008C	ND	5.0	µg/L	R	LR-SUR
2,4,6-Trichlorophenol	SW8270C	DUP-3-8-22	2203496-009C	ND	5.0	µg/L	R	LR-SUR
2,4,6-Trichlorophenol	SW8270C	EB-3-8-22	2203496-001C	ND	5.0	µg/L	UJ	LR-SUR
2,4-Dimethylphenol	SW8270C	OW-50	2203496-004C	ND	5.0	µg/L	R	LR-SUR
2,4-Dimethylphenol	SW8270C	OW-52	2203496-005C	ND	5.0	µg/L	R	LR-SUR
2,4-Dimethylphenol	SW8270C	OW-29	2203496-006C	ND	5.0	µg/L	R	LR-SUR
2,4-Dimethylphenol	SW8270C	MKTF-43	2203496-007C	ND	5.0	µg/L	R	LR-SUR
2,4-Dimethylphenol	SW8270C	OW-10	2203496-008C	ND	5.0	µg/L	R	LR-SUR
2,4-Dimethylphenol	SW8270C	DUP-3-8-22	2203496-009C	ND	5.0	µg/L	R	LR-SUR



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Analyte	Method	Field Sample ID	Lab Sample ID	Result	Limit	Units	Reviewer Qualifier	DV Flag Reasons
2,4-Dimethylphenol	SW8270C	EB-3-8-22	2203496-001C	ND	5.0	µg/L	UJ	LR-SUR
2,4-Dinitrophenol	SW8270C	OW-50	2203496-004C	ND	5.0	µg/L	R	LR-SUR
2,4-Dinitrophenol	SW8270C	OW-52	2203496-005C	ND	5.0	µg/L	R	LR-SUR
2,4-Dinitrophenol	SW8270C	OW-29	2203496-006C	ND	5.0	µg/L	R	LR-SUR
2,4-Dinitrophenol	SW8270C	MKTF-43	2203496-007C	ND	5.0	µg/L	R	LR-SUR
2,4-Dinitrophenol	SW8270C	OW-10	2203496-008C	ND	5.0	µg/L	R	LR-SUR
2,4-Dinitrophenol	SW8270C	DUP-3-8-22	2203496-009C	ND	5.0	µg/L	R	LR-SUR
2,4-Dinitrophenol	SW8270C	EB-3-8-22	2203496-001C	ND	5.0	µg/L	UJ	LR-SUR
2-Methylnaphthalene	SW8270C	EB-3-8-22	2203496-001c	ND	0.10	µg/L	UJ	ERPD-LCS
2-Methylnaphthalene	SW8270C	BW-5C	2203496-002c	ND	0.10	µg/L	UJ	ERPD-LCS
2-Methylnaphthalene	SW8270C	BW-5B	2203496-003c	ND	0.10	µg/L	UJ	ERPD-LCS
2-Methylnaphthalene	SW8270C	OW-50	2203496-004c	ND	0.10	µg/L	UJ	ERPD-LCS
2-Methylnaphthalene	SW8270C	OW-52	2203496-005c	ND	0.10	µg/L	UJ	ERPD-LCS
2-Methylnaphthalene	SW8270C	OW-29	2203496-006c	ND	0.10	µg/L	UJ	ERPD-LCS
2-Methylnaphthalene	SW8270C	MKTF-43	2203496-007c	ND	0.10	µg/L	UJ	ERPD-LCS
2-Methylnaphthalene	SW8270C	OW-10	2203496-008c	ND	0.10	µg/L	UJ	ERPD-LCS
2-Methylnaphthalene	SW8270C	DUP-3-8-22	2203496-009c	ND	0.10	µg/L	UJ	ERPD-LCS
2-Methylphenol	SW8270C	OW-50	2203496-004C	ND	5.0	µg/L	R	LR-SUR
2-Methylphenol	SW8270C	OW-52	2203496-005C	ND	5.0	µg/L	R	LR-SUR
2-Methylphenol	SW8270C	OW-29	2203496-006C	ND	5.0	µg/L	R	LR-SUR
2-Methylphenol	SW8270C	MKTF-43	2203496-007C	ND	5.0	µg/L	R	LR-SUR
2-Methylphenol	SW8270C	OW-10	2203496-008C	ND	5.0	µg/L	R	LR-SUR
2-Methylphenol	SW8270C	DUP-3-8-22	2203496-009C	ND	5.0	µg/L	R	LR-SUR
2-Methylphenol	SW8270C	EB-3-8-22	2203496-001C	ND	5.0	µg/L	UJ	LR-SUR
3,4-Methylphenol	SW8270C	OW-50	2203496-004C	ND	5.0	µg/L	R	LR-SUR
3,4-Methylphenol	SW8270C	OW-52	2203496-005C	ND	5.0	µg/L	R	LR-SUR
3,4-Methylphenol	SW8270C	OW-29	2203496-006C	ND	5.0	µg/L	R	LR-SUR



Analyte	Method	Field Sample ID	Lab Sample ID	Result	Limit	Units	Reviewer Qualifier	DV Flag Reasons
3,4-Methylphenol	SW8270C	MKTF-43	2203496-007C	ND	5.0	µg/L	R	LR-SUR
3,4-Methylphenol	SW8270C	OW-10	2203496-008C	ND	5.0	µg/L	R	LR-SUR
3,4-Methylphenol	SW8270C	DUP-3-8-22	2203496-009C	ND	5.0	µg/L	R	LR-SUR
3,4-Methylphenol	SW8270C	EB-3-8-22	2203496-001C	ND	5.0	µg/L	UJ	LR-SUR
Acenaphthene	SW8270C	EB-3-8-22	2203496-001c	ND	0.10	µg/L	UJ	ERPD-LCS
Acenaphthene	SW8270C	BW-5C	2203496-002c	ND	0.10	µg/L	UJ	ERPD-LCS
Acenaphthene	SW8270C	BW-5B	2203496-003c	ND	0.10	µg/L	UJ	ERPD-LCS
Acenaphthene	SW8270C	OW-50	2203496-004c	ND	0.10	µg/L	UJ	ERPD-LCS
Acenaphthene	SW8270C	OW-52	2203496-005c	ND	0.10	µg/L	UJ	ERPD-LCS
Acenaphthene	SW8270C	OW-29	2203496-006c	ND	0.10	µg/L	UJ	ERPD-LCS
Acenaphthene	SW8270C	MKTF-43	2203496-007c	ND	0.10	µg/L	UJ	ERPD-LCS
Acenaphthene	SW8270C	OW-10	2203496-008c	ND	0.10	µg/L	UJ	ERPD-LCS
Acenaphthene	SW8270C	DUP-3-8-22	2203496-009c	ND	0.10	µg/L	UJ	ERPD-LCS
Acetone	SW8260B	OW-29	2203496-006a	3.0	10	µg/L	J	MDLRL
Arsenic, Dissolved	E200.8	BW-5C	2203496-002E	0.00043	0.0010	mg/L	J	MDLRL
Arsenic, Dissolved	E200.8	BW-5B	2203496-003E	0.00079	0.0010	mg/L	J	MDLRL
Arsenic, Dissolved	E200.8	OW-52	2203496-005E	0.00079	0.0010	mg/L	J	MDLRL
Arsenic, Dissolved	E200.8	OW-29	2203496-006E	0.00059	0.0010	mg/L	J	MDLRL
Arsenic, Total	E200.8	BW-5B	2203496-003D	0.00096	0.0010	mg/L	J	MDLRL
Arsenic, Total	E200.8	OW-52	2203496-005D	0.00075	0.0010	mg/L	J	MDLRL
Arsenic, Total	E200.8	OW-29	2203496-006D	0.00076	0.0010	mg/L	J	MDLRL
Arsenic, Total	E200.8	MKTF-43	2203496-007D	0.0028	0.010	mg/L	J	MDLRL
Arsenic, Total	E200.8	OW-10	2203496-008D	0.00065	0.0010	mg/L	J	MDLRL
Benzoic Acid	SW8270C	OW-52	2203496-005C	ND	20	µg/L	R	LR-SUR
Benzoic Acid	SW8270C	MKTF-43	2203496-007C	ND	20	µg/L	R	LR-SUR
Benzoic Acid	SW8270C	OW-10	2203496-008C	ND	20	µg/L	R	LR-SUR
Benzoic Acid	SW8270C	DUP-3-8-22	2203496-009C	ND	20	µg/L	R	LR-SUR



Analyte	Method	Field Sample ID	Lab Sample ID	Result	Limit	Units	Reviewer Qualifier	DV Flag Reasons
Benzoic Acid	SW8270C	EB-3-8-22	2203496-001C	ND	20	µg/L	UJ	LR-SUR
Benzoic Acid	SW8270C	OW-50	2203496-004C	ND	20	µg/L	UJ	LR-SUR
Benzoic Acid	SW8270C	OW-29	2203496-006C	ND	20	µg/L	UJ	LR-SUR
Beryllium, Total	E200.8	DUP-3-8-22	2203496-009D	0.0022	0.0050	mg/L	J	MDLRL
Bis(2-ethylhexyl)phthalate	SW8270C	OW-52	2203496-005C	ND	10	µg/L	R	LR-SUR
Bis(2-ethylhexyl)phthalate	SW8270C	MKTF-43	2203496-007C	ND	10	µg/L	R	LR-SUR
Bis(2-ethylhexyl)phthalate	SW8270C	OW-10	2203496-008C	ND	10	µg/L	R	LR-SUR
Bis(2-ethylhexyl)phthalate	SW8270C	DUP-3-8-22	2203496-009C	ND	10	µg/L	R	LR-SUR
Bis(2-ethylhexyl)phthalate	SW8270C	EB-3-8-22	2203496-001C	ND	10	µg/L	UJ	LR-SUR
Bis(2-ethylhexyl)phthalate	SW8270C	OW-50	2203496-004C	ND	10	µg/L	UJ	LR-SUR
Bis(2-ethylhexyl)phthalate	SW8270C	OW-29	2203496-006C	ND	10	µg/L	UJ	LR-SUR
Cadmium, Dissolved	E200.8	MKTF-43	2203496-007E	0.0030	0.010	mg/L	J	MDLRL
Chloromethane	SW8260B	EB-3-8-22	2203496-001a	0.47	3.0	µg/L	J	MDLRL
Chromium, Dissolved	E200.8	BW-5C	2203496-002E	0.00048	0.0010	mg/L	U	EBD, MDLRL
Chromium, Dissolved	E200.8	BW-5B	2203496-003E	0.00069	0.0010	mg/L	U	EBD, MDLRL
Chromium, Dissolved	E200.8	OW-50	2203496-004E	0.00025	0.0010	mg/L	U	EBD, MDLRL
Chromium, Dissolved	E200.8	OW-52	2203496-005E	0.00041	0.0010	mg/L	U	EBD, MDLRL
Chromium, Dissolved	E200.8	OW-29	2203496-006E	0.00048	0.0010	mg/L	U	EBD, MDLRL
Chromium, Dissolved	E200.8	DUP-3-8-22	2203496-009E	0.0015	0.0050	mg/L	U	EBD, MDLRL
Chromium, Dissolved	E200.8	EB-3-8-22	2203496-001E	0.00027	0.0010	mg/L	J	MDLRL
Cobalt, Dissolved	E 200.7	MKTF-43	2203496-007E	0.023	0.030	mg/L	J	MDLRL
Cobalt, Dissolved	E 200.7	OW-10	2203496-008E	0.0032	0.0060	mg/L	J	MDLRL
Cobalt, Dissolved	E 200.7	DUP-3-8-22	2203496-009E	0.0035	0.0060	mg/L	J	MDLRL
Cobalt, Total	E200.8	BW-5B	2203496-003D	0.00021	0.0010	mg/L	J	MDLRL
Cobalt, Total	E200.8	OW-52	2203496-005D	0.00048	0.0010	mg/L	J	MDLRL
Cobalt, Total	E200.8	OW-29	2203496-006D	0.00089	0.0010	mg/L	J	MDLRL
Cobalt, Total	E200.8	MKTF-43	2203496-007D	0.0021	0.010	mg/L	J	MDLRL



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Analyte	Method	Field Sample ID	Lab Sample ID	Result	Limit	Units	Reviewer Qualifier	DV Flag Reasons
Cyanide, Total	E335.4	OW-50	2203496-004F	3.29	5.00	µg/L	J	MDLRL
Diethylphthalate	SW8270C	OW-52	2203496-005C	ND	10	µg/L	R	LR-SUR
Diethylphthalate	SW8270C	MKTF-43	2203496-007C	ND	10	µg/L	R	LR-SUR
Diethylphthalate	SW8270C	OW-10	2203496-008C	ND	10	µg/L	R	LR-SUR
Diethylphthalate	SW8270C	DUP-3-8-22	2203496-009C	ND	10	µg/L	R	LR-SUR
Diethylphthalate	SW8270C	EB-3-8-22	2203496-001C	ND	10	µg/L	UJ	LR-SUR
Diethylphthalate	SW8270C	OW-50	2203496-004C	ND	10	µg/L	UJ	LR-SUR
Diethylphthalate	SW8270C	OW-29	2203496-006C	ND	10	µg/L	UJ	LR-SUR
Dimethylphthalate	SW8270C	OW-52	2203496-005C	ND	10	µg/L	R	LR-SUR
Dimethylphthalate	SW8270C	MKTF-43	2203496-007C	ND	10	µg/L	R	LR-SUR
Dimethylphthalate	SW8270C	OW-10	2203496-008C	ND	10	µg/L	R	LR-SUR
Dimethylphthalate	SW8270C	DUP-3-8-22	2203496-009C	ND	10	µg/L	R	LR-SUR
Dimethylphthalate	SW8270C	EB-3-8-22	2203496-001C	ND	10	µg/L	UJ	LR-SUR
Dimethylphthalate	SW8270C	OW-50	2203496-004C	ND	10	µg/L	UJ	LR-SUR
Dimethylphthalate	SW8270C	OW-29	2203496-006C	ND	10	µg/L	UJ	LR-SUR
Di-n-butylphthalate	SW8270C	OW-52	2203496-005C	ND	10	µg/L	R	LR-SUR
Di-n-butylphthalate	SW8270C	MKTF-43	2203496-007C	ND	10	µg/L	R	LR-SUR
Di-n-butylphthalate	SW8270C	OW-10	2203496-008C	ND	10	µg/L	R	LR-SUR
Di-n-butylphthalate	SW8270C	DUP-3-8-22	2203496-009C	ND	10	µg/L	R	LR-SUR
Di-n-butylphthalate	SW8270C	EB-3-8-22	2203496-001C	ND	10	µg/L	UJ	LR-SUR
Di-n-butylphthalate	SW8270C	OW-50	2203496-004C	ND	10	µg/L	UJ	LR-SUR
Di-n-butylphthalate	SW8270C	OW-29	2203496-006C	ND	10	µg/L	UJ	LR-SUR
Di-n-octylphthalate	SW8270C	OW-52	2203496-005C	ND	20	µg/L	R	LR-SUR
Di-n-octylphthalate	SW8270C	MKTF-43	2203496-007C	ND	20	µg/L	R	LR-SUR
Di-n-octylphthalate	SW8270C	OW-10	2203496-008C	ND	20	µg/L	R	LR-SUR
Di-n-octylphthalate	SW8270C	DUP-3-8-22	2203496-009C	ND	20	µg/L	R	LR-SUR
Di-n-octylphthalate	SW8270C	EB-3-8-22	2203496-001C	ND	20	µg/L	UJ	LR-SUR



Analyte	Method	Field Sample ID	Lab Sample ID	Result	Limit	Units	Reviewer Qualifier	DV Flag Reasons
Di-n-octylphthalate	SW8270C	OW-50	2203496-004C	ND	20	µg/L	UJ	LR-SUR
Di-n-octylphthalate	SW8270C	OW-29	2203496-006C	ND	20	µg/L	UJ	LR-SUR
Lead, Dissolved	E200.8	BW-5B	2203496-003E	0.00010	0.00050	mg/L	J	MDLRL
Lead, Total	E200.8	BW-5B	2203496-003D	0.00015	0.00050	mg/L	J	MDLRL
Lead, Total	E200.8	OW-52	2203496-005D	0.00023	0.00050	mg/L	J	MDLRL
Lead, Total	E200.8	OW-29	2203496-006D	0.00028	0.00050	mg/L	J	MDLRL
Lead, Total	E200.8	MKTF-43	2203496-007D	0.0015	0.0050	mg/L	J	MDLRL
Lead, Total	E200.8	OW-10	2203496-008D	0.00011	0.00050	mg/L	J	MDLRL
Mercury, Dissolved	E245.1	BW-5C	2203496-002E	0.00014	0.00020	mg/L	U	EBD, MDLRL
Mercury, Dissolved	E245.1	BW-5B	2203496-003E	0.00010	0.00020	mg/L	U	EBD, MDLRL
Mercury, Dissolved	E245.1	DUP-3-8-22	2203496-009E	0.00012	0.00020	mg/L	U	EBD, MDLRL
Mercury, Dissolved	E245.1	EB-3-8-22	2203496-001E	0.00010	0.00020	mg/L	J	MDLRL
MTBE	SW8260B	MKTF-43	2203496-007a	0.51	1.0	µg/L	J	MDLRL
Naphthalene	SW8270C	EB-3-8-22	2203496-001c	ND	0.10	µg/L	UJ	ERPD-LCS
Naphthalene	SW8270C	BW-5C	2203496-002c	ND	0.10	µg/L	UJ	ERPD-LCS
Naphthalene	SW8270C	BW-5B	2203496-003c	ND	0.10	µg/L	UJ	ERPD-LCS
Naphthalene	SW8270C	OW-50	2203496-004c	ND	0.10	µg/L	UJ	ERPD-LCS
Naphthalene	SW8270C	OW-52	2203496-005c	ND	0.10	µg/L	UJ	ERPD-LCS
Naphthalene	SW8270C	OW-29	2203496-006c	ND	0.10	µg/L	UJ	ERPD-LCS
Naphthalene	SW8270C	MKTF-43	2203496-007c	ND	0.10	µg/L	UJ	ERPD-LCS
Naphthalene	SW8270C	OW-10	2203496-008c	ND	0.10	µg/L	UJ	ERPD-LCS
Naphthalene	SW8270C	DUP-3-8-22	2203496-009c	ND	0.10	µg/L	UJ	ERPD-LCS
Nickel, Dissolved	E200.8	BW-5C	2203496-002E	0.0025	0.0010	mg/L	J	ERPD-FD
Nickel, Dissolved	E200.8	DUP-3-8-22	2203496-009E	ND	0.0050	mg/L	UJ	ERPD-FD
Nickel, Dissolved	E200.8	OW-52	2203496-005E	0.00057	0.0010	mg/L	J	MDLRL
Nickel, Total	E200.8	OW-52	2203496-005D	0.00092	0.0010	mg/L	J	MDLRL
Nickel, Total	E200.8	MKTF-43	2203496-007D	0.0082	0.010	mg/L	J	MDLRL



Analyte	Method	Field Sample ID	Lab Sample ID	Result	Limit	Units	Reviewer Qualifier	DV Flag Reasons
Phenol	SW8270C	OW-50	2203496-004C	ND	5.0	µg/L	R	LR-SUR
Phenol	SW8270C	OW-52	2203496-005C	ND	5.0	µg/L	R	LR-SUR
Phenol	SW8270C	OW-29	2203496-006C	ND	5.0	µg/L	R	LR-SUR
Phenol	SW8270C	MKTF-43	2203496-007C	ND	5.0	µg/L	R	LR-SUR
Phenol	SW8270C	OW-10	2203496-008C	ND	5.0	µg/L	R	LR-SUR
Phenol	SW8270C	DUP-3-8-22	2203496-009C	ND	5.0	µg/L	R	LR-SUR
Phenol	SW8270C	EB-3-8-22	2203496-001C	ND	5.0	µg/L	UJ	LR-SUR
Pyridine	SW8270C	OW-52	2203496-005C	ND	10	µg/L	R	LR-SUR
Pyridine	SW8270C	MKTF-43	2203496-007C	ND	10	µg/L	R	LR-SUR
Pyridine	SW8270C	OW-10	2203496-008C	ND	10	µg/L	R	LR-SUR
Pyridine	SW8270C	DUP-3-8-22	2203496-009C	ND	10	µg/L	R	LR-SUR
Pyridine	SW8270C	EB-3-8-22	2203496-001C	ND	10	µg/L	UJ	LR-SUR
Pyridine	SW8270C	OW-50	2203496-004C	ND	10	µg/L	UJ	LR-SUR
Pyridine	SW8270C	OW-29	2203496-006C	ND	10	µg/L	UJ	LR-SUR
Selenium, Dissolved	E200.8	BW-5C	2203496-002E	0.00045	0.0010	mg/L	J	MDLRL
Selenium, Total	E200.8	BW-5B	2203496-003D	0.00076	0.0010	mg/L	J	MDLRL
Silver, Total	E200.8	BW-5C	2203496-002D	0.00030	0.00050	mg/L	J	MDLRL
Silver, Total	E200.8	DUP-3-8-22	2203496-009D	0.00033	0.00050	mg/L	J	MDLRL
TPH DRO	SW8015	BW-5C	2203496-002C	0.069	0.064	mg/L	JB	MBD
TPH DRO	SW8015	MKTF-43	2203496-007C	0.13	0.064	mg/L	JB	MBD
TPH DRO	SW8015	OW-10	2203496-008C	0.080	0.064	mg/L	JB	MBD
TPH DRO	SW8015	DUP-3-8-22	2203496-009C	0.071	0.064	mg/L	JB	MBD
TPH DRO	SW8015	BW-5B	2203496-003C	0.031	0.064	mg/L	U	MBD, MDLRL
TPH DRO	SW8015	OW-50	2203496-004C	0.030	0.064	mg/L	U	MBD, MDLRL
TPH DRO	SW8015	OW-52	2203496-005C	0.026	0.064	mg/L	U	MBD, MDLRL
TPH GRO	SW8015	BW-5C	2203496-002a	0.062	0.050	mg/L	JB	MBD
TPH GRO	SW8015	BW-5B	2203496-003a	0.054	0.050	mg/L	JB	MBD



Analyte	Method	Field Sample ID	Lab Sample ID	Result	Limit	Units	Reviewer Qualifier	DV Flag Reasons
TPH GRO	SW8015	OW-50	2203496-004a	0.085	0.050	mg/L	JB	MBD
TPH GRO	SW8015	DUP-3-8-22	2203496-009a	0.060	0.050	mg/L	JB	MBD
TPH GRO	SW8015	EB-3-8-22	2203496-001a	0.040	0.050	mg/L	U	MBD, MDLRL
TPH GRO	SW8015	OW-52	2203496-005a	0.049	0.050	mg/L	U	MBD, MDLRL
TPH GRO	SW8015	MKTF-43	2203496-007a	0.039	0.050	mg/L	U	MBD, MDLRL
TPH GRO	SW8015	OW-10	2203496-008a	0.042	0.050	mg/L	U	MBD, MDLRL
Vanadium, Dissolved	E 200.7	BW-5B	2203496-003E	0.0084	0.050	mg/L	J	MDLRL
Vanadium, Dissolved	E 200.7	OW-52	2203496-005E	0.011	0.050	mg/L	J	MDLRL
Vanadium, Dissolved	E 200.7	OW-10	2203496-008E	0.0051	0.050	mg/L	J	MDLRL
Zinc, Dissolved	E 200.7	OW-29	2203496-006E	0.010	0.010	mg/L	JB	EBD
Zinc, Dissolved	E 200.7	BW-5C	2203496-002E	0.0073	0.010	mg/L	U	EBD, MDLRL
Zinc, Dissolved	E 200.7	BW-5B	2203496-003E	0.0074	0.010	mg/L	U	EBD, MDLRL
Zinc, Dissolved	E 200.7	OW-50	2203496-004E	0.0086	0.010	mg/L	U	EBD, MDLRL
Zinc, Dissolved	E 200.7	OW-52	2203496-005E	0.0049	0.010	mg/L	U	EBD, MDLRL
Zinc, Dissolved	E 200.7	MKTF-43	2203496-007E	0.020	0.050	mg/L	U	EBD, MDLRL
Zinc, Dissolved	E 200.7	OW-10	2203496-008E	0.0094	0.010	mg/L	U	EBD, MDLRL
Zinc, Dissolved	E 200.7	DUP-3-8-22	2203496-009E	0.0069	0.010	mg/L	U	EBD, MDLRL
Zinc, Dissolved	E 200.7	EB-3-8-22	2203496-001E	0.0054	0.010	mg/L	J	MDLRL





Client: Marathon Oil	Laboratory: Hall Environmental Analysis Laboratory					
Project Name: Western Refining Southwest, GW Sampling 2022	Sample Matrix: Groundwater					
Project Number: 697-080-002 Task: 0006	Sample Start Date: 03/09/2022					
Date Validated: 03/30/2022	Sample End Date: 03/09/2022					
<ul> <li>Parameters Included:</li> <li>Total Suspended Solids (TSS) by Standard Methods for the Examination of Water and Wastewater (SM) Method 2540D</li> </ul>						
Laboratory Project ID: 2203571						
Data Validator: Daran O'Hollearn, Lead Project Scientist						
Reviewer: Mike Phillips, Senior Chemist						

#### DATA EVALUATION CRITERIA SUMMARY

A Tier II Data Validation was performed by Trihydro Corporation's Chemical Data Evaluation Services Group on the analytical data report packages generated by Hall Environmental Analysis Laboratory of Albuquerque, New Mexico, evaluating samples from the Marathon Oil site, located in Gallup, New Mexico.

Laboratory accuracy was established by reviewing the demonstrated percent recoveries (%R) of the following items to verify that data are not biased.

Laboratory control samples (LCS)

Method compliance was established by reviewing sample integrity, holding times, detection limits, laboratory blanks, initial and continuing calibrations (where applicable), and the LCS percent recoveries against method-specific requirements.

Completeness was evaluated by determining the overall ratio of the number of samples and analyses planned versus the number of samples with valid analyses. Determination of completeness included a review of the chain-of-custody (CoC), laboratory analytical methods, and other laboratory and field documents associated with this analytical data set.

#### SAMPLE NUMBERS TABLE

Client Sample ID	Laboratory Sample Number
MKTF-41	2203571-001
MKTF-32	2203571-002
MKTF-34	2203571-003



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The laboratory data were reviewed to evaluate compliance with the methods and the quality of the reported data. Assessment of CoC completeness is included in Item 3 of the Data Validation Checklist. A check mark ( $\checkmark$ ) indicates that the referenced validation criteria were deemed acceptable, whereas a crossed circle ( $\otimes$ ) indicates validation criteria for which the data have been qualified by the data validator. An empty circle (O) indicates that the specified criterion does not apply to the reviewed data. Details are noted in the tables below.

#### Validation Criteria

- ✓ Data Completeness
- ✓ CoC Documentation (Item 3)
- ⊗ Holding Times and Preservation (Items 6 and 7)
- O Initial and Continuing Calibrations (Items 9 and 10)
- ✓ Laboratory Blanks (Items 11 and 12)
- O Matrix Spikes (MS) and Matrix Spike Duplicates (MSD) ( (Items 13 and 14)
- ✓ LCS (Items 15 and 16)
- O System Monitoring Compounds (i.e., Surrogates) (Item 17)
- O Field, Equipment, and Trip Blanks (Items 18 and 19)
- O Field Duplicates (Items 20 and 21)
- O Laboratory Duplicates (Item 22)
- O Data Relationships (Item 23)

#### **Guidance References**

Chemical data validation was conducted in accordance with the United States Environmental Protection Agency (USEPA) Contract Laboratory Program (CLP) National Functional Guidelines for the analyses listed below, or by the appropriate method if not covered in the National Functional Guidelines.

- Data for inorganic analyses were evaluated according to validation criteria set forth in the USEPA CLP National Functional Guidelines for Inorganic Superfund Methods Data Review, document number EPA-540-R-20-006, November 2020 with additional reference to the USEPA CLP National Functional Guidelines for Inorganic Data Review, document number EPA 540-R-04-004, October 2004.
- Trihydro Data Validation Variance Documentation, February 2021.





#### **OVERALL DATA PACKAGE ASSESSMENT**

Based on a data validation review, the data are acceptable as delivered. Data qualified by the laboratory are discussed in Item 2 of the Validation Criteria Checklist.

The purpose of validating data and assigning qualifiers is to assist in proper data interpretation. Data that are not qualified meet the site data quality objectives. If values are assigned qualifiers other than an R (rejected, data not usable), the data may be used for site evaluation; however, consideration should be given to the reasons for qualification when interpreting sample concentrations. Data points that are assigned an R qualifier should not be used for site evaluation purposes.

If applicable, text was identified in **bold font** in the Validation Criteria Checklist to indicate that further action and/or qualification of the data were required. Data may have been qualified with J data flags by the laboratory if the result was greater than or equal to the method detection limit (MDL) but less than the reporting limit (RL). These laboratory-applied J flags were preserved, if present, and included in the Data Qualification Summary table at the end of this report. If applicable, data validation qualifiers were added for the items noted with crossed circles in the Validation Criteria section above. Please see the Data Qualification Summary table at the end of this report.

If data would be qualified with more than one flag, one qualifier was assigned based on the severity; however, all reasons for qualification were retained. Data that would be qualified with both J+ and J- flags were evaluated based on validation criteria and assigned the appropriate flag. The hierarchy of qualifiers from the most to least severe is as follows:

R > JB/U > NJ > J+/J- > J/UJ

Data qualifiers used during this validation are included in the following table.

<u>Qualifier</u>	Definition		
J	Estimated concentration		
UJ	Estimated reporting limit		

#### **Data Completeness**

The analyses were performed as requested on the CoC records. The associated samples were received by the laboratory and analyzed properly unless otherwise noted in the Criteria Checklist below. The complete data package consisted of 3 data points. The data completeness measure for this data package is calculated to be 100% and is acceptable.



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VALIDATION CRITERIA CHECKLIST						
1. Was the report free of non-conformances identified by the laboratory?	Yes					
Comments: The laboratory did not identify non-conformances regarding the analytical data.						
<ol> <li>Were the data free of data qualification flags and/or notes used by the laboratory? If no, define.</li> </ol>	Yes					
Comments: The laboratory did not apply qualification flags or other notes to the data in the laboratory	report.					
3. Were sample CoC forms and custody procedures complete?	Yes					
Comments: The CoC records from field to laboratory were complete, and custody was maintained as and laboratory personnel signatures, dates, and times of receipt. Custody seals were not present or resamples were delivered to the laboratory by courier, and custody was maintained at all times.	evidenced by field equired since the					
4. Were detection limits in accordance with the quality assurance project plan (QAPP), permit, or method, or indicated as acceptable?	Yes					
Comments: The reporting limits for the analyses were reviewed and appeared to be acceptable. Dilut for the analyses of the submitted samples.	ions were not applied					
<ol><li>Were the reported analytical methods and constituents in compliance with the QAPP, permit, or CoC?</li></ol>	Yes					
Comments: The reported analytical methods were in compliance with the CoC, and the laboratory rep constituents in accordance with the CoC.	orted the requested					
6. Were samples received in good condition within method-specified requirements?	No					
Comments: Samples were received on ice, in good condition, and with the cooler temperatures both within and outside the recommended temperature range of $4^{\circ}C \pm 2^{\circ}C$ between $0.9^{\circ}C$ and $3.5^{\circ}C$ as noted on the CoC and the <i>Sample Log-in Check List</i> . The cooler temperatures below 2.0°C were judged as acceptable since the laboratory did not report the sample containers as broken or frozen.						
7. Were samples extracted/digested and analyzed within method-specified or technical holding times?	No					
Comments: The samples were not analyzed within method-specific holding times.						
<u>Method 2540D</u> : The submitted samples were analyzed outside the defined holding time of 7 days by approximately 1 day. Detected results for samples MKTF-32 and MKTF-34 by Method 2540D were assigned J qualifiers based on the holding time exceedances. The non-detect result for sample MKTF-41 was assigned a UJ qualifier based on the holding time exceedance.						
8. Were reported units appropriate for the sample matrix/matrices and analytical method(s)? Specify if wet or dry units were used for soil.	Yes					
Comments: The results were reported in concentration units of milligrams per liter (mg/L), which were acceptable for the sample matrix and the analyses requested.						
9. Did the laboratory provide any specific initial and/or continuing calibration results?	No					
Comments: Initial and continuing calibration data were not included as part of this data set.						
10. If initial and/or continuing calibration results were provided, were the results within acceptable limits?	N/A					
Comments: Initial and continuing calibration data were not included as part of this data set.						



VALIDATION CRITERIA CHECKLIST	
11. Was the total number of laboratory blank samples prepared equal to at least 5% of the total number of samples or analyzed as required by the method?	Yes
Comments: The total number of laboratory blank samples prepared was equal to at least 5% of the total samples.	number of
12. Were target analytes reported as not detected in the laboratory blanks?	Yes
Comments: Target analytes were reported as not detected in the laboratory blanks.	
13. Was the total number of MS samples prepared equal to at least 5% of the total number of samples or analyzed as required by the method?	No
Comments: The total number of matrix spike samples prepared was not equal to at least 5% of the total samples. Matrix spikes were not prepared for the analyses in this data set.	number of
14. For MS/MSDs prepared from project samples, were percent recoveries and RPDs within data validation or laboratory quality control (QC) limits?	N/A
Comments: MS/MSD samples were not prepared using project samples as the sample source.	
15. Was the total number of LCSs analyzed equal to at least 5% of the total number of samples or analyzed as required by the method?	Yes
Comments: The total number of LCS samples analyzed was equal to at least 5% of the total number of	samples.
16. Were LCS/LCSD percent recoveries and LCS/LCSD RPDs within data validation or laboratory QC limits?	Yes
Comments: The LCS percent recoveries were within laboratory QC limits. LCSDs were not analyzed as set.	part of this sample
17. Were surrogate recoveries within laboratory QC limits?	N/A
Comments: Surrogates were not required for the analyses included in this data set.	
18. Were the number of trip blank, field blank, and/or equipment blank samples collected equal to at least 10% of the total number of samples or as required by the project guidelines, QAPP, SAP, or permit?	No
Comments: Trip, field, and equipment blank samples were not collected for this sample set.	
19. Were target analytes reported as not detected in the trip blank, field blank, and/or equipment blank samples?	N/A
Comments: Trip, field, and equipment blank samples were not collected for this sample set.	
20. Was the number of field duplicates collected equal to at least 10% of the total number of samples or as required by the project guidelines, QAPP, SAP, or permit?	No
Comments: Field duplicates were not collected as part of this sample set.	
21. Were field duplicate RPD values within data validation QC limits (soil 0-50%, water 0-30%, or air 0-25%)?	N/A
Comments: Field duplicates were not collected as part of this sample set.	
22. For laboratory duplicates prepared from project samples, were RPDs within data validation or laboratory QC limits?	N/A
Comments: Laboratory duplicate samples were not prepared for this sample set.	



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VALIDATION CRITERIA CHECKLIST	
23. Were the following data relationships realistic and acceptable?	
• Target analytes were reported by more than one method (e.g., 8260/8270, EPH/8270), and the results were in agreement?	N/A
Comments: Target analytes were not reported by more than one method.	
<ul> <li>Both total and dissolved metals analyses were performed, and the total metals results were greater than or equal to the dissolved metals results?</li> </ul>	N/A
Comments: Total and dissolved metals analyses were not performed for this data set.	



#### DATA QUALIFICATION SUMMARY

Abbreviation	Reason	
HT-AN	Sample was analyzed outside of the method holding time.	

Analyte	Method	Field Sample ID	Lab Sample ID	Result	Limit	Units	Reviewer Qualifier	DV Flag Reasons
Solids, Total Suspended	SM 2540 D	MKTF-32	2203571-002A	91	4.0	mg/L	J	HT-AN
Solids, Total Suspended	SM 2540 D	MKTF-34	2203571-003A	27	4.0	mg/L	J	HT-AN
Solids, Total Suspended	SM 2540 D	MKTF-41	2203571-001A	ND	4.0	mg/L	UJ	HT-AN



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Client: Marathon Oil	Laboratory: Hall Environmental Analysis Laboratory			
Project Name: Western Refining Southwest, Q1 GW Sampling	Sample Matrix: Groundwater			
Project Number: 697-080-002 Task: 0006	Sample Start Date: 03/09/2022			
Date Validated: 04/04/2022 revised 11/16/2022	Sample End Date: 03/09/2022			
Parameters Included:				
<ul> <li>Volatile Organic Compounds (VOC) by Environmental Pro Waste (SW-846) Method 8260B</li> </ul>	otection Agency (EPA) Test Methods for Evaluating Solid			
<ul> <li>1,2-Dibromoethane (EDB) by EPA Method 504.1</li> </ul>				
<ul> <li>Semivolatile Organic Compounds (SVOC) by SW-846 Method 8270C and Method 8270C with Selected Ion Monitoring (SIM)</li> </ul>				
<ul> <li>Total Petroleum Hydrocarbons (TPH) Gasoline Range Organics (GRO) by SW-846 Method 8015D</li> </ul>				
<ul> <li>TPH Diesel Range Organics (DRO) and Motor Oil Range Organics (MRO) by SW-846 Method 8015D Modified</li> </ul>				
<ul> <li>Total and Dissolved Metals by EPA Method 200.7 and Method 200.8</li> </ul>				
<ul> <li>Total and Dissolved Mercury by EPA Method 245.1</li> </ul>				
<ul> <li>Cyanide by Standard Methods for the Examination of Water and Wastewater (SM) Method 4500 CN E</li> </ul>				
Laboratory Project ID: 2203574				
Data Validator: Daran O'Hollearn, Lead Project Scientist				
Reviewer: Mike Phillips, Senior Chemist and Charles Ballek, Senior Chemist				

#### DATA EVALUATION CRITERIA SUMMARY

A Tier II Data Validation was performed by Trihydro Corporation's Chemical Data Evaluation Services Group on the analytical data report packages generated by Hall Environmental Analysis Laboratory of Albuquerque, New Mexico, with additional data from Pace Analytical National of Mount Juliet, Tennessee evaluating samples from the Marathon Oil site, located in Gallup, New Mexico.

Precision, accuracy, method compliance, and completeness of this data package were assessed during this data review. Precision was determined by evaluating the calculated relative percent difference (RPD) values from:

- Field duplicate pairs
- Laboratory duplicate pairs
- Matrix spike (MS) and matrix spike duplicate (MSD) pairs
- Laboratory control sample (LCS) and laboratory control sample duplicate (LCSD) pairs

Laboratory accuracy was established by reviewing the demonstrated percent recoveries (%R) of the following items to verify that data are not biased.

- MS/MSD samples
- LCS/LCSD samples
- Organic system monitoring compounds (surrogates)



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Field accuracy was established by collecting and analyzing the following samples to monitor for possible ambient or cross contamination during sampling and transportation.

- Trip blanks
- Field blanks
- Equipment blanks

Method compliance was established by reviewing sample integrity, holding times, detection limits, surrogate recoveries, laboratory blanks, initial and continuing calibrations (where applicable), and the LCS/LCSD percent recoveries against method-specific requirements.

Completeness was evaluated by determining the overall ratio of the number of samples and analyses planned versus the number of samples with valid analyses. Determination of completeness included a review of the chain-of-custody (CoC), laboratory analytical methods, and other laboratory and field documents associated with this analytical data set.

Client Sample ID	Laboratory Sample Number
MKTF-42	2203574-001
MKTF-41	2203574-002
MKTF-32	2203574-003
MKTF-34	2203574-004
PW-3	2203574-005
PW-4	2203574-006
DUP-3-9-22	2203574-007
EB-3-9-22	2203574-008
FB 3-9-22	2203574-009
Trip Blank	2203574-010

### SAMPLE NUMBERS TABLE

This data validation report was revised to incorporate data from a re-issued laboratory report with changes in analytes, results, and quality control information.





The laboratory data were reviewed to evaluate compliance with the methods and the quality of the reported data. Assessment of CoC completeness is included in Item 3 of the Data Validation Checklist. A check mark ( $\checkmark$ ) indicates that the referenced validation criteria were deemed acceptable, whereas a crossed circle ( $\otimes$ ) indicates validation criteria for which the data have been qualified by the data validator. An empty circle (O) indicates that the specified criterion does not apply to the reviewed data. Details are noted in the tables below.

#### Validation Criteria

- ✓ Data Completeness
- ✓ CoC Documentation (Item 3)
- ✓ Holding Times and Preservation (Items 6 and 7)
- O Initial and Continuing Calibrations (Items 9 and 10)
- ⊗ Laboratory Blanks (Items 11 and 12)
- ✓ MS/MSD (Items 13 and 14)
- ⊗ LCS/LCSD (Items 15 and 16)
- System Monitoring Compounds (i.e., Surrogates) (Item 17)
- 8 Field, Equipment, and Trip Blanks (Items 18 and 19)
- ⊗ Field Duplicates (Items 20 and 21)
- ✓ Laboratory Duplicates (Item 22)
- ✓ Data Relationships (Item 23)

#### **Guidance References**

Chemical data validation was conducted in accordance with the United States Environmental Protection Agency (USEPA) Contract Laboratory Program (CLP) National Functional Guidelines for the analyses listed below, or by the appropriate method if not covered in the National Functional Guidelines.

- Data for organic analyses were evaluated according to validation criteria set forth in the USEPA CLP National Functional Guidelines for Organic Superfund Methods Data Review, document number EPA-540-R-20-005, November 2020 with additional reference to the USEPA CLP National Functional Guidelines for Organic Data Review, document number EPA 540/R-99/008, October 1999.
- Data for inorganic analyses were evaluated according to validation criteria set forth in the USEPA CLP National Functional Guidelines for Inorganic Superfund Methods Data Review, document number EPA-540-R-20-006, November 2020 with additional reference to the USEPA CLP National Functional Guidelines for Inorganic Data Review, document number EPA 540-R-04-004, October 2004.
- Review of field duplicates was conducted according to the USEPA Region I New England Environmental Data Review Supplement for Region 1 Data Review Elements and Superfund Specific Guidance/Procedures, EQADR-Supplement2, September 2020.
- Trihydro Data Validation Variance Documentation, February 2021.



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#### **OVERALL DATA PACKAGE ASSESSMENT**

Based on a data validation review, the data are acceptable as delivered. Data qualified by the laboratory are discussed in Item 2 of the Validation Criteria Checklist.

The purpose of validating data and assigning qualifiers is to assist in proper data interpretation. Data that are not qualified meet the site data quality objectives. If values are assigned qualifiers other than an R (rejected, data not usable), the data may be used for site evaluation; however, consideration should be given to the reasons for qualification when interpreting sample concentrations. Data points that are assigned an R qualifier should not be used for site evaluation purposes.

If applicable, text was identified in **bold font** in the Validation Criteria Checklist to indicate that further action and/or qualification of the data were required. Data may have been qualified with J data flags by the laboratory if the result was greater than or equal to the method detection limit (MDL) but less than the reporting limit (RL). These laboratory-applied J flags were preserved, if present, and included in the Data Qualification Summary table at the end of this report. If applicable, data validation qualifiers were added for the items noted with crossed circles in the Validation Criteria section above. Please see the Data Qualification Summary table at the end of this report.

If data would be qualified with more than one flag, one qualifier was assigned based on the severity; however, all reasons for qualification were retained. Data that would be qualified with both J+ and J- flags were evaluated based on validation criteria and assigned the appropriate flag. The hierarchy of qualifiers from the most to least severe is as follows:

Data qualifiers used during this validation are included in the following table.

<u>Qualifier</u>	Definition	
J	Estimated concentration	
J+	The result is an estimated concentration, but may be biased high	
JB	Estimated concentration due to blank contamination	
UJ	Estimated reporting limit	
U	Evaluated to be undetected at the reporting limit	
R	Rejected, data not usable	

#### **Data Completeness**

The analyses were performed as requested on the CoC records. The associated samples were received by the laboratory and analyzed properly unless otherwise noted in the Criteria Checklist below. The complete data package consisted of 637 data points. The data completeness calculation does not include any submitted blank sample results. Six data points were rejected. The data completeness measure for this data package is calculated to be 99.06% and is acceptable.



VALIDATION CRITERIA CHECKLIST					
1. Was the report free of non-conformances identified by the laboratory? No					
Comments: The laboratory noted the following analytical non-conformance related to this data set.					
Method 8270: "S" flagged surrogates are due to sample dilution and/or matrix interferences.					
Method 8015D: "S" flagged surrogates are due to sample dilution and/or matrix interferences.					
2. Were the data free of data qualification flags and/or notes used by the laboratory?     No     If no. define.					
Comments: The laboratory used the following data qualification flags with this data set.					
D – Sample diluted due to matrix.					
J – Analyte detected below quantitation limits					
J – The identification of the analyte is acceptable; the reported value is an estimate.					
J6 – The sample matrix interfered with the ability to make any accurate determination; spike value is low.					
R – % RPD is outside of range.					
S – % Recovery outside of range due to dilution or matrix interference.					
3. Were sample CoC forms and custody procedures complete? Yes					
Comments: The CoC records from field to laboratory were complete, and custody was maintained as evidenced by field and laboratory personnel signatures, dates, and times of receipt. Custody seals were not present or required since the samples were delivered to the laboratory by courier, and custody was maintained at all times.					
permit, or method, or indicated as acceptable?					
Comments: The detection limits appeared to be acceptable. The following dilutions were applied.					
8015 MKTE-32 DLIP-3-9-22 GRO 2					
8260B MKTF-32 DUP-3-9-22 VOCs 2					
200.8 Multiple Samples Select Total and Dissolved Metals 5					
504.1 Multiple Samples EDB 10					
8270C MKTF-42, DUP-3-9-22 SVOCs 10					
8270 SIM MKTF-42 1,4-Dioxane 20					
8015D MKTF-42, DUP-3-9-22 DRO and MRO 20					
8260B MKTF-32 MTBE 20					
8270 SIM MKTF-42, MKTF-41, DUP-3-9-22 SVOCs 20					
5. Were the reported analytical methods and constituents in compliance with the No QAPP. permit. or CoC?					
Comments: The reported analytical methods were in compliance with the CoC, and the laboratory reported the requested constituents in accordance with the CoC, with the following exceptions.					
The CoC requested total and dissolved metals using Method 200.7; however, the laboratory analyzed the samples using					

both Method 200.7 and Method 200.8. This substituted analytical method, Method 200.8, met similar sensitivity, accuracy, and precision goals and, therefore, was an acceptable replacement.

The CoC requested cyanide using Method 335.4; however, the laboratory analyzed the samples using Method 4500 CN E. This substituted analytical method met similar sensitivity, accuracy, and precision goals and, therefore, was an acceptable replacement.

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		VALIDATION CRITERIA CH	ECKLIST			
6. Were sam	6. Were samples received in good condition within method-specified requirements? No					
Comments: Sa recommended <i>Check List</i> . Th containers as b	imples were rec temperature ran e cooler tempera roken or frozen.	eived on ice, in good condition, and with ge of 4°C ± 2°C between 0.9°C and 3.5° atures below 2.0°C were judged as accep	the cooler temp C as noted on t otable since the	peratures both within he CoC and the <i>Sam</i> laboratory did not re	and outside the <i>ple Log-in</i> port the sample	
Samples transf results to the co	erred to Pace National Natio National National Natio	ational were assumed to be received with reported.	nin the recomm	ended temperature ra	ange, since	
7. Were sam technical h	oles extracted/di olding times?	gested and analyzed within method-spec	cified or	Ye	es	
Comments: Th	e samples were	extracted/digested and analyzed within	method-specific	c holding times.		
8. Were repo method(s)	rted units approp ? Specify if wet	oriate for the sample matrix/matrices and or dry units were used for soil.	analytical	Ye	es	
Comments: Th which were acc	e results were re eptable for the s	eported in concentration units of microgra sample matrix and the analyses requeste	ams per liter (µɑ d.	g/L) and milligrams pe	er liter (mg/L),	
9. Did the lab	oratory provide	any specific initial and/or continuing calib	ration results?	N	0	
Comments: Ini	tial and continui	ng calibration data were not included as r	part of this data	set.		
10. If initial and/or continuing calibration results were provided, were the results within     N/A						
Comments: Ini	tial and continui	ng calibration data were not included as i	part of this data	set		
11. Was the total number of laboratory blank samples prepared equal to at least 5% of       Yes         the total number of samples or analyzed as required by the method?					es	
Comments: Th samples.	e total number o	of laboratory blank samples prepared was	s equal to at lea	ast 5% of the total nu	mber of	
12. Were targe	et analytes repor	ted as not detected in the laboratory blar	nks?	N	0	
Comments: Ta	rget analytes we	ere reported as not detected in the labora	torv blanks, wi	th the following excer	otions.	
-	Method	Analyte	Batch	Concentration		
	8260B	Chloromethane	R86565	0.65 µg/L		
	8260B	Trichloroethene	R86565	0.24 μg/L		
	8015D	GRO	R86565	0.042 mg/L		
8015D DRO 66129 0.026 mg/L						
245.1 Dissolved and Total Mercury 66260 0.00012 mg/L						
Detections of were assigned the reporting I of the identified times the blank	the identified a I U qualifiers. I imits but less t analytes in the concentration d	nalytes in the associated samples that Detections of the identified analytes in han or equal to 10 times the blank rest associated samples and detections that v id not require qualification.	t were less that the associate ults were assig were above the	n the applicable rep d samples that were gned JB qualifiers. reporting limit and gr	oorting limits greater than Non-detections reater than ten	



#### VALIDATION CRITERIA CHECKLIST

13. Was the total number of MS samples prepared equal to at least 5% of the total number of samples or analyzed as required by the method?

Yes

Comments: The total number of matrix spike samples prepared was equal to at least 5% of the total number of samples, although MS samples were not prepared/reported for all analyses and/or batch. The matrix spike sample source for each analytical batch in this sample set has been indicated below.

<u>Method</u>	Analytes	<u>Batch</u>	MS Sample Source
200.7	Dissolved Metals	C86413	EB-3-9-22
200.8	Total Metals	66151	Not Prepared
200.8 Total Metals		66191	Not Prepared
200.8	Dissolved Metals	A86537	Not Prepared
200.8	Dissolved Metals	A86624	Not Prepared
200.8	Dissolved Metals	B86600	Not Prepared
245.1	Dissolved and Total Mercury	66259	MKTF-41
245.1	Dissolved and Total Mercury	66260	EB-3-9-22
504.1	EDB	66232	Not Prepared
4500CN E	Cyanide	WG1832548	Not Associated, PW-4
8015D	TPH DRO and MRO	66129	Not Prepared
8015D	GRO	R86565	Not Prepared
8260B	VOCs	R86565	MKTF-42
8270C	SVOCs	66111	Not Prepared
8270C SIM	SVOCs	66214	Not Prepared

Not Associated – The MS sample source was not associated with this project. Not Prepared – Matrix spikes were not prepared/reported for this batch.

14. For MS/MSDs prepared from project samples, were percent recoveries and RPDs within data validation or laboratory quality control (QC) limits?

Yes

Comments: The MS/MSD percent recoveries and RPDs for project samples were within data validation and laboratory QC limits.

The percent recoveries and RPD values for MS/MSDs prepared from non-project samples were evaluated and considered, but data were not qualified based on those results since matrix similarity to project samples could not be guaranteed.

15. Was the total number of LCSs analyzed equal to at least 5% of the total number of<br/>samples or analyzed as required by the method?Yes

Comments: The total number of LCS samples analyzed was equal to at least 5% of the total number of samples.



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#### VALIDATION CRITERIA CHECKLIST

16. Were LCS/LCSD percent recoveries and LCS/LCSD RPDs within data validation or laboratory QC limits?

No

Comments: The LCS and LCSD percent recoveries and LCS/LCSD RPDs were within data validation and laboratory QC limits, with the following exceptions.

<u>Method</u>	<u>Analyte</u>	<u>Batch</u>	<u>LCS</u> <u>Recovery</u>	<u>LCSD</u> <u>Recovery</u>	LCS/LCSD QC Limits	LCS/LCSD RPD	<u>RPD QC</u> Limits
8270C	1,4-Dichlorobenzene	66111	Acceptable	Acceptable	15.0-87.6%	32.0%	30.4%
8270C	Phenol	66111	Acceptable	Acceptable	16.8-70.5%	38.9%	37.2%
200.8	<b>Dissolved Selenium</b>	A86537	69.2%		70-130%		
245.1	Mercury	66259	143%		70-130%		
245.1	Mercury	66260	140%		70-130%		

1,4-Dichlorobenzene and phenol were not detected in the associated samples in Method 8270C batch 66111, and these results were assigned UJ qualifiers due to evidence of poor precision.

Dissolved selenium was not detected in the associated sample EB-3-9-22, and this result was qualified as UJ due to potential low bias.

Detections of mercury in the associated samples in Method 245.1 batches 66259 and 66260 were assigned J+ qualifiers due to evidence of potential high bias. The non-detect results for mercury in these batches did not require qualification based on these non-conformances.

17. Were surrogate recoveries within laboratory QC limits?

No

Comments: Surrogate recoveries were within laboratory QC limits, with the following exceptions.

<u>Method</u>	Surrogate	<u>Sample</u>	<u>Surrogate</u> <u>Recovery</u>	QC Limits
8270C	2-Fluorophenol	MKTF-34	0.0%	29.4-87.7%
8270C	Phenol-d₅	MKTF-34	5.8%	28.5-64.7%

Since Method 8270 surrogate associations were not available from the laboratory, qualification was assigned to all of the target analytes in a given fraction (acid or base/neutral) when two or more surrogates from the same fraction (acid or base/neutral) were outside the acceptance range. This condition did not exist for the samples MKTF-41, MKTF-32, PW-3, and PW-4, and qualification of sample data was not required.

The acid fraction target analytes associated with the identified surrogate recoveries were not detected in sample MKTF-34. Since the surrogate recoveries were less than 10%, the results for the acid extractables were qualified as R indicating rejected results, data not usable, due to evidence of extreme low bias.

The DRO and MRO results for samples MKTF-42 and DUP-3-9-22 were not qualified based on the surrogate nonconformances in the Method 8015D analyses since the applied dilutions of 20 times resulted in surrogate concentrations below routinely calibrated levels, and those results were deemed unreliable and possibly inaccurate.

The SVOC results for samples MKTF-42 and DUP-3-9-22 were not qualified based on the surrogate non-conformances in the Method 8270C analyses since the applied dilutions of 10 times resulted in surrogate concentrations below routinely calibrated levels, and those results were deemed unreliable and possibly inaccurate.

The SVOC results for samples MKTF-42, MKTF-41, and DUP-3-9-22 were not qualified based on the surrogate nonconformances in the Method 8270 SIM analyses since the applied dilutions of 20 times resulted in surrogate concentrations below routinely calibrated levels, and those results were deemed unreliable and possibly inaccurate.

Qualification of sample data was not required based on surrogate non-conformances in QC samples as the environmental samples were evaluated based on their specific surrogate recoveries.


Yes

# VALIDATION CRITERIA CHECKLIST

18. Were the number of trip blank, field blank, and/or equipment blank samples collected equal to at least 10% of the total number of samples or as required by the project guidelines, QAPP, SAP, or permit?

Comments: The number of trip, field, and equipment blanks collected was equal to at least 10% of the number of samples. One trip blank sample, Trip Blank, one field blank sample, FB 3-9-22, and one equipment blank sample, EB-3-9-22, were collected as part of this sample set.

19. Were target analytes reported as not detected in the trip blank, field blank, and/or No equipment blank samples?

Comments: Target analytes were not detected in the trip blank, field blank, and equipment blank samples with the following exceptions.

Blank Sample ID	<u>Method</u>	Analyte	<u>Concentration</u>
Trip Blank	8260B	Chloromethane	0.70 µg/L
Trip Blank	8260B	Methylene Chloride	0.51 μg/L
FB-3-9-22	8260B	Acetone	3.1 μg/L
FB-3-9-22	8260B	Chloromethane	0.68 µg/L
FB-3-9-22	8260B	Methylene Chloride	4.0 µg/L
EB-3-9-22	8260B	1,2-Dichloroethane	0.41 μg/L
EB-3-9-22	8260B	Chloromethane	0.66 µg/L
EB-3-9-22	8015D	GRO	0.039 mg/L
EB-3-9-22	8015D	DRO	0.022 mg/L
EB-3-9-22	200.7	Dissolved Zinc	0.0045 mg/L
EB-3-9-22	200.8	Dissolved Chromium	0.00020 mg/L
EB-3-9-22	245.1	Dissolved Mercury	0.000095 mg/L

Detections of the identified analytes in the associated samples that were less than the blank results and/or less than the applicable reporting limits were assigned U qualifiers. Detections of the identified analytes in the associated samples that were greater than or equal to the reporting limits but less than 10 times the blank results were assigned JB qualifiers. Non-detections of the identified analytes in the associated samples and detections that were above the reporting limit and greater than ten times the blank concentration did not require qualification.

The chloromethane, dissolved mercury, DRO, and GRO results for the samples in batches R86565, 66260, 66129, and R86565, respectively, were previously qualified due to laboratory method blank detections; therefore, additional qualification due to the trip, field, and equipment blank detections was not required.

20. Was the number of field duplicates collected equal to at least 10% of the total number of samples or as required by the project guidelines, QAPP, SAP, or permit?

Yes

Comments: The number of field duplicates collected was equal to at least 10% of the number of samples.

Sample DUP-3-9-22 was collected as a field duplicate of sample MKTF-42.



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#### VALIDATION CRITERIA CHECKLIST

21. Were field duplicate RPD values within data validation QC limits (soil 0-50%, water 0-30%, or air 0-25%)?

Comments: As indicated in the Field Duplicate Summary Table at the end of this report, field duplicate RPD values were within data validation QC limits of 0-30% for water samples, with the following exceptions.

The RPD values for multiple analytes exceeded the data validation limit of 30%, which was evidence of poor precision. These analyte results were qualified as J for samples MKTF-42 and DUP-3-9-22.

An RPD value could not be calculated for total chromium for the field duplicate pair MKTF-42 and DUP-3-9-22 since the analyte was detected in the parent sample and was undetected in the duplicate sample. As the detection in the parent sample was greater than two times the reporting limit, total chromium was qualified as J and UJ for the parent and duplicate samples, respectively.

22. For laboratory duplicates prepared from project samples, were RPDs within laboratory QC limits?

Yes

No

Comments: Laboratory duplicates were prepared for the analysis of cyanide in batch WG1832548 from sample MKTF-32 and from a sample not associated with this data set.

The RPD for the laboratory duplicate prepared from a project sample was within laboratory acceptance limits.

The RPD value for the laboratory duplicate sample prepared from a non-project sample was evaluated and considered, but data were not qualified based on this result since matrix similarity to project samples could not be guaranteed.



Yes

#### VALIDATION CRITERIA CHECKLIST

23. Were the following data relationships realistic and acceptable?

 Target analytes were reported by more than one method (e.g., 8260/8270, EPH/8270), and the results were in agreement?

Comments: Target analytes were not reported by more than one method in this data set, with the following exception.

The target analyte 1,2-dibromoethane (EDB) was reported from analyses by both Method 8260B and Method 504.1. This analyte was reported as not detected by both methods, or the results were less than the applicable RLs for the comparable analyses, or one or both results were within 5 times the applicable reporting limit. Validation action was not required.

• Both total and dissolved metals analyses were performed, and the total metals No results were greater than or equal to the dissolved metals results?

Comments: The total metals concentrations were greater than or equal to the dissolved fractions, with the following exceptions.

Sample ID	<u>Analyte</u>	<u>Total</u> <u>Result</u>	<u>Dissolved</u> <u>Result</u>	Reporting Limit	<u>Units</u>	<u>RPD</u>
MKTF-41	Mercury	0.00011	0.00016	0.00020	mg/L	*
PW-3	Mercury	ND	0.000093	0.00020	mg/L	♦
EB-3-9-22	Mercury	ND	0.000095	0.00020	mg/L	♦
MKTF-41	Arsenic	0.0021	0.0023	0.0010	mg/L	*
MKTF-41	Barium	0.063	0.066	0.0050	mg/L	4.7%
MKTF-34	Barium	0.17	0.18	0.0050	mg/L	5.7%
PW-3	Barium	0.011	0.013	0.0010 / 0.0050	mg/L	*
EB-3-9-22	Chromium	ND	0.00020	0.0010	mg/L	♦
MKTF-34	Cobalt	0.0077	0.0080	0.0010 / 0.0060	mg/L	*
PW-3	Cobalt	ND	0.0032	0.0010 / 0.0060	mg/L	♦
PW-4	Cobalt	ND	0.0025	0.0010 / 0.0060	mg/L	♦
MKTF-42	Zinc	ND	0.011	0.010	mg/L	♦
MKTF-41	Zinc	ND	0.0097	0.010	mg/L	♦
MKTF-34	Zinc	0.0086	0.013	0.010	mg/L	*
PW-3	Zinc	0.0080	0.012	0.010	mg/L	•
PW-4	Zinc	0.014	0.022	0.010	mg/L	•
DUP-3-9-22	Zinc	ND	0.013	0.010	mg/L	♦
EB-3-9-22	Zinc	ND	0.0045	0.010	mg/L	♦

----- RPD could not be calculated.

♦ = One or both of the detections were less than 5 times the applicable reporting limits, and qualification of data was not required.

The differences for the corresponding analytical results were within five times the applicable reporting limits, and validation action was not required, or the RPDs between the results were less than 30% indicating that the data were within the measurement uncertainty for the methods, and qualification of results was not required based on the analytical inconsistencies.



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Client Sample ID: MKTF-42 Field Duplicate Sample ID: DUP-3-9-22					
Analyte	Method	Laboratory Result	Duplicate Result	Relative Percent Difference (RPD)	
Vanadium, Dissolved	E 200.7	0.058 mg/L	0.056 mg/L	3.5% +/-RL	
Zinc, Dissolved	E 200.7	0.011 mg/L	0.013 mg/L	16.7% +/-RL	
Arsenic, Dissolved	E200.8	0.0023 mg/L	0.0021 mg/L	9.1%	
Arsenic, Total	E200.8	0.0024 mg/L	0.0026 mg/L	8.0%	
Barium, Dissolved	E200.8	0.054 mg/L	0.053 mg/L	1.9%	
Barium, Total	E200.8	0.059 mg/L	0.059 mg/L	0.0%	
Chromium, Dissolved	E200.8	0.00030 mg/L	ND (0.0050 mg/L)	DL	
Chromium, Total	E200.8	0.0096 mg/L	ND (0.0010 mg/L)	DL	
Cobalt, Total	E200.8	0.00028 mg/L	0.00021 mg/L	28.6% +/-RL	
Lead, Total	E200.8	0.00025 mg/L	0.00019 mg/L	27.3% +/-RL	
Nickel, Total	E200.8	0.00063 mg/L	ND (0.0010 mg/L)	DL	
Selenium, Dissolved	E200.8	0.00083 mg/L	ND (0.0050 mg/L)	DL	
Selenium, Total	E200.8	0.00099 mg/L	0.00097 mg/L	2.0% +/-RL	
Vanadium, Total	E200.8	0.060 mg/L	0.062 mg/L	3.3%	
Mercury, Dissolved	E245.1	0.000092 mg/L	ND (0.00020 mg/L)	DL	
Mercury, Total	E245.1	0.000092 mg/L	0.000095 mg/L	3.2% +/-RL	
Cyanide, Total	E335.4	6.93 µg/L	3.89 µg/L	56.2% +/-RL	
1,2-Dibromoethane	E504.1	0.12 µg/L	0.074 μg/L	47.4% +/-RL	
TPH DRO	SW8015	23 mg/L	21 mg/L	9.1%	
TPH GRO	SW8015	0.21 mg/L	0.47 μg/L	76.5%	
1,1-Dichloroethane	SW8260B	0.68 µg/L	1.4 μg/L	69.2% +/-RL	
1,1-Dichloroethene	SW8260B	1.1 μg/L	2.6 µg/L	81.1% +/-RL	
1,2,4-Trimethylbenzene	SW8260B	6.3 μg/L	13 µg/L	<b>69.4%</b>	
1,2-Dichloroethane	SW8260B	1.3 µg/L	2.6 µg/L	66.7% +/-RL	
1,3,5-Trimethylbenzene	SW8260B	2.1 μg/L	4.6 μg/L	74.6%	
Benzene	SW8260B	9.5 μg/L	21 µg/L	75.4%	
Chloromethane	SW8260B	0.68 µg/L	1.3 µg/L	62.6% +/-RL	
Ethylbenzene	SW8260B	1.2 μg/L	2.7 μg/L	76.9% +/-RL	
Isopropylbenzene	SW8260B	1.5 μg/L	3.3 µg/L	75.0% +/-RL	
MTBE	SW8260B	1.2 μg/L	2.5 µg/L	70.3% +/-RL	
n-Butylbenzene	SW8260B	0.46 µg/L	1.2 μg/L	89.2% +/-RL	
n-Propylbenzene	SW8260B	1.6 µg/L	3.5 µg/L	74.5% +/-RL	
p-Isopropyltoluene	SW8260B	0.37 µg/L	0.84 µg/L	77.7% +/-RL	
sec-Butylbenzene	SW8260B	0.38 µg/L	0.85 µg/L	76.4% +/-RL	
Toluene	SW8260B	0.43 µg/L	1.2 µg/L	94.5% +/-RL	
Vinyl Chloride	SW8260B	ND (1.0 µg/L)	0.87 µg/L	DL	
Xylenes, Total	SW8260B	26 µg/L	56 µg/L	73.2%	
Naphthalene	SW8270C	ND (2.0 µg/L)	2.0 μg/L	DL	

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Field duplicate RPD control limits are not to exceed 30% for water as established by USEPA Region I - New England Environmental Data Review Supplement for Region 1 Data Review Elements and Superfund Specific Guidance/Procedures, EQADR-Supplement2, September 2020.

DL – Indicates that the analyte was detected in one of the duplicate samples and was undetected in the other sample, and therefore an RPD could not be calculated. Data were not qualified since the detection was within two times the reporting limit. Non-detected results are indicated above with the applicable reporting limit as ND (RL).

+/-RL – Indicates that the detections in both of the samples were within two times the reporting limit. Qualification of data was not required.

The RPD values for multiple analytes exceeded the data validation limit of 30%, which was evidence of poor precision. These analyte results were qualified as J for samples MKTF-42 and DUP-3-9-22.

An RPD value could not be calculated for total chromium for the field duplicate pair MKTF-42 and DUP-3-9-22 since the analyte was detected in the parent sample and was undetected in the duplicate sample. As the detection in the parent sample was greater than two times the reporting limit, total chromium was qualified as J and UJ for the parent and duplicate samples, respectively.



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## DATA QUALIFICATION SUMMARY

Abbreviation	Reason
MBD	Method blank detection
HR-LCS	The LCS and/or LCSD percent recovery was greater than the upper acceptable limit indicating a possible high bias.
LR-LCS	The LCS and/or LCSD percent recovery was less than the lower acceptable limit indicating a possible low bias.
ERPD-LCS	The LCS/LCSD RPD exceeded the upper acceptable limit indicating poor precision.
LR-SUR	The surrogate percent recovery was less than the lower acceptable limit indicating a possible low bias.
TBD	Trip blank detection
FBD	Field blank detection
EBD	Equipment blank detection
ERPD-FD	High field duplicate RPD.
MDLRL	Flagged by the laboratory: The result was greater than the MDL but less than the RL.

Analyte	Method	Field Sample ID	Lab Sample ID	Result	Limit	Units	Reviewer Qualifier	DV Flag Reasons
1,1-Dichloroethane	SW8260B	MKTF-42	2203574-001a	0.68	1	µg/L	J	MDLRL
1,1-Dichloroethane	SW8260B	MKTF-34	2203574-004a	0.55	1	µg/L	J	MDLRL
1,1-Dichloroethane	SW8260B	DUP-3-9-22	2203574-007a	1.4	2	µg/L	J	MDLRL
1,1-Dichloroethene	SW8260B	MKTF-34	2203574-004a	0.57	1	µg/L	J	MDLRL
1,2,4-Trimethylbenzene	SW8260B	MKTF-42	2203574-001a	6.3	1	µg/L	J	ERPD-FD
1,2,4-Trimethylbenzene	SW8260B	MKTF-34	2203574-004a	0.4	1	µg/L	J	MDLRL
1,2,4-Trimethylbenzene	SW8260B	DUP-3-9-22	2203574-007a	13	2	µg/L	J	ERPD-FD
1,2-Dibromoethane	E504.1	DUP-3-9-22	2203574-007B	0.074	0.093	µg/L	J	MDLRL
1,2-Dichloroethane	SW8260B	MKTF-42	2203574-001a	1.3	1	µg/L	JB	EBD
1,2-Dichloroethane	SW8260B	MKTF-41	2203574-002a	2.1	1	µg/L	JB	EBD
1,2-Dichloroethane	SW8260B	MKTF-34	2203574-004a	0.54	1	µg/L	U	EBD, MDLRL
1,2-Dichloroethane	SW8260B	PW-4	2203574-006a	0.42	1	µg/L	U	EBD, MDLRL



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Analyte	Method	Field Sample ID	Lab Sample ID	Result	Limit	Units	Reviewer Qualifier	DV Flag Reasons
1,2-Dichloroethane	SW8260B	DUP-3-9-22	2203574-007a	2.6	2	µg/L	JB	EBD
1,2-Dichloroethane	SW8260B	EB-3-9-22	2203574-008a	0.41	1	µg/L	J	MDLRL
1,3,5-Trimethylbenzene	SW8260B	MKTF-42	2203574-001a	2.1	1	µg/L	J	ERPD-FD
1,3,5-Trimethylbenzene	SW8260B	MKTF-41	2203574-002a	0.91	1	µg/L	J	MDLRL
1,3,5-Trimethylbenzene	SW8260B	DUP-3-9-22	2203574-007a	4.6	2	µg/L	J	ERPD-FD
1,4-Dichlorobenzene	SW8270C	MKTF-42	2203574-001C	ND	50	µg/L	UJ	ERPD-LCS
1,4-Dichlorobenzene	SW8270C	MKTF-41	2203574-002C	ND	5	µg/L	UJ	ERPD-LCS
1,4-Dichlorobenzene	SW8270C	MKTF-32	2203574-003C	ND	5	µg/L	UJ	ERPD-LCS
1,4-Dichlorobenzene	SW8270C	MKTF-34	2203574-004C	ND	5	µg/L	UJ	ERPD-LCS
1,4-Dichlorobenzene	SW8270C	PW-3	2203574-005C	ND	5	µg/L	UJ	ERPD-LCS
1,4-Dichlorobenzene	SW8270C	PW-4	2203574-006C	ND	5	µg/L	UJ	ERPD-LCS
1,4-Dichlorobenzene	SW8270C	DUP-3-9-22	2203574-007C	ND	50	µg/L	UJ	ERPD-LCS
1,4-Dichlorobenzene	SW8270C	EB-3-9-22	2203574-008C	ND	5	µg/L	UJ	ERPD-LCS
2,4,6-Trichlorophenol	SW8270C	MKTF-34	2203574-004C	ND	5	µg/L	R	LR-SUR
2,4-Dimethylphenol	SW8270C	MKTF-34	2203574-004C	ND	5	µg/L	R	LR-SUR
2,4-Dinitrophenol	SW8270C	MKTF-34	2203574-004C	ND	5	µg/L	R	LR-SUR
2-Butanone	SW8260B	MKTF-34	2203574-004a	6.8	10	µg/L	J	MDLRL
2-Methylphenol	SW8270C	MKTF-34	2203574-004C	ND	5	µg/L	R	LR-SUR
3,4-Methylphenol	SW8270C	MKTF-34	2203574-004C	ND	5	µg/L	R	LR-SUR
Acetone	SW8260B	MKTF-34	2203574-004a	16	10	µg/L	JB	FBD
Acetone	SW8260B	FB 3-9-22	2203574-009a	3.1	10	µg/L	J	MDLRL
Arsenic, Dissolved	E200.8	MKTF-34	2203574-004E	0.002	0.005	mg/L	J	MDLRL
Arsenic, Dissolved	E200.8	PW-3	2203574-005E	0.0037	0.005	mg/L	J	MDLRL
Arsenic, Dissolved	E200.8	PW-4	2203574-006E	0.00094	0.005	mg/L	J	MDLRL
Arsenic, Dissolved	E200.8	DUP-3-9-22	2203574-007E	0.0021	0.005	mg/L	J	MDLRL
Benzene	SW8260B	MKTF-42	2203574-001a	9.5	1	µg/L	J	ERPD-FD
Benzene	SW8260B	MKTF-41	2203574-002a	0.35	1	µg/L	J	MDLRL
Benzene	SW8260B	DUP-3-9-22	2203574-007a	21	2	µg/L	J	ERPD-FD



Analyte	Method	Field Sample ID	Lab Sample ID	Result	Limit	Units	Reviewer Qualifier	DV Flag Reasons
Bis(2-ethylhexyl)phthalate	SW8270C	MKTF-34	2203574-004C	6.2	10	µg/L	J	MDLRL
Carbon Disulfide	SW8260B	PW-4	2203574-006a	0.68	10	µg/L	J	MDLRL
Chloromethane	SW8260B	MKTF-42	2203574-001a	0.68	3	µg/L	U	MBD, MDLRL
Chloromethane	SW8260B	MKTF-41	2203574-002a	0.67	3	µg/L	U	MBD, MDLRL
Chloromethane	SW8260B	MKTF-32	2203574-003a	1.3	6	µg/L	U	MBD, MDLRL
Chloromethane	SW8260B	PW-3	2203574-005a	0.8	3	µg/L	U	MBD, MDLRL
Chloromethane	SW8260B	PW-4	2203574-006a	0.71	3	µg/L	U	MBD, MDLRL
Chloromethane	SW8260B	DUP-3-9-22	2203574-007a	1.3	6	µg/L	U	MBD, MDLRL
Chloromethane	SW8260B	EB-3-9-22	2203574-008a	0.66	3	µg/L	U	MBD, MDLRL
Chloromethane	SW8260B	FB 3-9-22	2203574-009a	0.68	3	µg/L	U	MBD, MDLRL
Chloromethane	SW8260B	Trip Blank	2203574-010a	0.7	3	µg/L	U	MBD, MDLRL
Chromium, Dissolved	E200.8	MKTF-42	2203574-001E	0.0003	0.001	mg/L	U	EBD, MDLRL
Chromium, Dissolved	E200.8	MKTF-41	2203574-002E	0.0013	0.001	mg/L	JB	EBD
Chromium, Dissolved	E200.8	MKTF-32	2203574-003E	0.00023	0.001	mg/L	U	EBD, MDLRL
Chromium, Dissolved	E200.8	EB-3-9-22	2203574-008E	0.0002	0.001	mg/L	J	MDLRL
Chromium, Total	E200.8	MKTF-42	2203574-001D	0.0096	0.001	mg/L	J	ERPD-FD
Chromium, Total	E200.8	MKTF-34	2203574-004D	0.00074	0.001	mg/L	J	MDLRL
Chromium, Total	E200.8	DUP-3-9-22	2203574-007D	ND	0.001	mg/L	UJ	ERPD-FD
Cobalt, Dissolved	E 200.7	PW-3	2203574-005E	0.0032	0.006	mg/L	J	MDLRL
Cobalt, Dissolved	E 200.7	PW-4	2203574-006E	0.0025	0.006	mg/L	J	MDLRL
Cobalt, Total	E200.8	MKTF-42	2203574-001D	0.00028	0.001	mg/L	J	MDLRL
Cobalt, Total	E200.8	MKTF-32	2203574-003D	0.00072	0.001	mg/L	J	MDLRL
Cobalt, Total	E200.8	DUP-3-9-22	2203574-007D	0.00021	0.001	mg/L	J	MDLRL
Cyanide, Total	E335.4	MKTF-41	2203574-002F	4.04	5	µg/L	J	MDLRL
Cyanide, Total	E335.4	MKTF-32	2203574-003F	2.03	5	µg/L	J	MDLRL
Cyanide, Total	E335.4	DUP-3-9-22	2203574-007F	3.89	5	µg/L	J	MDLRL
Ethylbenzene	SW8260B	MKTF-41	2203574-002a	0.8	1	µg/L	J	MDLRL
Isopropylbenzene	SW8260B	MKTF-41	2203574-002a	0.18	1	µg/L	J	MDLRL



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Analyte	Method	Field Sample ID	Lab Sample ID	Result	Limit	Units	Reviewer Qualifier	DV Flag Reasons
Lead, Dissolved	E200.8	MKTF-32	2203574-003E	0.000095	0.0005	mg/L	J	MDLRL
Lead, Dissolved	E200.8	MKTF-34	2203574-004E	0.0014	0.0025	mg/L	J	MDLRL
Lead, Total	E200.8	MKTF-42	2203574-001D	0.00025	0.0005	mg/L	J	MDLRL
Lead, Total	E200.8	MKTF-41	2203574-002D	0.000066	0.0005	mg/L	J	MDLRL
Lead, Total	E200.8	DUP-3-9-22	2203574-007D	0.00019	0.0005	mg/L	J	MDLRL
Mercury, Dissolved	E245.1	MKTF-42	2203574-001E	0.000092	0.0002	mg/L	J+	HR-LCS, MDLRL
Mercury, Dissolved	E245.1	MKTF-41	2203574-002E	0.00016	0.0002	mg/L	J+	HR-LCS, MDLRL
Mercury, Dissolved	E245.1	MKTF-34	2203574-004E	0.00023	0.0002	mg/L	JB	HR-LCS, MBD
Mercury, Dissolved	E245.1	PW-3	2203574-005E	0.000093	0.0002	mg/L	U	HR-LCS, MBD, MDLRL
Mercury, Dissolved	E245.1	PW-4	2203574-006E	0.000093	0.0002	mg/L	U	HR-LCS, MBD, MDLRL
Mercury, Dissolved	E245.1	EB-3-9-22	2203574-008E	0.000095	0.0002	mg/L	U	HR-LCS, MBD, MDLRL
Mercury, Total	E245.1	MKTF-42	2203574-001D	0.000092	0.0002	mg/L	J+	HR-LCS, MDLRL
Mercury, Total	E245.1	MKTF-41	2203574-002D	0.00011	0.0002	mg/L	J+	HR-LCS, MDLRL
Mercury, Total	E245.1	MKTF-32	2203574-003D	0.000098	0.0002	mg/L	U	HR-LCS, MBD, MDLRL
Mercury, Total	E245.1	MKTF-34	2203574-004D	0.00046	0.0002	mg/L	JB	HR-LCS, MBD
Mercury, Total	E245.1	PW-4	2203574-006D	0.0001	0.0002	mg/L	U	HR-LCS, MBD, MDLRL
Mercury, Total	E245.1	DUP-3-9-22	2203574-007D	0.000095	0.0002	mg/L	U	HR-LCS, MBD, MDLRL
Methylene Chloride	SW8260B	MKTF-34	2203574-004a	1.1	3	µg/L	U	MDLRL, TBD
Methylene Chloride	SW8260B	PW-4	2203574-006a	0.53	3	µg/L	U	MDLRL, TBD
Methylene Chloride	SW8260B	FB 3-9-22	2203574-009a	4	3	µg/L	JB	TBD
Methylene Chloride	SW8260B	Trip Blank	2203574-010a	0.51	3	µg/L	J	MDLRL
MTBE	SW8260B	MKTF-41	2203574-002a	0.56	1	µg/L	J	MDLRL
n-Butylbenzene	SW8260B	MKTF-42	2203574-001a	0.46	3	µg/L	J	MDLRL
n-Butylbenzene	SW8260B	DUP-3-9-22	2203574-007a	1.2	6	µg/L	J	MDLRL
Nickel, Total	E200.8	MKTF-42	2203574-001D	0.00063	0.001	mg/L	J	MDLRL
Nickel, Total	E200.8	PW-3	2203574-005D	0.00097	0.001	mg/L	J	MDLRL
n-Propylbenzene	SW8260B	MKTF-41	2203574-002a	0.34	1	µg/L	J	MDLRL
Phenol	SW8270C	MKTF-42	2203574-001C	ND	50	µg/L	UJ	ERPD-LCS



Analyte	Method	Field Sample ID	Lab Sample ID	Result	Limit	Units	Reviewer Qualifier	DV Flag Reasons
Phenol	SW8270C	MKTF-41	2203574-002C	ND	5	µg/L	UJ	ERPD-LCS
Phenol	SW8270C	MKTF-32	2203574-003C	ND	5	µg/L	UJ	ERPD-LCS
Phenol	SW8270C	MKTF-34	2203574-004C	ND	5	µg/L	R	ERPD-LCS, LR-SUR
Phenol	SW8270C	PW-3	2203574-005C	ND	5	µg/L	UJ	ERPD-LCS
Phenol	SW8270C	PW-4	2203574-006C	ND	5	µg/L	UJ	ERPD-LCS
Phenol	SW8270C	DUP-3-9-22	2203574-007C	ND	50	µg/L	UJ	ERPD-LCS
Phenol	SW8270C	EB-3-9-22	2203574-008C	ND	5	µg/L	UJ	ERPD-LCS
p-Isopropyltoluene	SW8260B	MKTF-42	2203574-001a	0.37	1	µg/L	J	MDLRL
p-Isopropyltoluene	SW8260B	DUP-3-9-22	2203574-007a	0.84	2	µg/L	J	MDLRL
sec-Butylbenzene	SW8260B	MKTF-42	2203574-001a	0.38	1	µg/L	J	MDLRL
sec-Butylbenzene	SW8260B	MKTF-32	2203574-003a	0.33	2	µg/L	J	MDLRL
sec-Butylbenzene	SW8260B	DUP-3-9-22	2203574-007a	0.85	2	µg/L	J	MDLRL
Selenium, Dissolved	E200.8	MKTF-42	2203574-001E	0.00083	0.001	mg/L	J	MDLRL
Selenium, Dissolved	E200.8	EB-3-9-22	2203574-008E	ND	0.001	mg/L	UJ	LR-LCS
Selenium, Total	E200.8	MKTF-42	2203574-001D	0.00099	0.001	mg/L	J	MDLRL
Selenium, Total	E200.8	MKTF-32	2203574-003D	0.00041	0.001	mg/L	J	MDLRL
Selenium, Total	E200.8	MKTF-34	2203574-004D	0.00072	0.001	mg/L	J	MDLRL
Selenium, Total	E200.8	DUP-3-9-22	2203574-007D	0.00097	0.001	mg/L	J	MDLRL
Silver, Total	E200.8	MKTF-34	2203574-004D	0.00041	0.0005	mg/L	J	MDLRL
Toluene	SW8260B	MKTF-42	2203574-001a	0.43	1	µg/L	J	MDLRL
Toluene	SW8260B	DUP-3-9-22	2203574-007a	1.2	2	µg/L	J	MDLRL
TPH DRO	SW8015	MKTF-32	2203574-003C	0.23	0.064	mg/L	JB	MBD
TPH DRO	SW8015	MKTF-34	2203574-004C	0.19	0.064	mg/L	JB	MBD
TPH DRO	SW8015	PW-3	2203574-005C	0.03	0.064	mg/L	U	MBD, MDLRL
TPH DRO	SW8015	PW-4	2203574-006C	0.022	0.064	mg/L	U	MBD, MDLRL
TPH DRO	SW8015	EB-3-9-22	2203574-008C	0.022	0.064	mg/L	U	MBD, MDLRL
TPH GRO	SW8015	MKTF-42	2203574-001a	0.21	0.05	mg/L	JB	ERPD-FD, MBD
TPH GRO	SW8015	MKTF-41	2203574-002a	0.085	0.05	mg/L	JB	MBD



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Analyte	Method	Field Sample ID	Lab Sample ID	Result	Limit	Units	Reviewer Qualifier	DV Flag Reasons
TPH GRO	SW8015	PW-3	2203574-005a	0.041	0.05	mg/L	U	MBD, MDLRL
TPH GRO	SW8015	PW-4	2203574-006a	0.042	0.05	mg/L	U	MBD, MDLRL
TPH GRO	SW8015	DUP-3-9-22	2203574-007a	0.47	0.1	mg/L	J	ERPD-FD
TPH GRO	SW8015	EB-3-9-22	2203574-008a	0.039	0.05	mg/L	U	MBD, MDLRL
Trichloroethene	SW8260B	MKTF-41	2203574-002a	0.35	1	µg/L	U	MBD, MDLRL
Trichloroethene	SW8260B	MKTF-32	2203574-003a	0.52	2	µg/L	U	MBD, MDLRL
Trichloroethene	SW8260B	MKTF-34	2203574-004a	0.69	1	µg/L	U	MBD, MDLRL
Trichloroethene	SW8260B	PW-4	2203574-006a	0.22	1	µg/L	U	MBD, MDLRL
Vanadium, Dissolved	E 200.7	MKTF-41	2203574-002E	0.03	0.05	mg/L	J	MDLRL
Vanadium, Dissolved	E 200.7	MKTF-32	2203574-003E	0.0063	0.05	mg/L	J	MDLRL
Vanadium, Dissolved	E 200.7	PW-3	2203574-005E	0.0026	0.05	mg/L	J	MDLRL
Vinyl Chloride	SW8260B	PW-4	2203574-006a	0.46	1	µg/L	J	MDLRL
Vinyl Chloride	SW8260B	DUP-3-9-22	2203574-007a	0.87	2	µg/L	J	MDLRL
Xylenes, Total	SW8260B	MKTF-42	2203574-001a	26	1.5	µg/L	J	ERPD-FD
Xylenes, Total	SW8260B	DUP-3-9-22	2203574-007a	56	3	µg/L	J	ERPD-FD
Zinc, Dissolved	E 200.7	MKTF-42	2203574-001E	0.011	0.01	mg/L	JB	EBD
Zinc, Dissolved	E 200.7	MKTF-41	2203574-002E	0.0097	0.01	mg/L	U	EBD, MDLRL
Zinc, Dissolved	E 200.7	MKTF-32	2203574-003E	0.0046	0.01	mg/L	U	EBD, MDLRL
Zinc, Dissolved	E 200.7	MKTF-34	2203574-004E	0.013	0.01	mg/L	JB	EBD
Zinc, Dissolved	E 200.7	PW-3	2203574-005E	0.012	0.01	mg/L	JB	EBD
Zinc, Dissolved	E 200.7	PW-4	2203574-006E	0.022	0.01	mg/L	JB	EBD
Zinc, Dissolved	E 200.7	DUP-3-9-22	2203574-007E	0.013	0.01	mg/L	JB	EBD
Zinc, Dissolved	E 200.7	EB-3-9-22	2203574-008E	0.0045	0.01	mg/L	J	MDLRL
Zinc, Total	E200.8	MKTF-32	2203574-003D	0.0047	0.01	mg/L	J	MDLRL
Zinc, Total	E200.8	MKTF-34	2203574-004D	0.0086	0.01	mg/L	J	MDLRL
Zinc, Total	E200.8	PW-3	2203574-005D	0.008	0.01	mg/L	J	MDLRL





Client: Marathon Oil	Laboratory: Hall Environmental Analysis Laboratory
Project Name: Western Refining Southwest, Q1 GW Sampling	Sample Matrix: Groundwater
Project Number: 697-080-002 Task: 0006	Sample Start Date: 03/10/2022
Date Validated: 09/19/2022	Sample End Date: 03/10/2022
Parameters Included:	
<ul> <li>Volatile Organic Compounds (VOCs) by Environmental P Waste (SW-846) Method 8260B</li> </ul>	rotection Agency (EPA) Test Methods for Evaluating Solid
<ul> <li>1,2-Dibromoethane (EDB) by EPA Method 504.1</li> </ul>	

- Semivolatile Organic Compounds (SVOCs) by SW-846 Method 8270C and Method 8270C with Selected Ion Monitoring (SIM)
- Total Petroleum Hydrocarbons (TPH) Gasoline Range Organics (GRO) by SW-846 Method 8015D
- TPH Diesel Range Organics (DRO) and Motor Oil Range Organics (MRO) by SW-846 Method 8015D Modified
- Total and Dissolved Metals by EPA Method 200.7 and Method 200.8
- Total and Dissolved Mercury by EPA Method 245.1
- Cyanide by Standard Methods for the Examination of Water and Wastewater (SM) Method 4500 CN E
- Per- and Polyfluorinated Alkyl Substances (PFAS) by Liquid Chromatography with Tandem Mass Spectrometry (LC-MS/MS) and Isotope Dilution (ID)

Laboratory Project ID: 2203667

Data Validator: Daran O'Hollearn, Lead Project Scientist

Reviewer: Charles Ballek, Senior Chemist

## DATA EVALUATION CRITERIA SUMMARY

A Tier II Data Validation was performed by Trihydro Corporation's Chemical Data Evaluation Services Group on the analytical data report packages generated by Hall Environmental Analysis Laboratory of Albuquerque, New Mexico, with additional data from Pace National of Mount Juliet, Tennessee, and from Vista Analytical Laboratory of El Dorado Hills, California, evaluating samples from the Marathon Oil site, located in Gallup, New Mexico.

Precision, accuracy, method compliance, and completeness of this data package were assessed during this data review. Precision was determined by evaluating the calculated relative percent difference (RPD) values from:

- Field duplicate pairs
- Laboratory duplicate pairs
- Matrix spike (MS) and matrix spike duplicate (MSD) pairs
- Laboratory control sample (LCS) and laboratory control sample duplicate (LCSD) pairs

Laboratory accuracy was established by reviewing the demonstrated percent recoveries (%R) of the following items to verify that data are not biased.

- MS/MSD samples
- LCS/LCSD samples
- Organic system monitoring compounds (surrogates)



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Field accuracy was established by collecting and analyzing the following samples to monitor for possible ambient or cross contamination during sampling and transportation.

- Trip blanks
- Field blanks
- Equipment blanks

Method compliance was established by reviewing sample integrity, holding times, detection limits, surrogate recoveries, laboratory blanks, initial and continuing calibrations (where applicable), and the LCS/LCSD percent recoveries against method-specific requirements.

Completeness was evaluated by determining the overall ratio of the number of samples and analyses planned versus the number of samples with valid analyses. Determination of completeness included a review of the chain-of-custody (CoC), laboratory analytical methods, and other laboratory and field documents associated with this analytical data set.

Client Sample ID	Laboratory Sample ID Hall Environmental	Laboratory Sample ID Pace	Laboratory Sample ID Vista
EB 3-10-22	2203667-001	L1471288-01	
MKTF-46	2203667-002	L1471288-02	
MKTF-35	2203667-003	L1471288-03	
OW-57	2203667-004	L1471288-04	
OW-58	2203667-005	L1471288-05	
OW-58A	2203667-006	L1471288-06	
OW-63	2203667-007	L1471288-07	2203119-01
DUP 3-10-22	2203667-008	L1471288-08	
FB 3-10-22	2203667-009		
PFAS-FB	2203667-010		2203119-02
Trip Blank	2203667-011		

#### SAMPLE NUMBERS TABLE





The laboratory data were reviewed to evaluate compliance with the methods and the quality of the reported data. Assessment of CoC completeness is included in Item 3 of the Data Validation Checklist. A check mark ( $\checkmark$ ) indicates that the referenced validation criteria were deemed acceptable, whereas a crossed circle ( $\otimes$ ) indicates validation criteria for which the data have been qualified by the data validator. An empty circle (O) indicates that the specified criterion does not apply to the reviewed data. Details are noted in the tables below.

#### Validation Criteria

- ✓ Data Completeness
- ⊗ Laboratory Identified Issues (Item 1)
- ✓ CoC Documentation (Item 3)
- ✓ Holding Times and Preservation (Items 6 and 7)
- O Initial and Continuing Calibrations (Items 9 and 10)
- ⊗ Laboratory Blanks (Items 11 and 12)
- ⊗ MS/MSD (Items 13 and 14)
- ⊗ LCS/LCSD (Items 15 and 16)
- System Monitoring Compounds (i.e., Surrogates and Internal Standards) (Item 17)
- 8 Field, Equipment, and Trip Blanks (Items 18 and 19)
- ⊗ Field Duplicates (Items 20 and 21)
- ✓ Laboratory Duplicates (Item 22)

#### **Guidance References**

Chemical data validation was conducted in accordance with the United States Environmental Protection Agency (USEPA) Contract Laboratory Program (CLP) National Functional Guidelines for the analyses listed below, or by the appropriate method if not covered in the National Functional Guidelines.

- Data for organic analyses were evaluated according to validation criteria set forth in the USEPA CLP National Functional Guidelines for Organic Superfund Methods Data Review, document number EPA-540-R-20-005, November 2020 with additional reference to the USEPA CLP National Functional Guidelines for Organic Data Review, document number EPA 540/R-99/008, October 1999.
- Data for inorganic analyses were evaluated according to validation criteria set forth in the USEPA CLP National Functional Guidelines for Inorganic Superfund Methods Data Review, document number EPA-540-R-20-006, November 2020 with additional reference to the USEPA CLP National Functional Guidelines for Inorganic Data Review, document number EPA 540-R-04-004, October 2004.
- Data review and evaluation was performed following criteria set forth in Data Review and Validation Guidelines for Perfluoroalkyl Substances (PFASs) Analyzed Using EPA Method 537, document number EPA 910-R-18-001, November 2018.
- Data were reviewed and evaluated according to criteria set forth in the Department of Defense (DoD) / Department of Energy (DOE) Quality Systems Manual (QSM) for Environmental Laboratories, Version 5.3, 2019.



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- Data were reviewed and evaluated according to criteria set forth in Data Validation Guidelines Module 3: Data Validation Procedure for Per- and Polyfluoroalkyl Substances Analysis by QSM Table B-15, United States Department of Defense, Environmental Data Quality Workgroup, May 2020.
- Review of field duplicates was conducted according to the USEPA Region I New England Environmental Data Review Supplement for Region 1 Data Review Elements and Superfund Specific Guidance/Procedures, EQADR-Supplement2, September 2020.
- Trihydro Data Validation Variance Documentation, April 2022.

## **OVERALL DATA PACKAGE ASSESSMENT**

Based on a data validation review, the data are acceptable as delivered. Data qualified by the laboratory are discussed in Item 2 of the Validation Criteria Checklist.

The purpose of validating data and assigning qualifiers is to assist in proper data interpretation. Data that are not qualified meet the site data quality objectives. If values are assigned qualifiers other than an R (rejected, data not usable), the data may be used for site evaluation; however, consideration should be given to the reasons for qualification when interpreting sample concentrations. Data points that are assigned an R qualifier should not be used for site evaluation purposes.

If applicable, text was identified in **bold font** in the Validation Criteria Checklist to indicate that further action and/or qualification of the data were required. Data may have been qualified with J data flags by the laboratory if the result was greater than or equal to the method detection limit (MDL) but less than the reporting limit (RL). These laboratory-applied J flags were preserved, if present, and included in the Data Qualification Summary table at the end of this report. If applicable, data validation qualifiers were added for the items noted with crossed circles in the Validation Criteria section above. Please see the Data Qualification Summary table at the end of this report.

If data would be qualified with more than one flag, one qualifier was assigned based on the severity; however, all reasons for qualification were retained. Data that would be qualified with both J+ and J- flags were evaluated based on validation criteria and assigned the appropriate flag. The hierarchy of qualifiers from the most to least severe is as follows:

R > JB/U > NJ > J+/J- > J/UJ

Data qualifiers used during this validation are included in the following table.

<u>Qualifier</u>	Definition
J	Estimated concentration
J+	The result is an estimated concentration, but may be biased high
J-	The result is an estimated concentration, but may be biased low
JB	Estimated concentration due to blank contamination
UJ	Estimated reporting limit
U	Evaluated to be undetected at the reporting limit
R	Rejected, data not usable

#### **Data Completeness**

The analyses were performed as requested on the CoC records. The associated samples were received by the laboratory and analyzed properly unless otherwise noted in the Criteria Checklist below. The complete data package consisted of 654 data points. The data completeness calculation does not include any submitted blank sample results. One data points was rejected. The data completeness measure for this data package is calculated to be 99.85% and is acceptable.



VALIDATION CRITERIA CHECKLIST									
1.	1. Was the report free of non-conformances identified by the laboratory?     No								
Cor	nments: The la	boratory noted the following analytical non-c	onformance related to this data set.						
Met con for t othe 827 <b>qua</b>	<u>Method 8270C SIM</u> : A laboratory error on the spiking of the LCS/LCSD occurred. The LCS/LCSD for only the 8270 SIM compound was spiked with the inappropriate spike and the laboratory could not determine the LCS/LCSD concentrations for the samples in this batch (R86533). The surrogate recoveries were all acceptable for the 8270 SIM samples and all other method criteria were met. We have flagged all compounds with an "E" flag to represent the fact that the data for the 8270SIM test should be considered estimated. The samples in Method 8270C SIM batch R86533 were assigned J qualifiers for detections and UJ for non-detections due to incomplete required quality control analyses.								
Met	hod 8270C: "S	" flagged surrogates denote low surrogate re	coveries due to matrix interferences/s	ample dilution.					
2.	Were the data If no, define.	free of data qualification flags and/or notes u	used by the laboratory?	No					
Cor	nments: The la	boratory used the following data qualification	n flags with this data set.						
D –	Sample diluted	l due to matrix.							
E –	Estimated valu	e.							
Н-	Recovery was	outside laboratory acceptance criteria.							
J –	Analyte detecte	d below quantitation limits.							
J3 -	- The associate	d batch QC was outside the established qua	lity control range for precision.						
J6 -	- The sample m	natrix interfered with the ability to make any a	ccurate determination; spike value is	low.					
R –	RPD value out	side of range.							
S –	% Recovery ou	utside of range due to dilution or matrix interfo	erence.						
* _ '	Value exceeds	maximum contaminant level.							
3.	Were sample	CoC forms and custody procedures complete	?	Yes					
Cor and sea	nments: The C laboratory pers led, and custod	oC records from field to laboratory were com sonnel signatures, dates, and times of receip y seals were present and intact on the shipp	plete, and custody was maintained as t. The laboratory noted that the shipp ing containers.	s evidenced by field ing containers were					
4.	Were detection	n limits in accordance with the quality assura	nce project plan (QAPP),	Yes					
	permit, or met	nod, or indicated as acceptable?							
Cor	nments: The d	etection limits appeared to be acceptable.	he following dilutions were applied.						
	Method	<u>Sample(s)</u>	Analyte(s)	Dilution Factor					
	200.7	OW-57, OW-63, MKTF-35	Total and Dissolved Barium	5					
	200.8	MKTF-35	Select Total Metals	5					
	245.1	DUP 3-10-22, MKTF-35	Total Mercury	5					
	200.7	OW-58, MKTF-35	Total and Dissolved Barium	10					
	504.1	Multiple Samples	EDB	10					
	8015 D         OW-58, OW-57, OW-58A         DRO and MRO         10								
	8015D	MKTF-35	GRO	10					
	8260B	MKTF-35	Select VOCs	10					
	8015D	OW-58A	GRO	20					
	8260B	OW-58A	Select VOCs	20					
	8015D	OW-58, OW-57, OW-63	GRO	50					



	VALIDATION CRITERIA CHECKLIST									
	Method	Sample(s)	Analyte(s)	Dilution Factor						
	8260B	OW-58, OW-57, OW-63	Select VOCs	50						
	8260B	MKTF-35	Select VOCs	100						
	8260B	OW-58A	Benzene	200						
	8260B	OW-58, OW-57, OW-63	Benzene	500						
5.	5. Were the reported analytical methods and constituents in compliance with the QAPP, permit, or CoC?									
con	stituents in acc	ordance with the CoC, with the following exce	eptions.	nory reported the requested						
The both and The This	The CoC requested total and dissolved metals using Method 200.7; however, the laboratory analyzed the samples using both Method 200.7 and Method 200.8. This substituted analytical method, Method 200.8, met similar sensitivity, accuracy, and precision goals and, therefore, was an acceptable replacement. The CoC requested cyanide using Method 335.4; however, the laboratory analyzed the samples using Method 4500 CN E.									
rep	lacement.									
6.	Were samples	received in good condition within method-sp	ecified requirements?	No						
reco Che reco coo tem or fi	ommended tem eck List. Sampl ommended rang ler temperature peratures below rozen.	perature range of $4^{\circ}C \pm 2^{\circ}C$ between -0.5°C es transferred to Pace National were receive ge at 1.7°C as noted on the CoC. Samples tr outside the recommended range at 0.7°C as w 2.0°C were judged as acceptable since the	to 5.3°C as noted on the CoC d in good condition with the co ransferred to Vista were receive noted on the Sample Log-in C laboratory did not report the sa	and the <i>Sample Log-in</i> oler temperature outside the ed in good condition with the Checklist. The cooler ample containers as broken						
7.	Were samples technical holdi	extracted/digested and analyzed within methin g times?	nod-specified or	Yes						
Cor	nments: The sa	amples were extracted/digested and analyzed	d within method-specific holdin	g times.						
8.	Were reported method(s)? S	units appropriate for the sample matrix/matri pecify if wet or dry units were used for soil.	ices and analytical	Yes						
Cor mill	Comments: The results were reported in concentration units of nanograms per liter (ng/L), micrograms per liter (µg/L), and milligrams per liter (mg/L), which were acceptable for the sample matrix and the analyses requested.									
9.	Did the laborat	tory provide any specific initial and/or continu	ing calibration results?	No						
Cor	nments: Initial	and continuing calibration data were not inclu	ided as part of this data set.							
10.	10. If initial and/or continuing calibration results were provided, were the results within N/A acceptable limits?									
Cor	Comments: Initial and continuing calibration data were not included as part of this data set.									
11.	Was the total r the total numb	number of laboratory blank samples prepared er of samples or analyzed as required by the	l equal to at least 5% of method?	Yes						
Cor	nments: The to	tal number of laboratory blank samples prepa	ared was equal to at least 5% o	of the total number of						



VALIDATION CRITERIA CHECKLIST										
12. Were target analytes reported as not detected in the laboratory blanks? No										
Comments:	Comments: Target analytes were reported as not detected in the laboratory blanks, with the following exceptions.									
		Method	Analyte	Batch	Concentration					
		8015D	DRO	66129	0.026 mg/L					
		8015D	DRO	66219	0.018 mg/L					
		8260B	Chloromethane	R86601	0.66 µg/L					
		8260B	Chloromethane	R86626	0.68 µg/L					
		8015D	GRO	R86601	0.044 mg/L					
		8015D	GRO	G86626	0.034 mg/L					
and/or less samples th qualifiers. reporting lin	Detections of DRO, GRO, and chloromethane in the associated samples that were less than the blank results and/or less than the applicable reporting limits were assigned U qualifiers. Detections of GRO in the associated samples that were greater than the reporting limits but less than 10 times the blank results were assigned JB qualifiers. Non-detections of the identified analytes in the associated samples and detections that were greater than the reporting limit and greater than ten times the blank concentration did not require qualification									
13. Was th numbe	e total number o r of samples or a	f MS sample analyzed as r	s prepared equal to at required by the method	t least 5% of the t d?	total	Yes				
Comments: although M analytical b	The total numb S samples were atch in this samp	er of matrix s not prepared ble set has be	spike samples prepare l/reported for all analys een indicated below.	ed was equal to a ses and/or batche	t least 5% of the tota es. The matrix spike	al number of samples, e sample source for ea	ich			
	<u>Method</u>		<u>Analytes</u>	<u>Batch</u>	MS Sample S	<u>Source</u>				
	200.7	-	Total Metals	66641	Not Prepared					
	200.7	-	Total Metals	66642	OW-57, OV	N-58				
	200.7	Dis	ssolved Metals	A86443	Not Prepa	ared				
	200.7	Dis	solved Barium	A87332	Not Prepa	ared				
	200.8	-	Total Metals	66191	Not Prepa	ared				
	200.8	Dis	ssolved Metals	A86482	EB 3-10-	-22				
	200.8	Di	issolved Lead	A86537	MKTF-4	16				
	245.1	Total and	d Dissolved Mercury	66283	DUP 3-10	)-22				
	504.1		EDB	66149	Not Prepa	ared				
	504.1		EDB	66232	Not Prepa	ared				
	4500CN E		Cyanide	WG1834196	EB 3-10-22, 0	OW-63				
	8015D	TPH	DRO and MRO	66129	Not Prepa	ared				
	8015D	TPH	DRO and MRO	66219	Not Prepa	ared				
	8015D		TPH GRO	G86626	Not Prepa	ared				
	8015D		TPH GRO	R86601	Not Prepa	ared				
	8260B		VOCs	R86601	MKTF-4	16				
	8260B		VOCs	R86626	Not Prepa	ared				
	8270C		SVOCs	66142	Not Prepa	ared				
	8270C SIM		1,4-Dioxane	R86533	Not Prepa	ared				
	PFAS Method		PFAs	B22C148	Not Prepa	ared				
Not Prepared	Not Prepared – Matrix spikes were not prepared/reported for this batch.									



VALIDATION CRITERIA CHECKLIST									
14. For MS/MSDs prepared from project samples, were percent recoveries and RPDs       No         within data validation or laboratory quality control (QC) limits?       No									
Comments: The percent recoveries and RPDs for MS/MSDs prepared from project samples were within data validation and laboratory QC limits or were not applicable because the unspiked amount was more than four times the spike added, with the following exceptions, with the following exceptions.									
The MS recovery for cyanide in Method 4500 CN E batch WG1834196 was outside the QC limits of 75-125% at 74.2%. Cyanide results were qualified as J- if detected and UJ if not detected in the associated samples due to evidence of potential low bias.									
Also, the MS/MSD RPD for cyanide Method 4500 CN E batch WG1834196 exceeded the QC limit of 20% at 28.4%. The associated sample results were qualified as J if detected or UJ if not detected due to evidence of poor precision.									
15. Was th sample	e total number of LCSs ar s or analyzed as required	alyzed equa	l to at least 5% o od?	of the total numb	per of	Yes			
Comments:	The total number of LCS	samples an	alyzed was equa	al to at least 5%	of the total nur	nber of samples	3.		
16. Were L laborat Comments:	CS/LCSD percent recove ory QC limits? The LCS and LCSD perc	ries and LCS cent recoveri	S/LCSD RPDs w es and LCS/LCS	ithin data validat SD RPDs were v	ion or /ithin data valio	No dation and labor	atory QC		
Method	<u>Analyte</u>	<u>Batch</u>	LCS Recovery	LCSD Recovery	LCS/LCSD QC Limits	LCS/LCSD RPD	RPD QC Limits		
200.7	Total Nickel	66642	67.7%		70-130%				
200.8	<b>Dissolved Antimony</b>	A86482	67.8%		70-130%				
8015D	TPH DRO	66219	77.8%	Acceptable	31.7-75.4%	Acceptable	20%		
8270 SIM	Acenaphthene	R86533	Acceptable	Acceptable	29.8-82.7%	40.5%	27.8%		
The total nickel and dissolved antimony results were qualified as J- if detected and UJ if not detected in the associated samples due to evidence of potential low bias. Detections of TPH DRO in the associated samples in batch 66219 were qualified as J+ due to evidence of potential high bias. The acenaphthene results were qualified as J for detections and UJ for non-detections for the associated samples due to evidence of potential samples are evidence of potential high bias.									
17. Were s	urrogate recoveries within	laboratory C	QC limits?			No			
Commenter Surregete recoveries were within laboratory OC limits with the following eventions									

Comments: Surrogate recoveries were within laboratory QC limits, with the following exceptions.

Since Method 8270C surrogate associations were not available from the laboratory, qualification was assigned to all of the target analytes in a given fraction (acid or base/neutral) when two or more surrogates from the same fraction (acid or base/neutral) were outside the acceptance range. This condition did not exist for the sample MKTF-35, and qualification of sample data was not required.

The DRO and MRO results for samples OW-57, OW-58, and OW-58A were not qualified based on the surrogate nonconformances in the Method 8015D analysis since the applied dilutions of 10 times resulted in a surrogate concentrations below routinely calibrated levels, and this result was deemed unreliable and possibly inaccurate.

The PFAS Method extracted internal standard (EIS) <sup>13</sup>C<sub>3</sub>-PFBA for sample OW-63 was recovered outside the data validation limits of 50-150% at 19.5%. The associated target analyte PFBA was not detected in sample OW-63, and this result was qualified as R due to evidence of extreme low bias (recovery less than 20%).



## VALIDATION CRITERIA CHECKLIST

18. Were the number of trip blank, field blank, and/or equipment blank samples collected equal to at least 10% of the total number of samples or as required by the project guidelines, QAPP, SAP, or permit?

Comments: The number of trip, field, and equipment blanks collected was equal to at least 10% of the number of samples. One trip blank sample, Trip Blank, two field blank samples, FB 3-10-22 and PFAS-FB, and one equipment blank sample, EB 3-10-22, were collected as part of this sample set.

19. Were target analytes reported as not detected in the trip blank, field blank, and/or equipment blank samples?

No

Yes

Comments: Target analytes were not detected in the trip blank, field blank, and equipment blank samples with the following exceptions.

Blank Sample ID	Method	Analyte	Concentration
Trip Blank	8260B	Benzene	0.29 μg/L
Trip Blank	8260B	Chloromethane	0.69 µg/L
Trip Blank	8015D	TPH GRO	0.034 mg/L
FB 3-10-22	8260B	Acetone	4.5 µg/L
FB 3-10-22	8260B	Benzene	0.37 µg/L
FB 3-10-22	8015D	TPH GRO	0.040 mg/L
EB 3-10-22	8260B	2-Butanone	5.7 μg/L
EB 3-10-22	8260B	Chloromethane	0.78 µg/L
EB 3-10-22	8015D	TPH GRO	0.039 mg/L
EB 3-10-22	8015D	TPH DRO	0.025 mg/L
EB 3-10-22	8270C SIM	Pyrene	0.24 μg/L
EB 3-10-22	200.7	Dissolved Zinc	0.0070 mg/L

Detections of benzene, pyrene, and dissolved zinc in the associated samples that were less than the blank results and/or less than the applicable reporting limits were assigned U qualifiers. Detections of pyrene and dissolved zinc in the associated samples that were greater than the reporting limits but less than 10 times the blank results were assigned JB qualifiers. Non-detections of the identified analytes in the associated samples and detections that were above the reporting limit and greater than ten times the blank concentration did not require qualification.

The chloromethane (batches R86601 and R86626), TPH GRO (batches R86601 and R86626), and TPH DRO (batches 66129 and 66219) results were previously qualified due to laboratory blank contamination; therefore, additional qualification due to the trip and equipment blank contamination was not required.

20. Was the number of field duplicates collected equal to at least 10% of the total Yes number of samples or as required by the project guidelines, QAPP, SAP, or permit?

Comments: The number of field duplicates collected was equal to at least 10% of the number of samples. Sample DUP-3-10-22 was collected as a field duplicate of sample MKTF-46.

21. Were field duplicate RPD values within data validation QC limits (soil 0-50%, water 0-30%, or air 0-25%)?

Comments: As indicated in the Field Duplicate Summary Table at the end of this report, field duplicate RPD values were within data validation QC limits of 0-30% for water samples, with the following exception.

The RPD value for naphthalene exceeded the data validation limit of 30% at 61.5%. The naphthalene results were qualified as J for samples MKTF-46 and DUP-3-10-22 due to evidence of poor precision.



No

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VALIDATION CRITERIA CHECKLIST										
22. For laboratory laboratory QC	N/A									
Comments: Labora summarized in the f	ple sources are									
	Method         Analytes         Batch         Laboratory Duplicate           Sample Source									
-	4500CN E	Су	vanide	WG1834196	Not	Associated	_			
-	4500CN E	Су	vanide	WG1834196	٩	MKTF-35	_			
Not Associated – The	laboratory duplic	ate sample s	ource was not as	sociated with this pr	roject.					
The RPDs for labor measurements were	atory duplicates e within 5 times	s prepared f the reporti	from project san ng limit.	nples were not ap	oplicable	since the result	for one or both			
The RPD values for but data were not q	the laboratory ualified based o	duplicate s	amples prepare sults since matri	d from non-projec x similarity to pro	ct sample ject samp	s were evaluate bles could not be	ed and considered, e guaranteed.			
23. Were the follow	/ing data relatio	onships real	istic?							
• Target ana EPH/8270	alytes were repo )?	orted by mo	re than one met	hod (e.g., 8260/8	3270,		N/A			
Comments: Target	analytes were	not reported	d by more than o	one method in thi	is data se	t.				
	·									
Both total a results were comments: The following the second	and dissolved r re greater than lowing table co as not provider	netals analy or equal to ontains the e	/ses were perfor the dissolved m exceptions in wh	med, and the tota etals results? ich the dissolved	al metals l metals re	esults exceeded	No I the total metals			
metals results that e based on these data	exceed the corr a.	responding	total metals resu	ilts. Therefore, q	jualificatio	on of results was	s not performed			
	Sample	ID	Analyte	<u>Total Resu</u> (mg/L)	<u>ilt</u> R	<u>Dissolved</u> esult (mg/L)				
	MKTF-4	46	Antimony	ND		0.0015				
	MKTF-3	35	Antimony	ND		0.00071				
	OW-58	A	Barium	0.90		0.94				
	OW-63	3	Barium	4.3		4.6				
	OW-5	7	Nickel	0.055		0.057				
	OW-58	A	Nickel	0.034		0.037				
	OW-63	3	Nickel	0.025		0.027				
	OW-63	3	Vanadium	0.0026		0.0027				
	OW-58	8	Zinc	ND		0.0091				
	OW-5	/	Zinc	ND		0.0080				
	OW-58	A	Zinc	ND		0.015				
	OW-6	3	Zinc	ND		0.015				
	DUP 3-10	)-22	Zinc	ND		0.0081				
	EB 3-10-	-22		ND		0.0070				
	MKTF-4	<del>1</del> 0	ZINC	ND		0.0099				
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Client Sample ID: MKTF-46 Field Duplicate Sample ID: DUP-3-10-22								
Analyte	Duplicate Result	Relative Percent Difference (RPD)						
1,2,4-Trimethylbenzene	SW8260B	0.37 µg/L	1.1 µg/L	99.3% +/-RL				
1,3,5-Trimethylbenzene	SW8260B	ND (1.0 µg/L)	0.21 µg/L	DL				
Benzene	SW8260B	ND (1.0 µg/L)	0.39 µg/L	DL				
Chlorobenzene	SW8260B	0.19 µg/L	0.38 µg/L	66.7% +/-RL				
Chloromethane	SW8260B	0.67 µg/L	0.67 µg/L	0.0% +/-RL				
sec-Butylbenzene	SW8260B	0.21 µg/L	0.37 µg/L	55.2% +/-RL				
Xylenes, Total	SW8260B	0.77 µg/L	1.8 µg/L	80.2% +/-RL				
1,4-Dioxane	SW8270C	1.7 μg/L	1.5 µg/L	12.5% +/-RL				
Naphthalene	SW8270C	0.18 µg/L	0.34 μg/L	61.5%				
TPH GRO	SW8015	0.061 mg/L	0.066 mg/L	7.9% +/-RL				
TPH DRO	SW8015	0.042 mg/L	0.046 mg/L	9.1% +/-RL				
Barium, Dissolved	E 200.7	0.030 mg/L	0.032 mg/L	6.5%				
Barium, Total	E 200.7	0.079 mg/L	0.069 mg/L	13.5%				
Cobalt, Dissolved	E 200.7	0.0029 mg/L	ND (0.0060 mg/L)	DL				
Cobalt, Total	E 200.7	0.0041 mg/L	0.0032 mg/L	24.7% +/-RL				
Vanadium, Dissolved	E 200.7	0.0021 mg/L	ND (0.050 mg/L)	DL				
Vanadium, Total	E 200.7	0.0047 mg/L	0.0049 mg/L	4.2% +/-RL				
Zinc, Dissolved	E 200.7	0.0099 mg/L	0.0081 mg/L	20.0% +/-RL				
Antimony, Dissolved	E200.8	0.0015 mg/L	ND (0.0010 mg/L)	DL				
Arsenic, Dissolved	E200.8	0.00093 mg/L	0.00096 mg/L	3.2% +/-RL				
Arsenic, Total	E200.8	0.0012 mg/L	0.0012 mg/L	0.0% +/-RL				
Lead, Total	E200.8	0.0011 mg/L	0.0010 mg/L	9.5%				

#### FIELD DUPLICATE SUMMARY

Field duplicate RPD control limits are not to exceed 30% for water as established by USEPA Region I - New England Environmental Data Review Supplement for Region 1 Data Review Elements and Superfund Specific Guidance/Procedures, EQADR-Supplement2, September 2020.

DL – Indicates that the analyte was detected in one of the duplicate samples and was undetected in the other sample, and therefore an RPD could not be calculated. Data were not qualified since the detection was within two times the reporting limit. Non-detected results are indicated above with the applicable reporting limit as ND (RL).

+/-RL – Indicates that the detections in both of the samples were within two times the reporting limit. Qualification of data was not required.

The RPD value for naphthalene exceeded the data validation limit of 30% at 61.5%, which was evidence of poor precision. The naphthalene results were qualified as J for samples MKTF-46 and DUP-3-10-22.

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Abbreviation	Reason
HZ-QAQC	Analysis of QA/QC samples was not performed at the required frequency.
MBD	Method blank detection
LR-MS	The MS and/or MSD percent recovery was less than the lower acceptable limit indicating possible matrix interference.
ERPD-MS	The MS/MSD RPD exceeded the upper acceptable limit indicating poor precision.
HR-LCS	The LCS and/or LCSD percent recovery was greater than the upper acceptable limit indicating a possible high bias.
LR-LCS	The LCS and/or LCSD percent recovery was less than the lower acceptable limit indicating a possible low bias.
ERPD-LCS	The LCS/LCSD RPD exceeded the upper acceptable limit indicating poor precision.
LR-EIS	The extracted internal standard (EIS) recovery was less than the lower acceptance limit.
EBD	Equipment blank detection
TBD	Trip blank detection
ERPD-FD	High field duplicate RPD.
MDLRL	Flagged by the laboratory: The result was greater than the MDL but less than the RL.

#### DATA QUALIFICATION SUMMARY

Analyte	Method	Field Sample ID	Lab Sample ID	Result	Limit	Units	Reviewer Qualifier	DV Flag Reasons
1,1-Dichloroethane	SW8260B	MKTF-35	2203667-003a	7.2	10	µg/L	J	MDLRL
1,1-Dichloroethane	SW8260B	OW-58A	2203667-006a	11	20	µg/L	J	MDLRL
1,1-Dichloroethane	SW8260B	OW-63	2203667-007a	31	50	µg/L	J	MDLRL
1,2,4-Trimethylbenzene	SW8260B	MKTF-46	2203667-002a	0.37	1.0	µg/L	J	MDLRL
1,2,4-Trimethylbenzene	SW8260B	OW-57	2203667-004a	6.5	50	µg/L	J	MDLRL
1,2,4-Trimethylbenzene	SW8260B	OW-58	2203667-005a	12	50	µg/L	J	MDLRL
1,2-Dichloroethane	SW8260B	OW-57	2203667-004a	21	50	µg/L	J	MDLRL
1,2-Dichloroethane	SW8260B	OW-58	2203667-005a	21	50	µg/L	J	MDLRL
1,2-Dichloroethane	SW8260B	OW-58A	2203667-006a	8.9	20	µg/L	J	MDLRL
1,2-Dichloroethane	SW8260B	OW-63	2203667-007a	21	50	µg/L	J	MDLRL



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Analyte	Method	Field Sample ID	Lab Sample ID	Result	Limit	Units	Reviewer Qualifier	DV Flag Reasons
1,3,5-Trimethylbenzene	SW8260B	DUP 3-10-22	2203667-008a	0.21	1.0	µg/L	J	MDLRL
1,4-Dioxane	SW8270C	MKTF-46	2203667-002c	1.7	1.0	µg/L	J	HZ-QAQC
1,4-Dioxane	SW8270C	MKTF-35	2203667-003C	1.7	1.0	µg/L	J	HZ-QAQC
1,4-Dioxane	SW8270C	OW-58	2203667-005C	1.3	1.0	µg/L	J	HZ-QAQC
1,4-Dioxane	SW8270C	OW-58A	2203667-006C	1.9	1.0	µg/L	J	HZ-QAQC
1,4-Dioxane	SW8270C	DUP 3-10-22	2203667-008c	1.5	1.0	µg/L	J	HZ-QAQC
1,4-Dioxane	SW8270C	EB 3-10-22	2203667-001c	ND	1.0	µg/L	UJ	HZ-QAQC
1,4-Dioxane	SW8270C	OW-57	2203667-004C	ND	1.0	µg/L	UJ	HZ-QAQC
1,4-Dioxane	SW8270C	OW-63	2203667-007C	ND	1.0	µg/L	UJ	HZ-QAQC
1-Methylnaphthalene	SW8270C	MKTF-35	2203667-003C	9.1	0.10	µg/L	J	HZ-QAQC
1-Methylnaphthalene	SW8270C	OW-57	2203667-004C	82	0.10	µg/L	J	HZ-QAQC
1-Methylnaphthalene	SW8270C	OW-58	2203667-005C	74	0.10	µg/L	J	HZ-QAQC
1-Methylnaphthalene	SW8270C	OW-58A	2203667-006C	91	0.10	µg/L	J	HZ-QAQC
1-Methylnaphthalene	SW8270C	OW-63	2203667-007C	65	0.10	µg/L	J	HZ-QAQC
1-Methylnaphthalene	SW8270C	EB 3-10-22	2203667-001c	ND	0.10	µg/L	UJ	HZ-QAQC
1-Methylnaphthalene	SW8270C	MKTF-46	2203667-002c	ND	0.10	µg/L	UJ	HZ-QAQC
1-Methylnaphthalene	SW8270C	DUP 3-10-22	2203667-008c	ND	0.10	µg/L	UJ	HZ-QAQC
2-Butanone	SW8260B	EB 3-10-22	2203667-001a	5.7	10	µg/L	J	MDLRL
2-Methylnaphthalene	SW8270C	MKTF-35	2203667-003C	13	0.10	µg/L	J	HZ-QAQC
2-Methylnaphthalene	SW8270C	OW-57	2203667-004C	59	0.10	µg/L	J	HZ-QAQC
2-Methylnaphthalene	SW8270C	OW-58	2203667-005C	83	0.10	µg/L	J	HZ-QAQC
2-Methylnaphthalene	SW8270C	OW-58A	2203667-006C	89	0.10	µg/L	J	HZ-QAQC
2-Methylnaphthalene	SW8270C	OW-63	2203667-007C	94	0.10	µg/L	J	HZ-QAQC
2-Methylnaphthalene	SW8270C	EB 3-10-22	2203667-001c	ND	0.10	µg/L	UJ	HZ-QAQC
2-Methylnaphthalene	SW8270C	MKTF-46	2203667-002c	ND	0.10	µg/L	UJ	HZ-QAQC
2-Methylnaphthalene	SW8270C	DUP 3-10-22	2203667-008c	ND	0.10	µg/L	UJ	HZ-QAQC
3,4-Methylphenol	SW8270C	OW-58A	2203667-006C	4.6	5.0	µg/L	J	MDLRL



Analyte	Method	Field Sample ID	Lab Sample ID	Result	Limit	Units	Reviewer Qualifier	DV Flag Reasons
Acenaphthene	SW8270C	MKTF-35	2203667-003C	1.6	0.10	µg/L	J	ERPD-LCS, HZ-QAQC
Acenaphthene	SW8270C	OW-57	2203667-004C	2.4	0.10	µg/L	J	ERPD-LCS, HZ-QAQC
Acenaphthene	SW8270C	OW-58	2203667-005C	2.2	0.10	µg/L	J	ERPD-LCS, HZ-QAQC
Acenaphthene	SW8270C	OW-63	2203667-007C	0.76	0.10	µg/L	J	ERPD-LCS, HZ-QAQC
Acenaphthene	SW8270C	EB 3-10-22	2203667-001c	ND	0.10	µg/L	UJ	ERPD-LCS, HZ-QAQC
Acenaphthene	SW8270C	MKTF-46	2203667-002c	ND	0.10	µg/L	UJ	ERPD-LCS, HZ-QAQC
Acenaphthene	SW8270C	OW-58A	2203667-006C	ND	0.10	µg/L	UJ	ERPD-LCS, HZ-QAQC
Acenaphthene	SW8270C	DUP 3-10-22	2203667-008c	ND	0.10	µg/L	UJ	ERPD-LCS, HZ-QAQC
Acetone	SW8260B	FB 3-10-22	2203667-009a	4.5	10	µg/L	J	MDLRL
Anthracene	SW8270C	MKTF-35	2203667-003C	0.30	0.10	µg/L	J	HZ-QAQC
Anthracene	SW8270C	OW-57	2203667-004C	0.20	0.10	µg/L	J	HZ-QAQC
Anthracene	SW8270C	OW-58	2203667-005C	0.30	0.10	µg/L	J	HZ-QAQC
Anthracene	SW8270C	OW-58A	2203667-006C	0.42	0.10	µg/L	J	HZ-QAQC
Anthracene	SW8270C	OW-63	2203667-007C	0.20	0.10	µg/L	J	HZ-QAQC
Anthracene	SW8270C	EB 3-10-22	2203667-001c	ND	0.10	µg/L	UJ	HZ-QAQC
Anthracene	SW8270C	MKTF-46	2203667-002c	ND	0.10	µg/L	UJ	HZ-QAQC
Anthracene	SW8270C	DUP 3-10-22	2203667-008c	ND	0.10	µg/L	UJ	HZ-QAQC
Antimony, Dissolved	E200.8	MKTF-46	2203667-002E	0.0015	0.0010	mg/L	J-	LR-LCS
Antimony, Dissolved	E200.8	EB 3-10-22	2203667-001E	ND	0.0010	mg/L	UJ	LR-LCS
Antimony, Dissolved	E200.8	OW-57	2203667-004E	ND	0.0010	mg/L	UJ	LR-LCS
Antimony, Dissolved	E200.8	OW-58	2203667-005E	ND	0.0010	mg/L	UJ	LR-LCS
Antimony, Dissolved	E200.8	OW-58A	2203667-006E	ND	0.0010	mg/L	UJ	LR-LCS
Antimony, Dissolved	E200.8	OW-63	2203667-007E	ND	0.0010	mg/L	UJ	LR-LCS
Antimony, Dissolved	E200.8	DUP 3-10-22	2203667-008E	ND	0.0010	mg/L	UJ	LR-LCS
Antimony, Dissolved	E200.8	MKTF-35	2203667-003E	0.00071	0.0010	mg/L	J-	LR-LCS, MDLRL
Arsenic, Dissolved	E200.8	MKTF-46	2203667-002E	0.00093	0.0010	mg/L	J	MDLRL
Arsenic, Dissolved	E200.8	MKTF-35	2203667-003E	0.00058	0.0010	mg/L	J	MDLRL



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Analyte	Method	Field Sample ID	Lab Sample ID	Result	Limit	Units	Reviewer Qualifier	DV Flag Reasons
Arsenic, Dissolved	E200.8	DUP 3-10-22	2203667-008E	0.00096	0.0010	mg/L	J	MDLRL
Benzene	SW8260B	Trip Blank	2203667-011a	0.29	1.0	µg/L	J	MDLRL
Benzene	SW8260B	DUP 3-10-22	2203667-008a	0.39	1.0	µg/L	U	MDLRL, TBD
Benzene	SW8260B	FB 3-10-22	2203667-009a	0.37	1.0	µg/L	U	MDLRL, TBD
Benzo(a)anthracene	SW8270C	EB 3-10-22	2203667-001c	ND	0.10	µg/L	UJ	HZ-QAQC
Benzo(a)anthracene	SW8270C	MKTF-46	2203667-002c	ND	0.10	µg/L	UJ	HZ-QAQC
Benzo(a)anthracene	SW8270C	MKTF-35	2203667-003C	ND	0.10	µg/L	UJ	HZ-QAQC
Benzo(a)anthracene	SW8270C	OW-57	2203667-004C	ND	0.10	µg/L	UJ	HZ-QAQC
Benzo(a)anthracene	SW8270C	OW-58	2203667-005C	ND	0.10	µg/L	UJ	HZ-QAQC
Benzo(a)anthracene	SW8270C	OW-58A	2203667-006C	ND	0.10	µg/L	UJ	HZ-QAQC
Benzo(a)anthracene	SW8270C	OW-63	2203667-007C	ND	0.10	µg/L	UJ	HZ-QAQC
Benzo(a)anthracene	SW8270C	DUP 3-10-22	2203667-008c	ND	0.10	µg/L	UJ	HZ-QAQC
Benzo(b)fluoranthene	SW8270C	EB 3-10-22	2203667-001c	ND	0.10	µg/L	UJ	HZ-QAQC
Benzo(b)fluoranthene	SW8270C	MKTF-46	2203667-002c	ND	0.10	µg/L	UJ	HZ-QAQC
Benzo(b)fluoranthene	SW8270C	MKTF-35	2203667-003C	ND	0.10	µg/L	UJ	HZ-QAQC
Benzo(b)fluoranthene	SW8270C	OW-57	2203667-004C	ND	0.10	µg/L	UJ	HZ-QAQC
Benzo(b)fluoranthene	SW8270C	OW-58	2203667-005C	ND	0.10	µg/L	UJ	HZ-QAQC
Benzo(b)fluoranthene	SW8270C	OW-58A	2203667-006C	ND	0.10	µg/L	UJ	HZ-QAQC
Benzo(b)fluoranthene	SW8270C	OW-63	2203667-007C	ND	0.10	µg/L	UJ	HZ-QAQC
Benzo(b)fluoranthene	SW8270C	DUP 3-10-22	2203667-008c	ND	0.10	µg/L	UJ	HZ-QAQC
Chlorobenzene	SW8260B	MKTF-46	2203667-002a	0.19	1.0	µg/L	J	MDLRL
Chlorobenzene	SW8260B	DUP 3-10-22	2203667-008a	0.38	1.0	µg/L	J	MDLRL
Chloroform	SW8260B	MKTF-35	2203667-003a	5.0	10	µg/L	J	MDLRL
Chloroform	SW8260B	OW-57	2203667-004a	9.5	50	µg/L	J	MDLRL
Chloroform	SW8260B	OW-58	2203667-005a	9.2	50	µg/L	J	MDLRL
Chloroform	SW8260B	OW-63	2203667-007a	17	50	µg/L	J	MDLRL
Chloromethane	SW8260B	EB 3-10-22	2203667-001a	0.78	3.0	µg/L	U	MBD, MDLRL



Analyte	Method	Field Sample ID	Lab Sample ID	Result	Limit	Units	Reviewer Qualifier	DV Flag Reasons
Chloromethane	SW8260B	MKTF-46	2203667-002a	0.67	3.0	µg/L	U	MBD, MDLRL
Chloromethane	SW8260B	OW-57	2203667-004a	47	150	µg/L	U	MBD, MDLRL
Chloromethane	SW8260B	OW-58	2203667-005a	47	150	µg/L	U	MBD, MDLRL
Chloromethane	SW8260B	OW-58A	2203667-006a	24	60	µg/L	U	MBD, MDLRL
Chloromethane	SW8260B	OW-63	2203667-007a	60	150	µg/L	U	MBD, MDLRL
Chloromethane	SW8260B	DUP 3-10-22	2203667-008a	0.67	3.0	µg/L	U	MBD, MDLRL
Chloromethane	SW8260B	Trip Blank	2203667-011a	0.69	3.0	µg/L	U	MBD, MDLRL
Chrysene	SW8270C	EB 3-10-22	2203667-001c	ND	0.10	µg/L	UJ	HZ-QAQC
Chrysene	SW8270C	MKTF-46	2203667-002c	ND	0.10	µg/L	UJ	HZ-QAQC
Chrysene	SW8270C	MKTF-35	2203667-003C	ND	0.10	µg/L	UJ	HZ-QAQC
Chrysene	SW8270C	OW-57	2203667-004C	ND	0.10	µg/L	UJ	HZ-QAQC
Chrysene	SW8270C	OW-58	2203667-005C	ND	0.10	µg/L	UJ	HZ-QAQC
Chrysene	SW8270C	OW-58A	2203667-006C	ND	0.10	µg/L	UJ	HZ-QAQC
Chrysene	SW8270C	OW-63	2203667-007C	ND	0.10	µg/L	UJ	HZ-QAQC
Chrysene	SW8270C	DUP 3-10-22	2203667-008c	ND	0.10	µg/L	UJ	HZ-QAQC
Cobalt, Dissolved	E 200.7	MKTF-46	2203667-002E	0.0029	0.0060	mg/L	J	MDLRL
Cobalt, Total	E 200.7	MKTF-46	2203667-002D	0.0041	0.0060	mg/L	J	MDLRL
Cobalt, Total	E 200.7	OW-58A	2203667-006D	0.0027	0.0060	mg/L	J	MDLRL
Cobalt, Total	E 200.7	DUP 3-10-22	2203667-008D	0.0032	0.0060	mg/L	J	MDLRL
Cyanide, Total	E335.4	OW-58	2203667-005F	0.00515	0.0050	mg/L	J-	ERPD-MS, LR-MS
Cyanide, Total	E335.4	OW-58A	2203667-006F	0.00527	0.0050	mg/L	J-	ERPD-MS, LR-MS
Cyanide, Total	E335.4	OW-63	2203667-007F	0.00773	0.0050	mg/L	J-	ERPD-MS, LR-MS
Cyanide, Total	E335.4	EB 3-10-22	2203667-001F	ND	0.0050	mg/L	UJ	ERPD-MS, LR-MS
Cyanide, Total	E335.4	MKTF-46	2203667-002F	ND	0.0050	mg/L	UJ	ERPD-MS, LR-MS
Cyanide, Total	E335.4	MKTF-35	2203667-003F	ND	0.0050	mg/L	UJ	ERPD-MS, LR-MS
Cyanide, Total	E335.4	OW-57	2203667-004F	ND	0.0050	mg/L	UJ	ERPD-MS, LR-MS
Cyanide, Total	E335.4	DUP 3-10-22	2203667-008F	ND	0.0050	mg/L	UJ	ERPD-MS, LR-MS



Analyte	Method	Field Sample ID	Lab Sample ID	Result	Limit	Units	Reviewer Qualifier	DV Flag Reasons
Fluoranthene	SW8270C	OW-58A	2203667-006C	0.26	0.20	µg/L	J	HZ-QAQC
Fluoranthene	SW8270C	EB 3-10-22	2203667-001c	ND	0.20	µg/L	UJ	HZ-QAQC
Fluoranthene	SW8270C	MKTF-46	2203667-002c	ND	0.20	µg/L	UJ	HZ-QAQC
Fluoranthene	SW8270C	MKTF-35	2203667-003C	ND	0.20	µg/L	UJ	HZ-QAQC
Fluoranthene	SW8270C	OW-57	2203667-004C	ND	0.20	µg/L	UJ	HZ-QAQC
Fluoranthene	SW8270C	OW-63	2203667-007C	ND	0.20	µg/L	UJ	HZ-QAQC
Fluoranthene	SW8270C	DUP 3-10-22	2203667-008c	ND	0.20	µg/L	UJ	HZ-QAQC
Fluoranthene	SW8270C	OW-58	2203667-005C	0.18	0.20	µg/L	J	HZ-QAQC, MDLRL
Fluorene	SW8270C	MKTF-35	2203667-003C	0.54	0.10	µg/L	J	HZ-QAQC
Fluorene	SW8270C	OW-57	2203667-004C	4.1	0.10	µg/L	J	HZ-QAQC
Fluorene	SW8270C	OW-58	2203667-005C	3.0	0.10	µg/L	J	HZ-QAQC
Fluorene	SW8270C	OW-58A	2203667-006C	4.7	0.10	µg/L	J	HZ-QAQC
Fluorene	SW8270C	OW-63	2203667-007C	1.4	0.10	µg/L	J	HZ-QAQC
Fluorene	SW8270C	EB 3-10-22	2203667-001c	ND	0.10	µg/L	UJ	HZ-QAQC
Fluorene	SW8270C	MKTF-46	2203667-002c	ND	0.10	µg/L	UJ	HZ-QAQC
Fluorene	SW8270C	DUP 3-10-22	2203667-008c	ND	0.10	µg/L	UJ	HZ-QAQC
Indeno(1,2,3-cd)pyrene	SW8270C	EB 3-10-22	2203667-001c	ND	0.30	µg/L	UJ	HZ-QAQC
Indeno(1,2,3-cd)pyrene	SW8270C	MKTF-46	2203667-002c	ND	0.30	µg/L	UJ	HZ-QAQC
Indeno(1,2,3-cd)pyrene	SW8270C	MKTF-35	2203667-003C	ND	0.30	µg/L	UJ	HZ-QAQC
Indeno(1,2,3-cd)pyrene	SW8270C	OW-57	2203667-004C	ND	0.30	µg/L	UJ	HZ-QAQC
Indeno(1,2,3-cd)pyrene	SW8270C	OW-58	2203667-005C	ND	0.30	µg/L	UJ	HZ-QAQC
Indeno(1,2,3-cd)pyrene	SW8270C	OW-63	2203667-007C	ND	0.30	µg/L	UJ	HZ-QAQC
Indeno(1,2,3-cd)pyrene	SW8270C	DUP 3-10-22	2203667-008c	ND	0.30	µg/L	UJ	HZ-QAQC
Isopropylbenzene	SW8260B	OW-57	2203667-004a	11	50	µg/L	J	MDLRL
Isopropylbenzene	SW8260B	OW-58	2203667-005a	35	50	µg/L	J	MDLRL
Lead, Dissolved	E200.8	MKTF-35	2203667-003E	0.00021	0.00050	mg/L	J	MDLRL
Lead, Total	E200.8	OW-57	2203667-004D	0.00049	0.00050	mg/L	J	MDLRL



Analyte	Method	Field Sample ID	Lab Sample ID	Result	Limit	Units	Reviewer Qualifier	DV Flag Reasons
Lead, Total	E200.8	OW-58	2203667-005D	0.00049	0.00050	mg/L	J	MDLRL
Lead, Total	E200.8	OW-63	2203667-007D	0.000081	0.00050	mg/L	J	MDLRL
МТВЕ	SW8260B	OW-57	2203667-004a	34	50	µg/L	J	MDLRL
МТВЕ	SW8260B	OW-63	2203667-007a	21	50	µg/L	J	MDLRL
Naphthalene	SW8270C	MKTF-35	2203667-003C	96	0.10	µg/L	J	HZ-QAQC
Naphthalene	SW8270C	OW-57	2203667-004C	170	0.10	µg/L	J	HZ-QAQC
Naphthalene	SW8270C	EB 3-10-22	2203667-001c	ND	0.10	µg/L	UJ	HZ-QAQC
Naphthalene	SW8270C	OW-58	2203667-005C	ND	0.10	µg/L	UJ	HZ-QAQC
Naphthalene	SW8270C	OW-58A	2203667-006C	ND	0.10	µg/L	UJ	HZ-QAQC
Naphthalene	SW8270C	OW-63	2203667-007C	ND	0.10	µg/L	UJ	HZ-QAQC
Naphthalene	SW8270C	MKTF-46	2203667-002c	0.18	0.10	µg/L	J	ERPD-FD, HZ-QAQC
Naphthalene	SW8270C	DUP 3-10-22	2203667-008c	0.34	0.10	µg/L	J	ERPD-FD, HZ-QAQC
n-Butylbenzene	SW8260B	MKTF-35	2203667-003a	5.3	30	µg/L	J	MDLRL
n-Butylbenzene	SW8260B	OW-58A	2203667-006a	11	60	µg/L	J	MDLRL
n-Butylbenzene	SW8260B	OW-63	2203667-007a	20	150	µg/L	J	MDLRL
Nickel, Total	E 200.7	OW-57	2203667-004D	0.055	0.010	mg/L	J-	LR-LCS
Nickel, Total	E 200.7	OW-58	2203667-005D	0.051	0.010	mg/L	J-	LR-LCS
Nickel, Total	E 200.7	OW-58A	2203667-006D	0.034	0.010	mg/L	J-	LR-LCS
Nickel, Total	E 200.7	OW-63	2203667-007D	0.025	0.010	mg/L	J-	LR-LCS
Nickel, Total	E 200.7	DUP 3-10-22	2203667-008D	ND	0.010	mg/L	UJ	LR-LCS
n-Propylbenzene	SW8260B	OW-57	2203667-004a	31	50	µg/L	J	MDLRL
Perfluorobutanoic acid (PFBA)	EPA 537.1	OW-63	2203667-007G	ND	2.09	ng/L	R	LR-EIS
Phenanthrene	SW8270C	MKTF-35	2203667-003C	0.16	0.10	µg/L	J	HZ-QAQC
Phenanthrene	SW8270C	OW-57	2203667-004C	5.5	0.10	µg/L	J	HZ-QAQC
Phenanthrene	SW8270C	OW-58	2203667-005C	2.6	0.10	µg/L	J	HZ-QAQC
Phenanthrene	SW8270C	OW-58A	2203667-006C	4.6	0.10	µg/L	J	HZ-QAQC
Phenanthrene	SW8270C	OW-63	2203667-007C	1.0	0.10	µg/L	J	HZ-QAQC



Analyte	Method	Field Sample ID	Lab Sample ID	Result	Limit	Units	Reviewer Qualifier	DV Flag Reasons
Phenanthrene	SW8270C	EB 3-10-22	2203667-001c	ND	0.10	µg/L	UJ	HZ-QAQC
Phenanthrene	SW8270C	MKTF-46	2203667-002c	ND	0.10	µg/L	UJ	HZ-QAQC
Phenanthrene	SW8270C	DUP 3-10-22	2203667-008c	ND	0.10	µg/L	UJ	HZ-QAQC
p-Isopropyltoluene	SW8260B	OW-58A	2203667-006a	4.7	20	µg/L	J	MDLRL
Pyrene	SW8270C	EB 3-10-22	2203667-001c	0.24	0.20	µg/L	J	HZ-QAQC
Pyrene	SW8270C	MKTF-46	2203667-002c	ND	0.20	µg/L	UJ	HZ-QAQC
Pyrene	SW8270C	DUP 3-10-22	2203667-008c	ND	0.20	µg/L	UJ	HZ-QAQC
Pyrene	SW8270C	OW-58A	2203667-006C	0.28	0.20	µg/L	JB	EBD, HZ-QAQC
Pyrene	SW8270C	OW-63	2203667-007C	0.24	0.20	µg/L	U	EBD, HZ-QAQC
Pyrene	SW8270C	MKTF-35	2203667-003C	0.16	0.20	µg/L	U	EBD, HZ-QAQC, MDLRL
Pyrene	SW8270C	OW-57	2203667-004C	0.16	0.20	µg/L	U	EBD, HZ-QAQC, MDLRL
Pyrene	SW8270C	OW-58	2203667-005C	0.18	0.20	µg/L	U	EBD, HZ-QAQC, MDLRL
sec-Butylbenzene	SW8260B	MKTF-46	2203667-002a	0.21	1.0	µg/L	J	MDLRL
sec-Butylbenzene	SW8260B	MKTF-35	2203667-003a	1.6	10	µg/L	J	MDLRL
sec-Butylbenzene	SW8260B	OW-58A	2203667-006a	3.3	20	µg/L	J	MDLRL
sec-Butylbenzene	SW8260B	OW-63	2203667-007a	9.4	50	µg/L	J	MDLRL
sec-Butylbenzene	SW8260B	DUP 3-10-22	2203667-008a	0.37	1.0	µg/L	J	MDLRL
Selenium, Total	E200.8	MKTF-35	2203667-003D	0.0045	0.0050	mg/L	J	MDLRL
Selenium, Total	E200.8	OW-57	2203667-004D	0.00059	0.0010	mg/L	J	MDLRL
Selenium, Total	E200.8	OW-58	2203667-005D	0.00045	0.0010	mg/L	J	MDLRL
Selenium, Total	E200.8	OW-58A	2203667-006D	0.00044	0.0010	mg/L	J	MDLRL
Styrene	SW8260B	MKTF-35	2203667-003a	2.3	10	µg/L	J	MDLRL
TPH DRO	SW8015	OW-58	2203667-005C	6.5	0.64	mg/L	J+	HR-LCS
TPH DRO	SW8015	OW-58A	2203667-006C	4.2	0.64	mg/L	J+	HR-LCS
TPH DRO	SW8015	OW-63	2203667-007C	3.3	0.064	mg/L	J+	HR-LCS
TPH DRO	SW8015	DUP 3-10-22	2203667-008C	0.046	0.064	mg/L	U	HR-LCS, MBD, MDLRL
TPH DRO	SW8015	EB 3-10-22	2203667-001C	0.025	0.064	mg/L	U	MBD, MDLRL



Analyte	Method	Field Sample ID	Lab Sample ID	Result	Limit	Units	Reviewer Qualifier	DV Flag Reasons
TPH DRO	SW8015	MKTF-46	2203667-002C	0.042	0.064	mg/L	U	MBD, MDLRL
TPH GRO	SW8015	MKTF-46	2203667-002a	0.061	0.050	mg/L	JB	MBD
TPH GRO	SW8015	DUP 3-10-22	2203667-008a	0.066	0.050	mg/L	JB	MBD
TPH GRO	SW8015	Trip Blank	2203667-011a	0.034	0.050	mg/L	U	MBD, MDLRL
TPH GRO	SW8015	EB 3-10-22	2203667-001a	0.039	0.050	mg/L	U	MBD, MDLRL
TPH GRO	SW8015	FB 3-10-22	2203667-009a	0.040	0.050	mg/L	U	MBD, MDLRL
Trichloroethene	SW8260B	MKTF-35	2203667-003a	3.0	10	µg/L	J	MDLRL
Vanadium, Dissolved	E 200.7	MKTF-46	2203667-002E	0.0021	0.050	mg/L	J	MDLRL
Vanadium, Dissolved	E 200.7	OW-57	2203667-004E	0.0023	0.050	mg/L	J	MDLRL
Vanadium, Dissolved	E 200.7	OW-58	2203667-005E	0.0031	0.050	mg/L	J	MDLRL
Vanadium, Dissolved	E 200.7	OW-63	2203667-007E	0.0027	0.050	mg/L	J	MDLRL
Vanadium, Total	E 200.7	MKTF-46	2203667-002D	0.0047	0.050	mg/L	J	MDLRL
Vanadium, Total	E 200.7	OW-57	2203667-004D	0.0036	0.050	mg/L	J	MDLRL
Vanadium, Total	E 200.7	OW-58	2203667-005D	0.0049	0.050	mg/L	J	MDLRL
Vanadium, Total	E 200.7	OW-63	2203667-007D	0.0026	0.050	mg/L	J	MDLRL
Vanadium, Total	E 200.7	DUP 3-10-22	2203667-008D	0.0049	0.050	mg/L	J	MDLRL
Xylenes, Total	SW8260B	MKTF-46	2203667-002a	0.77	1.5	µg/L	J	MDLRL
Zinc, Dissolved	E 200.7	OW-58A	2203667-006E	0.015	0.010	mg/L	JB	EBD
Zinc, Dissolved	E 200.7	OW-63	2203667-007E	0.015	0.010	mg/L	JB	EBD
Zinc, Dissolved	E 200.7	MKTF-46	2203667-002E	0.0099	0.010	mg/L	U	EBD, MDLRL
Zinc, Dissolved	E 200.7	MKTF-35	2203667-003E	0.0057	0.010	mg/L	U	EBD, MDLRL
Zinc, Dissolved	E 200.7	OW-57	2203667-004E	0.0080	0.010	mg/L	U	EBD, MDLRL
Zinc, Dissolved	E 200.7	OW-58	2203667-005E	0.0091	0.010	mg/L	U	EBD, MDLRL
Zinc, Dissolved	E 200.7	DUP 3-10-22	2203667-008E	0.0081	0.010	mg/L	U	EBD, MDLRL
Zinc, Dissolved	E 200.7	EB 3-10-22	2203667-001E	0.007	0.010	mg/L	J	MDLRL



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Client: Marathon Oil	Laboratory: Hall Environmental Analysis Laboratory
Project Name: Western Refining Southwest, GW Sampling 2022	Sample Matrix: Groundwater
Project Number: 697-080-002 Task: 0006	Sample Start Date: 03/10/2022
Date Validated: 03/31/2022	Sample End Date: 03/10/2022
<ul> <li>Parameters Included:</li> <li>Total Suspended Solids (TSS) by Standard Methods for the 2540D</li> </ul>	e Examination of Water and Wastewater (SM) Method
Laboratory Project ID: 2203670	
Data Validator: Daran O'Hollearn, Lead Project Scientist	
Reviewer: Mike Phillips, Senior Chemist	

## DATA EVALUATION CRITERIA SUMMARY

A Tier II Data Validation was performed by Trihydro Corporation's Chemical Data Evaluation Services Group on the analytical data report package generated by Hall Environmental Analysis Laboratory of Albuquerque, New Mexico, evaluating samples from the Marathon Oil site, located in Gallup, New Mexico.

Laboratory accuracy was established by reviewing the demonstrated percent recoveries (%R) of the following items to verify that data are not biased.

Laboratory control samples (LCS)

Method compliance was established by reviewing sample integrity, holding times, detection limits, laboratory blanks, initial and continuing calibrations (where applicable), and the LCS percent recoveries against method-specific requirements.

Completeness was evaluated by determining the overall ratio of the number of samples and analyses planned versus the number of samples with valid analyses. Determination of completeness included a review of the chain-of-custody (CoC), laboratory analytical methods, and other laboratory and field documents associated with this analytical data set.

## SAMPLE NUMBERS TABLE

Client Sample ID	Laboratory Sample Number
OW-57	2203670-001
OW-58A	2203670-002



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The laboratory data were reviewed to evaluate compliance with the methods and the quality of the reported data. Assessment of CoC completeness is included in Item 3 of the Data Validation Checklist. A check mark ( $\checkmark$ ) indicates that the referenced validation criteria were deemed acceptable, whereas a crossed circle ( $\otimes$ ) indicates validation criteria for which the data have been qualified by the data validator. An empty circle (O) indicates that the specified criterion does not apply to the reviewed data. Details are noted in the tables below.

#### Validation Criteria

- ✓ Data Completeness
- ✓ CoC Documentation (Item 3)
- ✓ Holding Times and Preservation (Items 6 and 7)
- O Initial and Continuing Calibrations (Items 9 and 10)
- ✓ Laboratory Blanks (Items 11 and 12)
- O Matrix Spikes (MS) and Matrix Spike Duplicates (MSD) ( (Items 13 and 14)
- ✓ LCS (Items 15 and 16)
- O System Monitoring Compounds (i.e., Surrogates) (Item 17)
- O Field, Equipment, and Trip Blanks (Items 18 and 19)
- O Field Duplicates (Items 20 and 21)
- O Laboratory Duplicates (Item 22)
- O Data Relationships (Item 23)

## **Guidance References**

Chemical data validation was conducted in accordance with the United States Environmental Protection Agency (USEPA) Contract Laboratory Program (CLP) National Functional Guidelines for the analyses listed below, or by the appropriate method if not covered in the National Functional Guidelines.

- Data for inorganic analyses were evaluated according to validation criteria set forth in the USEPA CLP National Functional Guidelines for Inorganic Superfund Methods Data Review, document number EPA-540-R-20-006, November 2020 with additional reference to the USEPA CLP National Functional Guidelines for Inorganic Data Review, document number EPA 540-R-04-004, October 2004.
- Trihydro Data Validation Variance Documentation, February 2021.





## **OVERALL DATA PACKAGE ASSESSMENT**

Based on a data validation review, the data are acceptable as delivered. Data qualified by the laboratory are discussed in Item 2 of the Validation Criteria Checklist.

The purpose of validating data and assigning qualifiers is to assist in proper data interpretation. Data that are not qualified meet the site data quality objectives. If values are assigned qualifiers other than an R (rejected, data not usable), the data may be used for site evaluation; however, consideration should be given to the reasons for qualification when interpreting sample concentrations. Data points that are assigned an R qualifier should not be used for site evaluation purposes.

If applicable, text was identified in **bold font** in the Validation Criteria Checklist to indicate that further action and/or qualification of the data were required. Data may have been qualified with J data flags by the laboratory if the result was greater than or equal to the method detection limit (MDL) but less than the reporting limit (RL). These laboratory-applied J flags were preserved, if present, and included in the Data Qualification Summary table at the end of this report. If applicable, data validation qualifiers were added for the items noted with crossed circles in the Validation Criteria section above. Please see the Data Qualification Summary table at the end of this report.

If data would be qualified with more than one flag, one qualifier was assigned based on the severity; however, all reasons for qualification were retained. Data that would be qualified with both J+ and J- flags were evaluated based on validation criteria and assigned the appropriate flag. The hierarchy of qualifiers from the most to least severe is as follows:

R > JB/U > NJ > J+/J- > J/UJ

Data qualifiers were not applied as a result of this validation.

#### **Data Completeness**

The analyses were performed as requested on the CoC records. The associated samples were received by the laboratory and analyzed properly unless otherwise noted in the Criteria Checklist below. The complete data package consisted of 2 data points. The data completeness measure for this data package is calculated to be 100% and is acceptable.



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VALIDATION CRITERIA CHECKLIST	
1. Was the report free of non-conformances identified by the laboratory?	Yes
Comments: The laboratory did not identify non-conformances regarding the analytical data.	
<ol> <li>Were the data free of data qualification flags and/or notes used by the laboratory? If no, define.</li> </ol>	Yes
Comments: The laboratory did not apply qualification flags or other notes to the data in the laboratory re	port.
3. Were sample CoC forms and custody procedures complete?	Yes
Comments: The CoC records from field to laboratory were complete, and custody was maintained as ev and laboratory personnel signatures, dates, and times of receipt. Custody seals were not present or requise samples were delivered to the laboratory by courier, and custody was maintained at all times.	idenced by field uired since the
4. Were detection limits in accordance with the quality assurance project plan (QAPP), permit, or method, or indicated as acceptable?	Yes
Comments: The reporting limits for the analyses were reviewed and appeared to be acceptable. Dilution for the analyses of the submitted samples.	ns were not applied
<ol><li>Were the reported analytical methods and constituents in compliance with the QAPP, permit, or CoC?</li></ol>	Yes
Comments: The reported analytical methods were in compliance with the CoC, and the laboratory report constituents in accordance with the CoC.	ted the requested
6. Were samples received in good condition within method-specified requirements?	No
Comments: Samples were received on ice, in good condition, and with the cooler temperatures both with recommended temperature range of $4^{\circ}C \pm 2^{\circ}C$ between -0.8°C and 5.3°C as noted on the CoC and the <i>Check List</i> . The cooler temperatures below 2.0°C were judged as acceptable since the laboratory did no containers as broken or frozen.	hin and outside the Sample Log-in ot report the sample
7. Were samples extracted/digested and analyzed within method-specified or technical holding times?	Yes
Comments: The samples were analyzed within method-specific holding times.	
8. Were reported units appropriate for the sample matrix/matrices and analytical method(s)? Specify if wet or dry units were used for soil.	Yes
Comments: The results were reported in concentration units of milligrams per liter (mg/L), which were ac sample matrix and the analyses requested.	cceptable for the
9. Did the laboratory provide any specific initial and/or continuing calibration results?	No
Comments: Initial and continuing calibration data were not included as part of this data set.	
10. If initial and/or continuing calibration results were provided, were the results within acceptable limits?	N/A
Comments: Initial and continuing calibration data were not included as part of this data set.	
11. Was the total number of laboratory blank samples prepared equal to at least 5% of the total number of samples or analyzed as required by the method?	Yes
Comments: The total number of laboratory blank samples prepared was equal to at least 5% of the total samples.	number of
12. Were target analytes reported as not detected in the laboratory blanks?	Yes
Comments: Target analytes were reported as not detected in the laboratory blanks.	
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VALIDATION CRITERIA CHECKLIST	
13. Was the total number of MS samples prepared equal to at least 5% of the total number of samples or analyzed as required by the method?	No
Comments: The total number of matrix spike samples prepared was not equal to at least 5% of the samples. Matrix spikes were not prepared for the analyses in this data set.	e total number of
14. For MS/MSDs prepared from project samples, were percent recoveries and RPDs within data validation or laboratory quality control (QC) limits?	N/A
Comments: MS/MSD samples were not prepared using project samples as the sample source.	
15. Was the total number of LCSs analyzed equal to at least 5% of the total number of samples or analyzed as required by the method?	Yes
Comments: The total number of LCS samples analyzed was equal to at least 5% of the total number	per of samples.
16. Were LCS/LCSD percent recoveries and LCS/LCSD RPDs within data validation or laboratory QC limits?	Yes
Comments: The LCS percent recoveries were within laboratory QC limits. LCSDs were not analyz set.	zed as part of this sample
17. Were surrogate recoveries within laboratory QC limits?	N/A
Comments: Surrogates were not required for the analyses included in this data set.	
18. Were the number of trip blank, field blank, and/or equipment blank samples collected equal to at least 10% of the total number of samples or as required by the project guidelines, QAPP, SAP, or permit?	No
Comments: Trip, field, and equipment blank samples were not collected for this sample set.	
19. Were target analytes reported as not detected in the trip blank, field blank, and/or equipment blank samples?	N/A
Comments: Trip, field, and equipment blank samples were not collected for this sample set.	
20. Was the number of field duplicates collected equal to at least 10% of the total number of samples or as required by the project guidelines, QAPP, SAP, or permit?	No
Comments: Field duplicates were not collected as part of this sample set.	
<ol> <li>Were field duplicate RPD values within data validation QC limits (soil 0-50%, water 0-30%, or air 0-25%)?</li> </ol>	N/A
Comments: Field duplicates were not collected as part of this sample set.	
22. For laboratory duplicates prepared from project samples, were RPDs within data validation or laboratory QC limits?	N/A
Comments: Laboratory duplicate samples were not prepared for this sample set.	


VALIDATION CRITERIA CHECKLIST						
23. Were the following data relationships realistic and acceptable?						
• Target analytes were reported by more than one method (e.g., 8260/8270, EPH/8270), and the results were in agreement?	N/A					
Comments: Target analytes were not reported by more than one method.						
• Both total and dissolved metals analyses were performed, and the total metals results were greater than or equal to the dissolved metals results?	N/A					
Comments: Total and dissolved metals analyses were not performed for this data set.						



### DATA QUALIFICATION SUMMARY

Data qualifiers were not applied as a result of this validation.



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Client: Marathon Oil	Laboratory: Hall Environmental Analysis Laboratory				
Project Name: Western Refining Southwest, Q1 GW Sampling	Sample Matrix: Groundwater				
Project Number: 697-080-002 Task: 0006	Sample Start Date: 03/15/2022				
Date Validated: 04/04/2022	Sample End Date: 03/15/2022				
Parameters Included:					
<ul> <li>Volatile Organic Compounds (VOC) by Environmental Pro Waste (SW-846) Method 8260B</li> </ul>	otection Agency (EPA) Test Methods for Evaluating Solid				
<ul> <li>1,2-Dibromoethane (EDB) by EPA Method 504.1</li> </ul>					
<ul> <li>Semivolatile Organic Compounds (SVOC) by SW-846 Method 8270C and Method 8270C with Selected Ion Monitoring (SIM)</li> </ul>					
<ul> <li>Total Petroleum Hydrocarbons (TPH) Gasoline Range Or</li> </ul>	ganics (GRO) by SW-846 Method 8015D				
<ul> <li>TPH Diesel Range Organics (DRO) and Motor Oil Range</li> </ul>	Organics (MRO) by SW-846 Method 8015D Modified				
<ul> <li>Total and Dissolved Metals by EPA Method 200.7 and Method</li> </ul>	ethod 200.8				
<ul> <li>Total and Dissolved Mercury by EPA Method 245.1</li> </ul>					
<ul> <li>Cyanide by Standard Methods for the Examination of Water and Wastewater (SM) Method 4500 CN E</li> </ul>					
Laboratory Project ID: 2203825					
Data Validator: Daran O'Hollearn, Lead Project Scientist					
Reviewer: Mike Phillips, Senior Chemist					

### DATA EVALUATION CRITERIA SUMMARY

A Tier II Data Validation was performed by Trihydro Corporation's Chemical Data Evaluation Services Group on the analytical data report packages generated by Hall Environmental Analysis Laboratory of Albuquerque, New Mexico, with additional data from Pace Analytical National of Mount Juliet, Tennessee evaluating samples from the Marathon Oil site, located in Gallup, New Mexico.

Precision, accuracy, method compliance, and completeness of this data package were assessed during this data review. Precision was determined by evaluating the calculated relative percent difference (RPD) values from:

- Field duplicate pairs
- Laboratory duplicate pairs
- Matrix spike (MS) and matrix spike duplicate (MSD) pairs
- Laboratory control sample (LCS) and laboratory control sample duplicate (LCSD) pairs

Laboratory accuracy was established by reviewing the demonstrated percent recoveries (%R) of the following items to verify that data are not biased.

- MS/MSD samples
- LCS/LCSD samples
- Organic system monitoring compounds (surrogates)



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Field accuracy was established by collecting and analyzing the following samples to monitor for possible ambient or cross contamination during sampling and transportation.

- Trip blanks
- Field blanks
- Equipment blanks

Method compliance was established by reviewing sample integrity, holding times, detection limits, surrogate recoveries, laboratory blanks, initial and continuing calibrations (where applicable), and the LCS/LCSD percent recoveries against method-specific requirements.

Completeness was evaluated by determining the overall ratio of the number of samples and analyses planned versus the number of samples with valid analyses. Determination of completeness included a review of the chain-of-custody (CoC), laboratory analytical methods, and other laboratory and field documents associated with this analytical data set.

Client Sample ID	Laboratory Sample Number
EB 3-15-22	2203825-001
OW-1	2203825-002
MKTF-17R	2203825-003
MKTF-18R	2203825-004
MKTF-38	2203825-005
MKTF-04R	2203825-006
MKTF-11	2203825-007
MKTF-10	2203825-008
FB 3-15-22	2203825-009
DUP-3-15-22	2203825-010
Trip Blank	2203825-011

### SAMPLE NUMBERS TABLE





The laboratory data were reviewed to evaluate compliance with the methods and the quality of the reported data. Assessment of CoC completeness is included in Item 3 of the Data Validation Checklist. A check mark ( $\checkmark$ ) indicates that the referenced validation criteria were deemed acceptable, whereas a crossed circle ( $\otimes$ ) indicates validation criteria for which the data have been qualified by the data validator. An empty circle (O) indicates that the specified criterion does not apply to the reviewed data. Details are noted in the tables below.

#### Validation Criteria

- ✓ Data Completeness
- ✓ CoC Documentation (Item 3)
- ✓ Holding Times and Preservation (Items 6 and 7)
- O Initial and Continuing Calibrations (Items 9 and 10)
- ⊗ Laboratory Blanks (Items 11 and 12)
- ⊗ MS/MSD (Items 13 and 14)
- ⊗ LCS/LCSD (Items 15 and 16)
- System Monitoring Compounds (i.e., Surrogates) (Item 17)
- 8 Field, Equipment, and Trip Blanks (Items 18 and 19)
- ⊗ Field Duplicates (Items 20 and 21)
- ✓ Laboratory Duplicates (Item 22)
- ✓ Data Relationships (Item 23)

### **Guidance References**

Chemical data validation was conducted in accordance with the United States Environmental Protection Agency (USEPA) Contract Laboratory Program (CLP) National Functional Guidelines for the analyses listed below, or by the appropriate method if not covered in the National Functional Guidelines.

- Data for organic analyses were evaluated according to validation criteria set forth in the USEPA CLP National Functional Guidelines for Organic Superfund Methods Data Review, document number EPA-540-R-20-005, November 2020 with additional reference to the USEPA CLP National Functional Guidelines for Organic Data Review, document number EPA 540/R-99/008, October 1999.
- Data for inorganic analyses were evaluated according to validation criteria set forth in the USEPA CLP National Functional Guidelines for Inorganic Superfund Methods Data Review, document number EPA-540-R-20-006, November 2020 with additional reference to the USEPA CLP National Functional Guidelines for Inorganic Data Review, document number EPA 540-R-04-004, October 2004.
- Review of field duplicates was conducted according to the USEPA Region I New England Environmental Data Review Supplement for Region 1 Data Review Elements and Superfund Specific Guidance/Procedures, EQADR-Supplement2, September 2020.
- Trihydro Data Validation Variance Documentation, February 2021.



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### **OVERALL DATA PACKAGE ASSESSMENT**

Based on a data validation review, the data are acceptable as delivered. Data qualified by the laboratory are discussed in Item 2 of the Validation Criteria Checklist.

The purpose of validating data and assigning qualifiers is to assist in proper data interpretation. Data that are not qualified meet the site data quality objectives. If values are assigned qualifiers other than an R (rejected, data not usable), the data may be used for site evaluation; however, consideration should be given to the reasons for qualification when interpreting sample concentrations. Data points that are assigned an R qualifier should not be used for site evaluation purposes.

If applicable, text was identified in **bold font** in the Validation Criteria Checklist to indicate that further action and/or qualification of the data were required. Data may have been qualified with J data flags by the laboratory if the result was greater than or equal to the method detection limit (MDL) but less than the reporting limit (RL). These laboratory-applied J flags were preserved, if present, and included in the Data Qualification Summary table at the end of this report. If applicable, data validation qualifiers were added for the items noted with crossed circles in the Validation Criteria section above. Please see the Data Qualification Summary table at the end of this report.

If data would be qualified with more than one flag, one qualifier was assigned based on the severity; however, all reasons for qualification were retained. Data that would be qualified with both J+ and J- flags were evaluated based on validation criteria and assigned the appropriate flag. The hierarchy of qualifiers from the most to least severe is as follows:

Data qualifiers used during this validation are included in the following table.

<u>Qualifier</u>	Definition
J	Estimated concentration
J+	The result is an estimated concentration, but may be biased high
J-	The result is an estimated concentration, but may be biased low
UJ	Estimated reporting limit
U	Evaluated to be undetected at the reporting limit
JB	Estimated concentration due to blank contamination
R	Rejected, data not usable

#### **Data Completeness**

The analyses were performed as requested on the CoC records. The associated samples were received by the laboratory and analyzed properly unless otherwise noted in the Criteria Checklist below. The complete data package consisted of 720 data points. The data completeness calculation does not include submitted blank sample results. Three data points were rejected. The data completeness measure for this data package is calculated to be 99.58% and is acceptable.



VALIDATION CRITERIA CHECKLIST							
1. Was	1. Was the report free of non-conformances identified by the laboratory? No						
Commer	Comments: The laboratory noted the following analytical non-conformance related to this data set.						
Method a	<u>3270</u> : "S" flag	ged surrogates denote low surrogate reco	overies due to matrix interference	es/sample dilution.			
2. Wer If no	e the data free o, define.	e of data qualification flags and/or notes u	sed by the laboratory?	No			
Commer	nts: The labor	atory used the following data qualification	flags with this data set.				
D – Sam	ple diluted due	e to matrix.	0				
J – Analy	/te detected b	elow quantitation limits					
.16 – The	sample matri	x interfered with the ability to make any ac	curate determination: spike valu	ie is low			
S – % R	ecovery outsid	le of range due to dilution or matrix interfe	rence				
* _ Value	evceeds may	vinum contaminant level					
			0				
3. Wer	e sample CoC	c forms and custody procedures complete	?	Yes			
Commer and labo samples	nts: The CoC ratory personr were delivere	records from field to laboratory were comp nel signatures, dates, and times of receipt d to the laboratory by courier, and custody	olete, and custody was maintain . Custody seals were not preser y was maintained at all times.	ed as evidenced by field nt or required since the			
4. Wer perr	e detection lin nit, or method	nits in accordance with the quality assurar , or indicated as acceptable?	nce project plan (QAPP),	Yes			
Commer	nts: The detec	tion limits appeared to be acceptable. Th	e following dilutions were applie	d.			
	Method	Sample(s)	<u>Analyte(s)</u>	Dilution Factor			
	200.8	MKTF-38	Dissolved Barium	5			
	200.8	MKTF-11, MKTF-10, OW-1	Select Total Metals	5			
	8015D	MKTF-04R	GRO	5			
	8260B	MKTF-04R	VOCs	5			
	200.8	MKTF-17R	Dissolved Barium	10			
	8015D	Multiple Samples	DRO, MRO, GRO	10			
	8260B	Multiple Samples	VOCs	10			
	8270 SIM	MKTF-04R	1,4-Dioxane	10			
	200.8	MKTF-38, MKTF-17R	Total Barium	20			
	200.8	MKTF-04R	Dissolved Barium	20			
	200.8	MKTF-18R, MKTF-04R	Total Barium	50			
	200.8	MKTF-18R	Dissolved Barium	50			
	8260B	MKTF-04R	Benzene	50			
	8260B	Multiple Samples	Select VOCs	100			
	200.8	MKTF-11	Dissolved and Total Barium	200			
	200.8	MKTF-10	Dissolved and Total Barium	500			
	8260B	MKTF-17R	Toluene	1,000			
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VALIDATION CRITERIA CHECKLIST							
5. Were the reported analytical methods and constituents in compliance with the QAPP, permit, or CoC?							
Comments: The reported analytical methods were in compliance with the CoC, and the laboratory reported the requested constituents in accordance with the CoC, with the following exceptions.							
The CoC requested both Method 200.7 a and precision goals	total and dissol and Method 200 and, therefore,	ved metals using Method 200.7 ).8. This substituted analytical n was an acceptable replacement	; however, the l nethod, Method 	aboratory analyzed tł 200.8, met similar se	ne samples using ensitivity, accuracy,		
The CoC requested This substituted ana replacement.	cyanide using I lytical method r	Method 335.4; however, the labo net similar sensitivity, accuracy,	oratory analyzed and precision o	d the samples using I goals and, therefore,	Method 4500 CN E. was an acceptable		
6. Were samples r	eceived in good	d condition within method-specif	ied requirement	ts?	No		
Comments: Sample temperature range o cooler temperatures broken or frozen.	es were received of 4°C ± 2°C bet below 2.0°C w	d on ice, in good condition, and tween -0.1°C and 1.0°C as note ere judged as acceptable since	with the cooler d on the CoC a the laboratory d	temperatures outside nd the <i>Sample Log-ir</i> lid not report the sam	the recommended <i>Check List</i> . The ple containers as		
Samples transferred range at 3.0°C as no	to Pace Nation oted on the CoC	nal were received in good condit C.	ion with the coc	ler temperature withi	n the recommended		
<ol> <li>Were samples e technical holdin</li> </ol>	extracted/digest g times?	ed and analyzed within method	specified or		Yes		
Comments: The sar	mples were extr	racted/digested and analyzed wi	thin method-sp	ecific holding times.			
8. Were reported ι method(s)? Sp	units appropriate ecify if wet or di	e for the sample matrix/matrices ry units were used for soil.	and analytical		Yes		
Comments: The res which were acceptal	ults were repor ble for the samp	ted in concentration units of mic ble matrix and the analyses requ	rograms per lite lested.	er (µg/L) and milligrar	ns per liter (mg/L),		
9. Did the laborato	ory provide any	specific initial and/or continuing	calibration resu	lts?	No		
Comments: Initial a	nd continuing c	alibration data were not included	as part of this	data set.			
10. If initial and/or c acceptable limit	ontinuing calibr s?	ration results were provided, we	e the results wi	thin	N/A		
Comments: Initial a	nd continuing c	alibration data were not included	as part of this	data set.			
11. Was the total nut the total numbe	umber of labora r of samples or	tory blank samples prepared eq analyzed as required by the me	ual to at least 5 thod?	% of	Yes		
Comments: The tota samples.	Comments: The total number of laboratory blank samples prepared was equal to at least 5% of the total number of samples.						
12. Were target ana	alytes reported a	as not detected in the laboratory	blanks?		No		
Comments: Target	analytes were r	eported as not detected in the la	aboratory blanks	s, with the following e	exceptions.		
	Method	Analyte	Batch	<u>Concentration</u>			
	8015D	DRO	66219	0.018 mg/L			
	8015D	DRO	66236	0.030 mg/L			
	8260B	Chloromethane	R86601	0.66 µg/L			
	8260B	Chloromethane	R86626	0.68 µg/L			
	8270 SIM	Pyrene	R86628	0.22 µg/L			



VALIDATION CRITERIA CHECKLIST						
	Method Analyte Batch Concentration					
	8015D	GRO	R86601	0.044 mg/L		
	8015D	GRO	G86626	0.034 mg/L		

Detections of the identified analytes in the associated samples that were less than the blank results and/or less than the applicable reporting limits were assigned U qualifiers. Detections of the identified analytes in the associated samples that were greater than the reporting limits but less than or equal to 10 times the blank results were assigned JB qualifiers. Non-detections of the identified analytes in the associated samples and detections that were above the reporting limit and greater than ten times the blank concentration did not require qualification.

13. Was the total number of MS samples prepared equal to at least 5% of the total Yes number of samples or analyzed as required by the method?

Comments: The total number of matrix spike samples prepared was equal to at least 5% of the total number of samples, although MS samples were not prepared/reported for all analyses and/or batch. The matrix spike sample source for each analytical batch in this sample set has been indicated below.

<u>Method</u>	Method <u>Analytes</u>		MS Sample Source
200.7	Dissolved Metals	A86535	EB 3-15-22
200.8	Total Metals	66254	EB 3-15-22, OW-1
200.8	Dissolved Metals	A86624	MKTF-11, MKTF-10
200.8	Dissolved Metals	B86600	Not Prepared
245.1	Dissolved and Total Mercury	66284	DUP-3-15-22
504.1	EDB	66256	Not Prepared
4500CN E	Cyanide	WG1835677	Not Associated, MKTF-04R
8015D	TPH DRO and MRO	66219	Not Prepared
8015D	TPH DRO and MRO	66236	Not Prepared
8015D	TPH GRO	G86626	Not Prepared
8015D	TPH GRO	R86601	Not Prepared
8260B	VOCs	R86601	Not Prepared
8260B	VOCs	R86626	Not Prepared
8270C	SVOCs	66226	Not Prepared
8270C SIM	SVOCs	R86628	Not Prepared
8270C SIM	1,4-Dioxane	R86665	Not Prepared

Not Associated – The MS sample source was not associated with this project. Not Prepared – Matrix spikes were not prepared/reported for this batch.

14. For MS/MSDs prepared from project samples, were percent recoveries and RPDs within data validation or laboratory quality control (QC) limits?

No

Comments: The MS/MSD percent recoveries and RPDs for project samples were within data validation and laboratory QC limits, with the following exception.

The MSD recovery for cyanide in Method 4500CN E batch WG1835677 (R86794) was outside the data validation QC limits of 75-125% at 74.8%. Cyanide results were qualified as J- if detected and UJ if not detected in the associated samples due to evidence of potential low bias.

The percent recoveries and RPD values for MS/MSDs prepared from non-project samples were evaluated and considered but data were not qualified based on those results since matrix similarity to project samples could not be guaranteed.



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		VALIDATION C		r	
15. Was the sample	e total numbe s or analyzed	r of LCSs analyzed equal to at lea as required by the method?	st 5% of the total nun	nber of	Yes
Comments:	The total nur	mber of LCS samples analyzed wa	as equal to at least 5%	% of the total n	umber of sample
16. Were L laborate	CS/LCSD per ory QC limits	cent recoveries and LCS/LCSD R	PDs within data valid	ation or	No
Comments: limits, with t	The LCS and he following e	d LCSD percent recoveries and LC exception.	CS/LCSD RPDs were	within data va	lidation and labo
The LCS re DRO was d	covery for D etected in th	RO in Method 8015D batch 6621 e associated samples, and thes	9 was outside the a e results were quality	cceptance lim fied as J+ due	its of 31.7-75.4 to potential high
17. Were s	urrogate reco	veries within laboratory QC limits?	,		No
Comments:	Surrogate re	coveries were within laboratory Q	C limits, with the follo	wing exception	IS.
	Method	Surrogate	Sample	<u>Surrogate</u> <u>Recovery</u>	QC Limits
	8270C	2-Fluorophenol	MKTF-17R	0.0%	29.4-87.7%
	8270C	Phenol-d₅	MKTF-17R	27.3%	28.5-64.7%
	8270C	Phenol-d₅	MKTF-11	26.9%	28.5-64.7%
	8270C	2,4,6-Tribromophenol	MKTF-11	12.6%	18.6-129%
	8270C	2-Fluorophenol	MKTF-10	0.0%	29.4-87.7%
	8270C	Phenol-d₅	MKTF-10	24.7%	28.5-64.7%
	8270C	2,4,6-Tribromophenol	MKTF-10	1.8%	18.6-129%
Since Method 8270 surrogate associations were not available from the laboratory, qualification was assigned to all of the target analytes in a given fraction (acid or base/neutral) when two or more surrogates from the same fraction (acid or base/neutral) were outside the acceptance range. This condition did not exist for the sample DUP-3-15-22, and qualification of sample data was not required. For samples MKTF-17R and MKTF-11, two or three of the three acid extractable surrogates reported recoveries above 10%. Therefore, the associated target analytes in these samples with surrogate recoveries that were less than the lower laboratory QC limits were qualified as J- if detected and UJ if not detected due to potential low bia					
For sample associated samples in were qualif	MKTF-10, tv with surroga dicating reje ied as J- for	vo of the three acid extractable s ate recoveries that were less tha cted results, data not usable du sample MKTF-10 due to potentia	surrogates were rec in 10% were qualifie e to evidence of ext al low bias.	overed below d as R if not d reme low bias	10%. The targe letected in the i . The detected
The DRO ar conformanc below routin	nd MRO resul es in the Meth ely calibrated	ts for samples MKTF-17R and Mk nod 8015D analyses since the app I levels, and those results were de	TF-18R were not qua lied dilutions of 10 tin emed unreliable and	alified based or nes resulted in possibly inaccu	n the surrogate n surrogate conce urate.
18. Were th collecte project	ne number of ed equal to at guidelines, Q	trip blank, field blank, and/or equip least 10% of the total number of s APP, SAP, or permit?	oment blank samples amples or as required	l by the	Yes
Comments: One trip bla	The number nk sample, Tr	of trip, field, and equipment blank ip Blank, one field blank sample, F	s collected was equal FB 3-15-22, and one e	to at least 10% equipment blar	% of the number nk sample, EB 3-

collected as part of this sample set.



## VALIDATION CRITERIA CHECKLIST

19. Were target analytes reported as not detected in the trip blank, field blank, and/or equipment blank samples?

No

Comments: Target analytes were not detected in the trip blank, field blank, and equipment blank samples with the following exceptions.

Blank Sample ID	Method	Analyte	<u>Concentration</u>
Trip Blank	8260B	GRO	0.035 mg/L
Trip Blank	8260B	Chloromethane	0.66 µg/L
FB 3-15-22	8260B	1,1-Dichloroethene	0.57 μg/L
FB 3-15-22	8260B	2-Butanone	7.9 μg/L
FB 3-15-22	8260B	Chloromethane	0.89 µg/L
EB 3-15-22	200.7	Dissolved Zinc	0.0063 mg/L
EB 3-15-22	200.8	Dissolved Barium	0.00082 mg/L
EB 3-15-22	8015D	DRO	0.026 mg/L
EB 3-15-22	8015D	GRO	0.037 mg/L
EB 3-15-22	8260B	2-Butanone	7.30 µg/L
EB 3-15-22	8260B	Benzene	0.23 µg/L
EB 3-15-22	8260B	Chloromethane	0.91 µg/L

Detections of the identified analytes in the associated samples that were less than the blank results and/or less than the applicable reporting limits were assigned U qualifiers. Detections of dissolved zinc in the associated samples that were greater than or equal to the reporting limits but less than 10 times the blank results were assigned JB qualifiers. Non-detections of the identified analytes in the associated samples and detections that were above the reporting limit and greater than ten times the blank concentration did not require qualification.

The chloromethane, DRO, and GRO results were previously qualified due to laboratory blank contamination; therefore, additional qualification due to the trip, field, and equipment blank contamination was not required.

20. Was the number of field duplicates collected equal to at least 10% of the total number of samples or as required by the project guidelines, QAPP, SAP, or permit?

Yes

No

Comments: The number of field duplicates collected was equal to at least 10% of the number of samples. Sample DUP-3-15-22 was collected as a field duplicate of sample OW-1.

21. Were field duplicate RPD values within data validation QC limits (soil 0-50%, water 0-30%, or air 0-25%)?

Comments: As indicated in the Field Duplicate Summary Table at the end of this report, field duplicate RPD values were within data validation QC limits of 0-30% for water samples, with the following exceptions.

RPD values could not be calculated for 1-methylnaphthalene and 2-methylnaphthalene for the field duplicate pair OW-1 and DUP-3-15-22 since the analytes were detected in the parent sample and were undetected in the duplicate sample. As the detections in the parent sample were greater than two times the reporting limits, 1- methylnaphthalene and 2-methylnaphthalene were qualified as J and UJ for the parent and duplicate samples, respectively.



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22.	For laboratory dup laboratory QC limit	licates prepared from p s?	roject samples	, were RPDs w	<i>i</i> ithin		N/A
Cor and	nments: Laboratory from a sample not	duplicates were preparation of the second states were preparation of the second states with this data states were preparation of the second states states were preparation of the sec	ared for the ana ta set.	lysis of cyanid	e in batch WG1835	677 from s	ample EB 3-15-22
The mea	RPD for the labora asurements were wi	tory duplicate prepared thin 5 times the reporti	l from a project ng limit.	sample was n	ot applicable since	the results	for one or both
The data	RPD value for the a were not qualified	laboratory duplicate sa based on this result sir	mple prepared nce matrix simil	from a non-pro arity to project	oject sample was ev samples could not	aluated ar be guaran	nd considered, but teed.
23.	Were the following	data relationships real	istic and accep	table?			
	• Target analyte EPH/8270), ar	es were reported by mo nd the results were in a	re than one me greement?	ethod (e.g., 826	60/8270,		Yes
Cor	nments: Target ana	alytes were not reported	d by more than	one method in	this data set, with t	he followi	ng exception.
The ana	target analyte 1,2-c lyte was reported as	dibromoethane (EDB) v s not detected by both	vas reported fro methods.	om analyses b <u>i</u>	y both Method 8260	B and Me	thod 504.1. This
Cor	Both total and results were g nments: The total n ortiges	dissolved metals analy reater than or equal to netals concentrations w	vses were perfo the dissolved r vere greater tha	ormed, and the netals results? an or equal to t	total metals he dissolved fraction	ns, with th	No e following
exc	Sample ID	Analyte	<u>Total</u> <u>Result</u>	<u>Dissolved</u> <u>Result</u>	Reporting Limit	<u>Units</u>	<u>RPD</u>
Ī	OW-1	Mercury	ND	0.00036	0.00020	mg/L	♦
Γ	MKTF-10	Barium	7.9	8.7	0.50	mg/L	9.6%
Γ	DUP-3-15-22	Barium	0.041	0.044	0.0010	mg/L	7.1%
Γ	EB 3-15-22	Barium	ND	0.00082	0.0010	mg/L	♦
Γ	OW-1	Barium	0.044	0.046	0.0050 / 0.0010	mg/L	4.4%
Γ	MKTF-11	Cobalt	0.0039	0.0058	0.0050 / 0.0060	mg/L	•
Γ	MKTF-17R	Cobalt	0.0023	0.0033	0.0010 / 0.0060	mg/L	•
Γ	MKTF-11	Selenium	ND	0.00046	0.0050 / 0.0010	mg/L	♦
Γ	DUP-3-15-22	Selenium	0.0022	0.0028	0.0010	mg/L	•
Γ	MKTF-18R	Zinc	0.0093	0.010	0.010	mg/L	•
Ī	DUP-3-15-22	Zinc	ND	0.0077	0.010	mg/L	♦
Ī	EB 3-15-22	Zinc	ND	0.0063	0.010	mg/L	♦
	OW-1	Zinc	ND	0.0094	0.010	mg/L	♦

VALIDATION CRITERIA CHECKLIST

----- RPD could not be calculated.

• = One or both of the detections were less than 5 times the applicable reporting limits, and qualification of data was not required.

The differences for the corresponding analytical results were within five times the applicable reporting limits and validation action was not required, or the RPDs between the results were less than 30% indicating that the data were within the measurement uncertainty for the methods, and qualification of results was not required based on the analytical inconsistencies.



Client Sample ID: OW-1 Field Duplicate Sample ID: DUP-3-15-22							
Analyte	Method	Laboratory Result	Duplicate Result	Relative Percent Difference (RPD)			
Vanadium, Dissolved	E 200.7	0.041 mg/L	0.044 mg/L	7.1% +/-RL			
Zinc, Dissolved	E 200.7	0.0094 mg/L	0.0077 mg/L	19.9% +/-RL			
Arsenic, Dissolved	E200.8	0.00052 mg/L	0.00068 mg/L	26.7% +/-RL			
Arsenic, Total	E200.8	0.00069 mg/L	0.00080 mg/L	14.8% +/-RL			
Barium, Dissolved	E200.8	0.046 mg/L	0.044 mg/L	4.4%			
Barium, Total	E200.8	0.044 mg/L	0.041 mg/L	7.1%			
Chromium, Dissolved	E200.8	0.00052 mg/L	0.00051 mg/L	1.9% +/-RL			
Chromium, Total	E200.8	0.0031 mg/L	0.0031 mg/L	0.0%			
Lead, Dissolved	E200.8	0.000077 mg/L	ND (0.00050 mg/L)	DL			
Lead, Total	E200.8	0.00019 mg/L	0.00018 mg/L	5.4% +/-RL			
Nickel, Dissolved	E200.8	0.00052 mg/L	0.00062 mg/L	17.5% +/-RL			
Nickel, Total	E200.8	0.0021 mg/L	0.0022 mg/L	4.7%			
Selenium, Dissolved	E200.8	0.0027 mg/L	0.0028 mg/L	3.6%			
Selenium, Total	E200.8	0.0027 mg/L	0.0022 mg/L	20.4%			
Vanadium, Total	E200.8	0.044 mg/L	0.045 mg/L	2.2%			
Mercury, Dissolved	E245.1	0.00036 mg/L	ND (0.00020 mg/L)	DL			
TPH DRO	SW8015	0.022 mg/L	0.026 mg/L	16.7% +/-RL			
TPH GRO	SW8015	0.041 mg/L	0.036 mg/L	13.0% +/-RL			
1,2-Dichloroethane	SW8260B	0.42 µg/L	0.41 µg/L	2.4% +/-RL			
Chloromethane	SW8260B	0.77 μg/L	0.75 µg/L	2.6% +/-RL			
MTBE	SW8260B	2.3 µg/L	2.3 µg/L	0.0%			
1,4-Dioxane	SW8270C	0.20 µg/L	ND (1.0 µg/L)	DL			
1-Methylnaphthalene	SW8270C	0.28 μg/L	ND (0.10 μg/L)	DL			
2-Methylnaphthalene	SW8270C	0.40 µg/L	ND (0.10 μg/L)	DL			
Naphthalene	SW8270C	0.14 µg/L	ND (0.10 µg/L)	DL			
Phenanthrene	SW8270C	0.080 µg/L	ND (0.10 µg/L)	DL			
Pyrene	SW8270C	0.24 µg/L	ND (0.40 µg/L)	DL			

#### FIELD DUPLICATE SUMMARY

Field duplicate RPD control limits are not to exceed 30% for water as established by USEPA Region I - New England Environmental Data Review Supplement for Region 1 Data Review Elements and Superfund Specific Guidance/Procedures, EQADR-Supplement2, September 2020.

DL – Indicates that the analyte was detected in one of the duplicate samples and was undetected in the other sample, and therefore an RPD could not be calculated. Data were not qualified since the detection was within two times the reporting limit. Non-detected results are indicated above with the applicable reporting limit as ND (RL).

+/-RL – Indicates that the detections in both of the samples were within two times the reporting limit. Qualification of data was not required.

RPD values could not be calculated for 1-methylnaphthalene and 2-methylnaphthalene since the analytes were detected in the parent sample and were undetected in the duplicate sample. As the detections in the parent sample were greater than two times the reporting limits, 1-methylnaphthalene and 2-methylnaphthalene were qualified as J and UJ for the parent and duplicate samples, respectively.



## DATA QUALIFICATION SUMMARY

Abbreviation	Reason
HR-LCS	The LCS and/or LCSD percent recovery was greater than the upper acceptable limit indicating a possible high bias.
LR-MS	The MS and/or MSD percent recovery was less than the lower acceptable limit indicating possible matrix interference.
LR-SUR	The surrogate percent recovery was less than the lower acceptable limit indicating a possible low bias.
EBD	Equipment blank detection
FBD	Field blank detection
ERPD-FD	High field duplicate RPD.
MDLRL	Flagged by the laboratory: The result was greater than the MDL but less than the RL.

Analyte	Method	Field Sample ID	Lab Sample ID	Result	Limit	Units	Reviewer Qualifier	DV Flag Reasons
1,1-Dichloroethane	SW8260B	MKTF-17R	2203825-003a	7.5	10	µg/L	J	MDLRL
1,1-Dichloroethene	SW8260B	MKTF-38	2203825-005a	0.61	1	µg/L	U	FBD, MDLRL
1,1-Dichloroethene	SW8260B	FB 3-15-22	2203825-009a	0.57	1	µg/L	J	MDLRL
1,2-Dichloroethane	SW8260B	OW-1	2203825-002a	0.42	1	µg/L	J	MDLRL
1,2-Dichloroethane	SW8260B	MKTF-17R	2203825-003a	4.2	10	µg/L	J	MDLRL
1,2-Dichloroethane	SW8260B	MKTF-38	2203825-005a	0.41	1	µg/L	J	MDLRL
1,2-Dichloroethane	SW8260B	MKTF-04R	2203825-006a	2.8	5	µg/L	J	MDLRL
1,2-Dichloroethane	SW8260B	MKTF-11	2203825-007a	4.3	10	µg/L	J	MDLRL
1,2-Dichloroethane	SW8260B	MKTF-10	2203825-008a	4.1	10	µg/L	J	MDLRL
1,2-Dichloroethane	SW8260B	DUP-3-15-22	2203825-010a	0.41	1	µg/L	J	MDLRL
1,4-Dioxane	SW8270C	OW-1	2203825-002c	0.2	1	µg/L	J	MDLRL
1-Methylnaphthalene	SW8270C	OW-1	2203825-002c	0.28	0.1	µg/L	J	ERPD-FD
1-Methylnaphthalene	SW8270C	DUP-3-15-22	2203825-010c	ND	0.1	µg/L	UJ	ERPD-FD
2,4,6-Trichlorophenol	SW8270C	MKTF-17R	2203825-003c	ND	5	µg/L	UJ	LR-SUR
2,4,6-Trichlorophenol	SW8270C	MKTF-11	2203825-007c	ND	5	µg/L	UJ	LR-SUR
2,4,6-Trichlorophenol	SW8270C	MKTF-10	2203825-008c	ND	5	µg/L	R	LR-SUR



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Analyte	Method	Field Sample ID	Lab Sample ID	Result	Limit	Units	Reviewer Qualifier	DV Flag Reasons
2,4-Dimethylphenol	SW8270C	MKTF-17R	2203825-003c	ND	5	µg/L	UJ	LR-SUR
2,4-Dimethylphenol	SW8270C	MKTF-18R	2203825-004c	2.7	5	µg/L	J	MDLRL
2,4-Dimethylphenol	SW8270C	MKTF-11	2203825-007c	4.3	5	µg/L	J-	LR-SUR, MDLRL
2,4-Dimethylphenol	SW8270C	MKTF-10	2203825-008c	16	5	µg/L	J-	LR-SUR
2,4-Dinitrophenol	SW8270C	MKTF-17R	2203825-003c	ND	5	µg/L	UJ	LR-SUR
2,4-Dinitrophenol	SW8270C	MKTF-11	2203825-007c	ND	5	µg/L	UJ	LR-SUR
2,4-Dinitrophenol	SW8270C	MKTF-10	2203825-008c	ND	5	µg/L	R	LR-SUR
2-Butanone	SW8260B	EB 3-15-22	2203825-001a	7.3	10	µg/L	U	FBD, MDLRL
2-Butanone	SW8260B	MKTF-10	2203825-008a	21	100	µg/L	U	FBD, MDLRL
2-Butanone	SW8260B	FB 3-15-22	2203825-009a	7.9	10	µg/L	J	MDLRL
2-Methylnaphthalene	SW8270C	OW-1	2203825-002c	0.4	0.1	µg/L	J	ERPD-FD
2-Methylnaphthalene	SW8270C	DUP-3-15-22	2203825-010c	ND	0.1	µg/L	UJ	ERPD-FD
2-Methylphenol	SW8270C	MKTF-17R	2203825-003c	20	5	µg/L	J-	LR-SUR
2-Methylphenol	SW8270C	MKTF-18R	2203825-004c	4.4	5	µg/L	J	MDLRL
2-Methylphenol	SW8270C	MKTF-11	2203825-007c	6.4	5	µg/L	J-	LR-SUR
2-Methylphenol	SW8270C	MKTF-10	2203825-008c	6.1	5	µg/L	J-	LR-SUR
3,4-Methylphenol	SW8270C	MKTF-17R	2203825-003c	11	5	µg/L	J-	LR-SUR
3,4-Methylphenol	SW8270C	MKTF-18R	2203825-004c	3.5	5	µg/L	J	MDLRL
3,4-Methylphenol	SW8270C	MKTF-11	2203825-007c	3.8	5	µg/L	J-	LR-SUR, MDLRL
3,4-Methylphenol	SW8270C	MKTF-10	2203825-008c	ND	5	µg/L	R	LR-SUR
Arsenic, Dissolved	E200.8	OW-1	2203825-002E	0.00052	0.001	mg/L	J	MDLRL
Arsenic, Dissolved	E200.8	DUP-3-15-22	2203825-010E	0.00068	0.001	mg/L	J	MDLRL
Arsenic, Total	E200.8	OW-1	2203825-002D	0.00069	0.001	mg/L	J	MDLRL
Arsenic, Total	E200.8	DUP-3-15-22	2203825-010D	0.0008	0.001	mg/L	J	MDLRL
Benzene	SW8260B	EB 3-15-22	2203825-001a	0.23	1	µg/L	J	MDLRL
Benzene	SW8260B	MKTF-38	2203825-005a	0.49	1	µg/L	U	EBD, MDLRL
Chloroform	SW8260B	MKTF-17R	2203825-003a	7.2	10	µg/L	J	MDLRL
Chloroform	SW8260B	MKTF-18R	2203825-004a	1.9	10	µg/L	J	MDLRL



Analyte	Method	Field Sample ID	Lab Sample ID	Result	Limit	Units	Reviewer Qualifier	DV Flag Reasons
Chloroform	SW8260B	MKTF-04R	2203825-006a	2.1	5	µg/L	J	MDLRL
Chloroform	SW8260B	MKTF-11	2203825-007a	3.5	10	µg/L	J	MDLRL
Chloroform	SW8260B	MKTF-10	2203825-008a	4	10	µg/L	J	MDLRL
Chloromethane	SW8260B	EB 3-15-22	2203825-001a	0.91	3	µg/L	U	MBD, MDLRL
Chloromethane	SW8260B	OW-1	2203825-002a	0.77	3	µg/L	U	MBD, MDLRL
Chloromethane	SW8260B	MKTF-38	2203825-005a	0.78	3	µg/L	U	MBD, MDLRL
Chloromethane	SW8260B	MKTF-04R	2203825-006a	3.9	15	µg/L	U	MBD, MDLRL
Chloromethane	SW8260B	MKTF-10	2203825-008a	27	30	µg/L	U	MBD, MDLRL
Chloromethane	SW8260B	FB 3-15-22	2203825-009a	0.89	3	µg/L	U	MBD, MDLRL
Chloromethane	SW8260B	DUP-3-15-22	2203825-010a	0.75	3	µg/L	U	MBD, MDLRL
Chloromethane	SW8260B	Trip Blank	2203825-011a	0.66	3	µg/L	U	MBD, MDLRL
Chromium, Total	E 200.7	OW-1	2203825-002D	0.0033	0.006	mg/L	J	MDLRL
Chromium, Total	E 200.7	MKTF-17R	2203825-003D	0.0041	0.006	mg/L	J	MDLRL
Chromium, Total	E 200.7	MKTF-18R	2203825-004D	0.0042	0.006	mg/L	J	MDLRL
Chromium, Total	E 200.7	MKTF-10	2203825-008D	0.0059	0.006	mg/L	J	MDLRL
Chromium, Total	E 200.7	DUP-3-15-22	2203825-010D	0.0029	0.006	mg/L	J	MDLRL
cis-1,2-Dichloroethene	SW8260B	MKTF-18R	2203825-004a	4.6	10	µg/L	J	MDLRL
cis-1,2-Dichloroethene	SW8260B	MKTF-10	2203825-008a	6.2	10	µg/L	J	MDLRL
Cobalt, Dissolved	E 200.7	MKTF-17R	2203825-003E	0.0033	0.006	mg/L	J	MDLRL
Cobalt, Dissolved	E 200.7	MKTF-18R	2203825-004E	0.0032	0.006	mg/L	J	MDLRL
Cobalt, Dissolved	E 200.7	MKTF-38	2203825-005E	0.0038	0.006	mg/L	J	MDLRL
Cobalt, Dissolved	E 200.7	MKTF-04R	2203825-006E	0.0056	0.006	mg/L	J	MDLRL
Cobalt, Dissolved	E 200.7	MKTF-11	2203825-007E	0.0058	0.006	mg/L	J	MDLRL
Cobalt, Total	E 200.7	MKTF-17R	2203825-003D	0.0037	0.006	mg/L	J	MDLRL
Cobalt, Total	E 200.7	MKTF-10	2203825-008D	0.0058	0.006	mg/L	J	MDLRL
Cyanide, Total	E335.4	EB 3-15-22	2203825-001F	ND	0.005	mg/L	UJ	LR-MS
Cyanide, Total	E335.4	OW-1	2203825-002F	ND	0.005	mg/L	UJ	LR-MS
Cyanide, Total	E335.4	MKTF-17R	2203825-003F	ND	0.005	mg/L	UJ	LR-MS



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Analyte	Method	Field Sample ID	Lab Sample ID	Result	Limit	Units	Reviewer Qualifier	DV Flag Reasons
Cyanide, Total	E335.4	MKTF-18R	2203825-004F	ND	0.005	mg/L	UJ	LR-MS
Cyanide, Total	E335.4	MKTF-38	2203825-005F	ND	0.005	mg/L	UJ	LR-MS
Cyanide, Total	E335.4	MKTF-04R	2203825-006F	0.00801	0.005	mg/L	J-	LR-MS
Cyanide, Total	E335.4	MKTF-11	2203825-007F	ND	0.005	mg/L	UJ	LR-MS
Cyanide, Total	E335.4	MKTF-10	2203825-008F	ND	0.005	mg/L	UJ	LR-MS
Cyanide, Total	E335.4	DUP-3-15-22	2203825-010F	ND	0.005	mg/L	UJ	LR-MS
lsopropylbenzene	SW8260B	MKTF-18R	2203825-004a	4.4	10	µg/L	J	MDLRL
Isopropylbenzene	SW8260B	MKTF-04R	2203825-006a	2.3	5	µg/L	J	MDLRL
Lead, Dissolved	E200.8	OW-1	2203825-002E	0.000077	0.0005	mg/L	J	MDLRL
Lead, Dissolved	E200.8	MKTF-17R	2203825-003E	0.00024	0.0005	mg/L	J	MDLRL
Lead, Dissolved	E200.8	MKTF-38	2203825-005E	0.000068	0.0005	mg/L	J	MDLRL
Lead, Total	E200.8	OW-1	2203825-002D	0.00019	0.0005	mg/L	J	MDLRL
Lead, Total	E200.8	MKTF-11	2203825-007D	0.002	0.0025	mg/L	J	MDLRL
Lead, Total	E200.8	DUP-3-15-22	2203825-010D	0.00018	0.0005	mg/L	J	MDLRL
Methylene Chloride	SW8260B	MKTF-10	2203825-008a	5.6	30	µg/L	J	MDLRL
MTBE	SW8260B	MKTF-10	2203825-008a	9.6	10	µg/L	J	MDLRL
n-Butylbenzene	SW8260B	MKTF-17R	2203825-003a	16	30	µg/L	J	MDLRL
n-Butylbenzene	SW8260B	MKTF-18R	2203825-004a	3.5	30	µg/L	J	MDLRL
n-Butylbenzene	SW8260B	MKTF-11	2203825-007a	5.3	30	µg/L	J	MDLRL
n-Butylbenzene	SW8260B	MKTF-10	2203825-008a	11	30	µg/L	J	MDLRL
Nickel, Dissolved	E 200.7	MKTF-17R	2203825-003E	0.0058	0.01	mg/L	J	MDLRL
Nickel, Dissolved	E 200.7	MKTF-18R	2203825-004E	0.0057	0.01	mg/L	J	MDLRL
Nickel, Dissolved	E 200.7	MKTF-38	2203825-005E	0.0055	0.01	mg/L	J	MDLRL
Nickel, Dissolved	E 200.7	MKTF-04R	2203825-006E	0.0083	0.01	mg/L	J	MDLRL
Nickel, Total	E 200.7	MKTF-17R	2203825-003D	0.0061	0.01	mg/L	J	MDLRL
Nickel, Total	E 200.7	MKTF-18R	2203825-004D	0.0098	0.01	mg/L	J	MDLRL
n-Propylbenzene	SW8260B	MKTF-18R	2203825-004a	6.6	10	µg/L	J	MDLRL
n-Propylbenzene	SW8260B	MKTF-04R	2203825-006a	3.1	5	µg/L	J	MDLRL



Analyte	Method	Field Sample ID	Lab Sample ID	Result	Limit	Units	Reviewer Qualifier	DV Flag Reasons
Phenanthrene	SW8270C	OW-1	2203825-002c	0.08	0.1	µg/L	J	MDLRL
Phenol	SW8270C	MKTF-17R	2203825-003c	7.5	5	µg/L	J-	LR-SUR
Phenol	SW8270C	MKTF-11	2203825-007c	30	5	µg/L	J-	LR-SUR
Phenol	SW8270C	MKTF-10	2203825-008c	22	5	µg/L	J-	LR-SUR
p-Isopropyltoluene	SW8260B	MKTF-17R	2203825-003a	5	10	µg/L	J	MDLRL
p-Isopropyltoluene	SW8260B	MKTF-18R	2203825-004a	2.2	10	µg/L	J	MDLRL
p-Isopropyltoluene	SW8260B	MKTF-04R	2203825-006a	1.3	5	µg/L	J	MDLRL
p-Isopropyltoluene	SW8260B	MKTF-10	2203825-008a	7.7	10	µg/L	J	MDLRL
Pyrene	SW8270C	OW-1	2203825-002c	0.24	0.4	µg/L	U	MBD, MDLRL
Pyrene	SW8270C	MKTF-17R	2203825-003c	0.42	0.4	µg/L	JB	MBD
Pyrene	SW8270C	MKTF-38	2203825-005c	0.16	0.4	µg/L	U	MBD, MDLRL
Pyrene	SW8270C	MKTF-04R	2203825-006c	0.22	0.4	µg/L	U	MBD, MDLRL
Pyrene	SW8270C	MKTF-11	2203825-007c	0.2	0.4	µg/L	U	MBD, MDLRL
Pyrene	SW8270C	MKTF-10	2203825-008c	0.18	0.4	µg/L	U	MBD, MDLRL
sec-Butylbenzene	SW8260B	MKTF-17R	2203825-003a	5.5	10	µg/L	J	MDLRL
sec-Butylbenzene	SW8260B	MKTF-18R	2203825-004a	1.7	10	µg/L	J	MDLRL
sec-Butylbenzene	SW8260B	MKTF-11	2203825-007a	4.4	10	µg/L	J	MDLRL
sec-Butylbenzene	SW8260B	MKTF-10	2203825-008a	5.7	10	µg/L	J	MDLRL
Selenium, Dissolved	E200.8	MKTF-11	2203825-007E	0.00046	0.001	mg/L	J	MDLRL
Selenium, Total	E200.8	MKTF-18R	2203825-004D	0.00087	0.001	mg/L	J	MDLRL
Styrene	SW8260B	MKTF-17R	2203825-003a	2.6	10	µg/L	J	MDLRL
Toluene	SW8260B	MKTF-38	2203825-005a	0.8	1	µg/L	J	MDLRL
TPH DRO	SW8015	EB 3-15-22	2203825-001C	0.026	0.064	mg/L	U	HR-LCS, MBD, MDLRL
TPH DRO	SW8015	OW-1	2203825-002C	0.022	0.064	mg/L	U	HR-LCS, MBD, MDLRL
TPH DRO	SW8015	MKTF-17R	2203825-003C	7	0.64	mg/L	J+	HR-LCS
TPH DRO	SW8015	MKTF-18R	2203825-004C	4	0.64	mg/L	J+	HR-LCS
TPH DRO	SW8015	MKTF-38	2203825-005C	0.11	0.064	mg/L	JB	HR-LCS, MBD
TPH DRO	SW8015	MKTF-04R	2203825-006C	1.5	0.064	mg/L	J+	HR-LCS



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Analyte	Method	Field Sample ID	Lab Sample ID	Result	Limit	Units	Reviewer Qualifier	DV Flag Reasons
TPH DRO	SW8015	MKTF-11	2203825-007C	0.92	0.064	mg/L	J+	HR-LCS
TPH DRO	SW8015	MKTF-10	2203825-008C	1.9	0.064	mg/L	J+	HR-LCS
TPH DRO	SW8015	DUP-3-15-22	2203825-010C	0.026	0.064	mg/L	U	MBD, MDLRL
TPH GRO	SW8015	EB 3-15-22	2203825-001a	0.037	0.05	mg/L	U	MBD, MDLRL
TPH GRO	SW8015	OW-1	2203825-002a	0.041	0.05	mg/L	U	MBD, MDLRL
TPH GRO	SW8015	MKTF-38	2203825-005a	0.047	0.05	mg/L	U	MBD, MDLRL
TPH GRO	SW8015	DUP-3-15-22	2203825-010a	0.036	0.05	mg/L	U	MBD, MDLRL
TPH GRO	SW8015	Trip Blank	2203825-011a	0.035	0.05	mg/L	U	MBD, MDLRL
TPH ORO	SW8015	MKTF-38	2203825-005C	0.066	0.08	mg/L	J	MDLRL
Trichloroethene	SW8260B	MKTF-38	2203825-005a	0.57	1	µg/L	J	MDLRL
Trichloroethene	SW8260B	MKTF-04R	2203825-006a	2.5	5	µg/L	J	MDLRL
Vanadium, Dissolved	E 200.7	OW-1	2203825-002E	0.041	0.05	mg/L	J	MDLRL
Vanadium, Dissolved	E 200.7	MKTF-38	2203825-005E	0.0041	0.05	mg/L	J	MDLRL
Vanadium, Dissolved	E 200.7	DUP-3-15-22	2203825-010E	0.044	0.05	mg/L	J	MDLRL
Vanadium, Total	E 200.7	OW-1	2203825-002D	0.043	0.05	mg/L	J	MDLRL
Vanadium, Total	E 200.7	MKTF-17R	2203825-003D	0.0056	0.05	mg/L	J	MDLRL
Vanadium, Total	E 200.7	MKTF-18R	2203825-004D	0.011	0.05	mg/L	J	MDLRL
Vanadium, Total	E 200.7	MKTF-38	2203825-005D	0.027	0.05	mg/L	J	MDLRL
Vanadium, Total	E 200.7	MKTF-04R	2203825-006D	0.024	0.05	mg/L	J	MDLRL
Vanadium, Total	E 200.7	MKTF-11	2203825-007D	0.0049	0.05	mg/L	J	MDLRL
Vanadium, Total	E 200.7	MKTF-10	2203825-008D	0.018	0.05	mg/L	J	MDLRL
Vanadium, Total	E 200.7	DUP-3-15-22	2203825-010D	0.042	0.05	mg/L	J	MDLRL
Vinyl Chloride	SW8260B	MKTF-17R	2203825-003a	4.4	10	µg/L	J	MDLRL
Vinyl Chloride	SW8260B	MKTF-10	2203825-008a	8	10	µg/L	J	MDLRL
Zinc, Dissolved	E 200.7	EB 3-15-22	2203825-001E	0.0063	0.01	mg/L	J	MDLRL
Zinc, Dissolved	E 200.7	OW-1	2203825-002E	0.0094	0.01	mg/L	U	EBD, MDLRL
Zinc, Dissolved	E 200.7	MKTF-17R	2203825-003E	0.033	0.01	mg/L	JB	EBD
Zinc, Dissolved	E 200.7	MKTF-18R	2203825-004E	0.01	0.01	mg/L	JB	EBD



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Analyte	Method	Field Sample ID	Lab Sample ID	Result	Limit	Units	Reviewer Qualifier	DV Flag Reasons
Zinc, Dissolved	E 200.7	MKTF-38	2203825-005E	0.0055	0.01	mg/L	U	EBD, MDLRL
Zinc, Dissolved	E 200.7	MKTF-04R	2203825-006E	0.012	0.01	mg/L	JB	EBD
Zinc, Dissolved	E 200.7	MKTF-11	2203825-007E	0.01	0.01	mg/L	JB	EBD
Zinc, Dissolved	E 200.7	MKTF-10	2203825-008E	0.008	0.01	mg/L	U	EBD, MDLRL
Zinc, Dissolved	E 200.7	DUP-3-15-22	2203825-010E	0.0077	0.01	mg/L	U	EBD, MDLRL
Zinc, Total	E 200.7	MKTF-18R	2203825-004D	0.0078	0.01	mg/L	J	MDLRL



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Client: Marathon Oil	Laboratory: Hall Environmental Analysis Laboratory
Project Name: Western Refining Southwest, Q1 GW Sampling	Sample Matrix: Groundwater
Project Number: 697-080-002 Task: 0006	Sample Start Date: 03/16/2022
Date Validated: 07/26/2022	Sample End Date: 03/16/2022
Parameters Included:	
<ul> <li>Volatile Organic Compounds (VOCs) by Environmental Pr Waste (SW-846) Method 8260B</li> </ul>	rotection Agency (EPA) Test Methods for Evaluating Solid
<ul> <li>1,2-Dibromoethane (EDB) by EPA Method 504.1</li> </ul>	
<ul> <li>Semivolatile Organic Compounds (SVOCs) by SW-846 M Monitoring (SIM)</li> </ul>	ethod 8270C and Method 8270C with Selected Ion
<ul> <li>Total Petroleum Hydrocarbons (TPH) Gasoline Range Org</li> </ul>	ganics (GRO) by SW-846 Method 8015D
<ul> <li>TPH Diesel Range Organics (DRO) and Motor Oil Range</li> </ul>	Organics (MRO) by SW-846 Method 8015D Modified
<ul> <li>Total and Dissolved Metals by EPA Method 200.7 and Method</li> </ul>	ethod 200.8
<ul> <li>Total and Dissolved Mercury by EPA Method 245.1</li> </ul>	
<ul> <li>Cyanide by Standard Methods for the Examination of Wat</li> </ul>	ter and Wastewater (SM) Method 4500 CN E
Laboratory Project ID: 2203920	
Data Validator: Daran O'Hollearn, Lead Project Scientist	
Reviewer: Mike Phillips, Senior Chemist	

### DATA EVALUATION CRITERIA SUMMARY

A Tier II Data Validation was performed by Trihydro Corporation's Chemical Data Evaluation Services Group on the analytical data report packages generated by Hall Environmental Analysis Laboratory of Albuquerque, New Mexico, with additional data from Pace Analytical National of Mount Juliet, Tennessee evaluating samples from the Marathon Oil site, located in Gallup, New Mexico.

Precision, accuracy, method compliance, and completeness of this data package were assessed during this data review. Precision was determined by evaluating the calculated relative percent difference (RPD) values from:

- Field duplicate pairs
- Laboratory duplicate pairs
- Matrix spike (MS) and matrix spike duplicate (MSD) pairs
- Laboratory control sample (LCS) and laboratory control sample duplicate (LCSD) pairs

Laboratory accuracy was established by reviewing the demonstrated percent recoveries (%R) of the following items to verify that data are not biased.

- MS/MSD samples
- LCS/LCSD samples
- Organic system monitoring compounds (surrogates)



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Field accuracy was established by collecting and analyzing the following samples to monitor for possible ambient or cross contamination during sampling and transportation.

- Trip blanks
- Field blanks
- Equipment blanks

Method compliance was established by reviewing sample integrity, holding times, detection limits, surrogate recoveries, laboratory blanks, initial and continuing calibrations (where applicable), and the LCS/LCSD percent recoveries against method-specific requirements.

Completeness was evaluated by determining the overall ratio of the number of samples and analyses planned versus the number of samples with valid analyses. Determination of completeness included a review of the chain-of-custody (CoC), laboratory analytical methods, and other laboratory and field documents associated with this analytical data set.

Client Sample ID	Laboratory Sample Number
EB 3-16-22	2203920-001
MKTF-40	2203920-002
MKTF-31	2203920-003
MKTF-25	2203920-004
MKTF-24	2203920-005
MKTF-02R	2203920-006
FB 3-16-22	2203920-007
DUP-3-16-22	2203920-008
Trip Blank	2203920-009

## SAMPLE NUMBERS TABLE





The laboratory data were reviewed to evaluate compliance with the methods and the quality of the reported data. Assessment of CoC completeness is included in Item 3 of the Data Validation Checklist. A check mark ( $\checkmark$ ) indicates that the referenced validation criteria were deemed acceptable, whereas a crossed circle ( $\otimes$ ) indicates validation criteria for which the data have been qualified by the data validator. An empty circle (O) indicates that the specified criterion does not apply to the reviewed data. Details are noted in the tables below.

#### Validation Criteria

- ✓ Data Completeness
- ✓ CoC Documentation (Item 3)
- ⊗ Holding Times and Preservation (Items 6 and 7)
- O Initial and Continuing Calibrations (Items 9 and 10)
- ⊗ Laboratory Blanks (Items 11 and 12)
- ⊗ MS/MSD (Items 13 and 14)
- ⊗ LCS/LCSD (Items 15 and 16)
- System Monitoring Compounds (i.e., Surrogates and Internal Standards) (Item 17)
- ⊗ Field, Equipment, and Trip Blanks (Items 18 and 19)
- ✓ Field Duplicates (Items 20 and 21)
- ✓ Laboratory Duplicates (Item 22)

### **Guidance References**

Chemical data validation was conducted in accordance with the United States Environmental Protection Agency (USEPA) Contract Laboratory Program (CLP) National Functional Guidelines for the analyses listed below, or by the appropriate method if not covered in the National Functional Guidelines.

- Data for organic analyses were evaluated according to validation criteria set forth in the USEPA CLP National Functional Guidelines for Organic Superfund Methods Data Review, document number EPA-540-R-20-005, November 2020 with additional reference to the USEPA CLP National Functional Guidelines for Organic Data Review, document number EPA 540/R-99/008, October 1999.
- Data for inorganic analyses were evaluated according to validation criteria set forth in the USEPA CLP National Functional Guidelines for Inorganic Superfund Methods Data Review, document number EPA-540-R-20-006, November 2020 with additional reference to the USEPA CLP National Functional Guidelines for Inorganic Data Review, document number EPA 540-R-04-004, October 2004.
- Review of field duplicates was conducted according to the USEPA Region I New England Environmental Data Review Supplement for Region 1 Data Review Elements and Superfund Specific Guidance/Procedures, EQADR-Supplement2, September 2020.
- Trihydro Data Validation Variance Documentation, April 2022.



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### **OVERALL DATA PACKAGE ASSESSMENT**

Based on a data validation review, the data are acceptable as delivered. Data qualified by the laboratory are discussed in Item 2 of the Validation Criteria Checklist.

The purpose of validating data and assigning qualifiers is to assist in proper data interpretation. Data that are not qualified meet the site data quality objectives. If values are assigned qualifiers other than an R (rejected, data not usable), the data may be used for site evaluation; however, consideration should be given to the reasons for qualification when interpreting sample concentrations. Data points that are assigned an R qualifier should not be used for site evaluation purposes.

If applicable, text was identified in **bold font** in the Validation Criteria Checklist to indicate that further action and/or qualification of the data were required. Data may have been qualified with J data flags by the laboratory if the result was greater than or equal to the method detection limit (MDL) but less than the reporting limit (RL). These laboratory-applied J flags were preserved, if present, and included in the Data Qualification Summary table at the end of this report. If applicable, data validation qualifiers were added for the items noted with crossed circles in the Validation Criteria section above. Please see the Data Qualification Summary table at the end of this report.

If data would be qualified with more than one flag, one qualifier was assigned based on the severity; however, all reasons for qualification were retained. Data that would be qualified with both J+ and J- flags were evaluated based on validation criteria and assigned the appropriate flag. The hierarchy of qualifiers from the most to least severe is as follows:

R > JB/U > NJ > J+/J- > J/UJ

Data qualifiers used during this validation are included in the following table.

<u>Qualifier</u>	Definition
J	Estimated concentration
J-	The result is an estimated concentration, but may be biased low
UJ	Estimated reporting limit
U	Evaluated to be undetected at the reporting limit
JB	Estimated concentration due to blank contamination
R	Rejected, data not usable

#### **Data Completeness**

The analyses were performed as requested on the CoC records. The associated samples were received by the laboratory and analyzed properly unless otherwise noted in the Criteria Checklist below. The complete data package consisted of 540 data points. The data completeness calculation does not include any submitted blank sample results. Seven data points were rejected. The data completeness measure for this data package is calculated to be 98.70% and is acceptable.



	VALIDATION CRIT	ERIA CHECKLIST					
1. Was the report free of non-conformances identified by the laboratory? No							
Comments: The laboratory noted the following analytical non-conformance related to this data set.							
Method 8270C: "S	" flagged surrogates denote low surrogate	recoveries due to matrix interferences/s	ample dilution.				
<ol> <li>Were the data free of data qualification flags and/or notes used by the laboratory?</li> <li>No If no, define.</li> </ol>							
Comments: The la	boratory used the following data qualification	on flags with this data set.					
J – Analyte detecte	d below quantitation limits						
J3 – The associate	d batch QC was outside the established qu	ality control range for precision.					
J6 – The sample m	atrix interfered with the ability to make any	accurate determination; spike value is l	ow.				
P1 – RPD value no	t applicable for sample concentrations less	than 5 times the reporting limit.					
R – RPD value out	side of range.						
S – % Recovery ou	Itside of range due to dilution or matrix inte	ference.					
* – Value exceeds	maximum contaminant level.						
3 Were sample	CoC forms and custody procedures comple	te?	Yes				
<ul><li>sealed, and custod</li><li>4. Were detection permit, or method</li></ul>	y seals were present and intact on the ship n limits in accordance with the quality assur nod, or indicated as acceptable?	ping containers. ance project plan (QAPP),	Yes				
Comments: The d	etection limits appeared to be acceptable.	The following dilutions were applied.	[]				
Method	<u>Sample(s)</u>	<u>Analyte(s)</u>	Dilution Factor				
200.8	Multiple Samples	Select Total and Dissolved Metals	5				
245.1	MKTF-24	Total Mercury	5				
8015D	MKTF-31, DUP-3-16-22	GRO	5				
8260B	MKTF-31, DUP-3-16-22	VOCs	5				
8015D		GRU	10				
8200B	MKTF-02R, MKTF-23, MKTF-24		10				
504 1	MKTE 02P	FDB	10				
8260B	MKTF-02IX MKTF-02I	Benzene	100				
02000		2012010					
5. Were the repo	rted analytical methods and constituents in	compliance with the	No				
QAPP, permit, Comments: The re	or CoC? ported analytical methods were in complian prodance with the CoC, with the following ex	nce with the CoC, and the laboratory re	ported the requeste				

The CoC requested total and dissolved metals using Method 200.7; however, the laboratory analyzed the samples using both Method 200.7 and Method 200.8. This substituted analytical method, Method 200.8, met similar sensitivity, accuracy, and precision goals and, therefore, was an acceptable replacement.

The CoC requested cyanide using Method 335.4; however, the laboratory analyzed the samples using Method 4500 CN E. This substituted analytical method met similar sensitivity, accuracy, and precision goals and, therefore, was an acceptable replacement.

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		VALIDATION CRIT		IST		
6. Were samples recei	ved in good cor	dition within method-s	pecified require	ments?	No	
Comments: Samples we recommended temperatu <i>Log-in Check List</i> . Samp outside the recommende acceptable since the labo	ere received on ure range of 4°C bles transferred bd range at 0.6°C pratory did not r	ice, in good condition, C ± 2°C at 0.2°C, 0.9°C to Pace National were C as noted on the CoC eport the sample conta	and with the co , 1.3°C, and 3.9 received in goo . The cooler te ainers as broker	oler temperatures b o°C as noted on the od condition with the mperatures below 2 n or frozen.	oth within and outside the CoC and the <i>Sample</i> cooler temperature .0°C were judged as	
7. Were samples extracted/digested and analyzed within method-specified or No technical holding times?						
Comments: The sample exceptions.	s were extracte	d/digested and analyze	ed within metho	d-specific holding tir	nes, with the following	
defined holding time of MKTF-25 by Method 45 The non-detect result f based on the holding ti 8. Were reported units	14 days by ap 00 CN E and th or sample EB 3 me exceedanc	proximately 1 day. C ne results were assign 3-16-22 was assigned e. the sample matrix/mat	yanide was de ned J qualifiers an R qualifier rices and analy	tected in samples s based on the hole to indicate that the tical	MKTF-40, MKTF-31, and ding time exceedances. e result was rejected Yes	
method(s)? Specify	if wet or dry un	its were used for soil.			100	
Comments: The results which were acceptable for	were reported in or the sample m	n concentration units o	f micrograms pe requested.	er liter (µg/L) and mi	lligrams per liter (mg/L),	
9. Did the laboratory p	rovide any spec	ific initial and/or contin	uing calibration	results?	No	
Comments: Initial and co	ontinuing calibra	ation data were not incl	uded as part of	this data set.		
10. If initial and/or contir acceptable limits?	nuing calibration	results were provided	, were the resul	ts within	N/A	
Comments: Initial and co	ontinuing calibra	ation data were not incl	uded as part of	this data set.		
11. Was the total number of s	er of laboratory samples or anal	blank samples prepare yzed as required by the	d equal to at lea e method?	ast 5% of	Yes	
Comments: The total nu samples.	mber of laborat	ory blank samples prer	pared was equa	l to at least 5% of th	e total number of	
12. Were target analyte	s reported as no	ot detected in the labor	atory blanks?		No	
Comments: Target anal	tes were report	ted as not detected in t	he laboratory b	lanks, with the follow	ving exceptions.	
	Method	<u>Analyte</u>	Batch	Concentration	]	
	8015D	DRO	66236	0.030 mg/L		
8260B Chloromethane R86626 0.68 μg/L						
	8260B	Chloromethane	R86666	0.66 µg/L		
	8015D	GRO	G86626	0.034 µg/L		
Detections of DRO, chl and/or less than the ap samples that were grea assigned JB qualifiers.	oromethane, a plicable report iter than the re Non-detection	nd GRO in the associ ing limits were assign porting limits but less s of the identified analy	ated samples in ned U qualifier s than or equal ytes in the associon	that were less than s. Detections of D I to 10 times the blaction of the blact	the blank results RO in the associated ank results were detections that were	



## VALIDATION CRITERIA CHECKLIST

13. Was the total number of MS samples prepared equal to at least 5% of the total number of samples or analyzed as required by the method?

Yes

Comments: The total number of matrix spike samples prepared was equal to at least 5% of the total number of samples, although MS samples were not prepared/reported for all analyses and/or batches. The matrix spike sample source for each analytical batch in this sample set has been indicated below.

<u>Method</u>	<u>Analytes</u>	<u>Batch</u>	MS Sample Source
200.7	Total Metals	66642	Not Prepared
200.7	Total Metals	66643	Not Prepared
200.7	Dissolved Metals	A86535	Not Prepared
200.8	Total Metals	66254	Not Prepared
200.8	Dissolved Metals	B86624	Not Prepared
245.1	Total and Dissolved Mercury	66370	MKTF-24
504.1	EDB	66256	Not Prepared
4500CN E	Cyanide	WG1838528	Not Associated
4500CN E	Cyanide	WG1837590	Not Associated
4500CN E	Cyanide	WG1836404	Not Associated, MKTF-02R
8015D	TPH DRO and MRO	66236	Not Prepared
8015D	TPH GRO	G86626	MKTF-31
8260B	VOCs	R86626	MKTF-40
8260B	VOCs	R86666	Not Prepared
8270C	SVOCs	66244	Not Prepared
8270C SIM	SVOCs	R86665	Not Prepared
8270C SIM	1,4-Dioxane	R86694	Not Prepared

Not Associated – The MS sample source was not associated with this project. Not Prepared – Matrix spikes were not prepared/reported for this batch.

14. For MS/MSDs prepared from project samples, were percent recoveries and RPDs within data validation or laboratory quality control (QC) limits?

No

Comments: The MS/MSD percent recoveries and RPDs for project samples were within data validation and laboratory QC limits, with the following exceptions.

<u>Method</u>	Analyte	<u>Batch</u>	MS/MSD RPD	<u>RPD QC</u> Limits
4500 CN E	Cyanide	WG1836404	23%	20%
8015D	TPH GRO	G86626	26.9%	20%

The identified analytes with MS/MSD RPD values that were above the QC limit were qualified as J for detections and UJ for non-detections for the associated samples due to evidence of poor precision.

The percent recoveries and RPD values for MS/MSDs prepared from non-project samples were evaluated and considered, but data were not qualified based on those results since matrix similarity to project samples could not be guaranteed.

15. Was the total number of LCSs analyzed equal to at least 5% of the total number of samples or analyzed as required by the method?

Yes

Comments: The total number of LCS samples analyzed was equal to at least 5% of the total number of samples.



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		VALIDATION CF	RITERIA CH	IECKL	IST			
16. Were LCS/LCSD percent recoveries and LCS/LCSD RPDs within data validation or No laboratory QC limits?								
Comments: The LCS and LCSD percent recoveries and LCS/LCSD RPDs were within data validation and laboratory QC limits, with the following exceptions.								
	Method	Method         Analyte         Batch         LCS         LCS/LCSD           QC Limits		<u>D</u> 8				
	200.7	Total Nickel	66642	67	7.7%	70-130%	,	
1	200.7	Total Nickel	66643	69	9.0%	70-130%	,	
Detections of t nickel was not	otal nickel in th detected in the	e associated samples we associated sample EB 3-	re assigned 16-22 and t	d J- qu he res	ualifiers d sult was a	ue to pote ssigned a	ntial low b UJ qualif	bias. Total ier.
17. Were surro	gate recoveries	within laboratory QC limits?	1				Ν	0
Comments: Su	rrogate recoverie	es were within laboratory Q	C limits, with	n the fo	ollowing ex	ceptions.		
	<u>Method</u>	<u>Surrogate</u>	<u>Sample</u>		<u>Surroga</u> <u>Recove</u>	<u>te</u> ry <u>QC</u>	Limits	
	8270C	2-Fluorophenol	MKTF-0	2R	6.13%	29.4	-87.7%	
	8270C	Phenol-d₅	MKTF-0	2R	19.0%	28.5	64.7%	
	8270C	2,4,6-Tribromophenol	MKTF-0	2R	2.36%	18.0	5-129%	
Since Method 8270C surrogate associations were not available from the laboratory, qualification was assigned to all of the target analytes in a given fraction (acid or base/neutral) when two or more surrogates from the same fraction (acid or base/neutral) when two or more surrogates from the same fraction (acid or base/neutral) when two or more surrogates from the same fraction (acid or base/neutral) were outside the acceptance range. Since 2 of the 3 acid fraction surrogates were recovered below 10% in sample MKTF-02R, acid fraction analytes were assigned R qualifiers indicating rejected results.								
18. Were the number of trip blank, field blank, and/or equipment blank samples       Yes         collected equal to at least 10% of the total number of samples or as required by the project guidelines, QAPP, SAP, or permit?       Yes								
Comments: Th One trip blank s collected as par	Comments: The number of trip, field, and equipment blanks collected was equal to at least 10% of the number of samples. One trip blank sample, Trip Blank, one field blank sample, FB 3-16-22, and one equipment blank sample, EB 3-16-22, were collected as part of this sample set.							



## VALIDATION CRITERIA CHECKLIST

19. Were target analytes reported as not detected in the trip blank, field blank, and/or equipment blank samples?

No

Comments: Target analytes were not detected in the trip blank, field blank, and equipment blank samples with the following exceptions.

Blank Sample ID	Method	<u>Analyte</u>	Concentration
Trip Blank	8260B	1,1-Dichloroethene	0.68 µg/L
Trip Blank	8260B	Chloromethane	0.69 µg/L
FB-3-16-22	8260B	1,1-Dichloroethene	0.57 μg/L
FB-3-16-22	8260B	2-Butanone	5.7 μg/L
FB-3-16-22	8260B	Chloromethane	0.84 µg/L
EB 3-16-22	200.7	Dissolved Zinc	0.0067 mg/L
EB 3-16-22	8015D	GRO	0.036 mg/L
EB 3-16-22	8260B	2-Butanone	8.5 µg/L
EB 3-16-22	8260B	Chloromethane	1.1 µg/L

Detections of 1,1-dichloroethene, 2-butanone, and dissolved zinc in the associated samples that were less than the blank results and/or less than the applicable reporting limits were assigned U qualifiers. Detections of dissolved zinc in the associated samples that were greater than the reporting limits but less than 10 times the blank results were assigned JB qualifiers. Non-detections of the identified analytes in the associated samples and detections that were above the reporting limit and greater than ten times the blank concentration did not require qualification.

The chloromethane (batches R86626 and R86666) and GRO (batch G86626) results were previously qualified due to laboratory blank contamination; therefore, additional qualification due to the trip, field, and equipment blank contamination was not required.

20. Was the number of field duplicates collected equal to at least 10% of the total number of samples or as required by the project guidelines, QAPP, SAP, or permit?

Yes

Yes

Yes

Comments: The number of field duplicates collected was equal to at least 10% of the number of samples. Sample DUP-3-16-22 was collected as a field duplicate of sample MKTF-31.

21. Were field duplicate RPD values within data validation QC limits (soil 0-50%, water 0-30%, or air 0-25%)?

Comments: As indicated in the Field Duplicate Summary Table at the end of this report, field duplicate RPD values were within data validation QC limits of 0-30% for water samples.

22. For laboratory duplicates prepared from project samples, were RPDs within laboratory QC limits?

Comments: Laboratory duplicates were prepared for these analyses, and the laboratory duplicate sample sources are summarized in the following table.

<u>Method</u>	<u>Analytes</u>	<u>Batch</u>	Laboratory Duplicate Sample Source
4500CN E	Cyanide	WG1836404	Not Associated, MKTF-24
4500CN E	Cyanide	WG1837590	MKTF-25. Not Associated
4500CN E	Cyanide	WG1838528	MKTF-31, Not Associated

Not Associated - The laboratory duplicate sample source was not associated with this project.

The RPDs for laboratory duplicates prepared from project samples were within laboratory acceptance limits or were not applicable since the result for one or both measurements were within 5 times the reporting limit.

The RPD values for the laboratory duplicate samples prepared from non-project samples were evaluated and considered, but data were not qualified based on these results since matrix similarity to project samples could not be guaranteed.



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VALIDATION CRITERIA CHECKLIST							
23. Were the following data relationships realistic?							
<ul> <li>Target analytes were reported by more than one method (e.g., 8260/8270, EPH/8270)?</li> </ul>	N/A						
Comments: Target analytes were not reported by more than one method in this data set.							
<ul> <li>Both total and dissolved metals analyses were performed, and the total metals results were greater than or equal to the dissolved metals results?</li> </ul>	No						

Comments: The following table contains the exceptions in which the dissolved metals results exceeded the total metals results. The EPA has not provided guidance or requirements for the evaluation, validation, and qualification of dissolved metals results that exceed the corresponding total metals results. Therefore, qualification of results was not performed based on these data.

Sample ID	Analyte	<u>Total Result</u> (mg/L)	<u>Dissolved</u> <u>Result (mg/L)</u>
MKTF-24	Arsenic	0.0030	0.0031
MKTF-24	Barium	0.76	0.81
MKTF-40	Cobalt	0.0039	0.0051
MKTF-40	Nickel	0.0094	0.010
MKTF-24	Nickel	0.031	0.033
MKTF-02R	Nickel	0.013	0.014
MKTF-40	Silver	ND	0.0016
MKTF-02R	Silver	ND	0.0016
EB 3-16-22	Zinc	ND	0.0067
MKTF-40	Zinc	0.0079	0.010
MKTF-24	Zinc	0.0076	0.0088
MKTF-02R	Zinc	0.011	0.013



Client Sample ID: MKTF-31								
Analyte	Method	Laboratory Result	Duplicate Result	Relative Percent Difference (RPD)				
Barium, Dissolved	E 200.7	0.12 mg/L	0.12 mg/L	0.0%				
Barium, Total	E 200.7	0.30 mg/L	0.34 mg/L	12.5%				
Chromium, Total	E 200.7	0.010 mg/L	0.0091 mg/L	9.4% +/-RL				
Cobalt, Total	E 200.7	0.0085 mg/L	0.0075 mg/L	12.5% +/-RL				
Nickel, Dissolved	E 200.7	0.0066 mg/L	0.0051 mg/L	25.6% +/-RL				
Nickel, Total	E 200.7	0.012 mg/L	0.012 mg/L	0.0% +/-RL				
Vanadium, Dissolved	E 200.7	0.0024 mg/L	0.0022 mg/L	8.7% +/-RL				
Vanadium, Total	E 200.7	0.025 mg/L	0.026 mg/L	3.9% +/-RL				
Zinc, Dissolved	E 200.7	0.0082 mg/L	0.0096 mg/L	15.7% +/-RL				
Zinc, Total	E 200.7	0.020 mg/L	0.022 mg/L	9.5%				
Arsenic, Dissolved	E200.8	0.00059 mg/L	0.00049 mg/L	18.5% +/-RL				
Arsenic, Total	E200.8	0.0021 mg/L	0.0023 mg/L	9.1%				
Lead, Dissolved	E200.8	0.00012 mg/L	0.00015 mg/L	22.2% +/-RL				
Lead, Total	E200.8	0.0084 mg/L	0.0095 mg/L	12.3%				
Selenium, Total	E200.8	0.0018 mg/L	0.0019 mg/L	5.4% +/-RL				
Mercury, Total	E245.1	0.00013 mg/L	ND (0.00020 mg/L)	DL				
Cyanide, Total	E335.4	0.00964 mg/L	ND (0.00500 mg/L)	DL				
TPH DRO	SW8015	0.29 mg/L	0.27 mg/L	7.1%				
TPH GRO	SW8015	0.55 mg/L	0.55 mg/L	0.0%				
1,1,1-Trichloroethane	SW8260B	2.3 µg/L	2.3 µg/L	0.0% +/-RL				
1,1-Dichloroethane	SW8260B	27 µg/L	30 µg/L	10.5%				
1,1-Dichloroethene	SW8260B	34 µg/L	41 µg/L	18.7%				
1,2-Dichloroethane	SW8260B	12 µg/L	12 µg/L	0.0%				
Benzene	SW8260B	ND (5.0 µg/L)	1.2 µg/L	DL				
Chloromethane	SW8260B	3.5 µg/L	3.4 µg/L	2.9% +/-RL				
cis-1,2-Dichloroethene	SW8260B	3.2 µg/L	3.1 μg/L	3.2% +/-RL				
МТВЕ	SW8260B	350 μg/L	340 µg/L	2.9%				
Trichloroethene	SW8260B	5.2 μg/L	5.1 µg/L	1.9% +/-RL				
1,4-Dioxane	SW8270C	81 µg/L	63 µg/L	25.0%				

#### FIELD DUPLICATE SUMMARY

Field duplicate RPD control limits are not to exceed 30% for water as established by USEPA Region I - New England Environmental Data Review Supplement for Region 1 Data Review Elements and Superfund Specific Guidance/Procedures, EQADR-Supplement2, September 2020.

DL – Indicates that the analyte was detected in one of the duplicate samples and was undetected in the other sample, and therefore an RPD could not be calculated. Data were not qualified since the detection was within two times the reporting limit. Non-detected results are indicated above with the applicable reporting limit as ND (RL).

+/-RL – Indicates that the detections in both of the samples were within two times the reporting limit. Qualification of data was not required.



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Abbreviation	Reason
HT-AN	Sample was analyzed outside of the method holding time.
ERPD-MS	The MS/MSD RPD exceeded the upper acceptable limit indicating poor precision.
LR-LCS	The LCS and/or LCSD percent recovery was less than the lower acceptable limit indicating a possible low bias.
LR-SUR	The surrogate percent recovery was less than the lower acceptable limit indicating a possible low bias.
MBD	Method blank detection
EBD	Equipment blank detection
FBD	Field blank detection
TBD	Trip blank detection
MDLRL	Flagged by the laboratory: The result was greater than the MDL but less than the RL.

## DATA QUALIFICATION SUMMARY

Analyte	Method	Field Sample ID	Lab Sample ID	Result	Limit	Units	Reviewer Qualifier	DV Flag Reasons
1,1,1-Trichloroethane	SW8260B	MKTF-31	2203920-003a	2.3	5.0	µg/L	J	MDLRL
1,1,1-Trichloroethane	SW8260B	DUP-3-16-22	2203920-008a	2.3	5.0	µg/L	J	MDLRL
1,1-Dichloroethane	SW8260B	MKTF-40	2203920-002a	0.85	1.0	µg/L	J	MDLRL
1,1-Dichloroethene	SW8260B	Trip Blank	2203920-009a	0.68	1.0	µg/L	J	MDLRL
1,1-Dichloroethene	SW8260B	MKTF-25	2203920-004a	9.2	10	µg/L	U	MDLRL, TBD
1,1-Dichloroethene	SW8260B	MKTF-24	2203920-005a	6.1	10	µg/L	U	MDLRL, TBD
1,1-Dichloroethene	SW8260B	FB 3-16-22	2203920-007a	0.57	1.0	µg/L	U	MDLRL, TBD
1,2-Dichloroethane	SW8260B	MKTF-40	2203920-002a	0.45	1.0	µg/L	J	MDLRL
1,2-Dichloroethane	SW8260B	MKTF-24	2203920-005a	5.9	10	µg/L	J	MDLRL
2,4,6-Trichlorophenol	SW8270C	MKTF-02R	2203920-006c	ND	50	µg/L	R	LR-SUR
2,4-Dimethylphenol	SW8270C	MKTF-02R	2203920-006c	ND	50	µg/L	R	LR-SUR
2,4-Dinitrophenol	SW8270C	MKTF-02R	2203920-006c	ND	5.0	µg/L	R	LR-SUR
2-Butanone	SW8260B	EB 3-16-22	2203920-001a	8.5	10	µg/L	U	FBD, MDLRL



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Analyte	Method	Field Sample ID	Lab Sample ID	Result	Limit	Units	Reviewer Qualifier	DV Flag Reasons
2-Butanone	SW8260B	FB 3-16-22	2203920-007a	5.7	10	µg/L	J	MDLRL
2-Methylphenol	SW8270C	MKTF-02R	2203920-006c	ND	5.0	µg/L	R	LR-SUR
3,4-Methylphenol	SW8270C	MKTF-02R	2203920-006c	ND	5.0	µg/L	R	LR-SUR
Arsenic, Dissolved	E200.8	MKTF-31	2203920-003E	0.00059	0.0010	mg/L	J	MDLRL
Arsenic, Dissolved	E200.8	MKTF-25	2203920-004E	0.00079	0.0010	mg/L	J	MDLRL
Arsenic, Dissolved	E200.8	MKTF-02R	2203920-006E	0.0018	0.0050	mg/L	J	MDLRL
Arsenic, Dissolved	E200.8	DUP-3-16-22	2203920-008E	0.00049	0.0010	mg/L	J	MDLRL
Arsenic, Total	E200.8	MKTF-40	2203920-002D	0.0013	0.0050	mg/L	J	MDLRL
Arsenic, Total	E200.8	MKTF-25	2203920-004D	0.0031	0.0050	mg/L	J	MDLRL
Arsenic, Total	E200.8	MKTF-24	2203920-005D	0.0030	0.0050	mg/L	J	MDLRL
Arsenic, Total	E200.8	MKTF-02R	2203920-006D	0.0021	0.0050	mg/L	J	MDLRL
Benzene	SW8260B	DUP-3-16-22	2203920-008a	1.2	5.0	µg/L	J	MDLRL
Chloromethane	SW8260B	EB 3-16-22	2203920-001a	1.1	3.0	µg/L	U	MBD, MDLRL
Chloromethane	SW8260B	MKTF-40	2203920-002a	0.75	3.0	µg/L	U	MBD, MDLRL
Chloromethane	SW8260B	MKTF-31	2203920-003a	3.5	15	µg/L	U	MBD, MDLRL
Chloromethane	SW8260B	MKTF-25	2203920-004a	9.9	30	µg/L	U	MBD, MDLRL
Chloromethane	SW8260B	MKTF-02R	2203920-006a	1.9	3.0	µg/L	U	MBD, MDLRL
Chloromethane	SW8260B	FB 3-16-22	2203920-007a	0.84	3.0	µg/L	U	MBD, MDLRL
Chloromethane	SW8260B	DUP-3-16-22	2203920-008a	3.4	15	µg/L	U	MBD, MDLRL
Chloromethane	SW8260B	Trip Blank	2203920-009a	0.69	3.0	µg/L	U	MBD, MDLRL
Chromium, Total	E 200.7	MKTF-25	2203920-004D	0.0037	0.0060	mg/L	J	MDLRL
cis-1,2-Dichloroethene	SW8260B	MKTF-31	2203920-003a	3.2	5.0	µg/L	J	MDLRL
cis-1,2-Dichloroethene	SW8260B	MKTF-25	2203920-004a	8.0	10	µg/L	J	MDLRL
cis-1,2-Dichloroethene	SW8260B	DUP-3-16-22	2203920-008a	3.1	5.0	µg/L	J	MDLRL
Cobalt, Dissolved	E 200.7	MKTF-40	2203920-002E	0.0051	0.0060	mg/L	J	MDLRL
Cobalt, Dissolved	E 200.7	MKTF-25	2203920-004E	0.0058	0.0060	mg/L	J	MDLRL
Cobalt, Dissolved	E 200.7	MKTF-02R	2203920-006E	0.0041	0.0060	mg/L	J	MDLRL



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Analyte	Method	Field Sample ID	Lab Sample ID	Result	Limit	Units	Reviewer Qualifier	DV Flag Reasons
Cobalt, Total	E 200.7	MKTF-40	2203920-002D	0.0039	0.0060	mg/L	J	MDLRL
Cobalt, Total	E 200.7	MKTF-02R	2203920-006D	0.0060	0.0060	mg/L	J	MDLRL
Cyanide, Total	E335.4	MKTF-40	2203920-002F	0.00839	0.0050	mg/L	J	HT-AN
Cyanide, Total	E335.4	MKTF-31	2203920-003F	0.00964	0.0050	mg/L	J	HT-AN
Cyanide, Total	E335.4	MKTF-25	2203920-004F	0.00896	0.0050	mg/L	J	HT-AN
Cyanide, Total	E335.4	EB 3-16-22	2203920-001F	ND	0.0050	mg/L	R	HT-AN
Cyanide, Total	E335.4	MKTF-02R	2203920-006F	0.0129	0.0050	mg/L	J	ERPD-MS
Cyanide, Total	E335.4	MKTF-24	2203920-005F	ND	0.0050	mg/L	UJ	ERPD-MS
Cyanide, Total	E335.4	DUP-3-16-22	2203920-008F	ND	0.0050	mg/L	UJ	ERPD-MS
Lead, Dissolved	E200.8	MKTF-31	2203920-003E	0.00012	0.00050	mg/L	J	MDLRL
Lead, Dissolved	E200.8	MKTF-25	2203920-004E	0.00023	0.00050	mg/L	J	MDLRL
Lead, Dissolved	E200.8	DUP-3-16-22	2203920-008E	0.00015	0.00050	mg/L	J	MDLRL
Lead, Total	E200.8	MKTF-40	2203920-002D	0.0024	0.0025	mg/L	J	MDLRL
Lead, Total	E200.8	MKTF-02R	2203920-006D	0.0012	0.0025	mg/L	J	MDLRL
Mercury, Total	E245.1	MKTF-40	2203920-002D	0.000099	0.00020	mg/L	J	MDLRL
Mercury, Total	E245.1	MKTF-31	2203920-003D	0.00013	0.00020	mg/L	J	MDLRL
Methylene Chloride	SW8260B	MKTF-02R	2203920-006a	1.1	3.0	µg/L	J	MDLRL
n-Butylbenzene	SW8260B	MKTF-24	2203920-005a	7.7	30	µg/L	J	MDLRL
Nickel, Dissolved	E 200.7	MKTF-31	2203920-003E	0.0066	0.010	mg/L	J	MDLRL
Nickel, Dissolved	E 200.7	DUP-3-16-22	2203920-008E	0.0051	0.010	mg/L	J	MDLRL
Nickel, Total	E 200.7	MKTF-31	2203920-003D	0.012	0.010	mg/L	J-	LR-LCS
Nickel, Total	E 200.7	MKTF-25	2203920-004D	0.029	0.010	mg/L	J-	LR-LCS
Nickel, Total	E 200.7	MKTF-24	2203920-005D	0.031	0.010	mg/L	J-	LR-LCS
Nickel, Total	E 200.7	MKTF-02R	2203920-006D	0.013	0.010	mg/L	J-	LR-LCS
Nickel, Total	E 200.7	DUP-3-16-22	2203920-008D	0.012	0.010	mg/L	J-	LR-LCS
Nickel, Total	E 200.7	EB 3-16-22	2203920-001D	ND	0.010	mg/L	UJ	LR-LCS
Nickel, Total	E 200.7	MKTF-40	2203920-002D	0.0094	0.010	mg/L	J-	LR-LCS, MDLRL



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Analyte	Method	Field Sample ID	Lab Sample ID	Result	Limit	Units	Reviewer Qualifier	DV Flag Reasons
Phenol	SW8270C	MKTF-02R	2203920-006c	ND	5.0	µg/L	R	LR-SUR
Phenol	SW8270C	MKTF-25	2203920-004c	4.1	5.0	µg/L	J	MDLRL
sec-Butylbenzene	SW8260B	MKTF-24	2203920-005a	4.6	10	µg/L	J	MDLRL
Selenium, Dissolved	E200.8	MKTF-25	2203920-004E	0.00041	0.0010	mg/L	J	MDLRL
Selenium, Dissolved	E200.8	MKTF-24	2203920-005E	0.00039	0.0010	mg/L	J	MDLRL
Selenium, Total	E200.8	MKTF-25	2203920-004D	0.0023	0.0050	mg/L	J	MDLRL
Selenium, Total	E200.8	MKTF-24	2203920-005D	0.0019	0.0050	mg/L	J	MDLRL
Silver, Dissolved	E 200.7	MKTF-40	2203920-002E	0.0016	0.0050	mg/L	J	MDLRL
Silver, Dissolved	E 200.7	MKTF-02R	2203920-006E	0.0016	0.0050	mg/L	J	MDLRL
Tetrachloroethene	SW8260B	MKTF-02R	2203920-006a	0.36	1.0	µg/L	J	MDLRL
TPH DRO	SW8015	MKTF-31	2203920-003C	0.29	0.064	mg/L	JB	MBD
TPH DRO	SW8015	MKTF-02R	2203920-006C	0.24	0.064	mg/L	JB	MBD
TPH DRO	SW8015	DUP-3-16-22	2203920-008C	0.27	0.064	mg/L	JB	MBD
TPH DRO	SW8015	MKTF-40	2203920-002C	0.058	0.064	mg/L	U	MBD, MDLRL
TPH GRO	SW8015	MKTF-31	2203920-003a	0.55	0.25	mg/L	J	ERPD-MS
TPH GRO	SW8015	MKTF-25	2203920-004a	0.97	0.50	mg/L	J	ERPD-MS
TPH GRO	SW8015	MKTF-24	2203920-005a	12	0.50	mg/L	J	ERPD-MS
TPH GRO	SW8015	MKTF-02R	2203920-006a	0.63	0.050	mg/L	J	ERPD-MS
TPH GRO	SW8015	DUP-3-16-22	2203920-008a	0.55	0.25	mg/L	J	ERPD-MS
TPH GRO	SW8015	EB 3-16-22	2203920-001a	0.036	0.050	mg/L	U	ERPD-MS, MBD, MDLRL
TPH GRO	SW8015	MKTF-40	2203920-002a	0.038	0.050	mg/L	U	ERPD-MS, MBD, MDLRL
Trichloroethene	SW8260B	MKTF-25	2203920-004a	5.7	10	µg/L	J	MDLRL
Trichloroethene	SW8260B	MKTF-24	2203920-005a	3.2	10	µg/L	J	MDLRL
Vanadium, Dissolved	E 200.7	MKTF-40	2203920-002E	0.0084	0.050	mg/L	J	MDLRL
Vanadium, Dissolved	E 200.7	MKTF-31	2203920-003E	0.0024	0.050	mg/L	J	MDLRL
Vanadium, Dissolved	E 200.7	MKTF-02R	2203920-006E	0.0032	0.050	mg/L	J	MDLRL



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Analyte	Method	Field Sample ID	Lab Sample ID	Result	Limit	Units	Reviewer Qualifier	DV Flag Reasons
Vanadium, Dissolved	E 200.7	DUP-3-16-22	2203920-008E	0.0022	0.050	mg/L	J	MDLRL
Vanadium, Total	E 200.7	MKTF-40	2203920-002D	0.016	0.050	mg/L	J	MDLRL
Vanadium, Total	E 200.7	MKTF-31	2203920-003D	0.025	0.050	mg/L	J	MDLRL
Vanadium, Total	E 200.7	MKTF-25	2203920-004D	0.016	0.050	mg/L	J	MDLRL
Vanadium, Total	E 200.7	MKTF-24	2203920-005D	0.0067	0.050	mg/L	J	MDLRL
Vanadium, Total	E 200.7	MKTF-02R	2203920-006D	0.0075	0.050	mg/L	J	MDLRL
Vanadium, Total	E 200.7	DUP-3-16-22	2203920-008D	0.026	0.050	mg/L	J	MDLRL
Vinyl Chloride	SW8260B	MKTF-25	2203920-004a	7.1	10	µg/L	J	MDLRL
Vinyl Chloride	SW8260B	MKTF-02R	2203920-006a	0.75	1.0	µg/L	J	MDLRL
Zinc, Dissolved	E 200.7	MKTF-40	2203920-002E	0.010	0.010	mg/L	JB	EBD
Zinc, Dissolved	E 200.7	MKTF-02R	2203920-006E	0.013	0.010	mg/L	JB	EBD
Zinc, Dissolved	E 200.7	MKTF-31	2203920-003E	0.0082	0.010	mg/L	U	EBD, MDLRL
Zinc, Dissolved	E 200.7	MKTF-25	2203920-004E	0.0054	0.010	mg/L	U	EBD, MDLRL
Zinc, Dissolved	E 200.7	MKTF-24	2203920-005E	0.0088	0.010	mg/L	U	EBD, MDLRL
Zinc, Dissolved	E 200.7	DUP-3-16-22	2203920-008E	0.0096	0.010	mg/L	U	EBD, MDLRL
Zinc, Dissolved	E 200.7	EB 3-16-22	2203920-001E	0.0067	0.010	mg/L	J	MDLRL
Zinc, Total	E 200.7	MKTF-40	2203920-002D	0.0079	0.010	mg/L	J	MDLRL
Zinc, Total	E 200.7	MKTF-24	2203920-005D	0.0076	0.010	mg/L	J	MDLRL



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Client: Marathon Oil	Laboratory: Hall Environmental Analysis Laboratory		
Project Name: Western Refining Southwest, Q1 GW Sampling	Sample Matrix: Groundwater		
Project Number: 697-080-002 Task: 0006	Sample Start Date: 03/17/2022		
Date Validated: 06/28/2022	Sample End Date: 03/17/2022		
Parameters Included:			
<ul> <li>Volatile Organic Compounds (VOCs) by Environmental P Waste (SW-846) Method 8260B</li> </ul>	rotection Agency (EPA) Test Methods for Evaluating Solid		
<ul> <li>1,2-Dibromoethane (EDB) by EPA Method 504.1</li> </ul>			
<ul> <li>Semivolatile Organic Compounds (SVOCs) by SW-846 Method 8270C and Method 8270C with Selected Ion Monitoring (SIM)</li> </ul>			
<ul> <li>Total Petroleum Hydrocarbons (TPH) Gasoline Range Or</li> </ul>	ganics (GRO) by SW-846 Method 8015D		
<ul> <li>TPH Diesel Range Organics (DRO) and Motor Oil Range</li> </ul>	Organics (MRO) by SW-846 Method 8015D Modified		
<ul> <li>Total and Dissolved Metals by EPA Method 200.7 and Method 200.8</li> </ul>			
<ul> <li>Total and Dissolved Mercury by EPA Method 245.1</li> </ul>			
<ul> <li>Cyanide by Standard Methods for the Examination of Water</li> </ul>	ter and Wastewater (SM) Method 4500 CN E		
Laboratory Project ID: 2203989			
Data Validator: Daran O'Hollearn, Lead Project Scientist			
Reviewer: Mike Phillips, Senior Chemist			

### DATA EVALUATION CRITERIA SUMMARY

A Tier II Data Validation was performed by Trihydro Corporation's Chemical Data Evaluation Services Group on the analytical data report packages generated by Hall Environmental Analysis Laboratory of Albuquerque, New Mexico, with additional data from Pace Analytical National of Mount Juliet, Tennessee evaluating samples from the Marathon Oil site, located in Gallup, New Mexico.

Precision, accuracy, method compliance, and completeness of this data package were assessed during this data review. Precision was determined by evaluating the calculated relative percent difference (RPD) values from:

- Field duplicate pairs
- Laboratory duplicate pairs
- Matrix spike (MS) and matrix spike duplicate (MSD) pairs
- Laboratory control sample (LCS) and laboratory control sample duplicate (LCSD) pairs

Laboratory accuracy was established by reviewing the demonstrated percent recoveries (%R) of the following items to verify that data are not biased.

- MS/MSD samples
- LCS/LCSD samples
- Organic system monitoring compounds (surrogates)



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Field accuracy was established by collecting and analyzing the following samples to monitor for possible ambient or cross contamination during sampling and transportation.

- Trip blanks
- Field blanks
- Equipment blanks

Method compliance was established by reviewing sample integrity, holding times, detection limits, surrogate recoveries, laboratory blanks, initial and continuing calibrations (where applicable), and the LCS/LCSD percent recoveries against method-specific requirements.

Completeness was evaluated by determining the overall ratio of the number of samples and analyses planned versus the number of samples with valid analyses. Determination of completeness included a review of the chain-of-custody (CoC), laboratory analytical methods, and other laboratory and field documents associated with this analytical data set.

Client Sample ID	Laboratory Sample Number
EB 3-17-22	2203989-001
MKTF-01R	2203989-002
MKTF-27	2203989-003
MKTF-28	2203989-004
MKTF-29	2203989-005
MKTF-30	2203989-006
FB 3-17-22	2203989-007
DUP-3-17-22	2203989-008
Trip Blank	2203989-009

### SAMPLE NUMBERS TABLE





The laboratory data were reviewed to evaluate compliance with the methods and the quality of the reported data. Assessment of CoC completeness is included in Item 3 of the Data Validation Checklist. A check mark ( $\checkmark$ ) indicates that the referenced validation criteria were deemed acceptable, whereas a crossed circle ( $\otimes$ ) indicates validation criteria for which the data have been qualified by the data validator. An empty circle (O) indicates that the specified criterion does not apply to the reviewed data. Details are noted in the tables below.

#### Validation Criteria

- ✓ Data Completeness
- ✓ CoC Documentation (Item 3)
- ✓ Holding Times and Preservation (Items 6 and 7)
- O Initial and Continuing Calibrations (Items 9 and 10)
- ⊗ Laboratory Blanks (Items 11 and 12)
- ✓ MS/MSD (Items 13 and 14)
- ⊗ LCS/LCSD (Items 15 and 16)
- System Monitoring Compounds (i.e., Surrogates and Internal Standards) (Item 17)
- ⊗ Field, Equipment, and Trip Blanks (Items 18 and 19)
- ⊗ Field Duplicates (Items 20 and 21)
- ✓ Laboratory Duplicates (Item 22)

#### **Guidance References**

Chemical data validation was conducted in accordance with the United States Environmental Protection Agency (USEPA) Contract Laboratory Program (CLP) National Functional Guidelines for the analyses listed below, or by the appropriate method if not covered in the National Functional Guidelines.

- Data for organic analyses were evaluated according to validation criteria set forth in the USEPA CLP National Functional Guidelines for Organic Superfund Methods Data Review, document number EPA-540-R-20-005, November 2020 with additional reference to the USEPA CLP National Functional Guidelines for Organic Data Review, document number EPA 540/R-99/008, October 1999.
- Data for inorganic analyses were evaluated according to validation criteria set forth in the USEPA CLP National Functional Guidelines for Inorganic Superfund Methods Data Review, document number EPA-540-R-20-006, November 2020 with additional reference to the USEPA CLP National Functional Guidelines for Inorganic Data Review, document number EPA 540-R-04-004, October 2004.
- Review of field duplicates was conducted according to the USEPA Region I New England Environmental Data Review Supplement for Region 1 Data Review Elements and Superfund Specific Guidance/Procedures, EQADR-Supplement2, September 2020.
- Trihydro Data Validation Variance Documentation, April 2022.



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### **OVERALL DATA PACKAGE ASSESSMENT**

Based on a data validation review, the data are acceptable as delivered. Data qualified by the laboratory are discussed in Item 2 of the Validation Criteria Checklist.

The purpose of validating data and assigning qualifiers is to assist in proper data interpretation. Data that are not qualified meet the site data quality objectives. If values are assigned qualifiers other than an R (rejected, data not usable), the data may be used for site evaluation; however, consideration should be given to the reasons for qualification when interpreting sample concentrations. Data points that are assigned an R qualifier should not be used for site evaluation purposes.

If applicable, text was identified in **bold font** in the Validation Criteria Checklist to indicate that further action and/or qualification of the data were required. Data may have been qualified with J data flags by the laboratory if the result was greater than or equal to the method detection limit (MDL) but less than the reporting limit (RL). These laboratory-applied J flags were preserved, if present, and included in the Data Qualification Summary table at the end of this report. If applicable, data validation qualifiers were added for the items noted with crossed circles in the Validation Criteria section above. Please see the Data Qualification Summary table at the end of this report.

If data would be qualified with more than one flag, one qualifier was assigned based on the severity; however, all reasons for qualification were retained. Data that would be qualified with both J+ and J- flags were evaluated based on validation criteria and assigned the appropriate flag. The hierarchy of qualifiers from the most to least severe is as follows:

Data qualifiers used during this validation are included in the following table.

<u>Qualifier</u>	Definition
J	Estimated concentration
J-	The result is an estimated concentration, but may be biased low
UJ	Estimated reporting limit
U	Evaluated to be undetected at the reporting limit
JB	Estimated concentration due to blank contamination
R	Rejected, data not usable

#### **Data Completeness**

The analyses were performed as requested on the CoC records. The associated samples were received by the laboratory and analyzed properly unless otherwise noted in the Criteria Checklist below. The complete data package consisted of 540 data points. The data completeness calculation does not include any submitted blank sample results. Eighteen data points were rejected. The data completeness measure for this data package is calculated to be 96.67% and is acceptable.



	VALIDAT	ION CRITERIA CHECKLIST			
1. Was the report free	e of non-conformances identi	fied by the laboratory?	No		
Comments: The laboratory noted the following analytical non-conformances related to this data set.					
"S" flagged surrogates denote low surrogate recoveries due to matrix interferences/sample dilution.					
Naphthalene was reported by EPA Method 8270 instead of EPA Method 8270 SIM because of its elevated concentration for sample MKTF-01R.					
2. Were the data free If no, define.	e of data qualification flags an	d/or notes used by the laboratory?	No		
Comments: The laboration	atory used the following data	qualification flags with this data set.			
E – Estimated value. 7 qualification of sample	This laboratory flag was applie data was not required.	ed only to QC sample and surrogate resul	ts in the laboratory report, and		
J – Analyte detected be	elow quantitation limits.				
J6 – The sample matrix	x interfered with the ability to	make any accurate determination; spike v	alue is low.		
P1 – RPD value not ap	plicable for sample concentra	ations less than 5 times the reporting limit.			
S – % Recovery outsid	e of range due to dilution or r	natrix interference.			
* – Value exceeds max	timum contaminant level.				
3. Were sample CoC	forms and custody procedure	es complete?	Yes		
Comments: The CoC records from field to laboratory were complete, and custody was maintained as evidenced by field and laboratory personnel signatures, dates, and times of receipt. Custody seals were not present or required since the samples were delivered to the laboratory by courier, and custody was maintained at all times.					
<ul> <li>4. Were detection limits in accordance with the quality assurance project plan (QAPP), Yes permit, or method, or indicated as acceptable?</li> </ul>					
Comments: The detec	tion limits appeared to be acc	ceptable. The following dilutions were app	blied.		
Method	<u>Sample(s)</u>	<u>Analyte(s)</u>	Dilution Factor		
200.7	MKTF-27, DUP-3-17-22	Total and Dissolved Metals	5		
200.8	MKTF-27, MKTF-29, DUP-3-17-22	Total and Dissolved Metals	5		
245.1	MKTF-29	Total Mercury	5		
200.7	MKTF-01R	Total and Dissolved Barium	10		
8015	MKTF-01R	GRO	10		
8260B	8260B MKTF-01R Select VOCs 10				
8260B	MKTF-01R	Benzene	100		
5. Were the reported QAPP, permit, or (	analytical methods and cons	tituents in compliance with the	No		
Comments: The report constituents in accorda	ted analytical methods were i ince with the CoC, with the fo	n compliance with the CoC, and the labor llowing exceptions. Method 200 7: however, the laboratory a	atory reported the requested		

both Method 200.7 and Method 200.8. This substituted analytical method, Method 200.8, met similar sensitivity, accuracy, and precision goals and, therefore, was an acceptable replacement.

The CoC requested cyanide using Method 335.4; however, the laboratory analyzed the samples using Method 4500 CN E. This substituted analytical method met similar sensitivity, accuracy, and precision goals and, therefore, was an acceptable replacement.



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VALIDATION CRITERIA CHECKLIST					
6. Were samples receiv	ved in good con	dition within method-s	pecified require	ments?	No
Comments: Samples were received on ice, in good condition, and with the cooler temperatures outside the recommended temperature range of $4^{\circ}C \pm 2^{\circ}C$ between $0.3^{\circ}C$ and $1.7^{\circ}C$ as noted on the CoC and the <i>Sample Log-in Check List</i> . Samples transferred to Pace National were received in good condition with the cooler temperature within the recommended range at 2.3°C as noted on the CoC. The cooler temperatures below 2.0°C were judged as acceptable since the laboratory did not report the sample containers as broken or frozen.					
7. Were samples extracted/digested and analyzed within method-specified or Yes technical holding times?					
Comments: The samples	s were extracted	d/digested and analyze	ed within metho	d-specific holding tin	nes.
8. Were reported units method(s)? Specify	appropriate for if wet or dry uni	the sample matrix/mat its were used for soil.	rices and analy	tical	Yes
Comments: The results which were acceptable for	were reported ir or the sample m	n concentration units o atrix and the analyses	f micrograms po requested.	er liter (μg/L) and mil	ligrams per liter (mg/L),
9. Did the laboratory pr	ovide any speci	ific initial and/or contin	uing calibration	results?	No
Comments: Initial and co	ontinuing calibra	ition data were not incl	uded as part of	this data set.	
10. If initial and/or contin acceptable limits?	uing calibration	results were provided	, were the resu	lts within	N/A
Comments: Initial and co	ontinuing calibra	ition data were not incl	uded as part of	this data set.	
11. Was the total number the total number of s	er of laboratory b amples or analy	plank samples prepare yzed as required by the	d equal to at le e method?	ast 5% of	Yes
Comments: The total nui samples.	mber of laborate	ory blank samples prer	pared was equa	ll to at least 5% of th	e total number of
12. Were target analytes	reported as no	t detected in the labor	atory blanks?		No
Comments: Target analy	rtes were report	ed as not detected in t	he laboratory b	lanks, with the follow	ving exceptions.
	<u>Method</u>	Analyte	<u>Batch</u>	Concentration	]
	8015D	DRO	66267	0.027 mg/L	
	8260B	Chloromethane	R86626	0.68 µg/L	
	8015D	GRO	G86626	0.034 mg/L	
Detections of the identi than the applicable repo samples that were grea assigned JB qualifiers. above the reporting limit	fied analytes in orting limits we ter than the re Non-detections and greater that	n the associated sam ere assigned U qualif porting limits but less s of the identified analy n ten times the blank c	ples that were iers. Detectio s than or equa /tes in the asso oncentration di	less than the blan ns of DRO and GRO I to 10 times the bla ciated samples and d not require qualific	k results and/or less D in the associated ank results were detections that were ation.



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## VALIDATION CRITERIA CHECKLIST

13. Was the total number of MS samples prepared equal to at least 5% of the total number of samples or analyzed as required by the method?

Yes

Comments: The total number of matrix spike samples prepared was equal to at least 5% of the total number of samples, although MS samples were not prepared/reported for all analyses and/or batch. The matrix spike sample source for each analytical batch in this sample set has been indicated below.

<u>Method</u>	<u>Analytes</u>	<u>Batch</u>	MS Sample Source
200.7	Total Metals	66643	MKTF-01R, MKTF-27
200.7	Dissolved Metals	A86575	EB 3-17-22
200.7	Dissolved Barium	A87332	Not Prepared
200.8	Total Metals	66341	EB 3-17-22, MKTF-01R
200.8	Dissolved Metals	A86633	MKTF-27
200.8	Dissolved Metals	B86624	Not Prepared
245.1	Total and Dissolved Mercury	66371	Not Prepared
504.1	EDB	66256	Not Prepared
504.1	EDB	66262	Not Prepared
4500CN E	Cyanide	WG1836836	MKTF-01R, MKTF-30
8015D	TPH DRO and MRO	66267	Not Prepared
8015D	TPH GRO	G86626	Not Prepared
8260B	VOCs	R86626	Not Prepared
8270C	SVOCs	66282	Not Prepared
8270C SIM	SVOCs	R86694	Not Prepared

Not Prepared – Matrix spikes were not prepared/reported for this batch.

14. For MS/MSDs prepared from project samples, were percent recoveries and RPDs within data validation or laboratory quality control (QC) limits?

No

Yes

No

Comments: The MS/MSD percent recoveries and RPDs for project samples were within data validation and laboratory QC limits, with the following exceptions.

The MS and MSD recoveries for cyanide in Method 4500 CN E batch WG1836836 were outside the laboratory QC limits of 90-110% at 86.2% and 79.2%, respectively. However, the recoveries were within data validation limits of 75-125%. Validation action was not required.

15. Was the total number of LCSs analyzed equal to at least 5% of the total number of samples or analyzed as required by the method?

Comments: The total number of LCS samples analyzed was equal to at least 5% of the total number of samples.

16. Were LCS/LCSD percent recoveries and LCS/LCSD RPDs within data validation or laboratory QC limits?

Comments: The LCS and LCSD percent recoveries and LCS/LCSD RPDs were within data validation and laboratory QC limits, with the following exception.

The LCS recovery for total nickel in Method 200.7 batch 66643 were outside the data validation acceptance limits of 70-130% at 69%, indicating a potential low bias. Associated samples with detections for total nickel were qualified with J- flags due to possible low bias, and the associated samples with non-detections for total nickel were qualified with a UJ flag due to possible low bias.



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17. Were surrogate recoveries within laboratory QC limits?

Comments: Surrogate recoveries were within laboratory QC limits, with the following exceptions.

Method	<u>Surrogate</u>	<u>Sample</u>	<u>Surrogate</u> <u>Recovery</u>	QC Limits
8270C	2-Fluorophenol	MKTF-27	5.18%	29.4-87.7%
8270C	Phenol-d₅	MKTF-27	10.6%	28.5-64.7%
8270C	2,4,6-Tribromophenol	MKTF-27	2.12%	18.6-129%
8270C	2-Fluorophenol	MKTF-29	5.56%	29.4-87.7%
8270C	Phenol-d₅	MKTF-29	18.0%	28.5-64.7%
8270C	2,4,6-Tribromophenol	MKTF-29	1.77%	18.6-129%
8270C	2-Fluorophenol	DUP-3-17-22	3.92%	29.4-87.7%
8270C	Phenol-d₅	DUP-3-17-22	9.97%	28.5-64.7%
8270C	2,4,6-Tribromophenol	DUP-3-17-22	1.87%	18.6-129%

Since Method 8270C surrogate associations were not available from the laboratory, qualification was assigned to all of the target analytes in a given fraction (acid or base/neutral) when two or more surrogates from the same fraction (acid or base/neutral) were outside the acceptance range.

The associated analytes were not detected in the listed samples. Since the recoveries for 2 of 3 surrogates in each of the identified samples were below 10%, these non-detected results were qualified as R indicating rejected results, data not usable.

 18. Were the number of trip blank, field blank, and/or equipment blank samples
 Yes

 collected equal to at least 10% of the total number of samples or as required by the
 project guidelines, QAPP, SAP, or permit?

Comments: The number of trip, field, and equipment blanks collected was equal to at least 10% of the number of samples. One trip blank sample, Trip Blank, one field blank sample, FB 3-17-22, and one equipment blank sample, EB 3-17-22, were collected as part of this sample set.

### VALIDATION CRITERIA CHECKLIST

19. Were target analytes reported as not detected in the trip blank, field blank, and/or equipment blank samples?

No

Comments: Target analytes were not detected in the trip blank, field blank, and equipment blank samples with the following exceptions.

Blank Sample ID	<u>Method</u>	<u>Analyte</u>	<u>Concentration</u>
Trip Blank	8260B	Chloromethane	0.69 µg/L
FB-3-17-22	8260B	2-Butanone	5.1 μg/L
FB-3-17-22	8260B	Chloromethane	0.71 μg/L
EB-3-17-22	200.7	Dissolved Zinc	0.0044 mg/L
EB-3-17-22	8015D	TPH DRO	0.021 mg/L
EB-3-17-22	8015D	TPH GRO	0.037 mg/L
EB-3-17-22	8260B	1,1-Dichloroethene	0.54 µg/L
EB-3-17-22	8260B	2-Butanone	5.3 µg/L

Detections of 2-butanone and dissolved zinc in the associated samples that were less than the applicable reporting limits were assigned U qualifiers. The detection of 1,1-dichloroethene in the associated sample MKTF-30 that was greater than the reporting limit but less than 10 times the blank result was assigned a JB qualifier. Non-detections of the identified analytes in the associated samples did not require qualification.

The chloromethane, DRO, and GRO results were previously qualified due to laboratory blank contamination in batches R86626, 66267, and G86626, respectively; therefore, additional qualification due to the trip, field, and equipment blank contamination was not required.

20. Was the number of field duplicates collected equal to at least 10% of the total number of samples or as required by the project guidelines, QAPP, SAP, or permit?

Yes

No

Comments: The number of field duplicates collected was equal to at least 10% of the number of samples. Sample DUP-3-17-22 was collected as a field duplicate of sample MKTF-27.

21. Were field duplicate RPD values within data validation QC limits (soil 0-50%, water 0-30%, or air 0-25%)?

Comments: As indicated in the Field Duplicate Summary Table at the end of this report, field duplicate RPD values were within data validation QC limits of 0-30% for water samples, with the following exception.

The RPD value for total cyanide exceeded the data validation limit of 30% at 90.0%, which was evidence of poor precision. The total cyanide results were qualified as J for samples MKTF-27 and DUP-3-17-22.



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		VALIDATIO		IECKLIST		
22. For laboratory duplicates prepared from project samples, were RPDs within laboratory QC limits?						N/A
Comments: Laborate summarized in the fo	ory duplicates were llowing table.	prepared for th	nese analyses a	nd the labc	oratory duplicate	sample sources are
	Method	<u>Analytes</u>	Batch	<u>Laborato</u> Samp	ory Duplicate ble Source	
	4500CN E	Cyanide	WG1836836	Not A	ssociated	
	4500CN E	Cyanide	WG1836836	M	KTF-28	
Not Associated – The la	boratory duplicate san	nple source was	not associated w	ith this proje	ct.	
The RPD for the labo measurements were	ratory duplicate pre non-detections.	pared from a p	project sample w	/as not app	licable since the	cyanide results for both
The RPD value for th data were not qualifie	e laboratory duplica ed based on this res	te sample pre ult since matri	pared from a no x similarity to pro	n-project s oject samp	ample was evaluates could not be g	ated and considered, bu guaranteed.
23. Were the followi	ng data relationships	s realistic?				
<ul> <li>Target analy EPH/8270)?</li> </ul>	/tes were reported b	y more than o	ne method (e.g.	, 8260/827	0,	N/A
Comments: Target a	nalytes were not rep	ported by more	e than one meth	od in this d	ata set.	
Comments: Target a	nalytes were not rep	ported by more	e than one meth	od in this d	ata set.	
Comments: Target a	nalytes were not rep	ported by more	e than one meth	od in this d	ata set.	
Comments: Target a	nalytes were not rep	ported by more	e than one meth	od in this d	ata set.	
Comments: Target a • Both total ar	nalytes were not rep nd dissolved metals	ported by more	e than one meth	od in this d d the total r	ata set. netals	No
Comments: Target a <ul> <li>Both total ar results were</li> </ul>	nalytes were not rep nd dissolved metals greater than or equ	oorted by more analyses were al to the disso	e than one meth e performed, and lived metals resi	od in this d d the total r ults?	ata set. netals	No
Comments: Target a <ul> <li>Both total ar results were</li> </ul> Comments: The follow	nalytes were not rep nd dissolved metals greater than or equ	analyses were al to the disso the exception	e than one meth e performed, and lved metals resi s in which the d	od in this d d the total r ults? issolved me	ata set. netals etals results exce	No eeded the total metals
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Comments: Target a • Both total ar results were Comments: The follo results. The EPA has metals results that ex based on these data.	nalytes were not rep d dissolved metals greater than or equ owing table contains s not provided guida acceed the correspon	analyses were analyses were al to the disso the exception ince or require ding total meta	e than one meth e performed, and lived metals resu s in which the d ements for the ev als results. The	od in this d d the total r ults? issolved me valuation, v refore, qua	ata set. netals etals results exce alidation, and qu lification of result	No eeded the total metals alification of dissolved s was not performed
Comments: Target a Both total ar results were Comments: The follo results. The EPA has metals results that ex- based on these data.	nalytes were not rep d dissolved metals greater than or equ owing table contains s not provided guida acceed the correspon	analyses were al to the disso the exception ince or require ding total meta	e than one meth e performed, and olved metals resi s in which the d ements for the ev als results. The	od in this d d the total r ults? issolved mo valuation, v refore, qua	ata set. netals etals results exce alidation, and qu lification of result	No eeded the total metals alification of dissolved s was not performed
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Comments: Target a • Both total ar results were Comments: The follo results. The EPA has metals results that ex based on these data.	nalytes were not rep and dissolved metals greater than or equipation owing table contains s not provided guida acceed the correspon <u>Sample ID</u> <u>MKTF-01R</u> <u>MKTF-29</u>	analyses were analyses were al to the disso the exception ince or require ding total meta <u>Analyte</u> Barium Barium	e than one mether e performed, and lived metals results s in which the d ements for the evaluation of	od in this d d the total r ults? issolved me valuation, v refore, qua <u>Result</u> <u>1</u> 1	ata set. netals etals results exce alidation, and qu lification of result <u>Dissolved Resu (mg/L)</u> 5.6 0.22	No eeded the total metals alification of dissolved s was not performed
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Comments: Target a Both total ar results were Comments: The follo results. The EPA has metals results that ex based on these data.	nalytes were not rep and dissolved metals be greater than or equi- owing table contains is not provided guida acceed the correspon <u>Sample ID</u> <u>MKTF-01R</u> <u>MKTF-29</u> <u>MKTF-27</u> <u>MKTF-28</u>	analyses were analyses were al to the disso the exception ince or require ding total meta <u>Analyte</u> Barium Barium Nickel Nickel Nickel	e than one meth e performed, and lived metals results s in which the d ements for the evals results. The <u>Total I</u> <u>(mo</u> 5. 0.0 0.0 0.0 0.0	od in this d d the total r ults? issolved me valuation, v refore, qua <u>Result</u> <u>1</u> 21 21 22 21 22	ata set. netals etals results exce alidation, and qu lification of result <u>Dissolved Resu</u> (mg/L) 5.6 0.22 0.027 0.033 0.0079	No eeded the total metals alification of dissolved s was not performed
Comments: Target a • Both total ar results were Comments: The follo results. The EPA has metals results that ex- based on these data.	nalytes were not rep nd dissolved metals greater than or equ owing table contains s not provided guida ceed the correspon <u>Sample ID</u> <u>MKTF-01R</u> <u>MKTF-29</u> <u>MKTF-27</u> <u>MKTF-28</u> <u>MKTF-29</u>	analyses were analyses were al to the disso the exception ince or require ding total meta <u>Analyte</u> <u>Barium</u> <u>Barium</u> <u>Nickel</u> <u>Nickel</u> <u>Nickel</u>	e than one mether e performed, and olved metals results s in which the d ements for the evals results. The <u>Total I</u> (mo 5. 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0	od in this d d the total r ults? issolved moved valuation, v refore, quar Result 1 21 21 22 21 21	ata set. metals etals results excer validation, and qu lification of result <u>Dissolved Result</u> <u>Dissolved Result</u> 0.027 0.027 0.027 0.033 0.0079 0.020	No eeded the total metals alification of dissolved s was not performed
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Comments: Target a • Both total ar results were Comments: The follo results. The EPA has metals results that ex- based on these data.	nalytes were not rep and dissolved metals greater than or equi- owing table contains s not provided guida acceed the correspon <u>Sample ID</u> <u>MKTF-01R</u> <u>MKTF-29</u> <u>MKTF-27</u> <u>MKTF-28</u> <u>MKTF-29</u> <u>DUP-3-17-22</u> DUP-3-17-22	analyses were al to the disso the exception ince or require ding total meta <u>Analyte</u> Barium Barium Nickel Nickel Nickel Nickel Selenium	e than one meth e performed, and lived metals results s in which the d ements for the evals results. The <u>Total I</u> (mo 5. 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0	od in this d d the total r ults? issolved movel valuation, v refore, qua Result <u>a/L)</u> 1 21 21 21 21 21 21 21 21 21 21 21 21 2	ata set. netals etals results excer ralidation, and qu lification of result <u>Dissolved Resu</u> (mg/L) 5.6 0.22 0.027 0.027 0.033 0.0079 0.020 0.030 0.0043	No eeded the total metals alification of dissolved s was not performed
Comments: Target a • Both total ar results were Comments: The follo results. The EPA has metals results that ex based on these data.	nalytes were not rep nd dissolved metals greater than or equi- owing table contains s not provided guida cceed the correspon <u>Sample ID</u> <u>MKTF-01R</u> <u>MKTF-29</u> <u>MKTF-29</u> <u>MKTF-27</u> <u>MKTF-28</u> <u>MKTF-29</u> <u>DUP-3-17-22</u> <u>DUP-3-17-22</u> <u>EB 3-17-22</u>	analyses were analyses were al to the disso the exception ince or require ding total meta <u>Analyte</u> <u>Barium</u> <u>Barium</u> <u>Barium</u> <u>Nickel</u> <u>Nickel</u> <u>Nickel</u> <u>Nickel</u> <u>Nickel</u> <u>Seleniun</u> <u>Zinc</u>	e than one methe e performed, and lived metals results s in which the d ements for the evals results. The <u>Total I</u> (mg 5. 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0	od in this d d the total r ults? issolved me valuation, v refore, qua <u>Result</u> <u>J/L)</u> 1 21 21 221 221 221 267 118 221 2067 118 221 2067 118 221 2067	ata set. netals etals results exce alidation, and qu lification of result <u>Dissolved Resu</u> (mg/L) 5.6 0.22 0.027 0.033 0.0079 0.020 0.030 0.0043 0.0044	No eeded the total metals alification of dissolved s was not performed
Comments: Target a • Both total ar results were Comments: The follo results. The EPA has metals results that ex based on these data.	nalytes were not rep and dissolved metals be greater than or equi- owing table contains is not provided guida acceed the correspon <u>Sample ID</u> <u>MKTF-01R</u> <u>MKTF-29</u> <u>MKTF-29</u> <u>MKTF-28</u> <u>MKTF-29</u> <u>DUP-3-17-22</u> <u>DUP-3-17-22</u> <u>EB 3-17-22</u> <u>MKTF-29</u>	analyses were analyses were al to the disso the exception ince or require ding total meta <u>Analyte</u> <u>Barium</u> <u>Barium</u> <u>Barium</u> <u>Nickel</u> <u>Nickel</u> <u>Nickel</u> <u>Nickel</u> <u>Seleniun</u> <u>Zinc</u> Zinc	e than one meth e performed, and lived metals results s in which the d ements for the evals results. The <u>Total I</u> (mo 5. 0.2 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	od in this d d the total r ults? issolved me valuation, v refore, qua <u>Result</u> <u>1</u> 21 21 21 21 21 21 21 21 21 21 21 21 21	ata set. netals etals results excer alidation, and qu lification of result <u>Dissolved Resu</u> (mg/L) 5.6 0.22 0.027 0.033 0.0079 0.020 0.030 0.0043 0.0044 0.0061	No eeded the total metals alification of dissolved s was not performed



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Client Sample ID: MKTF-27 Field Duplicate Sample ID: DUP-3-17-22					
Analyte	Method	Laboratory Result	Duplicate Result	Relative Percent Difference (RPD)	
Barium, Dissolved	E 200.7	0.068 mg/L	0.068 mg/L	0.0%	
Barium, Total	E 200.7	0.073 mg/L	0.076 mg/L	4.0%	
Cobalt, Total	E 200.7	0.015 mg/L	0.017 mg/L	12.5% +/-RL	
Nickel, Dissolved	E 200.7	0.033 mg/L	0.030 mg/L	9.5% +/-RL	
Nickel, Total	E 200.7	0.021 mg/L	0.021 mg/L	0.0% +/-RL	
Arsenic, Dissolved	E200.8	0.0011 mg/L	0.0012 mg/L	8.7% +/-RL	
Arsenic, Total	E200.8	0.0015 mg/L	0.0015 mg/L	0.0% +/-RL	
Lead, Total	E200.8	0.00093 mg/L	0.0017 mg/L	58.6% +/-RL	
Selenium, Dissolved	E200.8	0.0047 mg/L	0.0043 mg/L	8.9% +/-RL	
Selenium, Total	E200.8	0.0062 mg/L	0.0034 mg/L	58.3% +/-RL	
Cyanide, Total	E335.4	0.0118 mg/L	0.0311 mg/L	90.0%	
TPH DRO	SW8015	0.36 mg/L	0.38 mg/L	5.4%	
TPH GRO	SW8015	0.054 mg/L	0.055 mg/L	1.8% +/-RL	
TPH ORO	SW8015	0.16 mg/L	0.18 mg/L	11.8%	
1,1-Dichloroethane	SW8260B	0.86 µg/L	0.89 µg/L	3.4% +/-RL	
1,2-Dichloroethane	SW8260B	0.54 µg/L	0.54 µg/L	0.0% +/-RL	
Benzene	SW8260B	1.3 µg/L	0.49 µg/L	90.5% +/-RL	
Chloromethane	SW8260B	0.72 µg/L	0.66 µg/L	8.7% +/-RL	
MTBE	SW8260B	17 μg/L	17 μg/L	0.0%	
Vinyl Chloride	SW8260B	0.46 µg/L	ND (1.0 μg/L)	DL	
1,4-Dioxane	SW8270C	3.3 µg/L	3.6 µg/L	8.7%	

#### FIELD DUPLICATE SUMMARY

Field duplicate RPD control limits are not to exceed 30% for water as established by USEPA Region I - New England Environmental Data Review Supplement for Region 1 Data Review Elements and Superfund Specific Guidance/Procedures, EQADR-Supplement2, September 2020.

DL – Indicates that the analyte was detected in one of the duplicate samples and was undetected in the other sample, and therefore an RPD could not be calculated. Data were not qualified since the detection was within two times the reporting limit. Non-detected results are indicated above with the applicable reporting limit as ND (RL).

+/-RL – Indicates that the detections in both of the samples were within two times the reporting limit. Qualification of data was not required.

The RPD value for total cyanide exceeded the data validation limit of 30% at 90.0%, which was evidence of poor precision. The total cyanide results were qualified as J for samples MKTF-27 and DUP-3-17-22.



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Abbreviation	Reason
EBD	Equipment blank detection
ERPD-FD	High field duplicate RPD.
FBD	Field blank detection
LR-LCS	The LCS and/or LCSD percent recovery was less than the lower acceptable limit indicating a possible low bias.
LR-SUR	The surrogate percent recovery was less than the lower acceptable limit indicating a possible low bias.
MBD	Method blank detection
MDLRL	Flagged by the laboratory: The result was greater than the MDL but less than the RL.

### DATA QUALIFICATION SUMMARY

Analyte	Method	Field Sample ID	Lab Sample ID	Result	Limit	Units	Reviewer Qualifier	DV Flag Reasons
1,1-Dichloroethane	SW8260B	MKTF-01R	2203989-002a	5.5	10	µg/L	J	MDLRL
1,1-Dichloroethane	SW8260B	MKTF-27	2203989-003a	0.86	1.0	µg/L	J	MDLRL
1,1-Dichloroethane	SW8260B	MKTF-29	2203989-005a	0.63	1.0	µg/L	J	MDLRL
1,1-Dichloroethane	SW8260B	DUP-3-17-22	2203989-008a	0.89	1.0	µg/L	J	MDLRL
1,1-Dichloroethene	SW8260B	MKTF-30	2203989-006a	1.3	1.0	µg/L	JB	EBD
1,1-Dichloroethene	SW8260B	EB 3-17-22	2203989-001a	0.54	1.0	µg/L	J	MDLRL
1,2-Dichloroethane	SW8260B	MKTF-01R	2203989-002a	5.1	10	µg/L	J	MDLRL
1,2-Dichloroethane	SW8260B	MKTF-27	2203989-003a	0.54	1.0	µg/L	J	MDLRL
1,2-Dichloroethane	SW8260B	MKTF-28	2203989-004a	0.42	1.0	µg/L	J	MDLRL
1,2-Dichloroethane	SW8260B	DUP-3-17-22	2203989-008a	0.54	1.0	µg/L	J	MDLRL
2,4,6-Trichlorophenol	SW8270C	MKTF-27	2203989-003c	ND	5.0	µg/L	R	LR-SUR
2,4,6-Trichlorophenol	SW8270C	MKTF-29	2203989-005c	ND	5.0	µg/L	R	LR-SUR
2,4,6-Trichlorophenol	SW8270C	DUP-3-17-22	2203989-008c	ND	5.0	µg/L	R	LR-SUR
2,4-Dimethylphenol	SW8270C	MKTF-27	2203989-003c	ND	5.0	µg/L	R	LR-SUR
2,4-Dimethylphenol	SW8270C	MKTF-29	2203989-005c	ND	5.0	µg/L	R	LR-SUR



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Analyte	Method	Field Sample ID	Lab Sample ID	Result	Limit	Units	Reviewer Qualifier	DV Flag Reasons
2,4-Dimethylphenol	SW8270C	DUP-3-17-22	2203989-008c	ND	5.0	µg/L	R	LR-SUR
2,4-Dimethylphenol	SW8270C	MKTF-01R	2203989-002c	4.0	5.0	µg/L	J	MDLRL
2,4-Dinitrophenol	SW8270C	MKTF-27	2203989-003c	ND	5.0	µg/L	R	LR-SUR
2,4-Dinitrophenol	SW8270C	MKTF-29	2203989-005c	ND	5.0	µg/L	R	LR-SUR
2,4-Dinitrophenol	SW8270C	DUP-3-17-22	2203989-008c	ND	5.0	µg/L	R	LR-SUR
2-Butanone	SW8260B	EB 3-17-22	2203989-001a	5.3	10	µg/L	U	FBD, MDLRL
2-Butanone	SW8260B	FB 3-17-22	2203989-007a	5.1	10	µg/L	J	MDLRL
2-Methylphenol	SW8270C	MKTF-27	2203989-003c	ND	5.0	µg/L	R	LR-SUR
2-Methylphenol	SW8270C	MKTF-29	2203989-005c	ND	5.0	µg/L	R	LR-SUR
2-Methylphenol	SW8270C	DUP-3-17-22	2203989-008c	ND	5.0	µg/L	R	LR-SUR
2-Methylphenol	SW8270C	MKTF-01R	2203989-002c	3.7	5.0	µg/L	J	MDLRL
3,4-Methylphenol	SW8270C	MKTF-27	2203989-003c	ND	5.0	µg/L	R	LR-SUR
3,4-Methylphenol	SW8270C	MKTF-29	2203989-005c	ND	5.0	µg/L	R	LR-SUR
3,4-Methylphenol	SW8270C	DUP-3-17-22	2203989-008c	ND	5.0	µg/L	R	LR-SUR
Arsenic, Dissolved	E200.8	MKTF-27	2203989-003E	0.0011	0.0050	mg/L	J	MDLRL
Arsenic, Dissolved	E200.8	MKTF-28	2203989-004E	0.00090	0.0010	mg/L	J	MDLRL
Arsenic, Dissolved	E200.8	MKTF-29	2203989-005E	0.00073	0.0050	mg/L	J	MDLRL
Arsenic, Dissolved	E200.8	MKTF-30	2203989-006E	0.00059	0.0010	mg/L	J	MDLRL
Arsenic, Dissolved	E200.8	DUP-3-17-22	2203989-008E	0.0012	0.0050	mg/L	J	MDLRL
Arsenic, Total	E200.8	MKTF-27	2203989-003D	0.0015	0.0050	mg/L	J	MDLRL
Arsenic, Total	E200.8	DUP-3-17-22	2203989-008D	0.0015	0.0050	mg/L	J	MDLRL
Benzene	SW8260B	MKTF-28	2203989-004a	0.30	1.0	µg/L	J	MDLRL
Benzene	SW8260B	DUP-3-17-22	2203989-008a	0.49	1.0	µg/L	J	MDLRL
Chloroform	SW8260B	MKTF-01R	2203989-002a	5.7	10	µg/L	J	MDLRL
Chloromethane	SW8260B	MKTF-27	2203989-003a	0.72	3.0	µg/L	U	MBD, MDLRL
Chloromethane	SW8260B	MKTF-28	2203989-004a	0.70	3.0	µg/L	U	MBD, MDLRL
Chloromethane	SW8260B	MKTF-29	2203989-005a	0.91	3.0	µg/L	U	MBD, MDLRL



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Analyte	Method	Field Sample ID	Lab Sample ID	Result	Limit	Units	Reviewer Qualifier	DV Flag Reasons
Chloromethane	SW8260B	MKTF-30	2203989-006a	0.65	3.0	µg/L	U	MBD, MDLRL
Chloromethane	SW8260B	FB 3-17-22	2203989-007a	0.71	3.0	µg/L	U	MBD, MDLRL
Chloromethane	SW8260B	DUP-3-17-22	2203989-008a	0.66	3.0	µg/L	U	MBD, MDLRL
Chloromethane	SW8260B	Trip Blank	2203989-009a	0.69	3.0	µg/L	U	MBD, MDLRL
Chromium, Total	E 200.7	MKTF-30	2203989-006D	0.0027	0.0060	mg/L	J	MDLRL
Cobalt, Dissolved	E 200.7	MKTF-01R	2203989-002E	0.003	0.0060	mg/L	J	MDLRL
Cobalt, Dissolved	E 200.7	MKTF-29	2203989-005E	0.0053	0.0060	mg/L	J	MDLRL
Cobalt, Total	E 200.7	MKTF-01R	2203989-002D	0.0053	0.0060	mg/L	J	MDLRL
Cobalt, Total	E 200.7	MKTF-27	2203989-003D	0.015	0.030	mg/L	J	MDLRL
Cobalt, Total	E 200.7	MKTF-28	2203989-004D	0.0057	0.0060	mg/L	J	MDLRL
Cobalt, Total	E 200.7	MKTF-29	2203989-005D	0.0059	0.0060	mg/L	J	MDLRL
Cobalt, Total	E 200.7	MKTF-30	2203989-006D	0.0041	0.0060	mg/L	J	MDLRL
Cobalt, Total	E 200.7	DUP-3-17-22	2203989-008D	0.017	0.030	mg/L	J	MDLRL
Cyanide, Total	E335.4	MKTF-27	2203989-003F	0.0118	0.0050	mg/L	J	ERPD-FD
Cyanide, Total	E335.4	DUP-3-17-22	2203989-008F	0.0311	0.0050	mg/L	J	ERPD-FD
Lead, Dissolved	E200.8	MKTF-30	2203989-006E	0.000072	0.00050	mg/L	J	MDLRL
Lead, Total	E200.8	MKTF-27	2203989-003D	0.00093	0.0025	mg/L	J	MDLRL
Lead, Total	E200.8	DUP-3-17-22	2203989-008D	0.0017	0.0025	mg/L	J	MDLRL
MTBE	SW8260B	MKTF-28	2203989-004a	0.53	1.0	µg/L	J	MDLRL
n-Butylbenzene	SW8260B	MKTF-01R	2203989-002a	11	30	µg/L	J	MDLRL
Nickel, Dissolved	E 200.7	MKTF-27	2203989-003E	0.033	0.050	mg/L	J	MDLRL
Nickel, Dissolved	E 200.7	MKTF-28	2203989-004E	0.0079	0.010	mg/L	J	MDLRL
Nickel, Dissolved	E 200.7	DUP-3-17-22	2203989-008E	0.030	0.050	mg/L	J	MDLRL
Nickel, Total	E 200.7	MKTF-01R	2203989-002D	0.024	0.010	mg/L	J-	LR-LCS
Nickel, Total	E 200.7	MKTF-29	2203989-005D	0.018	0.010	mg/L	J-	LR-LCS
Nickel, Total	E 200.7	MKTF-30	2203989-006D	0.017	0.010	mg/L	J-	LR-LCS
Nickel, Total	E 200.7	EB 3-17-22	2203989-001D	ND	0.010	mg/L	UJ	LR-LCS



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Analyte	Method	Field Sample ID	Lab Sample ID	Result	Limit	Units	Reviewer Qualifier	DV Flag Reasons
Nickel, Total	E 200.7	MKTF-27	2203989-003D	0.021	0.050	mg/L	J-	LR-LCS, MDLRL
Nickel, Total	E 200.7	MKTF-28	2203989-004D	0.0067	0.010	mg/L	J-	LR-LCS, MDLRL
Nickel, Total	E 200.7	DUP-3-17-22	2203989-008D	0.021	0.050	mg/L	J-	LR-LCS, MDLRL
Phenol	SW8270C	MKTF-27	2203989-003c	ND	5.0	µg/L	R	LR-SUR
Phenol	SW8270C	MKTF-29	2203989-005c	ND	5.0	µg/L	R	LR-SUR
Phenol	SW8270C	DUP-3-17-22	2203989-008c	ND	5.0	µg/L	R	LR-SUR
p-Isopropyltoluene	SW8260B	MKTF-01R	2203989-002a	2.7	10	µg/L	J	MDLRL
sec-Butylbenzene	SW8260B	MKTF-01R	2203989-002a	4.2	10	µg/L	J	MDLRL
Selenium, Dissolved	E200.8	MKTF-01R	2203989-002E	0.00038	0.0010	mg/L	J	MDLRL
Selenium, Dissolved	E200.8	MKTF-27	2203989-003E	0.0047	0.0050	mg/L	J	MDLRL
Selenium, Dissolved	E200.8	MKTF-28	2203989-004E	0.00068	0.0010	mg/L	J	MDLRL
Selenium, Dissolved	E200.8	DUP-3-17-22	2203989-008E	0.0043	0.0050	mg/L	J	MDLRL
Selenium, Total	E200.8	MKTF-01R	2203989-002D	0.00075	0.0010	mg/L	J	MDLRL
Selenium, Total	E200.8	MKTF-29	2203989-005D	0.00069	0.0010	mg/L	J	MDLRL
Selenium, Total	E200.8	DUP-3-17-22	2203989-008D	0.0034	0.00500	mg/L	J	MDLRL
Silver, Dissolved	E 200.7	MKTF-29	2203989-005E	0.0017	0.0050	mg/L	J	MDLRL
Silver, Total	E 200.7	MKTF-29	2203989-005D	0.0019	0.005	mg/L	J	MDLRL
TPH DRO	SW8015	MKTF-28	2203989-004C	0.17	0.064	mg/L	JB	MBD
TPH DRO	SW8015	MKTF-30	2203989-006C	0.13	0.064	mg/L	JB	MBD
TPH DRO	SW8015	EB 3-17-22	2203989-001C	0.021	0.064	mg/L	U	MBD, MDLRL
TPH GRO	SW8015	MKTF-27	2203989-003a	0.054	0.050	mg/L	JB	MBD
TPH GRO	SW8015	MKTF-29	2203989-005a	0.058	0.050	mg/L	JB	MBD
TPH GRO	SW8015	MKTF-30	2203989-006a	0.066	0.050	mg/L	JB	MBD
TPH GRO	SW8015	DUP-3-17-22	2203989-008a	0.055	0.050	mg/L	JB	MBD
TPH GRO	SW8015	EB 3-17-22	2203989-001a	0.037	0.050	mg/L	U	MBD, MDLRL
TPH GRO	SW8015	MKTF-28	2203989-004a	0.039	0.050	mg/L	U	MBD, MDLRL
TPH ORO	SW8015	MKTF-28	2203989-004C	0.056	0.080	mg/L	J	MDLRL



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Analyte	Method	Field Sample ID	Lab Sample ID	Result	Limit	Units	Reviewer Qualifier	DV Flag Reasons
Trichloroethene	SW8260B	MKTF-01R	2203989-002a	3.0	10	µg/L	J	MDLRL
Vanadium, Dissolved	E 200.7	MKTF-28	2203989-004E	0.0027	0.050	mg/L	J	MDLRL
Vanadium, Dissolved	E 200.7	MKTF-29	2203989-005E	0.0034	0.050	mg/L	J	MDLRL
Vanadium, Dissolved	E 200.7	MKTF-30	2203989-006E	0.0031	0.050	mg/L	J	MDLRL
Vanadium, Total	E 200.7	MKTF-01R	2203989-002D	0.0054	0.050	mg/L	J	MDLRL
Vanadium, Total	E 200.7	MKTF-28	2203989-004D	0.012	0.050	mg/L	J	MDLRL
Vanadium, Total	E 200.7	MKTF-29	2203989-005D	0.0044	0.050	mg/L	J	MDLRL
Vanadium, Total	E 200.7	MKTF-30	2203989-006D	0.014	0.050	mg/L	J	MDLRL
Vinyl Chloride	SW8260B	MKTF-27	2203989-003a	0.46	1.0	µg/L	J	MDLRL
Vinyl Chloride	SW8260B	MKTF-29	2203989-005a	0.44	1.0	µg/L	J	MDLRL
Vinyl Chloride	SW8260B	MKTF-30	2203989-006a	0.46	1.0	µg/L	J	MDLRL
Zinc, Dissolved	E 200.7	MKTF-01R	2203989-002E	0.0077	0.010	mg/L	U	EBD, MDLRL
Zinc, Dissolved	E 200.7	MKTF-28	2203989-004E	0.0059	0.010	mg/L	U	EBD, MDLRL
Zinc, Dissolved	E 200.7	MKTF-29	2203989-005E	0.0061	0.010	mg/L	U	EBD, MDLRL
Zinc, Dissolved	E 200.7	MKTF-30	2203989-006E	0.0082	0.010	mg/L	U	EBD, MDLRL
Zinc, Dissolved	E 200.7	EB 3-17-22	2203989-001E	0.0044	0.010	mg/L	J	MDLRL
Zinc, Total	E 200.7	MKTF-30	2203989-006D	0.0082	0.010	mg/L	J	MDLRL



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Western Refining Southwest LLC D/B/A Marathon Gallup Refinery 2022 Annual Groundwater Monitoring Report

Appendix D-2. 2<sup>nd</sup> Quarter Data Validation Reports



Client: Marathon Oil	Laboratory: Hall Environmental Analysis Laboratory					
Project Name: Western Refining Southwest, Q2 GW Sampling	Sample Matrix: Aqueous					
Project Number: 697-080-002 Task: 0006	Sample Start Date: 06/21/2022					
Date Validated: 09/19/2022	Sample End Date: 06/21/2022					
Parameters Included:						
<ul> <li>Volatile Organic Compounds (VOCs) by Environmental Protection Agency (EPA) Test Methods for Evaluating Solid Waste (SW-846) Method 8260B</li> </ul>						
<ul> <li>1,2-Dibromoethane (EDB) by EPA Method 504.1</li> </ul>						
<ul> <li>Semivolatile Organic Compounds (SVOCs) by SW-846 Method 8270C and Method 8270C with Selected Ion Monitoring (SIM)</li> </ul>						
<ul> <li>Total Petroleum Hydrocarbons (TPH) Gasoline Range Or</li> </ul>	rganics (GRO) by SW-846 Method 8015D					
<ul> <li>TPH Diesel Range Organics (DRO) and Motor Oil Range</li> </ul>	Organics (MRO) by SW-846 Method 8015D Modified					
<ul> <li>Total and Dissolved Metals by EPA Method 200.7 and Method</li> </ul>	ethod 200.8					
<ul> <li>Total and Dissolved Mercury by EPA Method 245.1</li> </ul>						
<ul> <li>Cyanide by Standard Methods for the Examination of Wa</li> </ul>	ter and Wastewater (SM) Method 4500 CN E					
Laboratory Project ID: 2206B30						
Data Validator: Daran O'Hollearn, Lead Project Scientist						
Reviewer: Charles Ballek, Senior Chemist						

### DATA EVALUATION CRITERIA SUMMARY

A Tier II Data Validation was performed by Trihydro Corporation's Chemical Data Evaluation Services Group on the analytical data report packages generated by Hall Environmental Analysis Laboratory of Albuquerque, New Mexico, with additional data from Pace National of Mount Juliet, Tennessee, evaluating samples from the Marathon Oil site, located in Gallup, New Mexico.

Precision, accuracy, method compliance, and completeness of this data package were assessed during this data review. Precision was determined by evaluating the calculated relative percent difference (RPD) values from:

- Field duplicate pairs
- Laboratory duplicate pairs
- Matrix spike (MS) and matrix spike duplicate (MSD) pairs
- Laboratory control sample (LCS) and laboratory control sample duplicate (LCSD) pairs

Laboratory accuracy was established by reviewing the demonstrated percent recoveries (%R) of the following items to verify that data are not biased.

- MS/MSD samples
- LCS/LCSD samples
- Organic system monitoring compounds (surrogates)



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Field accuracy was established by collecting and analyzing the following samples to monitor for possible ambient or cross contamination during sampling and transportation.

- Trip blanks
- Field blanks
- Equipment blanks

Method compliance was established by reviewing sample integrity, holding times, detection limits, surrogate recoveries, laboratory blanks, initial and continuing calibrations (where applicable), and the LCS/LCSD percent recoveries against method-specific requirements.

Completeness was evaluated by determining the overall ratio of the number of samples and analyses planned versus the number of samples with valid analyses. Determination of completeness included a review of the chain-of-custody (CoC), laboratory analytical methods, and other laboratory and field documents associated with this analytical data set.

Client Sample ID	Laboratory Sample Number
EB-6-21-22	2206B30-001
MKTF-46	2206B30-002
MKTF-18R	2206B30-003
MKTF-35	2206B30-004
MKTF-38	2206B30-005
MKTF-11	2206B30-006
MKTF-16	2206B30-007
FB-6-21-22	2206B30-008
DUP-6-21-22	2206B30-009
Trip Blank	2206B30-010

### SAMPLE NUMBERS TABLE





The laboratory data were reviewed to evaluate compliance with the methods and the quality of the reported data. Assessment of CoC completeness is included in Item 3 of the Data Validation Checklist. A check mark ( $\checkmark$ ) indicates that the referenced validation criteria were deemed acceptable, whereas a crossed circle ( $\otimes$ ) indicates validation criteria for which the data have been qualified by the data validator. An empty circle (O) indicates that the specified criterion does not apply to the reviewed data. Details are noted in the tables below.

#### Validation Criteria

- ✓ Data Completeness
- ✓ CoC Documentation (Item 3)
- ✓ Holding Times and Preservation (Items 6 and 7)
- O Initial and Continuing Calibrations (Items 9 and 10)
- ⊗ Laboratory Blanks (Items 11 and 12)
- ✓ MS/MSD (Items 13 and 14)
- ⊗ LCS/LCSD (Items 15 and 16)
- System Monitoring Compounds (i.e., Surrogates) (Item 17)
- 8 Field, Equipment, and Trip Blanks (Items 18 and 19)
- ⊗ Field Duplicates (Items 20 and 21)
- ✓ Laboratory Duplicates (Item 22)

### **Guidance References**

Chemical data validation was conducted in accordance with the United States Environmental Protection Agency (USEPA) Contract Laboratory Program (CLP) National Functional Guidelines for the analyses listed below, or by the appropriate method if not covered in the National Functional Guidelines.

- Data for organic analyses were evaluated according to validation criteria set forth in the USEPA CLP National Functional Guidelines for Organic Superfund Methods Data Review, document number EPA-540-R-20-005, November 2020 with additional reference to the USEPA CLP National Functional Guidelines for Organic Data Review, document number EPA 540/R-99/008, October 1999.
- Data for inorganic analyses were evaluated according to validation criteria set forth in the USEPA CLP National Functional Guidelines for Inorganic Superfund Methods Data Review, document number EPA-540-R-20-006, November 2020 with additional reference to the USEPA CLP National Functional Guidelines for Inorganic Data Review, document number EPA 540-R-04-004, October 2004.
- Review of field duplicates was conducted according to the USEPA Region I New England Environmental Data Review Supplement for Region 1 Data Review Elements and Superfund Specific Guidance/Procedures, EQADR-Supplement2, September 2020.
- Trihydro Data Validation Variance Documentation, April 2022.



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### **OVERALL DATA PACKAGE ASSESSMENT**

Based on a data validation review, the data are acceptable as delivered. Data qualified by the laboratory are discussed in Item 2 of the Validation Criteria Checklist.

The purpose of validating data and assigning qualifiers is to assist in proper data interpretation. Data that are not qualified meet the site data quality objectives. If values are assigned qualifiers other than an R (rejected, data not usable), the data may be used for site evaluation; however, consideration should be given to the reasons for qualification when interpreting sample concentrations. Data points that are assigned an R qualifier should not be used for site evaluation purposes.

If applicable, text was identified in **bold font** in the Validation Criteria Checklist to indicate that further action and/or qualification of the data were required. Data may have been qualified with J data flags by the laboratory if the result was greater than or equal to the method detection limit (MDL) but less than the reporting limit (RL). These laboratory-applied J flags were preserved, if present, and included in the Data Qualification Summary table at the end of this report. If applicable, data validation qualifiers were added for the items noted with crossed circles in the Validation Criteria section above. Please see the Data Qualification Summary table at the end of this report.

If data would be qualified with more than one flag, one qualifier was assigned based on the severity; however, all reasons for qualification were retained. Data that would be qualified with both J+ and J- flags were evaluated based on validation criteria and assigned the appropriate flag. The hierarchy of qualifiers from the most to least severe is as follows:

Data qualifiers used during this validation are included in the following table.

<u>Qualifier</u>	Definition		
J	Estimated concentration		
J+	The result is an estimated concentration, but may be biased high		
J-	The result is an estimated concentration, but may be biased low		
UJ	Estimated reporting limit		
U	Evaluated to be undetected at the reporting limit		
JB Estimated concentration due to blank contamination			

#### **Data Completeness**

The analyses were performed as requested on the CoC records. The associated samples were received by the laboratory and analyzed properly unless otherwise noted in the Criteria Checklist below. The complete data package consisted of 628 data points. The data completeness calculation does not include any submitted blank sample results. Data points were not rejected. The data completeness measure for this data package is calculated to be 100% and is acceptable.



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1. Was the report free of non-conformances identified by the laboratory? No							
1. Was the report free of non-conformances identified by the laboratory? No							
Comments: The laboratory noted the following analytical non-conformances related to this data set.							
Method 8270C: Naphthalene, 1-methylnaphthalene, and 2-methylnaphthalene may be reported by either EPA Method 8270 or EPA Method 8270 SIM, depending which method needs the least dilution. In this report naphthalene, 1-methylnaphthalene, and 2-methylnaphthalene were reported by EPA Method 8270 instead of EPA Method 8270 SIM for sample MKTF-18R. Naphthalene and 2-methylnaphthalene were reported by EPA Method 8270 instead of EPA Method 8270 SIM for SIM for SIM for sample MKTF-35.							
Method 4500CN E: For samples MKTF-18R, MKTF-38, and MKTF-16, analyses were performed from improper containers							
<ol> <li>Were the data free of data qualification flags and/or notes used by the laboratory? No If no, define.</li> </ol>							
Comments: The laboratory used the following data qualification flags with this data set.							
J – Analyte detected below quantitation limits.							
P – Sample pH not in range.							
P1 – RPD value not applicable for sample concentrations less than 5 times the reporting limit.							
R – RPD value outside of range.							
S – % Recovery outside of range due to dilution or matrix interference.							
* – Value exceeds maximum contaminant level.							
3. Were sample CoC forms and custody procedures complete? Yes							
Comments: The CoC records from field to laboratory were complete, and custody was maintained as evidenced by field and laboratory personnel signatures, dates, and times of receipt. The laboratory noted that the shipping containers were sealed, and custody seals were present and intact on the shipping containers.							
4. Were detection limits in accordance with the quality assurance project plan (QAPP), Yes							
Commente: The detection limits appeared to be acceptable. The following dilutions were applied							
Method Sample(s) Analyte(s) Dilution Factor							
200.7 Multiple Samples Total and/or Dissolved Barium 2							
200.8 MKTF-35. MKTF-11. MKTF-16 Select Total and Dissolved Metals 5							
8015D MKTF-18R, MKTF-35, MKTF-11 TPH GRO 10							
8260B MKTF-18R, MKTF-11 Select VOCs 10							
8260B MKTF-35 VOCs 20							
8260B MKTF-18R, MKTF-11 Benzene 100							
200.7 MKTF-35 Total Barium 100							
8260B MKTF-35 Benzene and Toluene 200							

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VALIDATION CRITERIA CHECKLIST	
<ol> <li>Were the reported analytical methods and constituents in compliance with the QAPP, permit, or CoC?</li> </ol>	No
Comments: The reported analytical methods were in compliance with the CoC, and the laboratory rep constituents in accordance with the CoC, with the following exceptions.	orted the requested
The CoC requested total and dissolved metals using Method 200.7; however, the laboratory analyzed both Method 200.7 and Method 200.8. This substituted analytical method, Method 200.8, met similar s and precision goals and, therefore, was an acceptable replacement.	the samples using sensitivity, accuracy,
The CoC requested cyanide using Method 335.4; however, the laboratory analyzed the samples using This substituted analytical method met similar sensitivity, accuracy, and precision goals and, therefore replacement.	Method 4500 CN E. , was an acceptable
6. Were samples received in good condition within method-specified requirements?	No
Comments: Samples were received on ice, in good condition, and with the cooler temperatures both v recommended temperature range of $4^{\circ}C \pm 2^{\circ}C$ between $0.4^{\circ}C$ and $5.3^{\circ}C$ as noted on the CoC and the <i>Check List</i> . Samples transferred to Pace National were received in good condition with the cooler temperatures below 2.0°C were judge since the laboratory did not report the sample containers as broken or frozen.	vithin and outside the e <i>Sample Log-in</i> perature outside the ed as acceptable
A preserved vial was submitted for the Method 8015D GRO analysis for sample MKTF-18R but the pH analysis was greater than two. Following EPA defined actions, the holding time for this sample was re to 7 days from sampling to analysis.	I at the time of duced from 14 days
7. Were samples extracted/digested and analyzed within method-specified or technical holding times?	Yes
Comments: The samples were extracted/digested and analyzed within method-specific and reduced h	nolding times.
8. Were reported units appropriate for the sample matrix/matrices and analytical method(s)? Specify if wet or dry units were used for soil.	Yes
Comments: The results were reported in concentration units of micrograms per liter ( $\mu$ g/L) and milligrawhich were acceptable for the sample matrix and the analyses requested.	ams per liter (mg/L),
9. Did the laboratory provide any specific initial and/or continuing calibration results?	No
Comments: Initial and continuing calibration data were not included as part of this data set.	
10. If initial and/or continuing calibration results were provided, were the results within acceptable limits?	N/A
Comments: Initial and continuing calibration data were not included as part of this data set.	
11. Was the total number of laboratory blank samples prepared equal to at least 5% of the total number of samples or analyzed as required by the method?	Yes
Comments: The total number of laboratory blank samples prepared was equal to at least 5% of the to samples.	tal number of
12. Were target analytes reported as not detected in the laboratory blanks?	No
Comments: Target analytes were reported as not detected in the laboratory blanks, with the following	exception.
TPH DRO was detected in the laboratory blank for Method 8015D batch 68348 at a concentration TPH DRO was detected in sample EB-6-21-22 at a concentration less than the laboratory report result was qualified with a U flag. The TPH DRO results for sample DUP-6-21-22 and sample Me greater than the blank detection and the laboratory reporting limit but less than 10 times the bla were qualified with JB flags. Detections of this analyte in the associated samples greater than ten ti concentration did not require qualification.	n of 0.021 mg/L. ing limit and the KTF-46 that were ank concentration mes the blank

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VALIDATION	CRITERIA	CHECKLIST
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13. Was the total number of MS samples prepared equal to at least 5% of the total number of samples or analyzed as required by the method?

Yes

Comments: The total number of matrix spike samples prepared was equal to at least 5% of the total number of samples, although MS samples were not prepared/reported for all analyses and/or batches. The matrix spike sample source for each analytical batch in this sample set has been indicated below.

<u>Method</u>	<u>Analytes</u>	<u>Batch</u>	MS Sample Source
200.7	Total Metals	68353	Not Prepared
200.7	Dissolved Metals	A88979	Not Prepared
200.7	Dissolved Metals	B88979	DUP-6-21-22
200.8	Total Metals	68353	Not Prepared
200.8	Dissolved Metals	A88981	Not Prepared
245.1	Total and Dissolved Mercury	68333	Not Prepared
504.1	EDB	68319	Not Prepared
4500CN E	Cyanide	WG1886404	MKTF-35
8015D	TPH DRO and MRO	68348	Not Prepared
8015D	TPH GRO	A89029	Not Prepared
8260B	Benzene	A89138	Not Prepared
8260B	VOCs	R89107	Not Prepared
8260B	VOCs	W89041	MKTF-46
8270C and 8270C SIM	SVOCs	68332	Not Prepared

Not Prepared – Matrix spikes were not prepared/reported for this batch.

14. For MS/MSDs prepared from project samples, were percent recoveries and RPDs within data validation or laboratory quality control (QC) limits?

Yes

Comments: The percent recoveries and RPDs for MS/MSDs prepared from project samples were within data validation and laboratory QC limits.

15. Was the total number of LCSs analyzed equal to at least 5% of the total number of samples or analyzed as required by the method?

Yes

Comments: The total number of LCS samples analyzed was equal to at least 5% of the total number of samples.



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## VALIDATION CRITERIA CHECKLIST

16. Were LCS/LCSD percent recoveries and LCS/LCSD RPDs within data validation or laboratory QC limits?

Comments: The LCS and LCSD percent recoveries and LCS/LCSD RPDs were within data validation and laboratory QC limits, with the following exceptions.

<u>Method</u>	Analyte	<u>Batch</u>	<u>LCS</u> <u>Recovery</u>	<u>LCSD</u> <u>Recovery</u>	LCS/LCSD QC Limits	LCS/LCSD RPD	<u>RPD</u> <u>QC</u> <u>Limits</u>
200.7	Total Nickel	68353	53.6%		70-130%		
200.8	Total Selenium	68353	131%		70-130%		
504.1	EDB	68319	Acceptable	Acceptable	70-130%	21.9%	20%
8015D	TPH DRO	68348	81.2%	89.2%	31.7-75.4%	Acceptable	20%
8270C SIM	1,4-Dioxane	68332	53.0%	55.0%	20.2-48.4%	Acceptable	30.1%
<u>Method</u>	Analyte	<u>Batch</u>	<u>LCS</u> <u>Recovery</u>	<u>LCSD</u> <u>Recovery</u>	LCS/LCSD QC Limits	LCS/LCSD RPD	<u>RPD</u> <u>QC</u> <u>Limits</u>
8270C SIM	Acenaphthene	68332	Acceptable	83.0%	29.8-82.7%	Acceptable	27.8%
8270C SIM	Phenanthrene	68332	Acceptable	94.0%	38.2-93.9%	Acceptable	27.9%

Total nickel results were was qualified as J- if detected and UJ if not detected in the associated samples due to evidence of potential low bias.

Analytes with LCS and/or LCSD recoveries greater than the laboratory or data validation QC limits were detected in associated samples and the results were qualified as J+ to indicate estimated concentrations that may be biased high. Non-detections of these analytes in the associated samples did not require qualification.

EDB was not detected in the associated samples and the results were qualified UJ due to evidence of poor precision.

17. Were surrogate recoveries within laboratory QC limits?

No

No

Comments: Surrogate recoveries were within laboratory QC limits, with the following exceptions.

Since Method 8270C and Method 8270C SIM surrogate associations were not available from the laboratory, qualification was assigned to all of the target analytes in a given fraction (acid or base/neutral) when two or more surrogates from the same fraction (acid or base/neutral) were outside the acceptance range. This condition did not exist for the samples MKTF-46 and MKTF-35 Method 8270C analyses.

The Method 8015D surrogate BFB was recovered in sample MKTF-35 outside the acceptance limits of 70-130% at 151%. The target analyte, TPH GRO, associated with this surrogate was detected in sample MKTF-35, and the result was assigned a J+ qualifier due to evidence of potential high bias.

Qualification of sample data was not required based on surrogate non-conformances in QC samples as the environmental samples were evaluated based on their specific surrogate recoveries.

18. Were the number of trip blank, field blank, and/or equipment blank samples collected equal to at least 10% of the total number of samples or as required by the project guidelines, QAPP, SAP, or permit?

Yes

Comments: The number of trip, field, and equipment blanks collected was equal to at least 10% of the number of samples. One trip blank sample, Trip Blank, one field blank sample, FB-6-21-22, and one equipment blank sample, EB 6-21-22, were collected as part of this sample set.



VALIDATION CRITERIA CHECKLIST							
19. Were target analytes reported as not detected in the trip blank, field blank, and/or No equipment blank samples?							
Comments: Target analytes were not detected in the trip blank, field blank, and equipment blank samples with the following exceptions.							
	Blank Sample ID         Method         Analyte         Concentration						
	FB-6-21-22	8260B	Acetone	3.6 µg/L			
	EB-6-21-22	8260B	Acetone	3.2 µg/L			
	EB-6-21-22	8260B	Methylene Chloride	0.80 µg/L			
	EB-6-21-22	8015D	TPH DRO	0.041 mg/L			
	EB-6-21-22	200.7	Dissolved Zinc	0.0075 mg/L			
20. Was the number Comments: 21-22 was c	e number of field duplicate of samples or as required The number of field duplicate ollected as a field duplicat	s collected equ l by the project cates collected re of sample Mk	al to at least 10% of the total guidelines, QAPP, SAP, or permit was equal to at least 10% of the n KTF-46.	Ye: ? umber of samples. Sa	s ample DUP-6-		
21. Were fie 0-30%,	eld duplicate RPD values v or air 0-25%)?	within data valio	lation QC limits (soil 0-50%, water	No			
Comments: within data v	As indicated in the Field I validation QC limits of 0-30	Duplicate Sumn )% for water sai	nary Table at the end of this report mples, with the following exceptior	t, field duplicate RPD ν n.	alues were		
The RPD value for TPH DRO exceeded the data validation limit of 30% at 96.3%, which was evidence of poor precision. The TPH DRO results were qualified as J for samples MKTF-46 and DUP-6-21-22.							
22. For labo laborato	oratory duplicates prepare ory QC limits?	d from project s	amples, were RPDs within	N/#	A		
Comments: Laboratory duplicates were prepared for the analysis of cyanide in batch WG1886404 from samples not associated with this data set.							
The RPD values for the laboratory duplicate samples prepared from non-project samples were evaluated and considered, but data were not qualified based on these results since matrix similarity to project samples could not be guaranteed.							



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VALIDATION CRITERIA CHECKLIST							
23. Were the following data relationships realistic?							
• Target analytes were reported by more than one method (e.g., 8260/8270, EPH/8270)?	N/A						
Comments: Target analytes were not reported by more than one method in this data set.							
<ul> <li>Both total and dissolved metals analyses were performed, and the total metals results were greater than or equal to the dissolved metals results?</li> </ul>	No						

Comments: The following table contains the exceptions in which the dissolved metals results exceeded the total metals results. The EPA has not provided guidance or requirements for the evaluation, validation, and qualification of dissolved metals results that exceed the corresponding total metals results. Therefore, qualification of results was not performed based on these data.

<u>Sample ID</u>	Analyte	<u>Total Result</u> (mg/L)	Dissolved Result (mg/L)
MKTF-35	Antimony	ND	0.00076
MKTF-16	Antimony	ND	0.00070
MKTF-18R	Arsenic	0.0065	0.0085
MKTF-11	Nickel	0.022	0.025
MKTF-46	Silver	ND	0.0032
MKTF-18R	Silver	ND	0.0016
MKTF-35	Silver	ND	0.0028
MKTF-38	Silver	ND	0.0027
MKTF-11	Silver	ND	0.0029
<u>Sample ID</u>	Analyte	<u>Total Result</u> (mg/L)	Dissolved Result (mg/L)
DUP-6-21-22	Silver	ND	0.0034
MKTF-11	Vanadium	ND	0.0030
EB-6-21-22	Zinc	ND	0.0075
MKTF-46	Zinc	0.0048	0.0084
MKTF-18R	Zinc	0.0044	0.0099
DUP-6-21-22	Zinc	0.0040	0.0071



	Client Sample ID: MKTF-46						
Analyte	Method	Laboratory Result	Duplicate Result	Relative Percent Difference (RPD)			
1,4-Dioxane	SW8270C	1.5 µg/L	1.7 µg/L	12.5% +/-RL			
Phenanthrene	SW8270C	0.22 µg/L	ND (0.30 µg/L)	DL			
TPH GRO	SW8015	0.016 mg/L	ND (0.050 mg/L)	DL			
TPH DRO	SW8015	0.070 mg/L	0.20 mg/L	96.3%			
Barium, Dissolved	E 200.7	0.037 mg/L	0.037 mg/L	0.0%			
Barium, Total	E 200.7	0.080 mg/L	0.080 mg/L	0.0%			
Chromium, Total	E 200.7	0.0021 mg/L	0.0023 mg/L	9.1% +/-RL			
Silver, Dissolved	E 200.7	0.0032 mg/L	0.0034 mg/L	6.1% +/-RL			
Vanadium, Dissolved	E 200.7	0.0040 mg/L	0.0042 mg/L	4.9% +/-RL			
Vanadium, Total	E 200.7	0.0040 mg/L	0.0044 mg/L	9.5% +/-RL			
Zinc, Dissolved	E 200.7	0.0084 mg/L	0.0071 mg/L	16.8% +/-RL			
Zinc, Total	E 200.7	0.0048 mg/L	0.0040 mg/L	18.2% +/-RL			
Arsenic, Dissolved	E200.8	0.00066 mg/L	0.00062 mg/L	6.3% +/-RL			
Arsenic, Total	E200.8	0.00086 mg/L	0.00078 mg/L	9.8% +/-RL			
Lead, Total	E200.8	0.0014 mg/L	0.0014 mg/L	0.0%			
Selenium, Total	E200.8	0.00045 mg/L	0.00051 mg/L	12.5% +/-RL			
Mercury, Total	E245.1	0.00013 mg/L	0.00013 mg/L	0.0% +/-RL			

#### FIELD DUPLICATE SUMMARY

Field duplicate RPD control limits are not to exceed 30% for water as established by USEPA Region I - New England Environmental Data Review Supplement for Region 1 Data Review Elements and Superfund Specific Guidance/Procedures, EQADR-Supplement2, September 2020.

DL – Indicates that the analyte was detected in one of the duplicate samples and was undetected in the other sample, and therefore an RPD could not be calculated. Data were not qualified since the detection was within two times the reporting limit. Non-detected results are indicated above with the applicable reporting limit as ND (RL).

+/-RL – Indicates that the detections in both of the samples were within two times the reporting limit. Qualification of data was not required.

The RPD value for TPH DRO exceeded the data validation limit of 30% at 96.3%, which was evidence of poor precision. The TPH DRO results were qualified as J for samples MKTF-46 and DUP-6-21-22.



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### DATA QUALIFICATION SUMMARY

Abbreviation	Reason
MBD	Method blank detection
HR-LCS	The LCS and/or LCSD percent recovery was greater than the upper acceptable limit indicating a possible high bias.
LR-LCS	The LCS and/or LCSD percent recovery was less than the lower acceptable limit indicating a possible low bias.
ERPD-LCS	The LCS/LCSD RPD exceeded the upper acceptable limit indicating poor precision.
HR-SUR	The surrogate percent recovery was greater than the upper acceptable limit indicating a possible high bias.
EBD	Equipment blank detection
FBD	Field blank detection
ERPD-FD	High field duplicate RPD.
MDLRL	Flagged by the laboratory: The result was greater than the MDL but less than the RL.

Analyte	Method	Field Sample ID	Lab Sample ID	Result	Limit	Units	Reviewer Qualifier	DV Flag Reasons
1,1,1-Trichloroethane	SW8260B	MKTF-16	2206b30-007a	0.95	1.0	µg/L	J	MDLRL
1,1-Dichloroethene	SW8260B	MKTF-38	2206b30-005a	0.31	1.0	µg/L	J	MDLRL
1,2-Dibromoethane	E504.1	EB-6-21-22	2206B30-001B	ND	0.0094	µg/L	UJ	ERPD-LCS
1,2-Dibromoethane	E504.1	MKTF-46	2206B30-002B	ND	0.0093	µg/L	UJ	ERPD-LCS
1,2-Dibromoethane	E504.1	MKTF-18R	2206B30-003B	ND	0.0094	µg/L	UJ	ERPD-LCS
1,2-Dibromoethane	E504.1	MKTF-35	2206B30-004B	ND	0.0094	µg/L	UJ	ERPD-LCS
1,2-Dibromoethane	E504.1	MKTF-38	2206B30-005B	ND	0.0095	µg/L	UJ	ERPD-LCS
1,2-Dibromoethane	E504.1	MKTF-11	2206B30-006B	ND	0.0094	µg/L	UJ	ERPD-LCS
1,2-Dibromoethane	E504.1	MKTF-16	2206B30-007B	ND	0.0095	µg/L	UJ	ERPD-LCS
1,2-Dibromoethane	E504.1	DUP-6-21-22	2206B30-009B	ND	0.0094	µg/L	UJ	ERPD-LCS
1,4-Dioxane	SW8270C	MKTF-46	2206b30-002c	1.5	1.0	µg/L	J+	HR-LCS
1,4-Dioxane	SW8270C	MKTF-18R	2206B30-003C	13	1.0	µg/L	J+	HR-LCS
1,4-Dioxane	SW8270C	MKTF-35	2206B30-004C	2.0	1.0	µg/L	J+	HR-LCS



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Analyte	Method	Field Sample ID	Lab Sample ID	Result	Limit	Units	Reviewer Qualifier	DV Flag Reasons
1,4-Dioxane	SW8270C	MKTF-38	2206b30-005c	3.6	1.0	µg/L	J+	HR-LCS
1,4-Dioxane	SW8270C	MKTF-11	2206b30-006c	6.6	1.0	µg/L	J+	HR-LCS
1,4-Dioxane	SW8270C	MKTF-16	2206b30-007c	1.4	1.0	µg/L	J+	HR-LCS
1,4-Dioxane	SW8270C	DUP-6-21-22	2206b30-009c	1.7	1.0	µg/L	J+	HR-LCS
1-Methylnaphthalene	SW8270C	MKTF-16	2206b30-007c	0.16	0.3	µg/L	J	MDLRL
2-Methylphenol	SW8270C	MKTF-18R	2206b30-003c	7.3	10	µg/L	J	MDLRL
Acenaphthene	SW8270C	MKTF-18R	2206B30-003C	6.3	0.30	µg/L	J+	HR-LCS
Acenaphthene	SW8270C	MKTF-35	2206B30-004C	1.6	0.30	µg/L	J+	HR-LCS
Acenaphthene	SW8270C	MKTF-11	2206b30-006c	0.44	0.30	µg/L	J+	HR-LCS
Acetone	SW8260B	EB-6-21-22	2206b30-001a	3.2	10	µg/L	U	FBD, MDLRL
Acetone	SW8260B	MKTF-38	2206b30-005a	5.4	10	µg/L	U	FBD, MDLRL
Acetone	SW8260B	MKTF-16	2206b30-007a	4.0	10	µg/L	U	FBD, MDLRL
Acetone	SW8260B	FB-6-21-22	2206b30-008a	3.6	10	µg/L	J	MDLRL
Antimony, Dissolved	E200.8	MKTF-35	2206B30-004E	0.00076	0.0010	mg/L	J	MDLRL
Antimony, Dissolved	E200.8	MKTF-16	2206B30-007E	0.00070	0.0010	mg/L	J	MDLRL
Arsenic, Dissolved	E200.8	MKTF-46	2206B30-002E	0.00066	0.0010	mg/L	J	MDLRL
Arsenic, Dissolved	E200.8	DUP-6-21-22	2206B30-009E	0.00062	0.0010	mg/L	J	MDLRL
Arsenic, Total	E200.8	MKTF-46	2206B30-002D	0.00086	0.0010	mg/L	J	MDLRL
Arsenic, Total	E200.8	DUP-6-21-22	2206B30-009D	0.00078	0.0010	mg/L	J	MDLRL
Benzo(a)anthracene	SW8270C	MKTF-18R	2206B30-003C	0.16	0.30	µg/L	J	MDLRL
Chromium, Total	E 200.7	MKTF-46	2206B30-002D	0.0021	0.0060	mg/L	J	MDLRL
Chromium, Total	E 200.7	MKTF-18R	2206B30-003D	0.0028	0.0060	mg/L	J	MDLRL
Chromium, Total	E 200.7	DUP-6-21-22	2206B30-009D	0.0023	0.0060	mg/L	J	MDLRL
cis-1,2-Dichloroethene	SW8260B	MKTF-18R	2206b30-003a	5.7	10	ug/L	J	MDLRL
Cobalt, Total	E 200.7	MKTF-18R	2206B30-003D	0.0051	0.0060	mg/L	J	MDLRL
Cobalt, Total	E 200.7	MKTF-11	2206B30-006D	0.0049	0.0060	mg/L	J	MDLRL
Isopropylbenzene	SW8260B	MKTF-18R	2206b30-003a	5.0	10	µg/L	J	MDLRL



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Analyte	Method	Field Sample ID	Lab Sample ID	Result	Limit	Units	Reviewer Qualifier	DV Flag Reasons
Isopropylbenzene	SW8260B	MKTF-16	2206b30-007a	0.48	1.0	µg/L	J	MDLRL
Lead, Dissolved	E200.8	MKTF-35	2206B30-004E	0.00021	0.00050	mg/L	J	MDLRL
Lead, Dissolved	E200.8	MKTF-38	2206B30-005E	0.0001	0.00050	mg/L	J	MDLRL
Lead, Dissolved	E200.8	MKTF-16	2206B30-007E	0.00017	0.00050	mg/L	J	MDLRL
Mercury, Total	E245.1	MKTF-46	2206B30-002D	0.00013	0.00020	mg/L	J	MDLRL
Mercury, Total	E245.1	DUP-6-21-22	2206B30-009D	0.00013	0.00020	mg/L	J	MDLRL
Methylene Chloride	SW8260B	EB-6-21-22	2206b30-001a	0.80	3.0	µg/L	J	MDLRL
n-Butylbenzene	SW8260B	MKTF-18R	2206b30-003a	3.7	30	µg/L	J	MDLRL
n-Butylbenzene	SW8260B	MKTF-35	2206b30-004a	8.0	60	µg/L	J	MDLRL
Nickel, Dissolved	E 200.7	MKTF-18R	2206B30-003E	0.0062	0.010	mg/L	J	MDLRL
Nickel, Dissolved	E 200.7	MKTF-38	2206B30-005E	0.0059	0.010	mg/L	J	MDLRL
Nickel, Dissolved	E 200.7	MKTF-16	2206B30-007E	0.0054	0.010	mg/L	J	MDLRL
Nickel, Total	E 200.7	MKTF-35	2206B30-004D	0.066	0.010	mg/L	J-	LR-LCS
Nickel, Total	E 200.7	MKTF-38	2206B30-005D	0.011	0.010	mg/L	J-	LR-LCS
Nickel, Total	E 200.7	MKTF-11	2206B30-006D	0.022	0.010	mg/L	J-	LR-LCS
Nickel, Total	E 200.7	MKTF-16	2206B30-007D	0.032	0.010	mg/L	J-	LR-LCS
Nickel, Total	E 200.7	EB-6-21-22	2206B30-001D	ND	0.010	mg/L	UJ	LR-LCS
Nickel, Total	E 200.7	MKTF-46	2206B30-002D	ND	0.010	mg/L	UJ	LR-LCS
Nickel, Total	E 200.7	DUP-6-21-22	2206B30-009D	ND	0.010	mg/L	UJ	LR-LCS
Nickel, Total	E 200.7	MKTF-18R	2206B30-003D	0.0079	0.010	mg/L	J-	LR-LCS, MDLRL
n-Propylbenzene	SW8260B	MKTF-18R	2206b30-003a	5.6	10	µg/L	J	MDLRL
Phenanthrene	SW8270C	MKTF-18R	2206B30-003C	6.7	0.30	µg/L	J+	HR-LCS
Phenanthrene	SW8270C	MKTF-35	2206B30-004C	0.38	0.30	µg/L	J+	HR-LCS
Phenanthrene	SW8270C	MKTF-11	2206b30-006c	0.38	0.30	µg/L	J+	HR-LCS
Phenanthrene	SW8270C	MKTF-46	2206b30-002c	0.22	0.30	µg/L	J+	HR-LCS, MDLRL
p-Isopropyltoluene	SW8260B	MKTF-18R	2206b30-003a	2.7	10	µg/L	J	MDLRL
p-Isopropyltoluene	SW8260B	MKTF-35	2206b30-004a	6.1	20	µg/L	J	MDLRL



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Analyte	Method	Field Sample ID	Lab Sample ID	Result	Limit	Units	Reviewer Qualifier	DV Flag Reasons
sec-Butylbenzene	SW8260B	MKTF-18R	2206b30-003a	2.6	10	µg/L	J	MDLRL
sec-Butylbenzene	SW8260B	MKTF-35	2206b30-004a	5.4	20	µg/L	J	MDLRL
sec-Butylbenzene	SW8260B	MKTF-11	2206b30-006a	5.7	10	µg/L	J	MDLRL
Selenium, Dissolved	E200.8	MKTF-16	2206B30-007E	0.00049	0.0010	mg/L	J	MDLRL
Selenium, Total	E200.8	MKTF-35	2206B30-004D	0.018	0.0050	mg/L	J+	HR-LCS
Selenium, Total	E200.8	MKTF-38	2206B30-005D	0.0035	0.0010	mg/L	J+	HR-LCS
Selenium, Total	E200.8	MKTF-16	2206B30-007D	0.0058	0.0010	mg/L	J+	HR-LCS
Selenium, Total	E200.8	MKTF-46	2206B30-002D	0.00045	0.0010	mg/L	J+	HR-LCS, MDLRL
Selenium, Total	E200.8	MKTF-18R	2206B30-003D	0.00075	0.0010	mg/L	J+	HR-LCS, MDLRL
Selenium, Total	E200.8	MKTF-11	2206B30-006D	0.00047	0.0010	mg/L	J+	HR-LCS, MDLRL
Selenium, Total	E200.8	DUP-6-21-22	2206B30-009D	0.00051	0.0010	mg/L	J+	HR-LCS, MDLRL
Silver, Dissolved	E 200.7	MKTF-46	2206B30-002E	0.0032	0.0050	mg/L	J	MDLRL
Silver, Dissolved	E 200.7	MKTF-18R	2206B30-003E	0.0016	0.0050	mg/L	J	MDLRL
Silver, Dissolved	E 200.7	MKTF-35	2206B30-004E	0.0028	0.0050	mg/L	J	MDLRL
Silver, Dissolved	E 200.7	MKTF-38	2206B30-005E	0.0027	0.0050	mg/L	J	MDLRL
Silver, Dissolved	E 200.7	MKTF-11	2206B30-006E	0.0029	0.0050	mg/L	J	MDLRL
Silver, Dissolved	E 200.7	DUP-6-21-22	2206B30-009E	0.0034	0.0050	mg/L	J	MDLRL
TPH DRO	SW8015	MKTF-18R	2206B30-003C	3.5	0.064	mg/L	J+	HR-LCS
TPH DRO	SW8015	MKTF-35	2206B30-004C	3.2	0.064	mg/L	J+	HR-LCS
TPH DRO	SW8015	MKTF-38	2206B30-005C	0.22	0.064	mg/L	J+	HR-LCS
TPH DRO	SW8015	MKTF-11	2206B30-006C	1.3	0.064	mg/L	J+	HR-LCS
TPH DRO	SW8015	EB-6-21-22	2206B30-001C	0.041	0.064	mg/L	U	HR-LCS, MBD, MDLRL
TPH DRO	SW8015	MKTF-46	2206B30-002C	0.07	0.064	mg/L	JB	ERPD-FD, HR-LCS, MBD
TPH DRO	SW8015	DUP-6-21-22	2206B30-009C	0.20	0.064	mg/L	JB	ERPD-FD, HR-LCS, MBD
TPH GRO	SW8015	MKTF-35	2206b30-004a	64	0.50	mg/L	J+	HR-SUR
TPH GRO	SW8015	MKTF-46	2206b30-002a	0.016	0.050	mg/L	J	MDLRL
TPH GRO	SW8015	MKTF-38	2206b30-005a	0.034	0.050	mg/L	J	MDLRL



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Analyte	Method	Field Sample ID	Lab Sample ID	Result	Limit	Units	Reviewer Qualifier	DV Flag Reasons
Trichloroethene	SW8260B	MKTF-38	2206b30-005a	0.47	1.0	µg/L	J	MDLRL
Vanadium, Dissolved	E 200.7	MKTF-46	2206B30-002E	0.0040	0.050	mg/L	J	MDLRL
Vanadium, Dissolved	E 200.7	MKTF-18R	2206B30-003E	0.0024	0.050	mg/L	J	MDLRL
Vanadium, Dissolved	E 200.7	MKTF-35	2206B30-004E	0.0029	0.050	mg/L	J	MDLRL
Vanadium, Dissolved	E 200.7	MKTF-38	2206B30-005E	0.0039	0.050	mg/L	J	MDLRL
Vanadium, Dissolved	E 200.7	MKTF-11	2206B30-006E	0.0030	0.050	mg/L	J	MDLRL
Vanadium, Dissolved	E 200.7	MKTF-16	2206B30-007E	0.0038	0.050	mg/L	J	MDLRL
Vanadium, Dissolved	E 200.7	DUP-6-21-22	2206B30-009E	0.0042	0.050	mg/L	J	MDLRL
Vanadium, Total	E 200.7	MKTF-46	2206B30-002D	0.004	0.050	mg/L	J	MDLRL
Vanadium, Total	E 200.7	MKTF-18R	2206B30-003D	0.011	0.050	mg/L	J	MDLRL
Vanadium, Total	E 200.7	MKTF-38	2206B30-005D	0.026	0.050	mg/L	J	MDLRL
Vanadium, Total	E 200.7	DUP-6-21-22	2206B30-009D	0.0044	0.050	mg/L	J	MDLRL
Vinyl Chloride	SW8260B	MKTF-16	2206b30-007a	0.93	1.0	µg/L	J	MDLRL
Zinc, Dissolved	E 200.7	MKTF-35	2206B30-004E	0.016	0.010	mg/L	JB	EBD
Zinc, Dissolved	E 200.7	MKTF-38	2206B30-005E	0.012	0.010	mg/L	JB	EBD
Zinc, Dissolved	E 200.7	MKTF-11	2206B30-006E	0.018	0.010	mg/L	JB	EBD
Zinc, Dissolved	E 200.7	MKTF-16	2206B30-007E	0.034	0.010	mg/L	JB	EBD
Zinc, Dissolved	E 200.7	MKTF-46	2206B30-002E	0.0084	0.010	mg/L	U	EBD, MDLRL
Zinc, Dissolved	E 200.7	MKTF-18R	2206B30-003E	0.0099	0.010	mg/L	U	EBD, MDLRL
Zinc, Dissolved	E 200.7	DUP-6-21-22	2206B30-009E	0.0071	0.010	mg/L	U	EBD, MDLRL
Zinc, Dissolved	E 200.7	EB-6-21-22	2206B30-001E	0.0075	0.010	mg/L	J	MDLRL
Zinc, Total	E 200.7	MKTF-46	2206B30-002D	0.0048	0.010	mg/L	J	MDLRL
Zinc, Total	E 200.7	MKTF-18R	2206B30-003D	0.0044	0.010	mg/L	J	MDLRL
Zinc, Total	E 200.7	DUP-6-21-22	2206B30-009D	0.0040	0.010	mg/L	J	MDLRL



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Client: Marathon Oil	Laboratory: Hall Environmental Analysis Laboratory				
Project Name: Western Refining Southwest, Quarterly GW	Sample Matrix: Groundwater				
Project Number: 697-080-002 Task: 0006	Sample Start Date: 06/22/2022				
Date Validated: 12/22/2022	Sample End Date: 06/22/2022				
Parameters Included:					
<ul> <li>Volatile Organic Compounds (VOC) by Environmental Pro Waste (SW-846) Method 8260B</li> </ul>	otection Agency (EPA) Test Methods for Evaluating Solid				
<ul> <li>1,2-Dibromoethane (EDB) by EPA Method 504.1</li> </ul>					
<ul> <li>Semivolatile Organic Compounds (SVOC) by SW-846 Me Monitoring (SIM)</li> </ul>	thod 8270C and Method 8270C with Selected Ion				
<ul> <li>Total Petroleum Hydrocarbons (TPH) Gasoline Range Or</li> </ul>	ganics (GRO) by SW-846 Method 8015D				
<ul> <li>TPH Diesel Range Organics (DRO) and Motor Oil Range</li> </ul>	Organics (MRO) by SW-846 Method 8015D Modified				
<ul> <li>Total and Dissolved Metals by EPA Method 200.7 and Method</li> </ul>	ethod 200.8				
<ul> <li>Total and Dissolved Mercury by EPA Method 245.1</li> </ul>					
<ul> <li>Cyanide by Standard Methods for the Examination of Wat</li> </ul>	ter and Wastewater (SM) Method 4500 CN E				
Laboratory Project ID: 2206C26					
Data Validator: Daran O'Hollearn, Lead Project Scientist					
Reviewer: Mike Phillips, Senior Chemist					

### DATA EVALUATION CRITERIA SUMMARY

A Tier II Data Validation was performed by Trihydro Corporation's Chemical Data Evaluation Services Group on the analytical data report packages generated by Hall Environmental Analysis Laboratory of Albuquerque, New Mexico, with additional data from Pace Analytical National of Mount Juliet, Tennessee evaluating samples from the Marathon Oil site, located in Gallup, New Mexico.

Precision, accuracy, method compliance, and completeness of this data package were assessed during this data review. Precision was determined by evaluating the calculated relative percent difference (RPD) values from:

- Field duplicate pairs
- Laboratory duplicate pairs
- Matrix spike (MS) and matrix spike duplicate (MSD) pairs
- Laboratory control sample (LCS) and laboratory control sample duplicate (LCSD) pairs

Laboratory accuracy was established by reviewing the demonstrated percent recoveries (%R) of the following items to verify that data are not biased.

- MS/MSD samples
- LCS/LCSD samples
- Organic system monitoring compounds (surrogates)



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Field accuracy was established by collecting and analyzing the following samples to monitor for possible ambient or cross contamination during sampling and transportation.

- Trip blanks
- Field blanks
- Equipment blanks

Method compliance was established by reviewing sample integrity, holding times, detection limits, surrogate recoveries, laboratory blanks, initial and continuing calibrations (where applicable), and the LCS/LCSD percent recoveries against method-specific requirements.

Completeness was evaluated by determining the overall ratio of the number of samples and analyses planned versus the number of samples with valid analyses. Determination of completeness included a review of the chain-of-custody (CoC), laboratory analytical methods, and other laboratory and field documents associated with this analytical data set.

Client Sample ID	Laboratory Sample Number
EB-6-22-22	2206C26-001
MKTF-40	2206C26-002
MKTF-31	2206C26-003
FB-6-22-22	2206C26-004
DUP-6-22-22	2206c26-005
Trip Blank	2206c26-006

### SAMPLE NUMBERS TABLE





The laboratory data were reviewed to evaluate compliance with the methods and the quality of the reported data. Assessment of CoC completeness is included in Item 3 of the Data Validation Checklist. A check mark ( $\checkmark$ ) indicates that the referenced validation criteria were deemed acceptable, whereas a crossed circle ( $\otimes$ ) indicates validation criteria for which the data have been qualified by the data validator. An empty circle (O) indicates that the specified criterion does not apply to the reviewed data. Details are noted in the tables below.

#### Validation Criteria

- ✓ Data Completeness
- ⊗ Laboratory Qualifiers (Item 2)
- ✓ CoC Documentation (Item 3)
- ✓ Holding Times and Preservation (Items 6 and 7)
- O Initial and Continuing Calibrations (Items 9 and 10)
- ⊗ Laboratory Blanks (Items 11 and 12)
- ✓ MS/MSD (Items 13 and 14)
- ⊗ LCS/LCSD (Items 15 and 16)
- ✓ System Monitoring Compounds (i.e., Surrogates) (Item 17)
- ⊗ Field, Equipment, and Trip Blanks (Items 18 and 19)
- ⊗ Field Duplicates (Items 20 and 21)
- ✓ Laboratory Duplicates (Item 22)

### **Guidance References**

Chemical data validation was conducted in accordance with the United States Environmental Protection Agency (USEPA) Contract Laboratory Program (CLP) National Functional Guidelines for the analyses listed below, or by the appropriate method if not covered in the National Functional Guidelines.

- Data for organic analyses were evaluated according to validation criteria set forth in the USEPA CLP National Functional Guidelines for Organic Superfund Methods Data Review, document number EPA-540-R-20-005, November 2020 with additional reference to the USEPA CLP National Functional Guidelines for Organic Data Review, document number EPA 540/R-99/008, October 1999.
- Data for inorganic analyses were evaluated according to validation criteria set forth in the USEPA CLP National Functional Guidelines for Inorganic Superfund Methods Data Review, document number EPA-540-R-20-006, November 2020 with additional reference to the USEPA CLP National Functional Guidelines for Inorganic Data Review, document number EPA 540-R-04-004, October 2004.
- Review of field duplicates was conducted according to the USEPA Region I New England Environmental Data Review Supplement for Region 1 Data Review Elements and Superfund Specific Guidance/Procedures, EQADR-Supplement2, September 2020.
- Trihydro Data Validation Variance Documentation, April 2022.



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## **OVERALL DATA PACKAGE ASSESSMENT**

Based on a data validation review, the data are acceptable as delivered. Data qualified by the laboratory are discussed in Item 2 of the Validation Criteria Checklist.

The purpose of validating data and assigning qualifiers is to assist in proper data interpretation. Data that are not qualified meet the site data quality objectives. If values are assigned qualifiers other than an R (rejected, data not usable), the data may be used for site evaluation; however, consideration should be given to the reasons for qualification when interpreting sample concentrations. Data points that are assigned an R qualifier should not be used for site evaluation purposes.

If applicable, text was identified in **bold font** in the Validation Criteria Checklist to indicate that further action and/or qualification of the data were required. Data may have been qualified with J data flags by the laboratory if the result was greater than or equal to the method detection limit (MDL) but less than the reporting limit (RL). These laboratory-applied J flags were preserved, if present, and included in the Data Qualification Summary table at the end of this report. If applicable, data validation qualifiers were added for the items noted with crossed circles in the Validation Criteria section above. Please see the Data Qualification Summary table at the end of this report.

If data would be qualified with more than one flag, one qualifier was assigned based on the severity; however, all reasons for qualification were retained. Data that would be qualified with both J+ and J- flags were evaluated based on validation criteria and assigned the appropriate flag. The hierarchy of qualifiers from the most to least severe is as follows:

Data qualifiers used during this validation are included in the following table.

<u>Qualifier</u>	Definition
J	Estimated concentration
J+	The result is an estimated concentration, but may be biased high
J-	The result is an estimated concentration, but may be biased low
UJ	Estimated reporting limit
U	Evaluated to be undetected at the reporting limit
JB	Estimated concentration due to blank contamination

### **Data Completeness**

The analyses were performed as requested on the CoC records. The associated samples were received by the laboratory and analyzed properly unless otherwise noted in the Criteria Checklist below. The complete data package consisted of 270 data points. The data completeness calculation does not include any submitted blank sample results. Data points were not rejected. The data completeness measure for this data package is calculated to be 100% and is acceptable.



		VALIDATION	CRITERIA CHECKLIST			
1. Was the repo	ort free of no	on-conformances identified b	by the laboratory?		Yes	
Comments: The laboratory did not report non-conformances related to the analytical data for this sample set.						
2. Were the dat If no, define.	a free of da	ta qualification flags and/or r	notes used by the laboratory?		No	
Comments: The	laboratory u	sed the following data qualit	fication flags with this data set.			
E – Estimated va 81. This result v	lue. The tai vas assigne	rget analyte 1,4-dioxane w	as flagged by the laboratory an estimated concentration.	with the E flag fo	r sample MKTF	
I – Analyte detec	ted below q	uantitation limits				
3 – The associa	ted batch Q	C was outside the establishe	ed quality control range for pred	cision.		
6 – The sample	matrix interf	ered with the ability to make	e any accurate determination; s	pike value is low.		
، 1 – RPD value	not applicab	le for sample concentrations	s less than 5 times the reporting	g limit.		
₹ – % RPD is ou	tside of rang	le.				
s – % Recovery	outside of ra	nge due to dilution or matrix	interference.			
- Value exceed	s maximum	contaminant level.				
. Were sample	e CoC forms	and custody procedures co	omplete?		Yes	
ealed, and custo	ersonnel sign ody seals we	natures, dates, and times of ere present and intact on the	receipt. The laboratory noted to shipping containers.	that the shipping c	ontainers were	
<ul> <li>vvere detecti permit, or me Comments: The</li> </ul>	on limits in a ethod, or ind	accordance with the quality a icated as acceptable?	assurance project plan (QAPP)	, re applied	Yes	
<ul> <li>vvere detecti permit, or me</li> <li>Comments: The</li> </ul>	on limits in a ethod, or ind detection lin Method	accordance with the quality a icated as acceptable? nits appeared to be acceptal Sample(s)	assurance project plan (QAPP) ble. The following dilutions we	, re applied.	Yes	
e. vvere detecti permit, or me Comments: The	on limits in a ethod, or ind detection lin <u>Method</u> 8260B	accordance with the quality a icated as acceptable? nits appeared to be acceptab <u>Sample(s)</u> MKTF-31	assurance project plan (QAPP) ble. The following dilutions we <u>Analyte(s)</u> VOCs	, re applied. Dilution Factor 2	Yes	
4. vvere detecti permit, or me Comments: The	on limits in a ethod, or ind detection lin <u>Method</u> 8260B 200.8	accordance with the quality a icated as acceptable? nits appeared to be acceptal <u>Sample(s)</u> MKTF-31 MKTF-40, DUP-6-22-22	assurance project plan (QAPP) ble. The following dilutions we <u>Analyte(s)</u> VOCs Dissolved and Total Metals	, re applied. <u>Dilution Factor</u> 2 5	Yes	
4. vvere detecti permit, or me Comments: The	on limits in a ethod, or ind detection lin <u>Method</u> 8260B 200.8 8260B	accordance with the quality a icated as acceptable? nits appeared to be acceptal <u>Sample(s)</u> MKTF-31 MKTF-40, DUP-6-22-22 MKTF-31	assurance project plan (QAPP) ble. The following dilutions we <u>Analyte(s)</u> VOCs Dissolved and Total Metals MTBE	re applied. Dilution Factor 2 5 10	Yes	

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VALIDATION CRITERIA CHECKLIST								
6. Were samples received in good condition within method-specified requirements? No								
Comments: Samples were received on ice, in good condition, and with the cooler temperatures outside the recommended temperature range of $4^{\circ}C \pm 2^{\circ}C$ at $0.9^{\circ}C$ and $1.1^{\circ}C$ as noted on the CoC and the <i>Sample Log-in Check List</i> . Samples transferred to Pace National were received in good condition with the cooler temperature outside the recommended range at $0.5^{\circ}C$ as noted on the CoC.								
The cooler temperatures below 2.0°C were judged as acceptable since the laboratory did not report the sample containers as broken or frozen.								
7. Were samples technical holdi	7. Were samples extracted/digested and analyzed within method-specified or technical holding times?							
Comments: The sa	amples were ex	tracted/digested and analyzed v	vithin method-sp	pecific holding times.				
8. Were reported method(s)? S	units appropria pecify if wet or	ate for the sample matrix/matrice dry units were used for soil.	es and analytical		Yes			
Comments: The re which were accepta	esults were repo able for the sar	orted in concentration units of m nple matrix and the analyses rec	icrograms per lit juested.	er (μg/L) and milligrams	per liter (mg/L),			
9. Did the laborat	ory provide an	y specific initial and/or continuin	g calibration res	ults?	No			
Comments: Initial	and continuing	calibration data were not include	ed as part of this	s data set.				
10. If initial and/or acceptable lim	continuing cali	bration results were provided, w	ere the results w	vithin	N/A			
Comments: Initial	and continuing	calibration data were not include	ed as part of this	s data set.				
11. Was the total r the total numb	number of labor er of samples o	atory blank samples prepared e or analyzed as required by the m	qual to at least ethod?	5% of	Yes			
Comments: The to samples.	tal number of l	aboratory blank samples prepare	ed was equal to	at least 5% of the total ı	number of			
12. Were target ar	alytes reported	as not detected in the laborato	ry blanks?		No			
Comments: Target	t analytes were	reported as not detected in the	laboratory blank	s, with the following exc	eption.			
TPH DRO was detected in the laboratory blank for Method 8015D batch 68348 at a concentration of 0.021 mg/L. TPH DRO results in the associated samples (EB-6-22-22 and MKTF-40) that were less than the laboratory reporting limit were assigned U qualifiers. The TPH DRO result for sample MKTF-31 that was greater than the laboratory reporting limit but less than or equal to 10 times the blank concentration was assigned a JB qualifier. The TPH DRO result in the associated sample DUP-6-22-22 was greater than ten times the blank concentration and did not require qualification.								
13. Was the total r number of sam	number of MS s oples or analyz	amples prepared equal to at lea ed as required by the method?	st 5% of the tota	al	Yes			
Comments: The to although MS samp analytical batch in t	tal number of r les were not pr his sample set	natrix spike samples prepared w epared/reported for all analyses has been indicated below.	as equal to at le and/or batches.	east 5% of the total num The matrix spike samp	ber of samples, le source for each			
	<u>Method</u>	Analytes	<u>Batch</u>	MS Sample Source				
	200.7	Total Metals	68353	DUP-6-22-22				
	200.7	Dissolved Metals	B88979	Not Prepared				
	200.8	Total Metals	68353	Not Prepared				
	200.8	Dissolved Metals	B89062	Not Prepared				
lL	200.8	Dissolved Metals	C89140	Not Prepared				

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		VALI	DATION CRITER	RIA CHECKLIS	Т			
	<u>Method</u>	<u>An</u>	alytes	<u>Batch</u>	MS Sample	e Source		
	245.1	Total and Dis	ssolved Mercury	68334	EB-6-2	EB-6-22-22		
	504.1	I	EDB 68319 DUP-6		DUP-6-	DUP-6-22-22		
	4500CN E	Cy	vanide	WG1888356	Not Asso	ociated		
	4500CN E	Су	/anide	WG1888360	Not Asso	ociated		
	8015D	TPH DR	O and MRO	68348	Not Pre	pared		
	8015D	(	GRO	A89029	Not Pre	pared		
	8260B	١	/0C	A89211	Not Pre	pared		
	8260B	١	/0C	R89156	MKTF	-40		
	8270C SIM	S	VOC	68332	Not Pre	pared		
	8270C	S	VOC	68332	Not Pre	pared		
lot Associated –	The MS sample sour	ce was not ass	ociated with this pr	oject.	•			
ot Prepared – N	latrix spikes were not	prepared/repor	ted for this batch.					
4. For MS/MS within data	SDs prepared from prepared fro	oroject sample atory quality c	es, were percent ontrol (QC) limits	recoveries and ??	RPDs	Yes		
comments: Th mits.	e MS/MSD percent	recoveries a	nd RPDs for proj	ect samples we	re within data v	alidation and lal	ooratory C	
he percent rec ut data were r	coveries and RPD v ot qualified based o	alues for MS/ on those resul	MSDs prepared ts since matrix s	from non-projec imilarity to proje	t samples were ct samples cou	e evaluated and uld not be guara	considere nteed.	
5. Was the to samples or	tal number of LCSs analyzed as requir	analyzed equed by the me	ual to at least 5% thod?	o of the total nur	nber of	Yes		
comments: Th	e total number of L	CS samples a	analyzed was equ	ual to at least 59	% of the total n	umber of sample	es.	
<ol> <li>Were LCS, laboratory</li> </ol>	LCSD percent reco	veries and L0	CS/LCSD RPDs	within data valid	ation or	No		
Comments: Th mits, with the f	e LCS and LCSD p	ercent recove	eries and LCS/LC	CSD RPDs were	within data va	lidation and labo	oratory QC	
Method	<u>Analyte</u>	<u>Batch</u>	<u>LCS</u> <u>Recovery</u>	<u>LCSD</u> <u>Recovery</u>	LCS/LCSD QC Limits	LCS/LCSD RPD	<u>RPD Q</u> <u>Limits</u>	
200.7	Total Nickel	68353	<b>53.6%</b>		70-130%			
200.8	Total Selenium	68353	131%		70-130%			
8011	EDB	68319	Acceptable	Acceptable	70-130%	21.9%	20%	
8015D	TPH DRO	68348	81.2%	89.2%	31.7-75.4%	Acceptable	20%	
8270C SIM	1,4-Dioxane	68332	53.0%	55.0%	20.2-48.4%	Acceptable	30.1%	
8270C SIM	Acenaphthene	68332	Acceptable	83.0%	29.8-82.7%	Acceptable	27.8%	
8270C SIM	Phenanthrene	68332	Acceptable	94.0%	38.2-93.9%	Acceptable	27.9%	
Detections of t qualified as U	total nickel in the a J due to evidence	associated stored stores	amples were qu	alified as J- an	d non-detecte	ed total nickel r	esults we	

detection of these analytes in the associated samples did not require qualification.

EDB was not detected in the associated samples, and the results were assigned UJ qualifiers due to evidence of poor precision.



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No

Yes

## VALIDATION CRITERIA CHECKLIST

17. Were surrogate recoveries within laboratory QC limits?

Comments: Surrogate recoveries were within laboratory QC limits, with the following exceptions.

Since Method 8270C surrogate associations were not available from the laboratory, qualification was assigned to all of the target analytes in a given fraction (acid or base/neutral) when two or more surrogates from the same fraction (acid or base/neutral) were outside the acceptance range. This condition did not exist for the sample EB-6-22-22, and qualification of sample data was not required.

Qualification of sample data was not required based on surrogate non-conformances in QC samples as the environmental samples were evaluated based on their specific surrogate recoveries.

18. Were the number of trip blank, field blank, and/or equipment blank samples collected equal to at least 10% of the total number of samples or as required by the project guidelines, QAPP, SAP, or permit?

Comments: The number of trip, field, and equipment blanks collected was equal to at least 10% of the number of samples. One trip blank sample, Trip Blank, one field blank sample, FB-6-22-22, and one equipment blank sample, EB-6-22-22, were collected as part of this sample set.

19. Were target analytes reported as not detected in the trip blank, field blank, and/or No equipment blank samples?

Comments: Target analytes were not detected in the trip blank, field blank, and equipment blank samples with the following exceptions.

Blank Sample ID	<u>Method</u>	<u>Analyte</u>	<u>Concentration</u>
FB-6-22-22	8260B	Acetone	5.7 μg/L
EB-6-22-22	200.7	<b>Dissolved Vanadium</b>	0.0021 mg/L
EB-6-22-22	200.7	Dissolved Zinc	0.0066 mg/L
EB-6-22-22	8015	TPH DRO	0.023 mg/L
EB-6-22-22	8260B	Acetone	5.30 µg/L

Detections of acetone, dissolved vanadium, and dissolved zinc in the associated samples that were less than the blank results and/or less than the applicable reporting limits were assigned U qualifiers. The detections of dissolved zinc in the associated samples DUP-6-22-22 and MKTF-40 that were greater than the reporting limit but less than 10 times the blank result were assigned JB qualifiers. Non-detections of the identified analytes in the associated samples did not require qualification.

The TPH DRO results for the samples in batch 68348 were previously qualified due to a laboratory blank detection; therefore, additional qualification due to the equipment blank contamination was not required.

20. Was the number of field duplicates collected equal to at least 10% of the total Yes number of samples or as required by the project guidelines, QAPP, SAP, or permit?

Comments: The number of field duplicates collected was equal to at least 10% of the number of samples.

Sample DUP-6-22-22 was collected as a field duplicate of sample MKTF-40.



## VALIDATION CRITERIA CHECKLIST

21. Were field duplicate RPD values within data validation QC limits (soil 0-50%, water 0-30%, or air 0-25%)?

Comments: As indicated in the Field Duplicate Summary Table at the end of this report, field duplicate RPD values were within data validation QC limits of 0-30% for water samples, with the following exceptions.

The RPD value for TPH DRO greatly exceeded the data validation limit of 30% at 163.6%. The reported results for TPH DRO were assigned J qualifiers for the parent and field duplicate samples, and J qualifiers for the results for TPH DRO in the associated samples due to evidence of extremely poor precision (RPD > 100%).

An RPD value could not be calculated for TPH ORO for the field duplicate pair MKTF-40 and DUP-6-22-22 since the analyte was detected in the duplicate sample and was undetected in the parent sample. As the detection in the duplicate sample was greater than two times the reporting limit, TPH ORO was qualified as J and UJ for the duplicate and parent samples, respectively.

22. For laboratory duplicates prepared from project samples, were RPDs within laboratory QC limits?

N/A

No

Comments: Laboratory duplicates were prepared for these analyses, and the laboratory duplicate sample sources are summarized in the following table.

<u>Method</u>	<u>Analytes</u>	<u>Batch</u>	Laboratory Duplicate Sample Source
4500CN E	Cyanide	WG1888356	Not Associated
4500CN E	Cyanide	WG1888360	Not Associated

Not Associated - The duplicate sample source was not associated with this project.

The RPD values for laboratory duplicate samples prepared from non-project samples were evaluated and considered, but data were not qualified based on these results since matrix similarity to project samples could not be guaranteed.



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VALIDATION CRITERIA CHECKLIST									
23. Were the following data relationships realistic?									
• Target analytes were reported by more than one method (e.g., 8260/8270, N/A EPH/8270)?									
Comments: Target ana	Comments: Target analytes were not reported by more than one method in this data set.								
Both total and or results were gr	dissolved metals ana eater than or equal to	lyses were perforr the dissolved me	ned, and the tota tals results?	al metals	No				
Comments: The followin results. The EPA has no metals results that excer based on these data.	ng table contains the ot provided guidance ed the corresponding	exceptions in whit or requirements f total metals resul	ch the dissolved or the evaluatior ts. Therefore, q	metals results exceent, validation, and qua ualification of results	eded the total metals lification of dissolved was not performed				
	Sample ID	Analyte	<u>Total Result</u> (mg/L)	Dissolved Result (mg/L)					
	MKTF-40	Nickel	0.0093	0.013					
	DUP-6-22-22	Nickel	0.010	0.011					
	MKTF-40	Silver	ND	0.0056					

Silver

Silver

Vanadium

Zinc

ND

ND

ND

ND

0.0016

0.0060

0.0021

0.0066

MKTF-31

DUP-6-22-22

EB-6-22-22

EB-6-22-22



Client Sample ID: MKTF-40 Field Duplicate Sample ID: DUP-6-22-22									
Analyte	Method	Laboratory Result	Duplicate Result	Relative Percent Difference (RPD)					
Barium, Dissolved	E 200.7	0.047 mg/L	0.050 mg/L	6.2%					
Barium, Total	E 200.7	0.29 mg/L	0.26 mg/L	10.9%					
Chromium, Total	E 200.7	0.0048 mg/L	0.0032 mg/L	40.0% +/-RL					
Cobalt, Total	E 200.7	0.0057 mg/L	0.0076 mg/L	28.6% +/-RL					
Nickel, Dissolved	E 200.7	0.013 mg/L	0.011 mg/L	16.7% +/-RL					
Nickel, Total	E 200.7	0.0093 mg/L	0.010 mg/L	7.3% +/-RL					
Silver, Dissolved	E 200.7	0.0056 mg/L	0.0060 mg/L	6.9% +/-RL					
Vanadium, Dissolved	E 200.7	0.013 mg/L	0.013 mg/L	0.0% +/-RL					
Vanadium, Total	E 200.7	0.027 mg/L	0.025 mg/L	7.7% +/-RL					
Zinc, Dissolved	E 200.7	0.018 mg/L	0.013 mg/L	32.3% +/-RL					
Zinc, Total	E 200.7	0.024 mg/L	0.019 mg/L	23.3%					
Arsenic, Dissolved	E200.8	0.00092 mg/L	0.00080 mg/L	14.0% +/-RL					
Arsenic, Total	E200.8	0.0024 mg/L	0.0017 mg/L	34.1% +/-RL					
Lead, Total	E200.8	0.012 mg/L	0.0099 mg/L	19.2%					
Cyanide, Total	E335.4	0.0128 mg/L	0.0129 mg/L	0.8%					
TPH DRO	SW8015	0.053 mg/L	0.53 mg/L	163.6%					
TPH ORO	SW8015	ND (0.080 mg/L)	1.1 mg/L	DL					
1,1-Dichloroethane	SW8260B	0.80 µg/L	0.97 µg/L	19.2% +/-RL					
MTBE	SW8260B	1.3 µg/L	1.4 µg/L	7.4% +/-RL					
1,4-Dioxane	SW8270C	11 µg/L	11 µg/L	0.0%					

## FIELD DUPLICATE SUMMARY

Field duplicate RPD control limits are not to exceed 30% for water as established by USEPA Region I - New England Environmental Data Review Supplement for Region 1 Data Review Elements and Superfund Specific Guidance/Procedures, EQADR-Supplement2, September 2020.

DL – Indicates that the analyte was detected in one of the duplicate samples and was undetected in the other sample, and therefore an RPD could not be calculated. Data were not qualified since the detection was within two times the reporting limit. Non-detected results are indicated above with the applicable reporting limit as ND (RL).

+/-RL – Indicates that the detections in both of the samples were within two times the reporting limit. Qualification of data was not required.

The RPD value for TPH DRO greatly exceeded the data validation limit of 30% at 163.6%. The reported results for TPH DRO were assigned J qualifiers for the parent and field duplicate samples, and J qualifiers for the results for TPH DRO in the associated samples due to evidence of extremely poor precision (RPD > 100%).

An RPD value could not be calculated for TPH ORO for the field duplicate pair MKTF-40 and DUP-6-22-22 since the analyte was detected in the duplicate sample and was undetected in the parent sample. As the detection in the duplicate sample was greater than two times the reporting limit, TPH ORO was qualified as J and UJ for the duplicate and parent samples, respectively.



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## DATA QUALIFICATION SUMMARY

Abbreviation	Reason
EBD	Equipment blank detection
ECAL	The result exceeds the calibration range.
ERPD-FD	High field duplicate RPD.
ERPD-LCS	The LCS/LCSD RPD exceeded the upper acceptable limit indicating poor precision.
FBD	Field blank detection
MBD	Method blank detection
HR-LCS	The LCS and/or LCSD percent recovery was greater than the upper acceptable limit indicating a possible high bias.
LR-LCS	The LCS and/or LCSD percent recovery was less than the lower acceptable limit indicating a possible low bias.
MDLRL	Flagged by the laboratory: The result was greater than the MDL but less than the RL.

Analyte	Method	Field Sample ID	Lab Sample ID	Result	Limit	Units	Reviewer Qualifier	DV Flag Reasons
1,1,1-Trichloroethane	SW8260B	MKTF-31	2206C26-003a	2.0	2.0	µg/L	J	MDLRL
1,1-Dichloroethane	SW8260B	MKTF-40	2206C26-002a	0.80	1.0	µg/L	J	MDLRL
1,1-Dichloroethane	SW8260B	DUP-6-22-22	2206c26-005a	0.97	1.0	µg/L	J	MDLRL
1,2-Dibromoethane	E504.1	EB-6-22-22	2206C26-001B	ND	0.0093	µg/L	UJ	ERPD-LCS
1,2-Dibromoethane	E504.1	MKTF-40	2206C26-002B	ND	0.0093	µg/L	UJ	ERPD-LCS
1,2-Dibromoethane	E504.1	MKTF-31	2206C26-003B	ND	0.0095	µg/L	UJ	ERPD-LCS
1,2-Dibromoethane	E504.1	DUP-6-22-22	2206C26-005B	ND	0.0093	µg/L	UJ	ERPD-LCS
1,4-Dioxane	SW8270C	MKTF-40	2206c26-002c	11	1.0	µg/L	J+	HR-LCS
1,4-Dioxane	SW8270C	DUP-6-22-22	2206c26-005c	11	1.0	µg/L	J+	HR-LCS
1,4-Dioxane	SW8270C	MKTF-31	2206c26-003c	79	1.0	µg/L	J+	ECAL, HR-LCS
Acetone	SW8260B	EB-6-22-22	2206C26-001a	5.3	10	µg/L	U	FBD, MDLRL
Acetone	SW8260B	FB-6-22-22	2206C26-004a	5.7	10	µg/L	J	MDLRL
Arsenic, Dissolved	E200.8	MKTF-40	2206C26-002E	0.00092	0.0050	mg/L	J	MDLRL



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Analyte	Method	Field Sample ID	Lab Sample ID	Result	Limit	Units	Reviewer Qualifier	DV Flag Reasons
Arsenic, Dissolved	E200.8	MKTF-31	2206C26-003E	0.00064	0.0010	mg/L	J	MDLRL
Arsenic, Dissolved	E200.8	DUP-6-22-22	2206C26-005E	0.0008	0.0050	mg/L	J	MDLRL
Arsenic, Total	E200.8	MKTF-40	2206C26-002D	0.0024	0.0050	mg/L	J	MDLRL
Arsenic, Total	E200.8	DUP-6-22-22	2206C26-005D	0.0017	0.0050	mg/L	J	MDLRL
Benzene	SW8260B	MKTF-31	2206C26-003a	0.51	2.0	µg/L	J	MDLRL
Chromium, Total	E 200.7	MKTF-40	2206C26-002D	0.0048	0.0060	mg/L	J	MDLRL
Chromium, Total	E 200.7	DUP-6-22-22	2206C26-005D	0.0032	0.0060	mg/L	J	MDLRL
Cobalt, Total	E 200.7	MKTF-40	2206C26-002D	0.0057	0.0060	mg/L	J	MDLRL
Lead, Dissolved	E200.8	MKTF-31	2206C26-003E	0.000088	0.00050	mg/L	J	MDLRL
Nickel, Dissolved	E 200.7	MKTF-31	2206C26-003E	0.0058	0.010	mg/L	J	MDLRL
Nickel, Total	E 200.7	MKTF-31	2206C26-003D	0.016	0.010	mg/L	J-	LR-LCS
Nickel, Total	E 200.7	EB-6-22-22	2206C26-001D	ND	0.010	mg/L	UJ	LR-LCS
Nickel, Total	E 200.7	MKTF-40	2206C26-002D	0.0093	0.010	mg/L	J-	LR-LCS, MDLRL
Nickel, Total	E 200.7	DUP-6-22-22	2206C26-005D	0.010	0.010	mg/L	J-	LR-LCS, MDLRL
Selenium, Total	E200.8	MKTF-31	2206C26-003D	0.0022	0.0010	mg/L	J+	HR-LCS
Silver, Dissolved	E 200.7	MKTF-31	2206C26-003E	0.0016	0.0050	mg/L	J	MDLRL
TPH DRO	SW8015	DUP-6-22-22	2206C26-005C	0.53	0.0640	mg/L	J+	ERPD-FD, HR-LCS
TPH DRO	SW8015	MKTF-31	2206C26-003C	0.21	0.064	mg/L	JB	MBD, ERPD-FD, HR-LCS
TPH DRO	SW8015	EB-6-22-22	2206C26-001C	0.023	0.064	mg/L	J+	ERPD-FD, HR-LCS, MBD, MDLRL
TPH DRO	SW8015	MKTF-40	2206C26-002C	0.053	0.064	mg/L	U	MBD, ERPD-FD, HR-LCS, MDLRL
TPH ORO	SW8015	DUP-6-22-22	2206C26-005C	1.1	0.080	mg/L	J	ERPD-FD
TPH ORO	SW8015	MKTF-40	2206C26-002C	ND	0.080	mg/L	UJ	ERPD-FD
Vanadium, Dissolved	E 200.7	MKTF-40	2206C26-002E	0.013	0.050	mg/L	U	EBD, MDLRL
Vanadium, Dissolved	E 200.7	MKTF-31	2206C26-003E	0.0067	0.050	mg/L	U	EBD, MDLRL
Vanadium, Dissolved	E 200.7	DUP-6-22-22	2206C26-005E	0.013	0.050	mg/L	U	EBD, MDLRL
Vanadium, Dissolved	E 200.7	EB-6-22-22	2206C26-001E	0.0021	0.050	mg/L	J	MDLRL



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Analyte	Method	Field Sample ID	Lab Sample ID	Result	Limit	Units	Reviewer Qualifier	DV Flag Reasons
Vanadium, Total	E 200.7	MKTF-40	2206C26-002D	0.027	0.050	mg/L	J	MDLRL
Vanadium, Total	E 200.7	MKTF-31	2206C26-003D	0.036	0.050	mg/L	J	MDLRL
Vanadium, Total	E 200.7	DUP-6-22-22	2206C26-005D	0.025	0.050	mg/L	J	MDLRL
Zinc, Dissolved	E 200.7	MKTF-40	2206C26-002E	0.018	0.010	mg/L	JB	EBD
Zinc, Dissolved	E 200.7	DUP-6-22-22	2206C26-005E	0.013	0.010	mg/L	JB	EBD
Zinc, Dissolved	E 200.7	MKTF-31	2206C26-003E	0.0079	0.010	mg/L	U	EBD, MDLRL
Zinc, Dissolved	E 200.7	EB-6-22-22	2206C26-001E	0.0066	0.010	mg/L	J	MDLRL



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Client: Marathon Oil	Laboratory: Hall Environmental Analysis Laboratory
Project Name: Western Refining Southwest, Q2 GW Sampling	Sample Matrix: Groundwater
Project Number: 697-080-002 Task 0006	Sample Start Date: 06/24/2022
Date Validated: 10/03/2022	Sample End Date: 06/24/2022
Parameters Included:	
<ul> <li>Volatile Organic Compounds (VOC) by Environmental Pr Waste (SW-846) Method 8260B</li> </ul>	otection Agency (EPA) Test Methods for Evaluating Solid
<ul> <li>1,2-Dibromoethane (EDB) by EPA Method 504.1</li> </ul>	
<ul> <li>Semivolatile Organic Compounds (SVOC) by SW-846 Me Monitoring (SIM)</li> </ul>	ethod 8270C and Method 8270 with Selected Ion
<ul> <li>Total Petroleum Hydrocarbons (TPH) Gasoline Range Or</li> </ul>	rganics (GRO) by SW-846 Method 8015D
<ul> <li>TPH Diesel Range Organics (DRO) and Motor Oil Range</li> </ul>	Organics (MRO) by SW-846 Method 8015D Modified
<ul> <li>Total and Dissolved Metals by EPA Method 200.7 and Method</li> </ul>	ethod 200.8
<ul> <li>Total and Dissolved Mercury by EPA Method 245.1</li> </ul>	
<ul> <li>Chemical Oxygen Demand (COD) by EPA Method 410.4</li> </ul>	
<ul> <li>Cyanide by Standard Methods for the Examination of Wa</li> </ul>	ter and Wastewater (SM) Method 4500 CN E
<ul> <li>Biochemical Oxygen Demand (BOD) by SM Method 5210</li> </ul>	DB
<ul> <li>E. Coli by SM Method 9223B</li> </ul>	
Laboratory Project ID: 2026E09	
Data Validator: Kyle Power, Environmental Chemist	
Reviewer: Charles Ballek, Senior Chemist	

## DATA EVALUATION CRITERIA SUMMARY

A Tier II Data Validation was performed by Trihydro Corporation's Chemical Data Evaluation Services Group on the analytical data report packages generated by Hall Environmental Analysis Laboratory of Albuquerque, New Mexico, with additional data from Pace Analytical National of Mount Juliet, Tennessee evaluating samples from the Marathon Oil site, located in Gallup, New Mexico.

Precision, accuracy, method compliance, and completeness of this data package were assessed during this data review. Precision was determined by evaluating the calculated relative percent difference (RPD) values from:

- Field duplicate pairs
- Laboratory duplicate pairs
- Matrix spike (MS) and matrix spike duplicate (MSD) pairs
- Laboratory control sample (LCS) and laboratory control sample duplicate (LCSD) pairs

Laboratory accuracy was established by reviewing the demonstrated percent recoveries (%R) of the following items to verify that data are not biased.

- MS/MSD samples
- LCS/LCSD samples
- Organic system monitoring compounds (surrogates)



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Field accuracy was established by collecting and analyzing the following samples to monitor for possible ambient or cross contamination during sampling and transportation.

- Trip blank
- Field blank
- Equipment blank

Method compliance was established by reviewing sample integrity, holding times, detection limits, surrogate recoveries, laboratory blanks, initial and continuing calibrations (where applicable), and the LCS/LCSD percent recoveries against method-specific requirements.

Completeness was evaluated by determining the overall ratio of the number of samples and analyses planned versus the number of samples with valid analyses. Determination of completeness included a review of the chain-of-custody (CoC), laboratory analytical methods, and other laboratory and field documents associated with this analytical data set.

Client Sample ID	Laboratory Sample Number
EB-6-24-22	2206E09-001
MKTF-27	2206E09-002
MKTF-28	2206E09-003
NAPIS-2	2206E09-004
NAPIS-3	2206E09-005
KA-3	2206E09-006
STP-1 to EP-2	2206E09-007
EP-2	2206E09-008
EP-6	2206E09-009
FB-6-24-22	2206E09-010
DUP-6-24-22	2206E09-011
Trip Blank	2206E09-012

#### SAMPLE NUMBERS TABLE





The laboratory data were reviewed to evaluate compliance with the methods and the quality of the reported data. Assessment of CoC completeness is included in Item 3 of the Data Validation Checklist. A check mark ( $\checkmark$ ) indicates that the referenced validation criteria were deemed acceptable, whereas a crossed circle ( $\otimes$ ) indicates validation criteria for which the data have been qualified by the data validator. An empty circle (O) indicates that the specified criterion does not apply to the reviewed data. Details are noted in the tables below.

## Validation Criteria

- ✓ Data Completeness
- ✓ CoC Documentation (Item 3)
- ✓ Holding Times and Preservation (Items 6 and 7)
- O Initial and Continuing Calibrations (Items 9 and 10)
- ⊗ Laboratory Blanks (Items 11 and 12)
- ✓ MS/MSD (Items 13 and 14)
- ⊗ LCS/LCSD (Items 15 and 16)
- System Monitoring Compounds (i.e., Surrogates) (Item 17)
- 8 Field, Equipment, and Trip Blanks (Items 18 and 19)
- ⊗ Field Duplicate (Items 20 and 21)
- ✓ Laboratory Duplicates (Item 22)

### **Guidance References**

Chemical data validation was conducted in accordance with the United States Environmental Protection Agency (USEPA) Contract Laboratory Program (CLP) National Functional Guidelines for the analyses listed below, or by the appropriate method if not covered in the National Functional Guidelines.

- Data for organic analyses were evaluated according to validation criteria set forth in the USEPA CLP National Functional Guidelines for Organic Superfund Methods Data Review, document number EPA-540-R-20-005, November 2020 with additional reference to the USEPA CLP National Functional Guidelines for Organic Data Review, document number EPA 540/R-99/008, October 1999.
- Data for inorganic analyses were evaluated according to validation criteria set forth in the USEPA CLP National Functional Guidelines for Inorganic Superfund Methods Data Review, document number EPA-540-R-20-006, November 2020 with additional reference to the USEPA CLP National Functional Guidelines for Inorganic Data Review, document number EPA 540-R-04-004, October 2004.
- Review of field duplicates was conducted according to the USEPA Region I New England Environmental Data Review Supplement for Region 1 Data Review Elements and Superfund Specific Guidance/Procedures, EQADR-Supplement2, September 2020.
- Trihydro Data Validation Variance Documentation, April 2022.



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## **OVERALL DATA PACKAGE ASSESSMENT**

Based on a data validation review, the data are acceptable as delivered. Data qualified by the laboratory are discussed in Item 2 of the Validation Criteria Checklist.

The purpose of validating data and assigning qualifiers is to assist in proper data interpretation. Data that are not qualified meet the site data quality objectives. If values are assigned qualifiers other than an R (rejected, data not usable), the data may be used for site evaluation; however, consideration should be given to the reasons for qualification when interpreting sample concentrations. Data points that are assigned an R qualifier should not be used for site evaluation purposes.

If applicable, text was identified in **bold font** in the Validation Criteria Checklist to indicate that further action and/or qualification of the data were required. Data may have been qualified with J data flags by the laboratory if the result was greater than or equal to the method detection limit (MDL) but less than the reporting limit (RL). These laboratory-applied J flags were preserved, if present, and included in the Data Qualification Summary table at the end of this report. If applicable, data validation qualifiers were added for the items noted with crossed circles in the Validation Criteria section above. Please see the Data Qualification Summary table at the end of this report.

If data would be qualified with more than one flag, one qualifier was assigned based on the severity; however, all reasons for qualification were retained. Data that would be qualified with both J+ and J- flags were evaluated based on validation criteria and assigned the appropriate flag. The hierarchy of qualifiers from the most to least severe is as follows:

■ R > JB/U > NJ > J+/J- > J/UJ

Data qualifiers used during this validation are included in the following table.

<u>Qualifier</u>	Definition
J	Estimated concentration
J+	The result is an estimated concentration, but may be biased high
J-	The result is an estimated concentration, but may be biased low
UJ	Estimated reporting limit
U	Evaluated to be undetected at the reporting limit
JB	Estimated concentration due to blank contamination
R	Rejected, data not usable

### **Data Completeness**

The analyses were performed as requested on the CoC records. The associated samples were received by the laboratory and analyzed properly unless otherwise noted in the Criteria Checklist below. The complete data package consisted of 819 data points. The data completeness calculation does not include any submitted blank sample results. One data point was rejected. The data completeness measure for this data package is calculated to be 99.88% and is acceptable.



VALIDATION CRITERIA CHECKLIST	
1. Was the report free of non-conformances identified by the laboratory?	Yes
Comments: The laboratory did not identify non-conformances regarding the analytical data.	
<ol> <li>Were the data free of data qualification flags and/or notes used by the laboratory? If no, define.</li> </ol>	No
Comments: The laboratory used the following data qualification flags with this data set.	
D – Sample diluted due to matrix	
J – Analyte detected below quantitation limits	
J6 – The sample matrix interfered with the ability to make any accurate determination; spike value is low	
P1 – RPD value not applicable for sample concentrations less than 5 times the RL.	
R – RPD outside of range	
S – % Recovery outside of range due to dilution or matrix interference.	
* – Value exceeds maximum contaminant level.	
3. Were sample CoC forms and custody procedures complete?	Yes
Comments: The CoC records from field to laboratory were complete, and custody was maintained as evand laboratory personnel signatures, dates, and times of receipt. Custody seals were not present or requestions were delivered to the laboratory by courier, and custody was maintained at all times.	ridenced by field uired since the
4. Were detection limits in accordance with the quality assurance project plan (QAPP), permit, or method, or indicated as acceptable?	Yes
Comments: The detection limits appeared to be acceptable. The following dilutions were applied.	
Method 8260B: Dilutions of 2 to 20 times were applied for the VOC analyses of select samples.	
<u>Methods 8270C/8270 SIM</u> : Dilutions of 10 times were applied for the SVOC analyses of samples STP-1 EP-6.	to EP-2, EP-2, and
<u>Method 200.7</u> : Dilutions of 5 and 10 times were applied for the total and dissolved metals analysis of sa NAPIS-3, and EP-6.	mples NAPIS-2,
Method 200.8: Dilutions of 5 to 100 times were applied for the metals analyses of select samples.	
Method 245.1: A dilution of 5 times was applied for the mercury analysis of sample KA-3.	
Method 410.4: A dilution of 5 times was applied for the COD analysis of sample EP-6.	
SM 9223B: Dilutions of 10 times were applied for the E. coil analysis of samples NAPIS-2, NAPIS-3, and	d EP-6.
<ol><li>Were the reported analytical methods and constituents in compliance with the QAPP, permit, or CoC?</li></ol>	Yes
Comments: The reported analytical methods were in compliance with the CoC, and the laboratory repor constituents in accordance with the CoC.	ted the requested
6. Were samples received in good condition within method-specified requirements?	No
Comments: Samples were received on ice, in good condition, and with the cooler temperatures both with recommended temperature range of $4^{\circ}C \pm 2^{\circ}C$ between 0.8°C and 5.3°C as noted on the Sample Log-II CoC. The cooler temperatures below 2°C were judged as acceptable since the samples were not report upon receipt at the laboratory, and the sample containers were reported to be intact.	hin and outside the <i>n Check List</i> and ed to be frozen
7. Were samples extracted/digested and analyzed within method-specified or technical holding times?	Yes
Comments: The samples were extracted/digested and analyzed within method-specific holding times.	

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VALIDATION CRITERIA CHECKLIST							
8. Were reported units appropriate for the sample matrix/matrices and analytical Yes method(s)? Specify if wet or dry units were used for soil.							
Comments: The results were reported in concentration units of micrograms per liter ( $\mu$ g/L), milligrams per liter (mg/L), and most probable number per 100 milliliters (MPN/100 mL), which were acceptable for the sample matrix and the analyses requested.							
9. Did the	laboratory provi	de any specific initial and/or cont	inuing calibration	results? No			
Comments:	Initial and conti	nuing calibration data were not ir	ncluded as part o	f this data set.			
10. If initial a accepta	and/or continuir ble limits?	ng calibration results were provide	ed, were the resu	Its within N/A			
Comments:	Initial and conti	nuing calibration data were not ir	ncluded as part o	f this data set.			
11. Was the the total	total number o number of sam	f laboratory blank samples prepa ples or analyzed as required by t	red equal to at le the method?	east 5% of Yes			
Comments: samples.	The total numb	er of laboratory blank samples pr	epared was equa	al to at least 5% of the total number o	of		
12. Were ta	rget analytes re	ported as not detected in the lab	oratory blanks?	No			
Comments:	Target analytes	s were reported as not detected in	n the laboratory b	blanks, with the following exceptions.			
TPH DRO w detection ar MKTF-28 at concentration 10 times the	as detected in nd the results v concentration on and the res blank detection	samples EB-6-24-22, EP-2, and were qualified as U. TPH DRO s greater than the blank detect ults were qualified as JB. TPH did not require qualification.	I STP-1 to EP-2 was detected in ion but less tha DRO results in t	at concentrations less than the bla samples DUP-6-24-22, MKTF-27, a n or equal to 10 times the blank he associated samples that were gre	ank and eater than		
13. Was the number	total number o of samples or a	f MS samples prepared equal to analyzed as required by the meth	at least 5% of the od?	e total Yes			
Comments: although MS analytical ba	The total numb samples were tch in this samp	er of matrix spike samples prepa not prepared/reported for all anal le set has been indicated below.	red was equal to yses and/or batc	at least 5% of the total number of sa h. The matrix spike sample source f	amples, for each		
	Method	<u>Analytes</u>	Batch	MS Sample Source			
	200.7	Total Metals	68406	Not Prepared			
	200.7	Dissolved Metals	B89068	Not Prepared			
	200.7	Dissolved Metals	A89154	Not Prepared			
	200.8	Total Metals	68406	DUP-6-24-22			
	200.8	Dissolved Metals	B89062	EB-6-24-22			
	200.8	Dissolved Metals	C89140	MKTF-27			
	245.1	Total Mercury	68497	KA-3			
	504.1	EDB	68526	EB-6-24-22			
	8015D	TPH DRO and MRO	68495	Not Prepared			
	8015D	TPH DRO	68464	Not Prepared			
	8015D	TPH GRO	A89090	MKTF-27			
	8260B	VOC	R89248	Not Prepared			
	8270C	SVOC	68408	Not Prepared			
	8270C	SVOC	68468	Not Prepared			

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VALIDATION CRITERIA CHECKLIST									
	Method	Analytes	E	atch	MS Sample So	ource			
	8270 SIM	SVOC	6	8408	Not Prepare	ed			
	8270 SIM	SVOC	6	8468	Not Prepare	ed			
	5210B	BOD	6	8337	Not Prepare	ed			
	9223B	E. Coli	6	8346	Not Prepare	ed			
	4500 CN E	Cyanide	WG	888930	Not Associa	ted			
	4500 CN E	Cyanide	WG	889365 N	ot Associated and	MKTF-28			
Not Associated – The MS sample source was not associated with this project. Not Prepared – Matrix spikes were not prepared/reported for this batch.									
14. For MS/ within d	MSDs prepared from proje ata validation or laboratory	ct samples, w quality contro	vere percent re ol (QC) limits?	coveries and F	RPDs	Yes			
Comments: limits.	The MS/MSD percent reco	overies and R	PDs for project	samples were	e within data valid	ation and labo	ratory QC		
Recoveries a based on the	and RPDs for MS/MSDs pr ese results since matrix sin	epared from r ilarity to proje	non-project san ect samples co	nples were cor uld not be gua	nsidered, but data ranteed.	were not qual	ified		
15. Was the samples	e total number of LCSs ana s or analyzed as required b	lyzed equal to y the method	o at least 5% of ?	<sup>t</sup> the total num	ber of	Yes			
Comments:	The total number of LCS s	amples analy	zed was equal	to at least 5%	of the total numb	er of samples.			
16. Were LO	CS/LCSD percent recoverion or QC limits?	es and LCS/L	CSD RPDs wit	nin data valida	tion or	No			
Comments: limits, with th	The LCS and LCSD perce ne exceptions listed in the f	nt recoveries ollowing table	and LCS/LCS	ORPDs were	within data validat	ion and labora	tory QC		
<u>Method</u>	Analyte	<u>Batch</u>	<u>LCS</u> <u>Recovery</u>	<u>LCSD</u> <u>Recovery</u>	LCS/LCSD QC Limits	LCS/LCSD RPD	<u>RPD</u> <u>QC</u> Limits		
200.7	Nickel, Total	68406	136%		70 4200/				
			10070		70-130%				
8015D	TPH DRO	68464	83.6%	 Acceptable	31.7-75.4%	 Acceptable	 20%		
8015D 8270C	TPH DRO Pyrene	<b>68464</b> 68408	83.6% Acceptable	Acceptable	<b>31.7-75.4%</b> 61-123%	 Acceptable 12.3%	 20% 11.8%		
8015D 8270C 8270C	TPH DRO Pyrene Acenaphthene	68464 68408 68468	83.6% Acceptable Acceptable	Acceptable Acceptable Acceptable	70-130%           31.7-75.4%           61-123%           21.3-104%	 Acceptable 12.3% 58.7%	 20% 11.8% 45.3%		
8015D 8270C 8270C 8270C	TPH DRO         Pyrene         Acenaphthene         1,4-Dichlorobenzene	68464           68408           68468           68468           68468	83.6% Acceptable Acceptable Acceptable	Acceptable Acceptable Acceptable Acceptable	70-130%           31.7-75.4%           61-123%           21.3-104%           15-89.8%	 Acceptable 12.3% 58.7% 55.4%	 20% 11.8% 45.3% <b>39.6%</b>		
8015D 8270C 8270C 8270C 8270C 8270C	TPH DRO         Pyrene         Acenaphthene         1,4-Dichlorobenzene         Phenol	68464           68408           68468           68468           68468           68468	83.6% Acceptable Acceptable Acceptable Acceptable	Acceptable Acceptable Acceptable Acceptable Acceptable	70-130%           31.7-75.4%           61-123%           21.3-104%           15-89.8%           17-61.1%	 Acceptable 12.3% 58.7% 55.4% 59.2%	 20% 11.8% 45.3% <b>39.6%</b> <b>42.5%</b>		
8015D 8270C 8270C 8270C 8270C 8270C 8270C	TPH DRO         Pyrene         Acenaphthene         1,4-Dichlorobenzene         Phenol         Pyrene	68464           68408           68408           68468           68468           68468           68468           68468	83.6% Acceptable Acceptable Acceptable Acceptable Acceptable	Acceptable Acceptable Acceptable Acceptable Acceptable Acceptable	70-130%           31.7-75.4%           61-123%           21.3-104%           15-89.8%           17-61.1%           61-123%	 Acceptable 12.3% 58.7% 55.4% 59.2% 19.2%	 20% 11.8% 45.3% <b>39.6%</b> <b>42.5%</b> 11.8%		
8015D 8270C 8270C 8270C 8270C 8270C 8270 SIM	TPH DRO Pyrene Acenaphthene 1,4-Dichlorobenzene Phenol Pyrene 1,4-Dioxane	68464           68408           68468           68468           68468           68468           68468           68468           68468           68468	83.6% Acceptable Acceptable Acceptable Acceptable Acceptable 53.0%	Acceptable Acceptable Acceptable Acceptable Acceptable Acceptable Acceptable	70-130%           31.7-75.4%           61-123%           21.3-104%           15-89.8%           17-61.1%           61-123%           20.2-48.4%	 Acceptable 12.3% 58.7% 55.4% 59.2% 19.2% Acceptable	 20% 11.8% 45.3% <b>39.6%</b> <b>42.5%</b> 11.8% 30.1%		
8015D 8270C 8270C 8270C 8270C 8270C 8270 SIM 8270 SIM	TPH DRO         Pyrene         Acenaphthene         1,4-Dichlorobenzene         Phenol         Pyrene         1,4-Dioxane         Naphthalene	68464           68408           68408           68468           68468           68468           68468           68468           68468           68408           68408	83.6% Acceptable Acceptable Acceptable Acceptable Acceptable 53.0% 80.0%	Acceptable Acceptable Acceptable Acceptable Acceptable Acceptable Acceptable Acceptable	70-130%           31.7-75.4%           61-123%           21.3-104%           15-89.8%           17-61.1%           61-123%           20.2-48.4%           21.3-79.9%	 Acceptable 12.3% 58.7% 55.4% 59.2% 19.2% Acceptable Acceptable	 20% 11.8% 45.3% <b>39.6%</b> <b>42.5%</b> 11.8% 30.1% 25.6%		

Analytes with LCS recoveries greater than laboratory QC limits were detected in the associated samples and the results were qualified as J+ to indicate estimated concentrations that may be biased high. Non-detections did not require qualification based on the evidence of potential high bias.

Results for 1,4-dichlorobenzene and phenol were qualified as J if detected in the associated samples and UJ if not detected due to evidence of poor precision.

Qualification was not required for acenaphthene and pyrene by Method 8270C as the associated samples' results were reported from Method 8270 SIM and the non-compliant LCS results did not apply to those analyses.



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Were	surrogate recov	eries within laboratory QC limit	s?		No
ments	s: Surrogate rec	coveries were within laboratory	QC limits, with the exc	eptions listed in t	he following ta
	Method	<u>Surrogate</u>	Sample	<u>Surrogate</u> <u>Recovery</u>	QC Limits
	8015D	Bromofluorobenzene	NAPIS-2	354%	70-130%
	8015D	Bromofluorobenzene	NAPIS-3	198%	70-130%
	8015D	Bromofluorobenzene	KA-3	161%	70-130%
	8015D	Di-n-octylphthalate	STP-1 to EP-2	25.5%	42.2-138%
	8270C	2-Fluorophenol	STP-1 to EP-2	0%	29.4-87.7%
	8270C	Phenol-d₅	STP-1 to EP-2	0%	28.5-64.7%
	8270C	2,4,6-Tribromophenol	STP-1 to EP-2	0%	18.6-129%
	8270C	Nitrobenzene-d <sub>5</sub>	STP-1 to EP-2	0%	36.9-103%
	8270C	2-Fluorobiphenyl	STP-1 to EP-2	0%	38.1-99.9%
	8270C	4-Terphenyl-d <sub>14</sub>	STP-1 to EP-2	0%	48-155%
	8270 SIM	Nitrobenzene-d <sub>5</sub>	STP-1 to EP-2	0%	31.6-100%
	8270 SIM	2-Fluorobiphenyl	STP-1 to EP-2	0%	26.7-90.1%
	8270 SIM	4-Terphenyl-d <sub>14</sub>	STP-1 to EP-2	0%	72.3-147%
	8015D	Di-n-octylphthalate	EP-2	6.11%	42.2-138%
	8270C	2-Fluorophenol	EP-2	0%	29.4-87.7%
	8270C	Phenol-d <sub>5</sub>	EP-2	0%	28.5-64.7%
	8270C	2,4,6-Tribromophenol	EP-2	0%	18.6-129%
	8270C	Nitrobenzene-d <sub>5</sub>	EP-2	0%	36.9-103%
	8270C	2-Fluorobiphenyl	EP-2	0%	38.1-99.9%
	8270C	4-Terphenyl-d <sub>14</sub>	EP-2	0%	48-155%
	8270 SIM	Nitrobenzene-d₅	EP-2	0%	31.6-100%
	8270 SIM	2-Fluorobiphenyl	EP-2	0%	26.7-90.1%
	8270 SIM	4-Terphenyl-d <sub>14</sub>	EP-2	0%	72.3-147%
	8270C	2-Fluorophenol	EP-6	0%	29.4-87.7%
	8270C	Phenol-d₅	EP-6	0%	28.5-64.7%
	8270C	2,4,6-Tribromophenol	EP-6	0%	18.6-129%
	8270C	Nitrobenzene-d <sub>5</sub>	EP-6	0%	36.9-103%
	8270C	2-Fluorobiphenyl	EP-6	0%	38.1-99.9%
	8270C	4-Terphenyl-d <sub>14</sub>	EP-6	0%	48-155%
	8270 SIM	Nitrobenzene-d <sub>5</sub>	EP-6	0%	31.6-100%
	8270 SIM	2-Fluorobiphenvl	FP-6	0%	26 7-90 1%

The analyte associated with bromofluorobenzene (TPH GRO) was detected in the affected samples and was qualified as J+ to indicate estimated concentrations that may be biased high.

The analytes associated with Method 8015 D surrogate di-n-octylphthalate were qualified as J- if detected and UJ if not detected in the affected samples. As the surrogate recovery in sample EP-2 was less than 10%, the non-detect result for TPH ORO was qualified as R to indicate a rejected datum.

Qualification was not required for samples STP-1 to EP-2, EP-2, and EP-6 as the listed surrogates were diluted out.

Qualification was not required based on surrogate nonconformance in QC samples as the environmental samples were evaluated based on their specific surrogate recoveries.



## VALIDATION CRITERIA CHECKLIST

18. Were the number of trip blank, field blank, and/or equipment blank samples collected equal to at least 10% of the total number of samples or as required by the project guidelines, QAPP, SAP, or permit?

Comments: The number of trip, field, and equipment blanks collected was equal to at least 10% of the number of samples. One trip blank sample, Trip Blank, one field blank sample, FB-6-24-22, and one equipment blank sample, EB-6-24-22, were collected as part of this sample set.

19.	Were target analytes reported as not detected in the trip blank, field blank, and/or	
	equipment blank samples?	

No

Yes

Comments: Target analytes were not detected in the trip blank, field blank, and equipment blank samples, with the exceptions listed in the following table.

Blank Sample ID	<u>Method</u>	<u>Analyte</u>	<u>Concentration</u>
FB-6-24-22	8260B	Acetone	7.4 μg/L
FB-6-24-22	8260B	Toluene	0.22 μg/L
FB-6-24-22	8260B	Xylenes, Total	0.64 µg/L
EB-6-24-22	8260B	Acetone	4.9 µg/L
EB-6-24-22	8260B	Chloromethane	0.6 μg/L
EB-6-24-22	8260B	Toluene	0.23 µg/L
EB-6-24-22	8260B	Xylenes, Total	0.64 µg/L
EB-6-24-22	8015D	TPH GRO	0.019 mg/L
EB-6-24-22	8015D	TPH DRO	0.031 mg/L
EB-6-24-22	200.7	Total Zinc	0.0046 mg/L
EB-6-24-22	200.7	Dissolved Zinc	0.0053 mg/L

Detections in the associated samples that were less than the applicable reporting limits were assigned U qualifiers. Detections in the associated samples that were greater than the reporting limits but less than 10 times the blank results were assigned JB qualifiers. Non-detections of the identified analytes in the associated samples and detections that were above the reporting limit and greater than ten times the blank concentration did not require qualification.

The TPH DRO results were previously qualified due to laboratory blank contamination in batch 68464; therefore, additional qualification due to the equipment blank contamination was not required.

20. Was the number of field duplicates collected equal to at least 10% of the total number of samples or as required by the project guidelines, QAPP, SAP, or permit?

Comments: The number of field duplicates collected was equal to at least 10% of the number of samples. Sample DUP-6-24-22 was collected as a field duplicate of sample MKTF-27.

21. Were field duplicate RPD values within data validation QC limits (soil 0-50%, water 0-30%, or air 0-25%)?

Comments: As indicated in the Field Duplicate Summary Table at the end of this report, field duplicate RPD values were within data validation QC limits of 0-30% for water samples, with the following exception.

The RPD value for total barium exceeded the data validation QC limit of 30% at 33.3%, which was evidence of poor precision. The total barium results were qualified as J for samples MKTF-27 and DUP-6-24-22.



Yes

No

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VALIDATION CRITERIA CHECKLIST								
22. For laboratory validation or la	1	Yes						
Comments: Labor the following table.	Comments: Laboratory duplicates prepared for these analyses and laboratory duplicate sample sources are summarized in the following table.							
	Method	<u>Analytes</u>	Batch	<u>Laborator</u> Sample	<u>y Duplicate</u> e Source			
	410.4	COD	WG1891521	STP-1 to EP-2 a	nd Not Associated			
	4500 CN E	Cyanide	WG1888930	Not Associated	and EB-6-24-22			
	4500CN E	Cyanide	WG1889365	Not As	sociated			
Not Associated – The	e laboratory duplic	ate sample so	ource was not assoc	ciated with this project.				
Laboratory duplica	te RPDs were w	ithin data va	lidation and labo	ratory QC limits.				
The RPD values for qualified based on	or laboratory dup these results sir	licate sampl ice matrix si	es prepared from milarity to project	non-project samples samples could not b	s were considered, b e guaranteed.	ut data were not		
23. Were the follo	wing data relatio	nships reali	stic?					
• Target an EPH/827	alytes were repo 0)?	orted by mor	e than one metho	od (e.g., 8260/8270,		N/A		
Comments: Targe	t analytes were	not reported	by more than on	e method.				
<ul> <li>Both total results we</li> </ul>	and dissolved r ere greater than	netals analys or equal to t	ses were perform he dissolved met	ed, and the total met als results?	als	No		
results. The EPA metals results that based on these da	has not provided exceed the corr ta.	guidance o esponding to	r requirements fo	n the dissolved meta r the evaluation, valio s. Therefore, qualific	ation, and qualificat ation of results was	ne total metals ion of dissolved not performed		
	Sample ID		<u>Analyte</u>	<u>Total Result</u> (mg/L)	Dissolved Result (mg/L)			
	STP-1 to EP-2		Antimony	0.00056	0.0012			
	NAPIS-2		Barium	4.4	4.9	_		
	EP-6		Barium	0.31	0.32			
	EP-6	0	Chromium	ND	0.021	_		
	KA-3		Nickel	0.023	0.025	_		
	EP-2		Nickel	0.05	0.052	_		
	MKTF-27	5	Selenium	ND	0.0018			
	STP-1 to EP-2		Selenium	0.00043	0.00045	_		
	MKTF-27		Silver	ND	0.0062	_		
	MKTF-28		Silver	ND	0.0022	_		
	NAPIS-2		Silver	0.002	0.0028	_		
	NAPIS-3		Silver	0.0024	0.0029	_		
	STP-1 to EP-2		Silver	0.0044	0.0048			
[	EP-2		Silver	ND	0.01			
[ [	EP-6		Silver	ND	0.026	1		
[ [	DUP-6-24-22		Silver	ND	0.0058	1		
	NAPIS-2	١	/anadium	ND	0.0025			

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VALIDATION CRITERIA CHECKLIST							
Sample ID	Analyte	<u>Total Result</u> (mg/L)	Dissolved Result (mg/L)				
KA-3	Vanadium	0.014	0.016				
STP-1 to EP	-2 Vanadium	ND	0.0022				
EP-2	Vanadium	ND	0.005				
EP-6	Vanadium	ND	0.016				
EB-6-24-22	2 Zinc	0.0046	0.0053				
MKTF-27	Zinc	0.0068	0.0084				
NAPIS-2	Zinc	0.0048	0.014				
NAPIS-3	Zinc	0.0041	0.0084				
KA-3	Zinc	0.0066	0.013				
EP-2	Zinc	0.0044	0.011				



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Client Sample ID: MKTF-27								
Field Duplicate Sample ID: DUP-6-24-22								
Analyte	Method	Laboratory Result	Duplicate Result	Relative Percent Difference (RPD)				
1,1-Dichloroethane	8260B	1.6 µg/L	1.7 μg/L	6.1% +/-RL				
1,1-Dichloroethene	8260B	0.87 µg/L	0.85 µg/L	2.3% +/-RL				
1,2-Dichloroethane	8260B	0.78 µg/L	0.78 µg/L	0.0% +/-RL				
Acetone	8260B	ND (10 μg/L)	2.9 µg/L	DL				
Benzene	8260B	0.55 µg/L	0.63 µg/L	13.6% +/-RL				
MTBE	8260B	39 µg/L	41 µg/L	5.0%				
1,4-Dioxane	8270 SIM	8.4 µg/L	7.1 μg/L	16.8%				
TPH GRO	8015D	0.046 mg/L	0.028 mg/L	48.6% +/-RL				
TPH DRO	8015D	0.19 mg/L	0.20 mg/L	5.1%				
Barium, Dissolved	200.7	0.055 mg/L	0.054 mg/L	1.8%				
Barium, Total	200.7	0.14 mg/L	0.10 mg/L	33.3%				
Nickel, Dissolved	200.7	0.031 mg/L	0.030 mg/L	3.3%				
Nickel, Total	200.7	0.035 mg/L	0.032 mg/L	9.0%				
Silver, Dissolved	200.7	0.0062 mg/L	0.0058 mg/L	6.7% +/-RL				
Vanadium, Dissolved	200.7	0.0025 mg/L	0.0023 mg/L	8.3% +/-RL				
Vanadium, Total	200.7	0.0087 mg/L	0.0063 mg/L	32.0% +/-RL				
Zinc, Dissolved	200.7	0.0084 mg/L	0.0072 mg/L	15.4% +/-RL				
Zinc, Total	200.7	0.0068 mg/L	0.0090 mg/L	27.8% +/-RL				
Arsenic, Dissolved	200.8	ND (0.005 mg/L)	0.00092 mg/L	DL				
Arsenic, Total	200.8	0.0010 mg/L	0.0013 mg/L	26.1% +/-RL				
Lead, Total	200.8	0.0025 mg/L	0.0019 mg/L	27.3% +/-RL				
Selenium, Dissolved	200.8	0.0018 mg/L	ND (0.005 mg/L)	DL				
Selenium, Total	200.8	ND (0.005 mg/L)	0.0020 mg/L	DL				
Cyanide, Total	4500 CN E	16.3 µg/L	14.7 µg/L	10.3%				

## FIELD DUPLICATE SUMMARY

Field duplicate RPD control limits are not to exceed 30% for water as established by USEPA Region I - New England Environmental Data Review Supplement for Region 1 Data Review Elements and Superfund Specific Guidance/Procedures, EQADR-Supplement2, September 2020.

DL – Indicates that the analyte was detected in one of the duplicate samples and was undetected in the other sample, and therefore an RPD could not be calculated. Data were not qualified since the detection was within two times the reporting limit. Non-detected results are indicated above with the applicable reporting limit as ND (RL).

+/-RL – Indicates that the detections in both of the samples were within two times the reporting limit. Qualification of data was not required.

The RPD value for total barium exceeded the data validation QC limit and was qualified as J for samples MKTF-27 and DUP-6-24-22 due to evidence of poor precision.



## DATA QUALIFICATION SUMMARY

Abbreviation	Reason
MBD	Method blank detection
HR-LCS	The LCS and/or LCSD percent recovery was greater than the upper acceptable limit indicating a possible high bias.
ERPD-LCS	The LCS/LCSD RPD exceeded the upper acceptable limit indicating poor precision.
HR-SUR	The surrogate percent recovery was greater than the upper acceptable limit indicating a possible high bias.
LR-SUR	The surrogate percent recovery was less than the lower acceptable limit indicating a possible low bias.
FBD	Field blank detection
EBD	Equipment blank detection
ERPD-FD	High field duplicate RPD.
MDLRL	Flagged by the laboratory: The result was greater than the MDL but less than the RL.

Analyte	Method	Field Sample ID	Lab Sample ID	Result	Limit	Units	Reviewer Qualifier	DV Flag Reasons
1,1-Dichloroethene	SW8260B	MKTF-27	2206e09-002a	0.87	1	µg/L	J	MDLRL
1,1-Dichloroethene	SW8260B	DUP-6-24-22	2206e09-011a	0.85	1	µg/L	J	MDLRL
1,2,4-Trimethylbenzene	SW8260B	NAPIS-2	2206e09-004a	1.7	2	µg/L	J	MDLRL
1,2,4-Trimethylbenzene	SW8260B	NAPIS-3	2206e09-005a	0.19	1	µg/L	J	MDLRL
1,2-Dichloroethane	SW8260B	MKTF-27	2206e09-002a	0.78	1	µg/L	J	MDLRL
1,2-Dichloroethane	SW8260B	DUP-6-24-22	2206e09-011a	0.78	1	µg/L	J	MDLRL
1,3,5-Trimethylbenzene	SW8260B	NAPIS-2	2206e09-004a	1.4	2	µg/L	J	MDLRL
1,4-Dichlorobenzene	SW8270C	NAPIS-2	2206E09-004C	ND	5	µg/L	UJ	ERPD-LCS
1,4-Dichlorobenzene	SW8270C	NAPIS-3	2206E09-005C	ND	5	µg/L	UJ	ERPD-LCS
1,4-Dichlorobenzene	SW8270C	KA-3	2206E09-006C	ND	5	µg/L	UJ	ERPD-LCS
1,4-Dichlorobenzene	SW8270C	STP-1 to EP-2	2206E09-007C	ND	50	µg/L	UJ	ERPD-LCS
1,4-Dichlorobenzene	SW8270C	EP-2	2206E09-008C	ND	500	µg/L	UJ	ERPD-LCS
1,4-Dichlorobenzene	SW8270C	EP-6	2206E09-009C	ND	200	µg/L	UJ	ERPD-LCS



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Analyte	Method	Field Sample ID	Lab Sample ID	Result	Limit	Units	Reviewer Qualifier	DV Flag Reasons
1,4-Dichlorobenzene	SW8270C	DUP-6-24-22	2206E09-011C	ND	5	µg/L	UJ	ERPD-LCS
1,4-Dioxane	SW8270C	MKTF-27	2206e09-002c	8.4	1	µg/L	J+	HR-LCS
1,4-Dioxane	SW8270C	MKTF-28	2206e09-003c	0.78	1	µg/L	J+	HR-LCS, MDLRL
1,4-Dioxane	SW8270C	NAPIS-3	2206e09-005c	0.68	1	µg/L	J	MDLRL
1,4-Dioxane	SW8270C	KA-3	2206e09-006c	0.58	1	µg/L	J	MDLRL
Acetone	SW8260B	EP-2	2206e09-008a	10	10	µg/L	JB	FBD
Acetone	SW8260B	EP-6	2206e09-009a	23	10	µg/L	JB	FBD
Acetone	SW8260B	EB-6-24-22	2206e09-001a	4.9	10	µg/L	U	FBD, MDLRL
Acetone	SW8260B	MKTF-28	2206e09-003a	2.7	10	µg/L	U	FBD, MDLRL
Acetone	SW8260B	NAPIS-2	2206e09-004a	15	20	µg/L	U	FBD, MDLRL
Acetone	SW8260B	NAPIS-3	2206e09-005a	6.5	10	µg/L	U	FBD, MDLRL
Acetone	SW8260B	KA-3	2206e09-006a	2.7	10	µg/L	U	FBD, MDLRL
Acetone	SW8260B	STP-1 to EP-2	2206e09-007a	4.2	10	µg/L	U	FBD, MDLRL
Acetone	SW8260B	FB-6-24-22	2206e09-010a	7.4	10	µg/L	J	MDLRL
Acetone	SW8260B	DUP-6-24-22	2206e09-011a	2.9	10	µg/L	J	MDLRL
Anthracene	SW8270C	NAPIS-2	2206e09-004c	0.22	0.3	µg/L	J	MDLRL
Antimony, Total	E200.8	STP-1 to EP-2	2206E09-007D	0.00056	0.001	mg/L	J	MDLRL
Arsenic, Dissolved	E200.8	MKTF-28	2206E09-003E	0.00084	0.001	mg/L	J	MDLRL
Arsenic, Dissolved	E200.8	KA-3	2206E09-006E	0.00071	0.001	mg/L	J	MDLRL
Arsenic, Dissolved	E200.8	DUP-6-24-22	2206E09-011E	0.00092	0.005	mg/L	J	MDLRL
Arsenic, Total	E200.8	MKTF-27	2206E09-002D	0.001	0.005	mg/L	J	MDLRL
Arsenic, Total	E200.8	KA-3	2206E09-006D	0.00081	0.001	mg/L	J	MDLRL
Arsenic, Total	E200.8	DUP-6-24-22	2206E09-011D	0.0013	0.005	mg/L	J	MDLRL
Barium, Total	E 200.7	MKTF-27	2206E09-002D	0.14	0.003	mg/L	J	ERPD-FD
Barium, Total	E 200.7	DUP-6-24-22	2206E09-011D	0.1	0.003	mg/L	J	ERPD-FD
Benzene	SW8260B	MKTF-27	2206e09-002a	0.55	1	µg/L	J	MDLRL



Analyte	Method	Field Sample ID	Lab Sample ID	Result	Limit	Units	Reviewer Qualifier	DV Flag Reasons
Benzene	SW8260B	DUP-6-24-22	2206e09-011a	0.63	1	µg/L	J	MDLRL
Carbon Disulfide	SW8260B	EP-2	2206e09-008a	1.3	10	µg/L	J	MDLRL
Chloroform	SW8260B	NAPIS-2	2206e09-004a	0.76	2	µg/L	J	MDLRL
Chloroform	SW8260B	NAPIS-3	2206e09-005a	0.22	1	µg/L	J	MDLRL
Chloroform	SW8260B	KA-3	2206e09-006a	0.25	1	µg/L	J	MDLRL
Chloromethane	SW8260B	NAPIS-2	2206e09-004a	1.3	6	µg/L	U	EBD, MDLRL
Chloromethane	SW8260B	NAPIS-3	2206e09-005a	0.64	3	µg/L	U	EBD, MDLRL
Chloromethane	SW8260B	STP-1 to EP-2	2206e09-007a	0.61	3	µg/L	U	EBD, MDLRL
Chloromethane	SW8260B	EP-2	2206e09-008a	0.76	3	µg/L	U	EBD, MDLRL
Chloromethane	SW8260B	EP-6	2206e09-009a	1.4	3	µg/L	U	EBD, MDLRL
Chloromethane	SW8260B	EB-6-24-22	2206e09-001a	0.6	3	µg/L	J	MDLRL
Chromium, Dissolved	E 200.7	EP-6	2206E09-009E	0.021	0.03	mg/L	J	MDLRL
Chromium, Total	E 200.7	MKTF-28	2206E09-003D	0.0021	0.006	mg/L	J	MDLRL
Cyanide, Total	E335.4	EP-6	2206E09-009F	4.4	5	µg/L	J	MDLRL
Lead, Dissolved	E200.8	NAPIS-2	2206E09-004E	0.00025	0.0005	mg/L	J	MDLRL
Lead, Dissolved	E200.8	KA-3	2206E09-006E	0.00024	0.0005	mg/L	J	MDLRL
Lead, Total	E200.8	KA-3	2206E09-006D	0.0004	0.0005	mg/L	J	MDLRL
Lead, Total	E200.8	STP-1 to EP-2	2206E09-007D	0.00021	0.0005	mg/L	J	MDLRL
Lead, Total	E200.8	DUP-6-24-22	2206E09-011D	0.0019	0.0025	mg/L	J	MDLRL
MTBE	SW8260B	MKTF-28	2206e09-003a	0.7	1	µg/L	J	MDLRL
n-Butylbenzene	SW8260B	NAPIS-2	2206e09-004a	1.5	6	µg/L	J	MDLRL
n-Butylbenzene	SW8260B	NAPIS-3	2206e09-005a	0.39	3	µg/L	J	MDLRL
Nickel, Dissolved	E 200.7	MKTF-28	2206E09-003E	0.0059	0.01	mg/L	J	MDLRL
Nickel, Total	E 200.7	MKTF-27	2206E09-002D	0.035	0.01	mg/L	J+	HR-LCS
Nickel, Total	E 200.7	NAPIS-2	2206E09-004D	0.064	0.01	mg/L	J+	HR-LCS
Nickel, Total	E 200.7	NAPIS-3	2206E09-005D	0.025	0.01	mg/L	J+	HR-LCS



Analyte	Method	Field Sample ID	Lab Sample ID	Result	Limit	Units	Reviewer Qualifier	DV Flag Reasons
Nickel, Total	E 200.7	KA-3	2206E09-006D	0.023	0.01	mg/L	J+	HR-LCS
Nickel, Total	E 200.7	EP-2	2206E09-008D	0.05	0.01	mg/L	J+	HR-LCS
Nickel, Total	E 200.7	EP-6	2206E09-009D	0.24	0.1	mg/L	J+	HR-LCS
Nickel, Total	E 200.7	DUP-6-24-22	2206E09-011D	0.032	0.01	mg/L	J+	HR-LCS
Nickel, Total	E 200.7	MKTF-28	2206E09-003D	0.009	0.01	mg/L	J+	HR-LCS, MDLRL
n-Propylbenzene	SW8260B	KA-3	2206e09-006a	0.59	1	µg/L	J	MDLRL
Phenanthrene	SW8270C	NAPIS-2	2206e09-004c	0.18	0.3	µg/L	J	MDLRL
Phenanthrene	SW8270C	NAPIS-3	2206e09-005c	0.16	0.3	µg/L	J	MDLRL
Phenol	SW8270C	NAPIS-2	2206E09-004C	52	20	µg/L	J	ERPD-LCS
Phenol	SW8270C	NAPIS-3	2206E09-005C	ND	20	µg/L	UJ	ERPD-LCS
Phenol	SW8270C	KA-3	2206E09-006C	ND	20	µg/L	UJ	ERPD-LCS
Phenol	SW8270C	STP-1 to EP-2	2206E09-007C	ND	200	µg/L	UJ	ERPD-LCS
Phenol	SW8270C	EP-2	2206E09-008C	ND	2000	µg/L	UJ	ERPD-LCS
Phenol	SW8270C	EP-6	2206E09-009C	ND	800	µg/L	UJ	ERPD-LCS
Phenol	SW8270C	DUP-6-24-22	2206E09-011C	ND	20	µg/L	UJ	ERPD-LCS
sec-Butylbenzene	SW8260B	NAPIS-3	2206e09-005a	0.77	1	µg/L	J	MDLRL
sec-Butylbenzene	SW8260B	KA-3	2206e09-006a	0.26	1	µg/L	J	MDLRL
Selenium, Dissolved	E200.8	MKTF-27	2206E09-002E	0.0018	0.005	mg/L	J	MDLRL
Selenium, Dissolved	E200.8	STP-1 to EP-2	2206E09-007E	0.00045	0.001	mg/L	J	MDLRL
Selenium, Total	E200.8	NAPIS-3	2206E09-005D	0.00037	0.001	mg/L	J	MDLRL
Selenium, Total	E200.8	STP-1 to EP-2	2206E09-007D	0.00043	0.001	mg/L	J	MDLRL
Selenium, Total	E200.8	EP-6	2206E09-009D	0.011	0.02	mg/L	J	MDLRL
Selenium, Total	E200.8	DUP-6-24-22	2206E09-011D	0.002	0.005	mg/L	J	MDLRL
Silver, Dissolved	E 200.7	MKTF-28	2206E09-003E	0.0022	0.005	mg/L	J	MDLRL
Silver, Dissolved	E 200.7	NAPIS-2	2206E09-004E	0.0028	0.005	mg/L	J	MDLRL
Silver, Dissolved	E 200.7	NAPIS-3	2206E09-005E	0.0029	0.005	mg/L	J	MDLRL



Analyte	Method	Field Sample ID	Lab Sample ID	Result	Limit	Units	Reviewer Qualifier	DV Flag Reasons
Silver, Dissolved	E 200.7	STP-1 to EP-2	2206E09-007E	0.0048	0.005	mg/L	J	MDLRL
Silver, Total	E 200.7	NAPIS-2	2206E09-004D	0.002	0.005	mg/L	J	MDLRL
Silver, Total	E 200.7	NAPIS-3	2206E09-005D	0.0024	0.005	mg/L	J	MDLRL
Silver, Total	E 200.7	STP-1 to EP-2	2206E09-007D	0.0044	0.005	mg/L	J	MDLRL
Toluene	SW8260B	EB-6-24-22	2206e09-001a	0.23	1	µg/L	U	FBD, MDLRL
Toluene	SW8260B	NAPIS-2	2206e09-004a	0.7	2	µg/L	U	FBD, MDLRL
Toluene	SW8260B	NAPIS-3	2206e09-005a	0.23	1	µg/L	U	FBD, MDLRL
Toluene	SW8260B	FB-6-24-22	2206e09-010a	0.22	1	µg/L	J	MDLRL
TPH DRO	SW8015	NAPIS-2	2206E09-004C	1.7	0.064	mg/L	J+	HR-LCS
TPH DRO	SW8015	NAPIS-3	2206E09-005C	0.54	0.064	mg/L	J+	HR-LCS
TPH DRO	SW8015	KA-3	2206E09-006C	1.2	0.064	mg/L	J+	HR-LCS
TPH DRO	SW8015	EP-6	2206E09-009C	0.9	0.064	mg/L	J+	HR-LCS
TPH DRO	SW8015	STP-1 to EP-2	2206E09-007C	0.04	0.064	mg/L	U	HR-LCS, LR-SUR, MBD, MDLRL
TPH DRO	SW8015	EP-2	2206E09-008C	0.045	0.064	mg/L	U	HR-LCS, LR-SUR, MBD, MDLRL
TPH DRO	SW8015	MKTF-27	2206E09-002C	0.19	0.064	mg/L	JB	HR-LCS, MBD
TPH DRO	SW8015	MKTF-28	2206E09-003C	0.19	0.064	mg/L	JB	HR-LCS, MBD
TPH DRO	SW8015	DUP-6-24-22	2206E09-011C	0.2	0.064	mg/L	JB	HR-LCS, MBD
TPH DRO	SW8015	EB-6-24-22	2206E09-001C	0.031	0.064	mg/L	U	HR-LCS, MBD, MDLRL
TPH GRO	SW8015	NAPIS-2	2206e09-004a	4.2	0.05	mg/L	J+	HR-SUR
TPH GRO	SW8015	NAPIS-3	2206e09-005a	0.9	0.05	mg/L	J+	HR-SUR
TPH GRO	SW8015	KA-3	2206e09-006a	0.15	0.05	mg/L	JB	EBD, HR-SUR
TPH GRO	SW8015	MKTF-27	2206e09-002a	0.046	0.05	mg/L	U	EBD, MDLRL
TPH GRO	SW8015	EP-2	2206e09-008a	0.0096	0.05	mg/L	U	EBD, MDLRL
TPH GRO	SW8015	DUP-6-24-22	2206e09-011a	0.028	0.05	mg/L	U	EBD, MDLRL
TPH GRO	SW8015	EB-6-24-22	2206e09-001a	0.019	0.05	mg/L	J	MDLRL
TPH ORO	SW8015	EP-2	2206E09-008C	ND	0.08	mg/L	R	LR-SUR



Analyte	Method	Field Sample ID	Lab Sample ID	Result	Limit	Units	Reviewer Qualifier	DV Flag Reasons
TPH ORO	SW8015	STP-1 to EP-2	2206E09-007C	ND	0.08	mg/L	UJ	LR-SUR
TPH ORO	SW8015	EP-6	2206E09-009C	0.058	0.08	mg/L	J	MDLRL
Vanadium, Dissolved	E 200.7	MKTF-27	2206E09-002E	0.0025	0.05	mg/L	J	MDLRL
Vanadium, Dissolved	E 200.7	MKTF-28	2206E09-003E	0.0042	0.05	mg/L	J	MDLRL
Vanadium, Dissolved	E 200.7	NAPIS-2	2206E09-004E	0.0025	0.05	mg/L	J	MDLRL
Vanadium, Dissolved	E 200.7	KA-3	2206E09-006E	0.016	0.05	mg/L	J	MDLRL
Vanadium, Dissolved	E 200.7	STP-1 to EP-2	2206E09-007E	0.0022	0.05	mg/L	J	MDLRL
Vanadium, Dissolved	E 200.7	EP-2	2206E09-008E	0.005	0.05	mg/L	J	MDLRL
Vanadium, Dissolved	E 200.7	EP-6	2206E09-009E	0.016	0.25	mg/L	J	MDLRL
Vanadium, Dissolved	E 200.7	DUP-6-24-22	2206E09-011E	0.0023	0.05	mg/L	J	MDLRL
Vanadium, Total	E 200.7	MKTF-27	2206E09-002D	0.0087	0.05	mg/L	J	MDLRL
Vanadium, Total	E 200.7	MKTF-28	2206E09-003D	0.012	0.05	mg/L	J	MDLRL
Vanadium, Total	E 200.7	KA-3	2206E09-006D	0.014	0.05	mg/L	J	MDLRL
Vanadium, Total	E 200.7	DUP-6-24-22	2206E09-011D	0.0063	0.05	mg/L	J	MDLRL
Xylenes, Total	SW8260B	NAPIS-3	2206e09-005a	3.3	1.5	µg/L	JB	FBD
Xylenes, Total	SW8260B	EB-6-24-22	2206e09-001a	0.64	1.5	µg/L	U	FBD, MDLRL
Xylenes, Total	SW8260B	KA-3	2206e09-006a	0.72	1.5	µg/L	U	FBD, MDLRL
Xylenes, Total	SW8260B	EP-2	2206e09-008a	0.66	1.5	µg/L	U	FBD, MDLRL
Xylenes, Total	SW8260B	EP-6	2206e09-009a	0.65	1.5	µg/L	U	FBD, MDLRL
Xylenes, Total	SW8260B	FB-6-24-22	2206e09-010a	0.64	1.5	µg/L	J	MDLRL
Zinc, Dissolved	E 200.7	NAPIS-2	2206E09-004E	0.014	0.01	mg/L	JB	EBD
Zinc, Dissolved	E 200.7	KA-3	2206E09-006E	0.013	0.01	mg/L	JB	EBD
Zinc, Dissolved	E 200.7	STP-1 to EP-2	2206E09-007E	0.025	0.01	mg/L	JB	EBD
Zinc, Dissolved	E 200.7	EP-2	2206E09-008E	0.011	0.01	mg/L	JB	EBD
Zinc, Dissolved	E 200.7	EB-6-24-22	2206E09-001E	0.0053	0.01	mg/L	U	EBD, MDLRL
Zinc, Dissolved	E 200.7	MKTF-27	2206E09-002E	0.0084	0.01	mg/L	U	EBD, MDLRL



Analyte	Method	Field Sample ID	Lab Sample ID	Result	Limit	Units	Reviewer Qualifier	DV Flag Reasons
Zinc, Dissolved	E 200.7	MKTF-28	2206E09-003E	0.009	0.01	mg/L	U	EBD, MDLRL
Zinc, Dissolved	E 200.7	NAPIS-3	2206E09-005E	0.0084	0.01	mg/L	U	EBD, MDLRL
Zinc, Dissolved	E 200.7	DUP-6-24-22	2206E09-011E	0.0072	0.01	mg/L	U	EBD, MDLRL
Zinc, Total	E 200.7	MKTF-28	2206E09-003D	0.018	0.01	mg/L	JB	EBD
Zinc, Total	E 200.7	STP-1 to EP-2	2206E09-007D	0.046	0.01	mg/L	JB	EBD
Zinc, Total	E 200.7	MKTF-27	2206E09-002D	0.0068	0.01	mg/L	U	EBD, MDLRL
Zinc, Total	E 200.7	NAPIS-2	2206E09-004D	0.0048	0.01	mg/L	U	EBD, MDLRL
Zinc, Total	E 200.7	NAPIS-3	2206E09-005D	0.0041	0.01	mg/L	U	EBD, MDLRL
Zinc, Total	E 200.7	KA-3	2206E09-006D	0.0066	0.01	mg/L	U	EBD, MDLRL
Zinc, Total	E 200.7	EP-2	2206E09-008D	0.0044	0.01	mg/L	U	EBD, MDLRL
Zinc, Total	E 200.7	DUP-6-24-22	2206E09-011D	0.009	0.01	mg/L	U	EBD, MDLRL
Zinc, Total	E 200.7	EB-6-24-22	2206E09-001D	0.0046	0.01	mg/L	J	MDLRL





Client: Marathon Oil	Laboratory: Hall Environmental Analysis Laboratory				
Project Name: Western Refining Southwest, Q2 GW Sampling	Sample Matrix: Groundwater				
Project Number: 697-080-002 Task 0006	Sample Start Date: 06/28/2022				
Date Validated: 10/03/2022	Sample End Date: 06/28/2022				
Parameters Included:					
<ul> <li>Volatile Organic Compounds (VOC) by Environmental Pro Waste (SW-846) Method 8260B</li> </ul>	otection Agency (EPA) Test Methods for Evaluating Solid				
<ul> <li>1,2-Dibromoethane (EDB) by EPA Method 504.1</li> </ul>					
<ul> <li>Semivolatile Organic Compounds (SVOC) by SW-846 Me Monitoring (SIM)</li> </ul>	ethod 8270C and Method 8270 with Selected Ion				
<ul> <li>Total Petroleum Hydrocarbons (TPH) Gasoline Range Or</li> </ul>	ganics (GRO) by SW-846 Method 8015D				
<ul> <li>TPH Diesel Range Organics (DRO) and Motor Oil Range</li> </ul>	Organics (MRO) by SW-846 Method 8015D Modified				
<ul> <li>Total and Dissolved Metals by EPA Method 200.7 and Method</li> </ul>	ethod 200.8				
<ul> <li>Total and Dissolved Mercury by EPA Method 245.1</li> </ul>					
<ul> <li>Cyanide by Standard Methods for the Examination of Wa</li> </ul>	ter and Wastewater (SM) Method 4500 CN E				
Laboratory Project ID: 2206F41					
Data Validator: Kyle Power, Environmental Chemist					
Reviewer: Mike Phillips, Senior Chemist					

## DATA EVALUATION CRITERIA SUMMARY

A Tier II Data Validation was performed by Trihydro Corporation's Chemical Data Evaluation Services Group on the analytical data report packages generated by Hall Environmental Analysis Laboratory of Albuquerque, New Mexico, with additional data from Pace Analytical National of Mount Juliet, Tennessee evaluating samples from the Marathon Oil site, located in Gallup, New Mexico.

Precision, accuracy, method compliance, and completeness of this data package were assessed during this data review. Precision was determined by evaluating the calculated relative percent difference (RPD) values from:

- Field duplicate pairs
- Laboratory duplicate pairs
- Matrix spike (MS) and matrix spike duplicate (MSD) pairs
- Laboratory control sample (LCS) and laboratory control sample duplicate (LCSD) pairs

Laboratory accuracy was established by reviewing the demonstrated percent recoveries (%R) of the following items to verify that data are not biased.

- MS/MSD samples
- LCS/LCSD samples
- Organic system monitoring compounds (surrogates)



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Field accuracy was established by collecting and analyzing the following samples to monitor for possible ambient or cross contamination during sampling and transportation.

- Trip blank
- Field blank
- Equipment blank

Method compliance was established by reviewing sample integrity, holding times, detection limits, surrogate recoveries, laboratory blanks, initial and continuing calibrations (where applicable), and the LCS/LCSD percent recoveries against method-specific requirements.

Completeness was evaluated by determining the overall ratio of the number of samples and analyses planned versus the number of samples with valid analyses. Determination of completeness included a review of the chain-of-custody (CoC), laboratory analytical methods, and other laboratory and field documents associated with this analytical data set.

Client Sample ID	Laboratory Sample Number
EB-6-28-22	2206F41-001
MKTF-30	2206F41-002
MKTF-29	2206F41-003
OPIS-1	2206F41-004
STP-1-NM	2206F41-005
OW-12A	2206F41-006
OW-70	2206F41-007
DUP-6-28-22	2206F41-008
FB-6-28-22	2206F41-009
Trip Blank	2206F41-010

### SAMPLE NUMBERS TABLE





The laboratory data were reviewed to evaluate compliance with the methods and the quality of the reported data. Assessment of CoC completeness is included in Item 3 of the Data Validation Checklist. A check mark ( $\checkmark$ ) indicates that the referenced validation criteria were deemed acceptable, whereas a crossed circle ( $\otimes$ ) indicates validation criteria for which the data have been qualified by the data validator. An empty circle ( $\bigcirc$ ) indicates that the specified criterion does not apply to the reviewed data. Details are noted in the tables below.

## Validation Criteria

- ✓ Data Completeness
- ✓ CoC Documentation (Item 3)
- ✓ Holding Times and Preservation (Items 6 and 7)
- O Initial and Continuing Calibrations (Items 9 and 10)
- ⊗ Laboratory Blanks (Items 11 and 12)
- ✓ MS/MSD (Items 13 and 14)
- ⊗ LCS/LCSD (Items 15 and 16)
- System Monitoring Compounds (i.e., Surrogates) (Item 17)
- ⊗ Field, Equipment, and Trip Blanks (Items 18 and 19)
- ⊗ Field Duplicate (Items 20 and 21)
- ✓ Laboratory Duplicates (Item 22)

### **Guidance References**

Chemical data validation was conducted in accordance with the United States Environmental Protection Agency (USEPA) Contract Laboratory Program (CLP) National Functional Guidelines for the analyses listed below, or by the appropriate method if not covered in the National Functional Guidelines.

- Data for organic analyses were evaluated according to validation criteria set forth in the USEPA CLP National Functional Guidelines for Organic Superfund Methods Data Review, document number EPA-540-R-20-005, November 2020 with additional reference to the USEPA CLP National Functional Guidelines for Organic Data Review, document number EPA 540/R-99/008, October 1999.
- Data for inorganic analyses were evaluated according to validation criteria set forth in the USEPA CLP National Functional Guidelines for Inorganic Superfund Methods Data Review, document number EPA-540-R-20-006, November 2020 with additional reference to the USEPA CLP National Functional Guidelines for Inorganic Data Review, document number EPA 540-R-04-004, October 2004.
- Review of field duplicates was conducted according to the USEPA Region I New England Environmental Data Review Supplement for Region 1 Data Review Elements and Superfund Specific Guidance/Procedures, EQADR-Supplement2, September 2020.
- Trihydro Data Validation Variance Documentation, April 2022.



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## **OVERALL DATA PACKAGE ASSESSMENT**

Based on a data validation review, the data are acceptable as delivered. Data qualified by the laboratory are discussed in Item 2 of the Validation Criteria Checklist.

The purpose of validating data and assigning qualifiers is to assist in proper data interpretation. Data that are not qualified meet the site data quality objectives. If values are assigned qualifiers other than an R (rejected, data not usable), the data may be used for site evaluation; however, consideration should be given to the reasons for qualification when interpreting sample concentrations. Data points that are assigned an R qualifier should not be used for site evaluation purposes.

If applicable, text was identified in **bold font** in the Validation Criteria Checklist to indicate that further action and/or qualification of the data were required. Data may have been qualified with J data flags by the laboratory if the result was greater than or equal to the method detection limit (MDL) but less than the reporting limit (RL). These laboratory-applied J flags were preserved, if present, and included in the Data Qualification Summary table at the end of this report. If applicable, data validation qualifiers were added for the items noted with crossed circles in the Validation Criteria section above. Please see the Data Qualification Summary table at the end of this report.

If data would be qualified with more than one flag, one qualifier was assigned based on the severity; however, all reasons for qualification were retained. Data that would be qualified with both J+ and J- flags were evaluated based on validation criteria and assigned the appropriate flag. The hierarchy of qualifiers from the most to least severe is as follows:

R > JB/U > NJ > J+/J- > J/UJ

Data qualifiers used during this validation are included in the following table.

<u>Qualifier</u>	Definition
J	Estimated concentration
J+	The result is an estimated concentration, but may be biased high
UJ	Estimated reporting limit
U	Evaluated to be undetected at the reporting limit
JB	Estimated concentration due to blank contamination

### **Data Completeness**

The analyses were performed as requested on the CoC records. The associated samples were received by the laboratory and analyzed properly unless otherwise noted in the Criteria Checklist below. The complete data package consisted of 630 data points. The data completeness calculation does not include any submitted blank sample results. Data points were not rejected. The data completeness measure for this data package is calculated to be 100% and is acceptable.



VALIDATION CRITERIA CHECKLIST	
1. Was the report free of non-conformances identified by the laboratory?	No
Comments: The laboratory noted the following non-conformances regarding the analytical data.	
Method 8270C: The recovery for pyrene in the LCSD was slightly low.	
"S" flagged surrogates denote low surrogate recoveries due to matrix interferences/sample dilution.	
<ol> <li>Were the data free of data qualification flags and/or notes used by the laboratory? If no, define.</li> </ol>	No
Comments: The laboratory used the following data qualification flags with this data set.	
D – Sample diluted due to matrix	
J – Analyte detected below quantitation limits	
J3 – The associated batch QC was outside the established quality control range for precision.	
J6 – The sample matrix interfered with the ability to make any accurate determination; spike value is low	<i>.</i>
P1 – RPD value not applicable for sample concentrations less than 5 times the RL.	
R – RPD outside of range	
S – % Recovery outside of range due to dilution or matrix interference.	
* – Value exceeds maximum contaminant level.	
3. Were sample CoC forms and custody procedures complete?	Yes
Comments: The CoC records from field to laboratory were complete, and custody was maintained as evand laboratory personnel signatures, dates, and times of receipt. Custody seals were not present or requestions amples were delivered to the laboratory by courier, and custody was maintained at all times.	videnced by field uired since the
4. Were detection limits in accordance with the quality assurance project plan (QAPP), permit, or method, or indicated as acceptable?	Yes
Comments: The detection limits appeared to be acceptable. The following dilutions were applied.	
Method 8260B: Dilutions of 2 to 20 times were applied for the VOC analyses of select samples.	
Methods 8270C/8270 SIM: A dilution of 10 times was applied for the SVOC analysis of sample OPIS-1.	
Method 8015D: A dilution of 2 times was applied for the TPH GRO analysis of sample OPIS-1.	
Method 8015D Modified: A dilution of 2 times was applied for the TPH DRO and TPH MRO analyses of	sample OPIS-1.
Method 200.7: Dilutions of 5 times were applied for the total barium analyses of samples OPIS-1 and O	W-12A.
Method 200.8: A dilution of 5 times was applied for the dissolved metals analysis of sample OPIS-1.	
5. Were the reported analytical methods and constituents in compliance with the QAPP, permit, or CoC?	No
Comments: The reported analytical methods were in compliance with the CoC, and the laboratory report constituents in accordance with the CoC, with the following exceptions.	ted the requested
The CoC requested total and dissolved metals using Method 200.7; however, the laboratory analyzed th both Method 200.7 and Method 200.8. This substituted analytical method, Method 200.8, met similar se and precision goals and, therefore, was an acceptable replacement.	e samples using nsitivity, accuracy,
The CoC requested cyanide using Method 335.4; however, the laboratory analyzed the samples using N This substituted analytical method met similar sensitivity, accuracy, and precision goals and, therefore, w replacement.	/lethod 4500 CN E. vas an acceptable

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VALIDATION CRITERIA CHECKLIST				
6. Were samples received in good condition within method-specified requirements?				
Comments: Samples were received on ice, in good condition, and with the cooler temperatures within the recommended temperature range of 4°C ± 2°C between 2.1°C and 5.2°C as noted on the <i>Sample Log-In Check List</i> and CoC.				
7. Were samples extracted/digested and analyzed within method-specified or technical holding times?				
Comments: The samples were extracted/digested and analyzed within method-specific holding times.				
8. Were reported units appropriate for the sample matrix/matrices and analytical method(s)? Specify if wet or dry units were used for soil.				
Comments: The results were reported in concentration units of micrograms per liter (µg/L) and milligrams per liter (mg/L), which were acceptable for the sample matrix and the analyses requested.				
9. Did the laboratory provide any specific initial and/or continuing calibration results?				
Comments: Initial and continuing calibration data were not included as part of this data set.				
10. If initial and/or continuing calibration results were provided, were the results within acceptable limits?				
Comments: Initial and continuing calibration data were not included as part of this data set.				
11. Was the total number of laboratory blank samples prepared equal to at least 5% of the total number of samples or analyzed as required by the method?				
Comments: The total number of laboratory blank samples prepared was equal to at least 5% of the total number of samples.				
12. Were target analytes reported as not detected in the laboratory blanks?				
Comments: Target analytes were reported as not detected in the laboratory blanks, with the following exceptions.				
<u>Method 8015D Modified</u> : The analyte TPH DRO was detected in the method blanks from batches 68495 and 68464 at 0.023 mg/L and 0.037 mg/L, respectively. TPH DRO was detected in sample EB-6-28-22 at a concentration less than the blank detection, and the result was qualified as U. TPH DRO was detected in samples MKTF-30 and STP-1-NM at concentrations greater than the blank detection but less than or equal to 10 times the blank concentration, and the results were qualified as JB.				
qualification.				
13. Was the total number of MS samples prepared equal to at least 5% of the totalYesnumber of samples or analyzed as required by the method?				
Comments: I ne total number of matrix spike samples prepared was equal to at least 5% of the total number of samples, although MS samples were not prepared/reported for all analyses and/or batches. The matrix spike sample source for each analytical batch in this sample set has been indicated below.				
Metho	d <u>Analytes</u>	Batch	MS Sample Source	
200.7	Total Metals	68545	Not Prepared	
200.7	Dissolved Metals	B89154	Not Prepared	
200.8	Total Metals	68545	Not Prepared	
200.8	Dissolved Metals	A89215	EB-6-28-22	
245.1	Total Mercury	68621	OW-12A	
504.1	EDB	68566	Not Prepared	
Trihydro				

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VALIDATION CRITERIA CHECKLIST										
	Method	Ana	lytes	Batch	MS Sample	Source				
	8015D	TPH DRC	and MRO	68495	Not Prepa	ared				
	8015D	TPH	DRO	68464	Not Prepa	ared				
	8015D	TPH	GRO	R89210	Not Prepa	ared				
	8260B	V	C	B89226	Not Prepa	ared				
	8260B	V	C	R89293	Not Prepa	ared				
	8270C	SV	'OC	68493	Not Prepa	ared				
	8270C	SV	'OC	68468	Not Prepa	ared				
	8270 SIM	SV	'OC	68493	Not Prepa	ared				
	8270 SIM	SV	OC .	68468	Not Prepa	ared				
	4500 CN E	Cya	inide	WG1889907	Not Prepa	ared				
	4500 CN E	Cya	inide	WG1891839	Not Associated a	and OW-70				
Not Associate	ed – The MS sample source	ce was not	associated with t	his project.						
Not Prepared	l – Matrix spikes were not	prepared/re	eported for this b	atch.						
14. For MS within	14. For MS/MSDs prepared from project samples, were percent recoveries and RPDs Yes within data validation or laboratory quality control (QC) limits?									
Comments	The MS/MSD percent	recoverie	s and RPDs fo	r project samples	were within data val	idation and labo	ratory OC			
limits.										
Recoveries and RPDs for MS/MSDs prepared from non-project samples were considered, but data were not qualified										
based on these results since matrix similarity to project samples could not be guaranteed.										
15. Was the total number of LCSs analyzed equal to at least 5% of the total number of Yes										
O										
Comments:	The total number of L	5 sample	es analyzed wa	as equal to at leas	at 5% of the total hun	iber of samples.				
16. Were L laborat	.CS/LCSD percent reco tory QC limits?	veries and	d LCS/LCSD R	PDs within data v	alidation or	No				
Comments:	The I CS and I CSD p	ercent rec	overies and I (	CS/LCSD RPDs w	vere within data valid	ation and labora	atory QC			
limits, with t	the exceptions listed in	the followi	ing table.							
Method	Analyte	<u>Batch</u>	<u>LCS</u> <u>Recovery</u>	<u>LCSD</u> <u>Recovery</u>	LCS/LCSD QC Limits	LCS/LCSD RPD	<u>RPD</u> <u>QC</u> Limits			
200.7	Nickel, Total	68545	132%		70-130%					
8015D	TPH DRO	68464	83.6%	Acceptable	31.7-75.4%	Acceptable	20%			
8015D	TPH DRO	68495	75.5%	78.6%	31.7-75.4%	Acceptable	20%			
8270C	Acenaphthene	68493	Acceptable	Acceptable	21.3-104%	53.0%	45.3%			
8270C	1,4-Dichlorobenzene	68493	Acceptable	Acceptable	15-89.8%	49.3%	39.6%			
8270C	Phenol	68493	Acceptable	Acceptable	17-61.1%	55.7%	42.5%			
8270C	Pyrene	68493	Acceptable	55.4%	61-123%	30.2%	11.8%			
8270C	Acenaphthene	68468	Acceptable	Acceptable	21.3-104%	58.7%	45.3%			
8270C	1,4-Dichlorobenzene	68468	Acceptable	Acceptable	15-89.8%	55.4%	39.6%			
8270C	Phenol	68468	Acceptable	Acceptable	17-61.1%	59.2%	42.5%			
8270C	Pyrene	68468	Acceptable	Acceptable	61-123%	19.2%	11.8%			
8270 SIM	1,4-Dioxane	68493	49.0%	Acceptable	20.2-48.4%	86.5%	30.1%			
8270 SIM	Naphthalene	68493	Acceptable	Acceptable	21.3-79.9%	87.9%	25.6%			



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	VALIDATION CRITERIA CHECKLIST											
Method	<u>Analyte</u>	<u>Batch</u>	<u>LCS</u> <u>Recovery</u>	<u>LCSD</u> <u>Recovery</u>	LCS/LCSD QC Limits	LCS/LCSD RPD	RPD QC Limits					
8270 SIM	1-Methylnaphthalene	68493	Acceptable	Acceptable	22.2-80.3%	80.4%	25%					
8270 SIM	2-Methylnaphthalene	68493	Acceptable	Acceptable	20.6-80.1%	76.6%	25%					
8270 SIM	Acenaphthene	68493	Acceptable	Acceptable	29.8-82.7%	80.3%	27.8%					
8270 SIM	Fluorene	68493	Acceptable	Acceptable	33.3-86%	56.5%	26.4%					
8270 SIM	Phenanthrene	68493	Acceptable	Acceptable	38.2-93.9%	33.3%	27.9%					
8270 SIM	Chrysene	68493	Acceptable	Acceptable	55.3-115%	34.7%	20%					

Analytes with LCS and/or LCSD recoveries greater than laboratory QC limits were detected in the associated samples, and the results were qualified as J+ to indicate estimated concentrations that may be biased high. Analytes with LCS/LCSD RPD values exceeding laboratory QC limits were qualified as J if detected and UJ if not detected due to poor precision.

Qualification was not required for acenaphthene and pyrene by Method 8270C as the associated samples' results were reported from Method 8270 SIM.

17. Were surrogate recoveries within laboratory QC limits?

No

Comments: Surrogate recoveries were within laboratory QC limits, with the exceptions listed in the following table.

<u>Method</u>	<u>Surrogate</u>	<u>Sample</u>	<u>Surrogate</u> <u>Recovery</u>	QC Limits
8015D	Bromofluorobenzene	OPIS-1	145%	70-130%
8270C	2-Fluorophenol	OPIS-1	0%	29.4-87.7%
8270C	Phenol-d₅	OPIS-1	0%	28.5-64.7%
8270C	2,4,6-Tribromophenol	OPIS-1	0%	18.6-129%
8270C	Nitrobenzene-d₅	OPIS-1	0%	36.9-103%
8270C	2-Fluorobiphenyl	OPIS-1	0%	38.1-99.9%
8270C	4-Terphenyl-d <sub>14</sub>	OPIS-1	0%	48-155%
8270 SIM	Nitrobenzene-d₅	OPIS-1	0%	31.6-100%
8270 SIM	2-Fluorobiphenyl	OPIS-1	0%	26.7-90.1%
8270 SIM	4-Terphenyl-d <sub>14</sub>	OPIS-1	0%	72.3-147%
8015D	Bromofluorobenzene	OW-12A	<b>261%</b>	70-130%
8270C	Phenol-d₅	OW-12A	0%	28.5-64.7%
8270 SIM	4-Terphenyl-d <sub>14</sub>	OW-12A	66.1%	72.3-147%
8015D	Bromofluorobenzene	OW-70	441%	70-130%
8270C	2,4,6-Tribromophenol	DUP-6-28-22	15.6%	18.6-129%
8270 SIM	4-Terphenyl-d <sub>14</sub>	DUP-6-28-22	71.2%	72.3-147%

# The analyte associated with bromofluorobenzene (TPH GRO) was detected in the affected samples and was qualified as J+ to indicate estimated concentrations that may be biased high.

The semivolatile organic compound results for sample OPIS-1 were not qualified based on the surrogate non-conformances in the Method 8270C and Method 8270 SIM analyses since the applied dilutions of 10 times resulted in surrogate concentrations below routinely calibrated levels, and these results were deemed unreliable and possibly inaccurate.

Since Methods 8270C and 8270 SIM surrogate associations were not available from the laboratory, qualification was assigned to all the target analytes in a given fraction (acid or base/neutral) when two or more surrogates from the same fraction (acid or base/neutral) were outside the acceptance range. This condition did not exist for the samples OW-12A and DUP-6-28-22, and qualification of sample data was not required.

Qualification was not required based on surrogate nonconformance in QC samples as the environmental samples were evaluated based on their specific surrogate recoveries.



## VALIDATION CRITERIA CHECKLIST

18. Were the number of trip blank, field blank, and/or equipment blank samples collected equal to at least 10% of the total number of samples or as required by the project guidelines, QAPP, SAP, or permit?

Comments: The number of trip, field, and equipment blanks collected was equal to at least 10% of the number of samples. One trip blank sample, Trip Blank, one field blank sample, FB-6-28-22, and one equipment blank sample, EB-6-28-22, were collected as part of this sample set.

19. Were target analytes reported as not detected in the trip blank, field blank, and/or equipment blank samples?

No

Yes

Comments: Target analytes were not detected in the trip blank, field blank, and equipment blank samples, with the exceptions listed in the following table.

	Blank Sample ID	<u>Method</u>	<u>Analyte</u>	Concentration
Ī	Trip Blank	8260B	Acetone	3.2 μg/L
	FB-6-28-22	8260B	Acetone	6.4 µg/L
Ī	FB-6-28-22	8260B	Chloromethane	0.50 μg/L
ſ	EB-6-28-22	8260B	Acetone	5.9 µg/L
ſ	EB-6-28-22	8260B	Chloromethane	0.41 µg/L
Ī	EB-6-28-22	200.7	Dissolved Zinc	0.0038 mg/L
ſ	EB-6-28-22	8015D	TPH GRO	0.010 mg/L
	EB-6-28-22	8015D	TPH DRO	0.022 mg/L

Detections in the associated samples that were less than the applicable reporting limits were assigned U qualifiers. Detections in the associated samples that were greater than the reporting limits but less than 10 times the blank results were assigned JB qualifiers. Non-detections of the identified analytes in the associated samples and detections that were above the reporting limit and greater than ten times the blank concentration did not require qualification.

The TPH DRO results were previously qualified due to laboratory blank contamination in batches 68495 and 68464; therefore, additional qualification due to the equipment blank contamination was not required.

20. Was the number of field duplicates collected equal to at least 10% of the total Yes number of samples or as required by the project guidelines, QAPP, SAP, or permit?

Comments: The number of field duplicates collected was equal to at least 10% of the number of samples. Sample DUP-6-28-22 was collected as a field duplicate of sample MKTF-29.

 Were field duplicate RPD values within data validation QC limits (soil 0-50%, water 0-30%, or air 0-25%)?

Comments: As indicated in the Field Duplicate Summary Table at the end of this report, field duplicate RPD values were within data validation QC limits of 0-30% for water samples, with the following exceptions.

The RPD value for TPH DRO exceeded the data validation QC limit of 30% at 56.2%, which was evidence of poor precision. The TPH DRO results were qualified as J for samples MKTF-29 and DUP-6-28-22.

An RPD value could not be calculated for TPH MRO for the field duplicate pairs MKTF-29 and DUP-6-28-22 because the analyte was detected in the parent sample and was undetected in the duplicate sample. As the detection in the parent was greater than two times the reporting limits, TPH MRO was qualified as J and UJ for the parent and duplicate samples, respectively.



No

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VALIDATION CRITERIA CHECKLIST									
22. For laboratory dup validation or laboration	licates prepared fro atory QC limits?	om project san	nples, were RPDs	s within o	data	N/A			
Comments: Laboratory the following table.	duplicates prepar	ed for these a	nalyses and labo	atory du	plicate sample s	ources are summarized in			
	Method	<u>Analytes</u>	Batch	<u>Labora</u> San	atory Duplicate nple Source				
	4500 CN E	Cyanide	WG1889907	Not	Associated				
	4500CN E	NE Cyanide WG1891839 Not Associated		Associated					
Not Associated – The labo	oratory duplicate sam	ple source was	not associated with	this proje	ect.				
The RPD values for laboratory duplicate samples prepared from non-project samples were considered, but data were not qualified based on these results since matrix similarity to project samples could not be guaranteed.									
23. Were the following	data relationships	realistic?							
Target analytes were reported by more than one method (e.g., 8260/8270, N/ EPH/8270)?									
Comments: Target and	alytes were not rep	orted by more	than one method	l.					
Both total and dissolved metals analyses were performed, and the total metals     No     results were greater than or equal to the dissolved metals results?									
results. The EPA has r metals results that exce based on these data.	not provided guidance of the correspond	nce or requirer	nents for the eval ls results. Theref	uation, v ore, qua	validation, and qu lification of result	alification of dissolved s was not performed			
	Sample ID	<u>Analyte</u>	<u>Total Re</u> (mg/L	<u>sult</u> )	Dissolved Res (mg/L)	<u>ult</u>			
	OPIS-1	Cadmium	ND		0.0011				
	DUP-6-28-22	Selenium	0.0004	1	0.0009				
	OPIS-1	Selenium	0.001	4	0.0018				
	STP-1-NM	Selenium	0.004	6	0.0078				
	DUP-6-28-22	Silver	ND		0.0066				
	MKTF-29	Silver	ND		0.0072				
	MKTF-30	Silver	ND		0.0025				
	OPIS-1	Silver	ND		0.0029				
	OW-12A	Silver	ND		0.0021				
	STP-1-NM	Silver	ND		0.0016				
	STP-1-NM	Vanadium	0.038	}	0.039				
	DUP-6-28-22	Zinc	0.008	2	0.0086				
	EB-6-28-22	Zinc	ND		0.0038				
	OPIS-1	Zinc	0.029	)	0.032				



Client Sample ID: MKTF-29										
Field Duplicate Sample ID: DUP-6-28-22										
Analyte	Method	Laboratory Result	Duplicate Result	Relative Percent Difference (RPD)						
1,1-Dichloroethane	8260B	0.94 µg/L	0.91 µg/L	3.2% +/-RL						
Chloromethane	8260B	0.52 µg/L	0.47 μg/L	10.1% +/-RL						
MTBE	8260B	22 µg/L	22 µg/L	0.0%						
1,4-Dioxane	8270 SIM	4.5 µg/L	4.0 µg/L	11.8%						
TPH GRO	8015D	0.025 mg/L	0.025 mg/L	0.0% +/-RL						
TPH DRO	8015D	0.57 mg/L	0.32 mg/L	56.2%						
TPH MRO	8015D	0.57 mg/L	ND (0.08 mg/L)	DL						
Barium, Dissolved	200.7	0.16 mg/L	0.15 mg/L	6.5%						
Barium, Total	200.7	0.26 mg/L	0.25 mg/L	3.9%						
Cobalt, Total	200.7	0.0070 mg/L	0.0086 mg/L	20.5% +/-RL						
Nickel, Dissolved	200.7	0.015 mg/L	0.015 mg/L	0.0% +/-RL						
Nickel, Total	200.7	0.024 mg/L	0.024 mg/L	0.0%						
Silver, Dissolved	200.7	0.0072 mg/L	0.0066 mg/L	8.7% +/-RL						
Vanadium, Dissolved	200.7	0.0064 mg/L	0.0064 mg/L	0.0% +/-RL						
Vanadium, Total	200.7	0.0073 mg/L	0.0072 mg/L	1.4% +/-RL						
Zinc, Dissolved	200.7	0.0087 mg/L	0.0086 mg/L	1.2% +/-RL						
Zinc, Total	200.7	0.013 mg/L	0.0082 mg/L	45.3% +/-RL						
Arsenic, Dissolved	200.8	0.00083 mg/L	0.00080 mg/L	3.7% +/-RL						
Arsenic, Total	200.8	0.00096 mg/L	0.00095 mg/L	1.0% +/-RL						
Lead, Dissolved	200.8	0.000064 mg/L	0.000061 mg/L	4.8% +/-RL						
Lead, Total	200.8	0.00053 mg/L	0.00040 mg/L	28.0% +/-RL						
Selenium, Dissolved	200.8	ND (0.0010 mg/L)	0.00090 mg/L	DL						
Selenium, Total	200.8	0.00075 mg/L	0.00041 mg/L	58.6% +/-RL						
Cyanide, Total	4500 CN E	6.31 µg/L	6.92 µg/L	9.2% +/-RL						

#### FIELD DUPLICATE SUMMARY

Field duplicate RPD control limits are not to exceed 30% for water as established by USEPA Region I - New England Environmental Data Review Supplement for Region 1 Data Review Elements and Superfund Specific Guidance/Procedures, EQADR-Supplement2, September 2020.

DL – Indicates that the analyte was detected in one of the duplicate samples and was undetected in the other sample, and therefore an RPD could not be calculated. Data were not qualified since the detection was within two times the reporting limit. Non-detected results are indicated above with the applicable reporting limit as ND (RL). **TPH MRO was detected in the parent sample, but not in the duplicate sample. As the detected result was greater than two times the reporting limit, TPH MRO was qualified as J and UJ for the parent and duplicate samples, respectively.** 

+/-RL – Indicates that the detections in both of the samples were within two times the reporting limit. Qualification of data was not required.

The RPD value for TPH DRO exceeded the data validation QC limit and was qualified as J for samples MKTF-29 and DUP-6-28-22 due to evidence of poor precision.



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## DATA QUALIFICATION SUMMARY

Abbreviation	Reason
HR-SUR	The surrogate percent recovery was greater than the upper acceptable limit indicating a possible high bias.
HR-LCS	The LCS and/or LCSD percent recovery was greater than the upper acceptable limit indicating a possible high bias.
ERPD-FD	High field duplicate RPD.
MBD	Method blank detection
FBD	Field blank detection
EBD	Equipment blank detection
TBD	Trip blank detection
MDLRL	Flagged by the laboratory: The result was greater than the MDL but less than the RL.
ERPD-LCS	The LCS/LCSD RPD exceeded the upper acceptable limit indicating poor precision.

Analyte	Method	Field Sample ID	Lab Sample ID	Result	Limit	Units	Reviewer Qualifier	DV Flag Reasons
1,1-Dichloroethane	SW8260B	MKTF-29	2206f41-003a	0.94	1	µg/L	J	MDLRL
1,1-Dichloroethane	SW8260B	OPIS-1	2206f41-004a	3	5	µg/L	J	MDLRL
1,1-Dichloroethane	SW8260B	OW-12A	2206f41-006a	1.1	2	µg/L	J	MDLRL
1,1-Dichloroethane	SW8260B	OW-70	2206f41-007a	0.74	1	µg/L	J	MDLRL
1,1-Dichloroethane	SW8260B	DUP-6-28-22	2206f41-008a	0.91	1	µg/L	J	MDLRL
1,2,4-Trimethylbenzene	SW8260B	OPIS-1	2206f41-004a	1.2	5	µg/L	J	MDLRL
1,2,4-Trimethylbenzene	SW8260B	OW-70	2206f41-007a	0.25	1	µg/L	J	MDLRL
1,2-Dichloroethane	SW8260B	OW-12A	2206f41-006a	0.92	2	µg/L	J	MDLRL
1,4-Dichlorobenzene	SW8270C	EB-6-28-22	2206F41-001C	ND	5	µg/L	UJ	ERPD-LCS
1,4-Dichlorobenzene	SW8270C	MKTF-30	2206F41-002C	ND	5	µg/L	UJ	ERPD-LCS
1,4-Dichlorobenzene	SW8270C	MKTF-29	2206F41-003C	ND	5	µg/L	UJ	ERPD-LCS
1,4-Dichlorobenzene	SW8270C	OPIS-1	2206F41-004C	ND	50	µg/L	UJ	ERPD-LCS
1,4-Dichlorobenzene	SW8270C	STP-1-NM	2206F41-005C	ND	5	µg/L	UJ	ERPD-LCS



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Analyte	Method	Field Sample ID	Lab Sample ID	Result	Limit	Units	Reviewer Qualifier	DV Flag Reasons
1,4-Dichlorobenzene	SW8270C	OW-12A	2206F41-006C	ND	5	µg/L	UJ	ERPD-LCS
1,4-Dichlorobenzene	SW8270C	OW-70	2206F41-007C	ND	5	µg/L	UJ	ERPD-LCS
1,4-Dichlorobenzene	SW8270C	DUP-6-28-22	2206F41-008C	ND	5	µg/L	UJ	ERPD-LCS
1,4-Dioxane	SW8270C	STP-1-NM	2206f41-005c	0.22	1	µg/L	J	MDLRL
1,4-Dioxane	SW8270C	OW-12A	2206f41-006c	16	1	µg/L	J+	ERPD-LCS, HR-LCS
1,4-Dioxane	SW8270C	DUP-6-28-22	2206f41-008c	4	1	µg/L	J+	ERPD-LCS, HR-LCS
1,4-Dioxane	SW8270C	OW-70	2206f41-007c	0.7	1	µg/L	J+	ERPD-LCS, HR-LCS, MDLRL
1-Methylnaphthalene	SW8270C	OW-12A	2206f41-006c	0.96	0.3	µg/L	J	ERPD-LCS
1-Methylnaphthalene	SW8270C	OW-70	2206f41-007c	ND	0.3	µg/L	UJ	ERPD-LCS
1-Methylnaphthalene	SW8270C	DUP-6-28-22	2206f41-008c	ND	0.3	µg/L	UJ	ERPD-LCS
2-Butanone	SW8260B	OW-12A	2206f41-006a	4.7	20	µg/L	J	MDLRL
2-Butanone	SW8260B	OW-70	2206f41-007a	2.6	10	µg/L	J	MDLRL
2-Methylnaphthalene	SW8270C	OW-12A	2206f41-006c	0.42	0.3	µg/L	J	ERPD-LCS
2-Methylnaphthalene	SW8270C	OW-70	2206f41-007c	ND	0.3	µg/L	UJ	ERPD-LCS
2-Methylnaphthalene	SW8270C	DUP-6-28-22	2206f41-008c	ND	0.3	µg/L	UJ	ERPD-LCS
Acenaphthene	SW8270C	OW-12A	2206f41-006c	ND	0.3	µg/L	UJ	ERPD-LCS
Acenaphthene	SW8270C	DUP-6-28-22	2206f41-008c	ND	0.3	µg/L	UJ	ERPD-LCS
Acenaphthene	SW8270C	OW-70	2206f41-007c	0.24	0.3	µg/L	J	ERPD-LCS, MDLRL
Acetone	SW8260B	Trip Blank	2206f41-010a	3.2	10	µg/L	J	MDLRL
Acetone	SW8260B	EB-6-28-22	2206f41-001a	5.9	10	µg/L	U	MDLRL, TBD
Acetone	SW8260B	OW-12A	2206f41-006a	11	20	µg/L	U	MDLRL, TBD
Acetone	SW8260B	OW-70	2206f41-007a	7.5	10	µg/L	U	MDLRL, TBD
Acetone	SW8260B	FB-6-28-22	2206f41-009a	6.4	10	µg/L	U	MDLRL, TBD
Arsenic, Dissolved	E200.8	MKTF-30	2206F41-002E	0.00063	0.001	mg/L	J	MDLRL
Arsenic, Dissolved	E200.8	MKTF-29	2206F41-003E	0.00083	0.001	mg/L	J	MDLRL
Arsenic, Dissolved	E200.8	DUP-6-28-22	2206F41-008E	0.0008	0.001	mg/L	J	MDLRL



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Analyte	Method	Field Sample ID	Lab Sample ID	Result	Limit	Units	Reviewer Qualifier	DV Flag Reasons
Arsenic, Total	E200.8	MKTF-29	2206F41-003D	0.00096	0.001	mg/L	J	MDLRL
Arsenic, Total	E200.8	DUP-6-28-22	2206F41-008D	0.00095	0.001	mg/L	J	MDLRL
Beryllium, Total	E 200.7	MKTF-30	2206F41-002D	0.0009	0.002	mg/L	J	MDLRL
Cadmium, Dissolved	E 200.7	OPIS-1	2206F41-004E	0.0011	0.002	mg/L	J	MDLRL
Chloromethane	SW8260B	EB-6-28-22	2206f41-001a	0.41	3	µg/L	U	FBD, MDLRL
Chloromethane	SW8260B	MKTF-29	2206f41-003a	0.52	3	µg/L	U	FBD, MDLRL
Chloromethane	SW8260B	STP-1-NM	2206f41-005a	0.44	3	µg/L	U	FBD, MDLRL
Chloromethane	SW8260B	OW-12A	2206f41-006a	2.2	6	µg/L	U	FBD, MDLRL
Chloromethane	SW8260B	OW-70	2206f41-007a	1.4	3	µg/L	U	FBD, MDLRL
Chloromethane	SW8260B	DUP-6-28-22	2206f41-008a	0.47	3	µg/L	U	FBD, MDLRL
Chloromethane	SW8260B	FB-6-28-22	2206f41-009a	0.5	3	µg/L	J	MDLRL
Chromium, Total	E 200.7	OPIS-1	2206F41-004D	0.0022	0.006	mg/L	J	MDLRL
Chrysene	SW8270C	OW-12A	2206f41-006c	ND	0.3	µg/L	UJ	ERPD-LCS
Chrysene	SW8270C	OW-70	2206f41-007c	ND	0.3	µg/L	UJ	ERPD-LCS
Chrysene	SW8270C	DUP-6-28-22	2206f41-008c	ND	0.3	µg/L	UJ	ERPD-LCS
cis-1,2-Dichloroethene	SW8260B	OW-12A	2206f41-006a	0.94	2	µg/L	J	MDLRL
Cobalt, Dissolved	E 200.7	OPIS-1	2206F41-004E	0.0051	0.006	mg/L	J	MDLRL
Cobalt, Dissolved	E 200.7	OW-70	2206F41-007E	0.0053	0.006	mg/L	J	MDLRL
Cyanide, Total	E335.4	MKTF-30	2206F41-002F	2.91	5	µg/L	J	MDLRL
Cyanide, Total	E335.4	OW-12A	2206F41-006F	2.42	5	µg/L	J	MDLRL
Cyanide, Total	E335.4	OW-70	2206F41-007F	4.04	5	µg/L	J	MDLRL
Fluorene	SW8270C	OW-70	2206f41-007c	ND	0.3	µg/L	UJ	ERPD-LCS
Fluorene	SW8270C	DUP-6-28-22	2206f41-008c	ND	0.3	µg/L	UJ	ERPD-LCS
Fluorene	SW8270C	OW-12A	2206f41-006c	0.16	0.3	µg/L	J	ERPD-LCS, MDLRL
Lead, Dissolved	E200.8	MKTF-29	2206F41-003E	0.000064	0.0005	mg/L	J	MDLRL
Lead, Dissolved	E200.8	OW-70	2206F41-007E	0.00013	0.0005	mg/L	J	MDLRL



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Δηαίντο	Method	Field Sample ID	I ah Sample ID	Result	Limit	Units	Reviewer	DV Flag Reasons
Analyte				Result		Units	Qualifier	
Lead, Dissolved	E200.8	DUP-6-28-22	2206F41-008E	0.000061	0.0005	mg/L	J	MDLRL
Lead, Total	E200.8	DUP-6-28-22	2206F41-008D	0.0004	0.0005	mg/L	J	MDLRL
MTBE	SW8260B	STP-1-NM	2206f41-005a	0.41	1	µg/L	J	MDLRL
Naphthalene	SW8270C	OW-12A	2206f41-006c	2.8	0.3	µg/L	J	ERPD-LCS
Naphthalene	SW8270C	OW-70	2206f41-007c	ND	0.3	µg/L	UJ	ERPD-LCS
Naphthalene	SW8270C	DUP-6-28-22	2206f41-008c	ND	0.3	µg/L	UJ	ERPD-LCS
n-Butylbenzene	SW8260B	OW-70	2206f41-007a	1.2	3	µg/L	J	MDLRL
Nickel, Dissolved	E 200.7	OW-12A	2206F41-006E	0.0068	0.01	mg/L	J	MDLRL
Nickel, Total	E 200.7	OW-12A	2206F41-006E	0.0068	0.01	mg/L	J+	HR-LCS
Nickel, Total	E 200.7	MKTF-30	2206F41-002D	0.03	0.01	mg/L	J+	HR-LCS
Nickel, Total	E 200.7	MKTF-29	2206F41-003D	0.024	0.01	mg/L	J+	HR-LCS
Nickel, Total	E 200.7	OPIS-1	2206F41-004D	0.18	0.01	mg/L	J+	HR-LCS
Nickel, Total	E 200.7	OW-12A	2206F41-006D	0.02	0.01	mg/L	+ل	HR-LCS
Nickel, Total	E 200.7	OW-70	2206F41-007D	0.05	0.01	mg/L	J+	HR-LCS
n-Propylbenzene	SW8260B	OPIS-1	2206f41-004a	1	5	µg/L	J	MDLRL
Phenanthrene	SW8270C	OW-70	2206f41-007c	0.62	0.3	µg/L	J	ERPD-LCS
Phenanthrene	SW8270C	OW-12A	2206f41-006c	ND	0.3	µg/L	UJ	ERPD-LCS
Phenanthrene	SW8270C	DUP-6-28-22	2206f41-008c	ND	0.3	µg/L	UJ	ERPD-LCS
Phenol	SW8270C	EB-6-28-22	2206F41-001C	ND	20	µg/L	UJ	ERPD-LCS
Phenol	SW8270C	MKTF-30	2206F41-002C	ND	20	µg/L	UJ	ERPD-LCS
Phenol	SW8270C	MKTF-29	2206F41-003C	ND	20	µg/L	UJ	ERPD-LCS
Phenol	SW8270C	OPIS-1	2206F41-004C	ND	200	µg/L	UJ	ERPD-LCS
Phenol	SW8270C	STP-1-NM	2206F41-005C	ND	20	µg/L	UJ	ERPD-LCS
Phenol	SW8270C	OW-12A	2206F41-006C	ND	20	µg/L	UJ	ERPD-LCS
Phenol	SW8270C	OW-70	2206F41-007C	ND	20	µg/L	UJ	ERPD-LCS
Phenol	SW8270C	DUP-6-28-22	2206F41-008C	ND	20	µg/L	UJ	ERPD-LCS



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Analyte	Method	Field Sample ID	Lab Sample ID	Result	Limit	Units	Reviewer Qualifier	DV Flag Reasons
sec-Butylbenzene	SW8260B	OW-12A	2206f41-006a	0.95	2	µg/L	J	MDLRL
Selenium, Dissolved	E200.8	MKTF-30	2206F41-002E	0.00037	0.001	mg/L	J	MDLRL
Selenium, Dissolved	E200.8	OPIS-1	2206F41-004E	0.0018	0.005	mg/L	J	MDLRL
Selenium, Dissolved	E200.8	OW-12A	2206F41-006E	0.00058	0.001	mg/L	J	MDLRL
Selenium, Dissolved	E200.8	DUP-6-28-22	2206F41-008E	0.0009	0.001	mg/L	J	MDLRL
Selenium, Total	E200.8	MKTF-29	2206F41-003D	0.00075	0.001	mg/L	J	MDLRL
Selenium, Total	E200.8	OW-70	2206F41-007D	0.00051	0.001	mg/L	J	MDLRL
Selenium, Total	E200.8	DUP-6-28-22	2206F41-008D	0.00041	0.001	mg/L	J	MDLRL
Silver, Dissolved	E 200.7	MKTF-30	2206F41-002E	0.0025	0.005	mg/L	J	MDLRL
Silver, Dissolved	E 200.7	OPIS-1	2206F41-004E	0.0029	0.005	mg/L	J	MDLRL
Silver, Dissolved	E 200.7	STP-1-NM	2206F41-005E	0.0016	0.005	mg/L	J	MDLRL
Silver, Dissolved	E 200.7	OW-12A	2206F41-006E	0.0021	0.005	mg/L	J	MDLRL
Toluene	SW8260B	OW-12A	2206f41-006a	1.5	2	µg/L	J	MDLRL
TPH DRO	SW8015	OPIS-1	2206F41-004C	6	0.13	mg/L	J+	HR-LCS
TPH DRO	SW8015	OW-12A	2206F41-006C	2	0.064	mg/L	J+	HR-LCS
TPH DRO	SW8015	OW-70	2206F41-007C	0.97	0.064	mg/L	J+	HR-LCS
TPH DRO	SW8015	MKTF-30	2206F41-002C	0.11	0.064	mg/L	JB	HR-LCS, MBD
TPH DRO	SW8015	STP-1-NM	2206F41-005C	0.17	0.064	mg/L	JB	HR-LCS, MBD
TPH DRO	SW8015	EB-6-28-22	2206F41-001C	0.022	0.064	mg/L	U	HR-LCS, MBD, MDLRL
TPH DRO	SW8015	MKTF-29	2206F41-003C	0.57	0.064	mg/L	J+	ERPD-FD, HR-LCS
TPH DRO	SW8015	DUP-6-28-22	2206F41-008C	0.32	0.064	mg/L	J+	ERPD-FD, HR-LCS
TPH GRO	SW8015	OPIS-1	2206F41-004a	0.48	0.1	mg/L	J+	HR-SUR
TPH GRO	SW8015	OW-12A	2206F41-006a	2.8	0.05	mg/L	J+	HR-SUR
TPH GRO	SW8015	OW-70	2206F41-007a	0.38	0.05	mg/L	J+	HR-SUR
TPH GRO	SW8015	MKTF-30	2206F41-002a	0.022	0.05	mg/L	U	EBD, MDLRL
TPH GRO	SW8015	MKTF-29	2206F41-003a	0.025	0.05	mg/L	U	EBD, MDLRL



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Analyte	Method	Field Sample ID	Lab Sample ID	Result	Limit	Units	Reviewer Qualifier	DV Flag Reasons
TPH GRO	SW8015	DUP-6-28-22	2206F41-008a	0.025	0.05	mg/L	U	EBD, MDLRL
TPH GRO	SW8015	EB-6-28-22	2206F41-001a	0.01	0.05	mg/L	J	MDLRL
TPH MRO	SW8015	MKTF-29	2206F41-003C	0.57	0.08	mg/L	J	ERPD-FD
TPH MRO	SW8015	DUP-6-28-22	2206F41-008C	ND	0.08	mg/L	UJ	ERPD-FD
Trichloroethene	SW8260B	MKTF-30	2206f41-002a	0.93	1	µg/L	J	MDLRL
Vanadium, Dissolved	E 200.7	MKTF-30	2206F41-002E	0.0041	0.05	mg/L	J	MDLRL
Vanadium, Dissolved	E 200.7	MKTF-29	2206F41-003E	0.0064	0.05	mg/L	J	MDLRL
Vanadium, Dissolved	E 200.7	OPIS-1	2206F41-004E	0.023	0.05	mg/L	J	MDLRL
Vanadium, Dissolved	E 200.7	STP-1-NM	2206F41-005E	0.039	0.05	mg/L	J	MDLRL
Vanadium, Dissolved	E 200.7	OW-12A	2206F41-006E	0.004	0.05	mg/L	J	MDLRL
Vanadium, Dissolved	E 200.7	OW-70	2206F41-007E	0.0018	0.05	mg/L	J	MDLRL
Vanadium, Dissolved	E 200.7	DUP-6-28-22	2206F41-008E	0.0064	0.05	mg/L	J	MDLRL
Vanadium, Total	E 200.7	MKTF-30	2206F41-002D	0.044	0.05	mg/L	J	MDLRL
Vanadium, Total	E 200.7	MKTF-29	2206F41-003D	0.0073	0.05	mg/L	J	MDLRL
Vanadium, Total	E 200.7	OPIS-1	2206F41-004D	0.037	0.05	mg/L	J	MDLRL
Vanadium, Total	E 200.7	STP-1-NM	2206F41-005D	0.038	0.05	mg/L	J	MDLRL
Vanadium, Total	E 200.7	OW-12A	2206F41-006D	0.032	0.05	mg/L	J	MDLRL
Vanadium, Total	E 200.7	OW-70	2206F41-007D	0.013	0.05	mg/L	J	MDLRL
Vanadium, Total	E 200.7	DUP-6-28-22	2206F41-008D	0.0072	0.05	mg/L	J	MDLRL
Zinc, Dissolved	E 200.7	OPIS-1	2206F41-004E	0.032	0.01	mg/L	JB	EBD
Zinc, Dissolved	E 200.7	OW-12A	2206F41-006E	0.014	0.01	mg/L	JB	EBD
Zinc, Dissolved	E 200.7	MKTF-30	2206F41-002E	0.0063	0.01	mg/L	U	EBD, MDLRL
Zinc, Dissolved	E 200.7	MKTF-29	2206F41-003E	0.0087	0.01	mg/L	U	EBD, MDLRL
Zinc, Dissolved	E 200.7	STP-1-NM	2206F41-005E	0.0089	0.01	mg/L	U	EBD, MDLRL
Zinc, Dissolved	E 200.7	OW-70	2206F41-007E	0.0097	0.01	mg/L	U	EBD, MDLRL
Zinc, Dissolved	E 200.7	DUP-6-28-22	2206F41-008E	0.0086	0.01	mg/L	U	EBD, MDLRL



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Analyte	Method	Field Sample ID	Lab Sample ID	Result	Limit	Units	Reviewer Qualifier	DV Flag Reasons
Zinc, Dissolved	E 200.7	EB-6-28-22	2206F41-001E	0.0038	0.01	mg/L	J	MDLRL
Zinc, Total	E 200.7	DUP-6-28-22	2206F41-008D	0.0082	0.01	mg/L	J	MDLRL



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**Released to Imaging: 4/21/2023 9:45:24 AM** 



Client: Marathon Oil	Laboratory: Hall Environmental Analysis Laboratory
Project Name: Western Refining Southwest, Quarterly GW	Sample Matrix: Groundwater
Project Number: 697-080-002 Task: 0006	Sample Start Date: 06/29/2022
Date Validated: 01/24/2023	Sample End Date: 06/29/2022
Parameters Included:	
<ul> <li>Volatile Organic Compounds (VOC) by Environmental Pro Waste (SW-846) Method 8260B</li> </ul>	otection Agency (EPA) Test Methods for Evaluating Solid
<ul> <li>1,2-Dibromoethane (EDB) by EPA Method 504.1</li> </ul>	
<ul> <li>Semivolatile Organic Compounds (SVOC) by SW-846 Me Monitoring (SIM)</li> </ul>	thod 8270C and Method 8270C with Selected Ion
<ul> <li>Total Petroleum Hydrocarbons (TPH) Gasoline Range Or</li> </ul>	ganics (GRO) by SW-846 Method 8015D
<ul> <li>TPH Diesel Range Organics (DRO) and Motor Oil Range</li> </ul>	Organics (MRO) by SW-846 Method 8015D Modified
<ul> <li>Total and Dissolved Metals by EPA Method 200.7 and Method</li> </ul>	ethod 200.8
<ul> <li>Total and Dissolved Mercury by EPA Method 245.1</li> </ul>	
<ul> <li>Cyanide by Standard Methods for the Examination of Wat</li> </ul>	ter and Wastewater (SM) Method 4500 CN E
Laboratory Project ID: 2206G22	
Data Validator: Daran O'Hollearn, Lead Project Scientist	
Reviewer: Charles Ballek, Senior Chemist	

#### DATA EVALUATION CRITERIA SUMMARY

A Tier II Data Validation was performed by Trihydro Corporation's Chemical Data Evaluation Services Group on the analytical data report packages generated by Hall Environmental Analysis Laboratory of Albuquerque, New Mexico, with additional data from Pace Analytical National of Mount Juliet, Tennessee evaluating samples from the Marathon Oil site, located in Gallup, New Mexico.

Precision, accuracy, method compliance, and completeness of this data package were assessed during this data review. Precision was determined by evaluating the calculated relative percent difference (RPD) values from:

- Field duplicate pairs
- Laboratory duplicate pairs
- Matrix spike (MS) and matrix spike duplicate (MSD) pairs
- Laboratory control sample (LCS) and laboratory control sample duplicate (LCSD) pairs

Laboratory accuracy was established by reviewing the demonstrated percent recoveries (%R) of the following items to verify that data are not biased.

- MS/MSD samples
- LCS/LCSD samples
- Organic system monitoring compounds (surrogates)



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Field accuracy was established by collecting and analyzing the following samples to monitor for possible ambient or cross contamination during sampling and transportation.

- Trip blanks
- Field blanks
- Equipment blanks

Method compliance was established by reviewing sample integrity, holding times, detection limits, surrogate recoveries, laboratory blanks, initial and continuing calibrations (where applicable), and the LCS/LCSD percent recoveries against method-specific requirements.

Completeness was evaluated by determining the overall ratio of the number of samples and analyses planned versus the number of samples with valid analyses. Determination of completeness included a review of the chain-of-custody (CoC), laboratory analytical methods, and other laboratory and field documents associated with this analytical data set.

Client Sample ID	Laboratory Sample Number
EB-6-29-22	2206G22-001
MKTF-44	2206G22-002
OW-57	2206G22-003
OW-58	2206G22-004
OW-58A	2206G22-005
DUP-6-29-22	2206G22-006
FB-6-29-22	2206G22-007
Trip Blank	2206G22-008

#### SAMPLE NUMBERS TABLE





The laboratory data were reviewed to evaluate compliance with the methods and the quality of the reported data. Assessment of CoC completeness is included in Item 3 of the Data Validation Checklist. A check mark ( $\checkmark$ ) indicates that the referenced validation criteria were deemed acceptable, whereas a crossed circle ( $\otimes$ ) indicates validation criteria for which the data have been qualified by the data validator. An empty circle (O) indicates that the specified criterion does not apply to the reviewed data. Details are noted in the tables below.

#### Validation Criteria

- ✓ Data Completeness
- ✓ CoC Documentation (Item 3)
- ✓ Holding Times and Preservation (Items 6 and 7)
- O Initial and Continuing Calibrations (Items 9 and 10)
- ⊗ Laboratory Blanks (Items 11 and 12)
- ✓ MS/MSD (Items 13 and 14)
- ⊗ LCS/LCSD (Items 15 and 16)
- System Monitoring Compounds (i.e., Surrogates) (Item 17)
- 8 Field, Equipment, and Trip Blanks (Items 18 and 19)
- ⊗ Field Duplicates (Items 20 and 21)
- ✓ Laboratory Duplicates (Item 22)

#### **Guidance References**

Chemical data validation was conducted in accordance with the United States Environmental Protection Agency (USEPA) Contract Laboratory Program (CLP) National Functional Guidelines for the analyses listed below, or by the appropriate method if not covered in the National Functional Guidelines.

- Data for organic analyses were evaluated according to validation criteria set forth in the USEPA CLP National Functional Guidelines for Organic Superfund Methods Data Review, document number EPA-540-R-20-005, November 2020 with additional reference to the USEPA CLP National Functional Guidelines for Organic Data Review, document number EPA 540/R-99/008, October 1999.
- Data for inorganic analyses were evaluated according to validation criteria set forth in the USEPA CLP National Functional Guidelines for Inorganic Superfund Methods Data Review, document number EPA-540-R-20-006, November 2020 with additional reference to the USEPA CLP National Functional Guidelines for Inorganic Data Review, document number EPA 540-R-04-004, October 2004.
- Review of field duplicates was conducted according to the USEPA Region I New England Environmental Data Review Supplement for Region 1 Data Review Elements and Superfund Specific Guidance/Procedures, EQADR-Supplement2, September 2020.
- Trihydro Data Validation Variance Documentation, April 2022.



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#### **OVERALL DATA PACKAGE ASSESSMENT**

Based on a data validation review, the data are acceptable as delivered. Data qualified by the laboratory are discussed in Item 2 of the Validation Criteria Checklist.

The purpose of validating data and assigning qualifiers is to assist in proper data interpretation. Data that are not qualified meet the site data quality objectives. If values are assigned qualifiers other than an R (rejected, data not usable), the data may be used for site evaluation; however, consideration should be given to the reasons for qualification when interpreting sample concentrations. Data points that are assigned an R qualifier should not be used for site evaluation purposes.

If applicable, text was identified in **bold font** in the Validation Criteria Checklist to indicate that further action and/or qualification of the data were required. Data may have been qualified with J data flags by the laboratory if the result was greater than or equal to the method detection limit (MDL) but less than the reporting limit (RL). These laboratory-applied J flags were preserved, if present, and included in the Data Qualification Summary table at the end of this report. If applicable, data validation qualifiers were added for the items noted with crossed circles in the Validation Criteria section above. Please see the Data Qualification Summary table at the end of this report.

If data would be qualified with more than one flag, one qualifier was assigned based on the severity; however, all reasons for qualification were retained. Data that would be qualified with both J+ and J- flags were evaluated based on validation criteria and assigned the appropriate flag. The hierarchy of qualifiers from the most to least severe is as follows:

Data qualifiers used during this validation are included in the following table.

<u>Qualifier</u>	Definition
J	Estimated concentration
J+	The result is an estimated concentration, but may be biased high
J-	The result is an estimated concentration, but may be biased low
UJ	Estimated reporting limit
U	Evaluated to be undetected at the reporting limit
JB	Estimated concentration due to blank contamination

#### **Data Completeness**

The analyses were performed as requested on the CoC records. The associated samples were received by the laboratory and analyzed properly unless otherwise noted in the Criteria Checklist below. The complete data package consisted of 450 data points. The data completeness calculation does not include any submitted blank sample results. Data points were not rejected. The data completeness measure for this data package is calculated to be 100% and is acceptable.



VALIDATION CRITERIA CHECKLIST							
1. Was the report free of non-conformances identified by the laboratory? No							
Comments	: The labora	atory noted the following analytical non-o	conformances related to this data	a set.			
<u>Method 82</u> laboratory	<u>Method 8270C</u> : The laboratory control spike duplicate (LCSD) for Method 8270 had a low recovery for pyrene. The laboratory control spike (LCS) had acceptable recovery.						
Naphthalei 8270 SIM,	Naphthalene, 1-methylnaphthalene, and 2-methylnaphthalene may be reported by either EPA Method 8270 or EPA Method 8270 SIM, depending which method needs the least dilution.						
2. Were If no,	2. Were the data free of data qualification flags and/or notes used by the laboratory? No If no, define.						
Comments	Comments: The laboratory used the following data qualification flags with this data set.						
J – Analyte	e detected be	elow quantitation limits.					
J6 – The s	ample matrix	k interfered with the ability to make any a	accurate determination; spike va	lue is low.			
P1 – RPD	value not ap	plicable for sample concentrations less t	than 5 times the reporting limit.				
R – % RPI	) outside of I	range.					
S – % Rec	overy outsid	e of range due to dilution or matrix interf	erence.				
* – Value e	xceeds max	imum contaminant level.					
3. Were	sample CoC	forms and custody procedures complete	e?	Yes			
Commonto		records from field to laboratory were con	anlata, and custody was maintai	nod as ovidencod	by field		
and labora	tory personn	ecolds from field to laboratory were con lel signatures, dates, and times of receip	t. Custody seals were not prese	ent nor required on	the		
coolers be	cause the sa	imples were transferred to a courier for o	delivery to the laboratory, and cu	istody was maintai	ned at all		
times.							
4. Were	detection lim . or method.	its in accordance with the quality assura or indicated as acceptable?	nce project plan (QAPP),	Yes			
Comments	: The detec	tion limits appeared to be acceptable. T	he following dilutions were appli	ed.			
	Method	Sample(s)	Analyte(s)	Dilution Factor			
	200.7	OW-57	Dissolved Barium	5			
	200.7	OW-58A	Dissolved and Total Barium	5			
	200.8	OW-57	Select Total Metals	5			
	245.1	OW-58A	Total Mercury	5			
	200.7	OW-58, DUP-6-29-22	Dissolved and Total Barium	10			
	8015D	OW-57, OW-58, DUP-6-29-22	DRO and MRO	10			
	200.7	OW-57	Total Metals	20			
	200.8	OW-57	Total Lead	20			
	8015D	OW-58A	GRO	20			
	8015D	OW-57, OW-58, DUP-6-29-22	GRO	50			
	8260B	Multiple Samples	Select VOCs	50			
	200.7	OW-57	Total Barium	100			
	8260B	Multiple Samples	Benzene	500			

VALIDATION CRITERIA CHECKLIST	
5. Were the reported analytical methods and constituents in compliance with the QAPP, permit, or CoC?	0
Comments: The reported analytical methods were in compliance with the CoC, and the laboratory reported t constituents in accordance with the CoC, with the following exceptions.	the requested
The CoC requested total and dissolved metals using only Method 200.7; however, the laboratory analyzed th using both Method 200.7 and Method 200.8. This substituted analytical method, Method 200.8, met similar s accuracy, and precision goals and, therefore, was an acceptable replacement.	ne samples sensitivity,
The CoC requested cyanide using Method 335.4; however, the laboratory analyzed the samples using Methor This substituted analytical method met similar sensitivity, accuracy, and precision goals and therefore, was a replacement.	od 4500 CN E. In acceptable
6. Were samples received in good condition within method-specified requirements? No	0
Comments: Samples were received on ice, in good condition, and with the cooler temperatures both within a recommended temperature range of $4^{\circ}C \pm 2^{\circ}C$ at $1.3^{\circ}C$ , $2.3^{\circ}C$ , and $3.6^{\circ}C$ as noted on the CoC and the Sam Check List. Samples transferred to Pace National were received in good condition with the cooler temperature recommended range at $0.4^{\circ}C$ as noted on the CoC.	and outside the <i>nple Log-in</i> ire outside the
The cooler temperatures below 2.0°C were judged as acceptable since the laboratory did not report the sample as broken or frozen.	ple containers
The laboratory noted that additional nitric acid preservative was added to samples OW-57 and OW-58A to ac meet the method requirement. Validation action was not required.	djust the pH to
7. Were samples extracted/digested and analyzed within method-specified or Ye technical holding times?	es
Comments: The samples were extracted/digested and analyzed within method-specific holding times.	
8. Were reported units appropriate for the sample matrix/matrices and analytical Ye method(s)? Specify if wet or dry units were used for soil.	es
Comments: The results were reported in concentration units of micrograms per liter ( $\mu$ g/L) and milligrams per which were acceptable for the sample matrix and the analyses requested.	er liter (mg/L),
9. Did the laboratory provide any specific initial and/or continuing calibration results?	0
Comments: Initial and continuing calibration data were not included as part of this data set.	
10. If initial and/or continuing calibration results were provided, were the results within N/. acceptable limits?	Ά
Comments: Initial and continuing calibration data were not included as part of this data set.	
11. Was the total number of laboratory blank samples prepared equal to at least 5% of the total number of samples or analyzed as required by the method?Ye	es
Comments: The total number of laboratory blank samples prepared was equal to at least 5% of the total nun samples.	nber of
12. Were target analytes reported as not detected in the laboratory blanks? No	0
Comments: Target analytes were reported as not detected in the laboratory blanks, with the following except	tion.
TPH DRO was detected in the laboratory blank for Method 8015D batch 68495 at a concentration of 0. TPH DRO was detected in samples EB-6-29-22 and MKTF-44 at concentrations less than the laborator limit and the results were assigned U qualifiers. The TPH DRO results in the remaining associated samp greater than ten times the blank concentration and did not require qualification.	.023 mg/L. ry reporting bles were



## VALIDATION CRITERIA CHECKLIST

13. Was the total number of MS samples prepared equal to at least 5% of the total number of samples or analyzed as required by the method?

Yes

Comments: The total number of matrix spike samples prepared was equal to at least 5% of the total number of samples, although MS samples were not prepared/reported for all analyses and/or batch. The matrix spike sample source for each analytical batch in this sample set has been indicated below.

<u>Method</u>	<u>Analytes</u>	<u>Batch</u>	MS Sample Source
200.7	Total Metals	68545	EB-6-29-22, MKTF-44
200.7	Dissolved Metals	A89290	Not Prepared
200.7	Dissolved Barium	A89335	Not Prepared
200.7	Dissolved Barium	B89506	Not Prepared
200.7	Dissolved Barium	C89417	OW-58A
200.8	Total Metals	68545	Not Prepared
200.8	Dissolved Metals	A89215	Not Prepared
245.1	Total and Dissolved Mercury	68622	OW-58A
504.1	EDB	68565	Not Prepared
504.1	EDB	68566	Not Prepared
4500CN E	Cyanide	WG1889913	Not Associated
4500CN E	Cyanide	WG1893803	OW-57, Not Associated
8015D	TPH DRO and MRO	68495	Not Prepared
8015D	GRO	G89271	MKTF-44
8260B	VOC	R89230	MKTF-44
8260B	VOC	R89347	Not Prepared
8270C SIM	SVOC	68493	Not Prepared
8270C	SVOC	68493	Not Prepared

Not Associated – The MS sample source was not associated with this project.

Not Prepared – Matrix spikes were not prepared/reported for this batch.

14. For MS/MSDs prepared from project samples, were percent recoveries and RPDs within data validation or laboratory guality control (QC) limits?

Yes

Yes

Comments: The MS/MSD percent recoveries and RPDs for project samples were within data validation and laboratory QC limits, with the following exception.

The MSD recovery for cyanide in Method 4500CN E batch WG1893803 was outside the laboratory QC limits of 90.0-110% at 87.5%. However, the recoveries were within data validation limits of 75-125%. Validation action was not required.

The percent recoveries and RPD values for MS/MSDs prepared from non-project samples were evaluated and considered, but data were not qualified based on those results since matrix similarity to project samples could not be guaranteed.

15. Was the total number of LCSs analyzed equal to at least 5% of the total number of samples or analyzed as required by the method?

Comments: The total number of LCS samples analyzed was equal to at least 5% of the total number of samples.



No

## VALIDATION CRITERIA CHECKLIST

# 16. Were LCS/LCSD percent recoveries and LCS/LCSD RPDs within data validation or laboratory QC limits?

Comments: The LCS and LCSD percent recoveries and LCS/LCSD RPDs were within data validation and laboratory QC limits, with the following exceptions.

<u>Method</u>	Analyte	<u>Batch</u>	<u>LCS</u> <u>Recovery</u>	<u>LCSD</u> <u>Recovery</u>	LCS/LCSD QC Limits	LCS/LCSD RPD	<u>RPD</u> <u>QC</u> <u>Limits</u>
200.7	Total Nickel	68545	132%		70-130%		
200.7	Dissolved Barium	C89417	60.7%		70-130%		
200.7	Dissolved Nickel	A89290	61.8%		70-130%		
8015D	DRO	68495	75.5%	78.6%	31.7-75.4%	Acceptable	20%
8270C	Acenaphthene	68493	Acceptable	Acceptable	21.3-104%	53.0%	45.3%
8270C	1,4-Dichlorobenzene	68493	Acceptable	Acceptable	15-89.8%	49.3%	39.6%
8270C	Phenol	68493	Acceptable	Acceptable	17-61.1%	55.7%	42.5%
8270C	Pyrene	68493	Acceptable	55.4%	61-123%	30.2%	11.8%
8270C SIM	1,4-Dioxane	68493	49.0%	Acceptable	20.2-48.4%	86.5%	30.1%
8270C SIM	Naphthalene	68493	Acceptable	Acceptable	21.3-79.9%	87.9%	25.6%
8270C SIM	1-MethyInaphthalene	68493	Acceptable	Acceptable	22.2-80.3%	80.4%	25%
8270C SIM	2-Methylnaphthalene	68493	Acceptable	Acceptable	20.6-80.1%	76.6%	25%
8270C SIM	Acenaphthene	68493	Acceptable	Acceptable	29.8-82.7%	80.3%	27.8%
8270C SIM	Fluorene	68493	Acceptable	Acceptable	33.3-86%	56.5%	26.4%
8270C SIM	Phenanthrene	68493	Acceptable	Acceptable	38.2-93.9%	33.3%	27.9%
8270C SIM	Chrysene	68493	Acceptable	Acceptable	55.3-115%	34.7%	20%

The target analytes total nickel and DRO were detected in the associated samples, and the results were qualified as J+ based on the evidence of potential high bias. Non-detections of total nickel and 1,4-dioxane in the associated samples did not require qualification based on the evidence of potential high bias.

Detections of the analytes with LCS and/or LCSD recoveries less than the lower QC limits in the associated samples were qualified as J- due to evidence of potential low bias. Non-detections of these analytes in the associated samples were qualified as UJ.

The analytes with LCS/LCSD RPD values that exceeded the QC limit were qualified as J for detections and UJ for non-detections for the associated samples due to evidence of poor precision.



		١	ALIDATION	I CRITERIA CHECKLIST	-		
17. Wer	e surrogate recov	veries within labor	atory QC lim	its?		No	
Commen	its: Surrogate re	coveries were with	nin laboratory	y QC limits, with the follow	ving exceptions.		
	Method	Surroga	<u>ite</u>	Sample	<u>Surrogate</u> <u>Recovery</u>	QC Limits	
	8270C	2-Fluorop	nenol	DUP-6-29-22	10.4%	29.4-87.7%	
	8270C	2,4,6-Tribrom	ophenol	DUP-6-29-22	4.47%	18.6-129%	
	8270C-SIM	4-Terphen	yl-d <sub>14</sub>	OW-58	71.8%	72.3-147%	
	8270C-SIM	4-Terphen	yl-d <sub>14</sub>	DUP-6-29-22	67.6%	72.3-147%	
nalysis henol v nalytes	of samples OW-5 was detected in were not detec	58 and DUP-6-9-2 sample DUP-6-29 ted in sample DL	2, and qualif 9-22 and this IP-6-29-22, a	ication of sample data wa s result was qualified as and these results were o	as not required. s J The remain qualified as UJ,	ning SVOC targ due to the evid	jet lence c
otentia	l low bias.						
ho DDC	and MRO result						
onformation of the DRC	ances in the Meth utinely calibrated	ts for samples Ov nod 8015D analys levels and those	/-57, OW-58 es since the results were	, and DUP-6-9-22 were n applied dilutions of 10 tin deemed unreliable and p	ot qualified base nes resulted in su ossibly inaccura	ed on the surroga urrogate concent te.	ate non trations
onforma elow roi Qualifica amples	ances in the Meth utinely calibrated tion of sample da were evaluated b	ts for samples OW nod 8015D analys levels and those ata was not require pased on their spe	7-57, OW-58 es since the results were ed based on cific surroga	, and DUP-6-9-22 were n applied dilutions of 10 tin deemed unreliable and p surrogate non-conformar te recoveries.	ot qualified base nes resulted in si ossibly inaccura nces in QC samp	ed on the surroga urrogate concent te. bles as the enviro	ate non trations onment
onforma elow rou Qualifica amples 8. Were colle proje	ances in the Meth utinely calibrated tion of sample da were evaluated to the number of t ected equal to at l ect guidelines, Q	ts for samples OW nod 8015D analyse levels and those ata was not require pased on their spe trip blank, field bla least 10% of the to APP, SAP, or perr	7-57, OW-58 es since the results were ed based on ecific surroga nk, and/or ec otal number o nit?	, and DUP-6-9-22 were n applied dilutions of 10 tin deemed unreliable and p surrogate non-conformar te recoveries. quipment blank samples of samples or as required	ot qualified base nes resulted in si ossibly inaccura nces in QC samp by the	ed on the surroga urrogate concent te. oles as the enviro Yes	ate non trations
onforma elow roi Qualifica amples 8. Were colle proje Commen One trip I ollected	ances in the Meth utinely calibrated tion of sample da were evaluated t e the number of t ected equal to at l ect guidelines, Q/ hts: The number blank sample, Tri as part of this sa	ts for samples OW nod 8015D analyse levels and those ata was not require pased on their spe trip blank, field bla least 10% of the to APP, SAP, or perr of trip, field, and e ip Blank, one field ample set.	7-57, OW-58 es since the results were ed based on ecific surroga nk, and/or ec otal number of nit? equipment bla blank sampl	, and DUP-6-9-22 were n applied dilutions of 10 tin deemed unreliable and p surrogate non-conformar te recoveries. quipment blank samples of samples or as required anks collected was equal le, FB-6-29-22, and one e	ot qualified base nes resulted in su ossibly inaccura nces in QC samp by the to at least 10% of equipment blank	ed on the surroga urrogate concent te. oles as the enviro Yes of the number of sample, EB-6-29	trations trations onment sampl 9-22, w
2000 Comment 2000	ances in the Meth utinely calibrated tion of sample da were evaluated b e the number of t ected equal to at l ect guidelines, Q/ ats: The number blank sample, Tri as part of this sa e target analytes ipment blank sam	ts for samples OW nod 8015D analyse levels and those ata was not require based on their spe trip blank, field bla least 10% of the to APP, SAP, or perr of trip, field, and e ip Blank, one field ample set. reported as not d nples?	7-57, OW-58 es since the results were ed based on ecific surroga nk, and/or ec otal number of nit? equipment bla blank sampl etected in the	, and DUP-6-9-22 were n applied dilutions of 10 tin deemed unreliable and p surrogate non-conformar te recoveries. quipment blank samples of samples or as required anks collected was equal le, FB-6-29-22, and one e e trip blank, field blank, a	ot qualified base nes resulted in su ossibly inaccura nees in QC samp by the to at least 10% o equipment blank	ed on the surroga urrogate concent te. oles as the enviro Yes of the number of sample, EB-6-29 No	trations ponment sample 9-22, w
2000 Comment 2010	ances in the Meth utinely calibrated tion of sample da were evaluated b e the number of t ected equal to at l ect guidelines, Q/ tts: The number blank sample, Tri as part of this sa e target analytes ipment blank sam tts: Target analytes	ts for samples OW nod 8015D analyse levels and those ata was not require pased on their spe trip blank, field bla least 10% of the to APP, SAP, or perr of trip, field, and e ip Blank, one field ample set. reported as not d nples? tes were not deteo	7-57, OW-58 es since the results were ed based on ecific surroga nk, and/or ec otal number of nit? equipment bla blank sampl etected in the cted in the tri	, and DUP-6-9-22 were n applied dilutions of 10 tin deemed unreliable and p surrogate non-conformar te recoveries. quipment blank samples of samples or as required anks collected was equal le, FB-6-29-22, and one e trip blank, field blank, and e	ot qualified base nes resulted in su ossibly inaccura nces in QC samp by the to at least 10% of equipment blank nd/or	ed on the surroga urrogate concent te. oles as the enviro Yes of the number of sample, EB-6-29 No samples with the	trations trations onment sampl 9-22, w e follow
elow roi Qualifica amples 8. Wen colle proje commen one trip l ollected 9. Wen equi	ances in the Meth utinely calibrated tion of sample da were evaluated b e the number of t ected equal to at l ect guidelines, Q/ hts: The number blank sample, Tri as part of this sa e target analytes ipment blank sam its: Target analytes is.	ts for samples OW nod 8015D analyse levels and those ata was not require based on their spe trip blank, field bla least 10% of the to APP, SAP, or perr of trip, field, and e ip Blank, one field ample set. reported as not d nples? tes were not detect	V-57, OW-58 es since the results were ed based on ecific surroga nk, and/or ec otal number of nit? equipment bla blank sampl etected in the cted in the tri	, and DUP-6-9-22 were n applied dilutions of 10 tin deemed unreliable and p surrogate non-conformar te recoveries. quipment blank samples of samples or as required anks collected was equal le, FB-6-29-22, and one e trip blank, field blank, and e <u>Analyte</u>	ot qualified base nes resulted in su ossibly inaccura nees in QC samp by the to at least 10% of equipment blank nd/or equipment blank	ed on the surroga urrogate concent te. oles as the enviro Yes of the number of sample, EB-6-29 No samples with the	trations onment sample 9-22, w
amples amples 8. Were colle proje commen ne trip l ollected 9. Were equi	ances in the Methutinely calibrated tion of sample da were evaluated b e the number of t ected equal to at l ect guidelines, Q/ tts: The number blank sample, Tri as part of this sa e target analytes ipment blank sam tts: Target analytes is.	ts for samples OW nod 8015D analysi levels and those ata was not require pased on their spe trip blank, field bla least 10% of the to APP, SAP, or perr of trip, field, and e ip Blank, one field ample set. reported as not d nples? tes were not detect lank Sample ID Trip Blank	7-57, OW-58 es since the results were ed based on ecific surroga nk, and/or ed otal number of nit? equipment bla blank sample etected in the tri <u>Method</u> 8260B	, and DUP-6-9-22 were n applied dilutions of 10 tin deemed unreliable and p surrogate non-conformar te recoveries. quipment blank samples of samples or as required anks collected was equal le, FB-6-29-22, and one e e trip blank, field blank, a p blank, field blank, and e <u>Analyte</u> <b>Acetone</b>	ot qualified base hes resulted in su ossibly inaccura nees in QC samp by the to at least 10% of equipment blank nd/or equipment blank <u>Concentrati</u> 13 µg/L	ed on the surroga urrogate concent te. oles as the enviro Yes of the number of sample, EB-6-29 No samples with the ion	trations trations onment sampl 9-22, w
elow roi Qualifica amples 8. Wen colle proje commen one trip l ollected 9. Wen equi	ances in the Methutinely calibrated tion of sample da were evaluated b e the number of t ected equal to at l ect guidelines, Q/ ats: The number blank sample, Tri as part of this sa e target analytes ipment blank sam ts: Target analytes <u>Blank</u>	ts for samples OW nod 8015D analysi levels and those ata was not require based on their spe trip blank, field bla least 10% of the to APP, SAP, or perr of trip, field, and e ip Blank, one field ample set. reported as not d nples? tes were not detect lank Sample ID Trip Blank EB-6-29-22	<ul> <li>7-57, OW-58</li> <li>es since the results were ed based on ecific surrogank, and/or ecotal number of the sample etected in the tries of the sample etected etected in the tries of the sample etected etected</li></ul>	, and DUP-6-9-22 were n applied dilutions of 10 tin deemed unreliable and p surrogate non-conformar te recoveries. quipment blank samples of samples or as required anks collected was equal le, FB-6-29-22, and one e e trip blank, field blank, a p blank, field blank, and e <u>Analyte</u> <u>Acetone</u> Dissolved Zinc	ot qualified base hes resulted in su ossibly inaccura nees in QC samp by the to at least 10% of equipment blank ind/or equipment blank <u>Concentrati</u> 13 µg/L 0.0098 mg	ed on the surroga urrogate concent te. oles as the enviro Yes of the number of sample, EB-6-29 No samples with the ion	trations onment sampl 9-22, w
2000 Sommer 2000 Sommer	ances in the Methutinely calibrated tion of sample da were evaluated b e the number of t ected equal to at l ect guidelines, Q/ tts: The number blank sample, Tri as part of this sa e target analytes ipment blank sam tts: Target analytes is.	ts for samples OW nod 8015D analysi levels and those ata was not require based on their spe trip blank, field bla least 10% of the to APP, SAP, or perr of trip, field, and e ip Blank, one field ample set. reported as not d nples? tes were not detect lank Sample ID Trip Blank EB-6-29-22 EB-6-29-22	<ul> <li>/-57, OW-58</li> <li>es since the results were ed based on ecific surroga nk, and/or ecotal number of nit?</li> <li>equipment bla blank sampletected in the tri</li> <li>Exted in the tri</li> <li>Method</li> <li>8260B</li> <li>200.7</li> <li>8015D</li> </ul>	, and DUP-6-9-22 were n applied dilutions of 10 tin deemed unreliable and p surrogate non-conformar te recoveries. quipment blank samples of samples or as required anks collected was equal le, FB-6-29-22, and one e e trip blank, field blank, a p blank, field blank, and e <u>Analyte</u> <u>Acetone</u> Dissolved Zinc DRO	ot qualified base hes resulted in su ossibly inaccura nees in QC samp by the to at least 10% of equipment blank nd/or equipment blank <u>Concentrati</u> 13 µg/L 0.0098 mg 0.025 mg/	ed on the surroga urrogate concent te. oles as the enviro Yes of the number of sample, EB-6-29 No samples with the ion	trations trations onment 

The DRO results for the samples in batch 68495 were previously qualified due to a laboratory blank detection; therefore, additional qualification due to the equipment blank contamination was not required.



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20. Was the number of sam		VALIDATIO	N CRITERIA CH	ECKLIST	
20. Was the number of field duplicates collected equal to at least 10% of the total number of samples or as required by the project guidelines, QAPP, SAP, or permit?					
Comments: The nu	umber of field d	uplicates collected w	as equal to at lea	st 10% of the number o	of samples.
Sample DUP-6-29-2	22 was collecte	d as a field duplicate	of sample OW-5	8.	
21. Were field duplicate RPD values within data validation QC limits (soil 0-50%, water 0-30%, or air 0-25%)?					
Comments: As indi within data validatic	icated in the Fie on QC limits of (	eld Duplicate Summa )-30% for water sam	ary Table at the e ples, with the follo	nd of this report, field do owing exception.	uplicate RPD values were
RPD value for phe and DUP-6-29-22 v	nol exceeded vere assigned	the data validation J qualifiers due to	limit of 30% at 4 evidence of poo	5.6%. The phenol res r precision.	ults for samples OW-58
22. For laboratory laboratory QC	duplicates prep limits?	ared from project sa	mples, were RPD	s within	Yes
Comments: Labora summarized in the	atory duplicates following table.	were prepared for th	nese analyses an	d the laboratory duplica	te sample sources are
Γ	<u>Method</u>	Analytes	<u>Batch</u>	Laboratory Dupli Sample Source	<u>cate</u> .e
	4500CN E	Cyanide	WG1889913	Not Associate	d
_	4500CN E	Cyanide	WG1893803	OW-57, Not Assoc	ciated
data were not qualit 23. Were the follow • Target and	fied based on th ving data relationalytes were repo	nese results since m onships realistic? orted by more than o	atrix similarity to p ne method (e.g.,	project samples could n 8260/8270,	ot be guaranteed. N/A
EPH/8270 Comments: Target	)? analytes were	not reported by more	e than one metho	d in this data set.	
Both total     results we	and dissolved r re greater than	netals analyses were or equal to the disso	e performed, and lved metals resul	the total metals ts?	No
<ul> <li>Both total results we</li> <li>Comments: The for results.</li> </ul>	and dissolved r re greater than llowing table co	netals analyses were or equal to the disso ntains the exception	e performed, and lved metals resul s in which the dis	the total metals ts? solved metals results e	No xceeded the total metals
Both total results we Comments: The fo results.	and dissolved r re greater than llowing table co <u>Sam</u> t	netals analyses were or equal to the disso ntains the exception <u>ole ID Anal</u>	e performed, and lived metals resul s in which the dis yte <u>Total R</u> (mg,	the total metals ts? solved metals results e esult <u>Dissolved Res</u> L) (mg/L)	No xceeded the total metals <u>ult</u>
Both total results we Comments: The for results.	and dissolved r re greater than llowing table co <u>Sam</u> t EB-6-	netals analyses were or equal to the disso ntains the exception <u>ole ID Anal</u> 29-22 Zin	e performed, and lived metals resul s in which the dis <u>yte <u>Total R</u> (mg, c NE</u>	the total metals ts? solved metals results e <u>esult Dissolved Res</u> L) (mg/L) 0.0098	No xceeded the total metals ult



Client Sample ID: OW-58 Field Duplicate Sample ID: DUP-6-29-22							
Analyte	Method	Laboratory Result	Duplicate Result	Relative Percent Difference (RPD)			
Barium, Dissolved	E 200.7	5.1 mg/L	5.0 mg/L	2.0%			
Barium, Total	E 200.7	5.5 mg/L	5.6 mg/L	1.8%			
Cobalt, Total	E 200.7	ND (0.0060 mg/L)	0.0039 mg/L	DL			
Nickel, Dissolved	E 200.7	0.050 mg/L	0.051 mg/L	2.0%			
Nickel, Total	E 200.7	0.058 mg/L	0.055 mg/L	5.3%			
Vanadium, Dissolved	E 200.7	0.0031 mg/L	0.0033 mg/L	6.3% +/-RL			
Vanadium, Total	E 200.7	0.0049 mg/L	0.004 mg/L	20.2% +/-RL			
Zinc, Dissolved	E 200.7	0.011 mg/L	0.011 mg/L	0.0% +/-RL			
Zinc, Total	E 200.7	0.014 mg/L	0.006 mg/L	80.0% +/-RL			
Arsenic, Dissolved	E200.8	0.0035 mg/L	0.0034 mg/L	2.9%			
Arsenic, Total	E200.8	0.0039 mg/L	0.0039 mg/L	0.0%			
Lead, Total	E200.8	0.00039 mg/L	0.00024 mg/L	47.6% +/-RL			
TPH DRO	SW8015	5.9 mg/L	5.2 mg/L	12.6%			
TPH GRO	SW8015	74 mg/L	77 mg/L	4.0%			
1,2,4-Trimethylbenzene	SW8260B	9.6 µg/L	9.6 µg/L	0.0% +/-RL			
Benzene	SW8260B	28,000 µg/L	27,000 µg/L	3.6%			
Ethylbenzene	SW8260B	1,200 µg/L	1,200 µg/L	0.0%			
Isopropylbenzene	SW8260B	31 µg/L	30 µg/L	3.3% +/-RL			
MTBE	SW8260B	1000 µg/L	1000 µg/L	0.0%			
n-Butylbenzene	SW8260B	15 µg/L	14 µg/L	6.9% +/-RL			
n-Propylbenzene	SW8260B	95 μg/L	93 µg/L	2.1% +/-RL			
sec-Butylbenzene	SW8260B	7.3 μg/L	ND (50 µg/L)	DL			
Toluene	SW8260B	39 µg/L	40 µg/L	2.5% +/-RL			
Xylenes, Total	SW8260B	130 µg/L	140 µg/L	7.4% +/-RL			
1-Methylnaphthalene	SW8270C	68 µg/L	65 µg/L	4.5%			
2-Methylnaphthalene	SW8270C	77 μg/L	73 µg/L	5.3%			
Acenaphthene	SW8270C	2.7 µg/L	2.2 µg/L	20.4%			
Anthracene	SW8270C	0.40 µg/L	0.30 µg/L	28.6% +/-RL			
Fluoranthene	SW8270C	0.24 µg/L	0.22 µg/L	8.7% +/-RL			
Fluorene	SW8270C	3.7 µg/L	2.9 µg/L	24.2%			
Naphthalene	SW8270C	140 µg/L	130 µg/L	7.4%			
Phenanthrene	SW8270C	3.3 µg/L	2.5 μg/L	27.6%			
Phenol	SW8270C	70 μg/L	44 µg/L	45.6%			

#### FIELD DUPLICATE SUMMARY

Field duplicate RPD control limits are not to exceed 30% for water as established by USEPA Region I - New England Environmental Data Review Supplement for Region 1 Data Review Elements and Superfund Specific Guidance/Procedures, EQADR-Supplement2, September 2020.

DL – Indicates that the analyte was detected in one of the duplicate samples and was undetected in the other sample, and therefore an RPD could not be calculated. Data were not qualified since the detection was within two times the reporting limit. Non-detected results are indicated above with the applicable reporting limit as ND (RL).



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+/-RL – Indicates that the detections in both of the samples were within two times the reporting limit. Qualification of data was not required.

RPD value for phenol exceeded the data validation limit of 30% at 45.6%, which was evidence of poor precision. The phenol results were qualified as J for samples OW-58 and DUP-6-29-22.



## DATA QUALIFICATION SUMMARY

Abbreviation	Reason
EBD	Equipment blank detection
ERPD-FD	High field duplicate RPD.
ERPD-LCS	The LCS/LCSD RPD exceeded the upper acceptable limit indicating poor precision.
HR-LCS	The LCS and/or LCSD percent recovery was greater than the upper acceptable limit indicating a possible high bias.
LR-LCS	The LCS and/or LCSD percent recovery was less than the lower acceptable limit indicating a possible low bias.
LR-SUR	The surrogate percent recovery was less than the lower acceptable limit indicating a possible low bias.
MBD	Method blank detection
MDLRL	Flagged by the laboratory: The result was greater than the MDL but less than the RL.
TBD	Trip blank detection

Analyte	Method	Field Sample ID	Lab Sample ID	Result	Limit	Units	Reviewer Qualifier	DV Flag Reasons
1,2,4-Trimethylbenzene	SW8260B	OW-58	2206G22-004A	9.6	50	µg/L	J	MDLRL
1,2,4-Trimethylbenzene	SW8260B	DUP-6-29-22	2206G22-006A	9.6	50	µg/L	J	MDLRL
1,3,5-Trimethylbenzene	SW8260B	OW-58A	2206G22-005A	45	50	µg/L	J	MDLRL
1,4-Dichlorobenzene	SW8270C	EB-6-29-22	2206G22-001C	ND	5.0	µg/L	UJ	ERPD-LCS
1,4-Dichlorobenzene	SW8270C	MKTF-44	2206G22-002C	ND	50	µg/L	UJ	ERPD-LCS
1,4-Dichlorobenzene	SW8270C	OW-57	2206G22-003C	ND	5.0	µg/L	UJ	ERPD-LCS
1,4-Dichlorobenzene	SW8270C	OW-58	2206G22-004C	ND	5.0	µg/L	UJ	ERPD-LCS
1,4-Dichlorobenzene	SW8270C	OW-58A	2206G22-005C	ND	5.0	µg/L	UJ	ERPD-LCS
1,4-Dichlorobenzene	SW8270C	DUP-6-29-22	2206G22-006C	ND	5.0	µg/L	UJ	ERPD-LCS
1,4-Dioxane	SW8270C	EB-6-29-22	2206g22-001c	ND	1.0	µg/L	UJ	ERPD-LCS
1,4-Dioxane	SW8270C	MKTF-44	2206g22-002c	ND	10	µg/L	UJ	ERPD-LCS
1,4-Dioxane	SW8270C	OW-57	2206G22-003C	ND	1.0	µg/L	UJ	ERPD-LCS
1,4-Dioxane	SW8270C	OW-58	2206G22-004C	ND	1.0	µg/L	UJ	ERPD-LCS



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Analyte	Method	Field Sample ID	Lab Sample ID	Result	Limit	Units	Reviewer Qualifier	DV Flag Reasons
1,4-Dioxane	SW8270C	OW-58A	2206G22-005C	ND	1.0	µg/L	UJ	ERPD-LCS
1,4-Dioxane	SW8270C	DUP-6-29-22	2206G22-006C	ND	1.0	µg/L	UJ	ERPD-LCS
1-Methylnaphthalene	SW8270C	OW-57	2206G22-003C	96	5.0	µg/L	J	ERPD-LCS
1-Methylnaphthalene	SW8270C	OW-58	2206G22-004C	68	5.0	µg/L	J	ERPD-LCS
1-Methylnaphthalene	SW8270C	OW-58A	2206G22-005C	100	5.0	µg/L	J	ERPD-LCS
1-Methylnaphthalene	SW8270C	DUP-6-29-22	2206G22-006C	65	5.0	µg/L	J	ERPD-LCS
1-Methylnaphthalene	SW8270C	EB-6-29-22	2206g22-001c	ND	0.3	µg/L	UJ	ERPD-LCS
1-Methylnaphthalene	SW8270C	MKTF-44	2206g22-002c	ND	3.0	µg/L	UJ	ERPD-LCS
2,4,6-Trichlorophenol	SW8270C	DUP-6-29-22	2206G22-006C	ND	10	µg/L	UJ	LR-SUR
2,4-Dimethylphenol	SW8270C	DUP-6-29-22	2206G22-006C	ND	10	µg/L	UJ	LR-SUR
2,4-Dinitrophenol	SW8270C	DUP-6-29-22	2206G22-006C	ND	20	µg/L	UJ	LR-SUR
2-Methylnaphthalene	SW8270C	OW-57	2206G22-003C	71	5.0	µg/L	J	ERPD-LCS
2-Methylnaphthalene	SW8270C	OW-58	2206G22-004C	77	5.0	µg/L	J	ERPD-LCS
2-Methylnaphthalene	SW8270C	OW-58A	2206G22-005C	97	5.0	µg/L	J	ERPD-LCS
2-Methylnaphthalene	SW8270C	DUP-6-29-22	2206G22-006C	73	5.0	µg/L	J	ERPD-LCS
2-Methylnaphthalene	SW8270C	EB-6-29-22	2206g22-001c	ND	0.3	µg/L	UJ	ERPD-LCS
2-Methylnaphthalene	SW8270C	MKTF-44	2206g22-002c	ND	3.0	µg/L	UJ	ERPD-LCS
2-Methylphenol	SW8270C	DUP-6-29-22	2206G22-006C	ND	10	µg/L	UJ	LR-SUR
2-Methylphenol	SW8270C	OW-58A	2206G22-005C	9.5	10	µg/L	J	MDLRL
3,4-Methylphenol	SW8270C	DUP-6-29-22	2206G22-006C	ND	10	µg/L	UJ	LR-SUR
Acenaphthene	SW8270C	OW-57	2206G22-003C	3.0	0.30	µg/L	J	ERPD-LCS
Acenaphthene	SW8270C	OW-58	2206G22-004C	2.7	0.30	µg/L	J	ERPD-LCS
Acenaphthene	SW8270C	OW-58A	2206G22-005C	4.2	0.30	µg/L	J	ERPD-LCS
Acenaphthene	SW8270C	DUP-6-29-22	2206G22-006C	2.2	0.30	µg/L	J	ERPD-LCS
Acenaphthene	SW8270C	EB-6-29-22	2206g22-001c	ND	0.30	µg/L	UJ	ERPD-LCS
Acenaphthene	SW8270C	MKTF-44	2206g22-002c	ND	3.0	µg/L	UJ	ERPD-LCS
Acetone	SW8260B	EB-6-29-22	2206G22-001A	8.6	10	µg/L	U	MDLRL, TBD



Analyte	Method	Field Sample ID	Lab Sample ID	Result	Limit	Units	Reviewer Qualifier	DV Flag Reasons
Anthracene	SW8270C	OW-57	2206G22-003C	0.20	0.30	µg/L	J	MDLRL
Barium, Dissolved	E 200.7	MKTF-44	2206G22-002E	0.035	0.0020	mg/L	J-	LR-LCS
Barium, Dissolved	E 200.7	OW-58A	2206G22-005E	1.0	0.010	mg/L	J-	LR-LCS
Barium, Dissolved	E 200.7	EB-6-29-22	2206G22-001E	ND	0.0020	mg/L	UJ	LR-LCS
Beryllium, Total	E 200.7	OW-57	2206G22-003D	0.029	0.040	mg/L	J	MDLRL
Chromium, Dissolved	E 200.7	MKTF-44	2206G22-002E	0.0024	0.0060	mg/L	J	MDLRL
Chromium, Total	E 200.7	OW-58A	2206G22-005D	0.0035	0.0060	mg/L	J	MDLRL
Chrysene	SW8270C	EB-6-29-22	2206g22-001c	ND	0.30	µg/L	UJ	ERPD-LCS
Chrysene	SW8270C	MKTF-44	2206g22-002c	ND	3.0	µg/L	UJ	ERPD-LCS
Chrysene	SW8270C	OW-57	2206G22-003C	ND	0.30	µg/L	UJ	ERPD-LCS
Chrysene	SW8270C	OW-58	2206G22-004C	ND	0.30	µg/L	UJ	ERPD-LCS
Chrysene	SW8270C	OW-58A	2206G22-005C	ND	0.30	µg/L	UJ	ERPD-LCS
Chrysene	SW8270C	DUP-6-29-22	2206G22-006C	ND	0.30	µg/L	UJ	ERPD-LCS
Cobalt, Dissolved	E 200.7	OW-57	2206G22-003E	0.0026	0.0060	mg/L	J	MDLRL
Cobalt, Total	E 200.7	DUP-6-29-22	2206G22-006D	0.0039	0.0060	mg/L	J	MDLRL
Fluoranthene	SW8270C	OW-58	2206G22-004C	0.24	0.30	µg/L	J	MDLRL
Fluoranthene	SW8270C	OW-58A	2206G22-005C	0.26	0.30	µg/L	J	MDLRL
Fluoranthene	SW8270C	DUP-6-29-22	2206G22-006C	0.22	0.30	µg/L	J	MDLRL
Fluorene	SW8270C	OW-57	2206G22-003C	5.3	0.30	µg/L	J	ERPD-LCS
Fluorene	SW8270C	OW-58	2206G22-004C	3.7	0.30	µg/L	J	ERPD-LCS
Fluorene	SW8270C	OW-58A	2206G22-005C	5.9	0.30	µg/L	J	ERPD-LCS
Fluorene	SW8270C	DUP-6-29-22	2206G22-006C	2.9	0.30	µg/L	J	ERPD-LCS
Fluorene	SW8270C	EB-6-29-22	2206g22-001c	ND	0.30	µg/L	UJ	ERPD-LCS
Fluorene	SW8270C	MKTF-44	2206g22-002c	ND	3.0	µg/L	UJ	ERPD-LCS
lsopropylbenzene	SW8260B	OW-57	2206G22-003A	14	50	µg/L	J	MDLRL
Isopropylbenzene	SW8260B	OW-58	2206G22-004A	31	50	µg/L	J	MDLRL
Isopropylbenzene	SW8260B	OW-58A	2206G22-005A	32	50	µg/L	J	MDLRL



Analyte	Method	Field Sample ID	Lab Sample ID	Result	Limit	Units	Reviewer Qualifier	DV Flag Reasons
lsopropylbenzene	SW8260B	DUP-6-29-22	2206G22-006A	30	50	µg/L	J	MDLRL
Lead, Dissolved	E200.8	MKTF-44	2206G22-002E	0.00032	0.00050	mg/L	J	MDLRL
Lead, Total	E200.8	OW-58	2206G22-004D	0.00039	0.00050	mg/L	J	MDLRL
Lead, Total	E200.8	DUP-6-29-22	2206G22-006D	0.00024	0.00050	mg/L	J	MDLRL
MTBE	SW8260B	OW-57	2206G22-003A	31	50	µg/L	J	MDLRL
Naphthalene	SW8270C	OW-57	2206G22-003C	130	5.0	µg/L	J	ERPD-LCS
Naphthalene	SW8270C	OW-58	2206G22-004C	140	5.0	µg/L	J	ERPD-LCS
Naphthalene	SW8270C	OW-58A	2206G22-005C	190	5.0	µg/L	J	ERPD-LCS
Naphthalene	SW8270C	DUP-6-29-22	2206G22-006C	130	5.0	µg/L	J	ERPD-LCS
Naphthalene	SW8270C	EB-6-29-22	2206g22-001c	ND	0.30	µg/L	UJ	ERPD-LCS
Naphthalene	SW8270C	MKTF-44	2206g22-002c	ND	3.0	µg/L	UJ	ERPD-LCS
n-Butylbenzene	SW8260B	OW-58	2206G22-004A	15	150	µg/L	J	MDLRL
n-Butylbenzene	SW8260B	OW-58A	2206G22-005A	15	150	µg/L	J	MDLRL
n-Butylbenzene	SW8260B	DUP-6-29-22	2206G22-006A	14	150	µg/L	J	MDLRL
Nickel, Dissolved	E 200.7	OW-57	2206G22-003E	0.057	0.010	mg/L	J-	LR-LCS
Nickel, Dissolved	E 200.7	OW-58	2206G22-004E	0.050	0.010	mg/L	J-	LR-LCS
Nickel, Dissolved	E 200.7	OW-58A	2206G22-005E	0.036	0.010	mg/L	J-	LR-LCS
Nickel, Dissolved	E 200.7	DUP-6-29-22	2206G22-006E	0.051	0.010	mg/L	J-	LR-LCS
Nickel, Dissolved	E 200.7	EB-6-29-22	2206G22-001E	ND	0.010	mg/L	UJ	LR-LCS
Nickel, Dissolved	E 200.7	MKTF-44	2206G22-002E	ND	0.010	mg/L	UJ	LR-LCS
Nickel, Total	E 200.7	OW-57	2206G22-003D	0.31	0.20	mg/L	J+	HR-LCS
Nickel, Total	E 200.7	OW-58	2206G22-004D	0.058	0.01	mg/L	J+	HR-LCS
Nickel, Total	E 200.7	OW-58A	2206G22-005D	0.040	0.010	mg/L	J+	HR-LCS
Nickel, Total	E 200.7	DUP-6-29-22	2206G22-006D	0.055	0.010	mg/L	J+	HR-LCS
Nickel, Total	E 200.7	MKTF-44	2206G22-002D	0.0081	0.010	mg/L	J+	HR-LCS, MDLRL
n-Propylbenzene	SW8260B	OW-57	2206G22-003A	34	50	µg/L	J	MDLRL
Phenanthrene	SW8270C	OW-57	2206G22-003C	7.3	0.30	µg/L	J	ERPD-LCS



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Analyte	Method	Field Sample ID	Lab Sample ID	Result	Limit	Units	Reviewer Qualifier	DV Flag Reasons
Phenanthrene	SW8270C	OW-58	2206G22-004C	3.3	0.30	µg/L	J	ERPD-LCS
Phenanthrene	SW8270C	OW-58A	2206G22-005C	5.0	0.30	µg/L	J	ERPD-LCS
Phenanthrene	SW8270C	DUP-6-29-22	2206G22-006C	2.5	0.30	µg/L	J	ERPD-LCS
Phenanthrene	SW8270C	EB-6-29-22	2206g22-001c	ND	0.30	µg/L	UJ	ERPD-LCS
Phenanthrene	SW8270C	MKTF-44	2206g22-002c	ND	3.0	µg/L	UJ	ERPD-LCS
Phenol	SW8270C	OW-58	2206G22-004C	70	20	µg/L	J	ERPD-FD, ERPD-LCS
Phenol	SW8270C	DUP-6-29-22	2206G22-006C	44	20	µg/L	J-	ERPD-FD, ERPD-LCS, LR-SUR
Phenol	SW8270C	OW-57	2206G22-003C	110	20	µg/L	J	ERPD-LCS
Phenol	SW8270C	OW-58A	2206G22-005C	21	20	µg/L	J	ERPD-LCS
Phenol	SW8270C	EB-6-29-22	2206G22-001C	ND	20	µg/L	UJ	ERPD-LCS
Phenol	SW8270C	MKTF-44	2206G22-002C	ND	200	µg/L	UJ	ERPD-LCS
Pyrene	SW8270C	EB-6-29-22	2206g22-001c	ND	1.0	µg/L	UJ	ERPD-LCS, LR-LCS
Pyrene	SW8270C	MKTF-44	2206g22-002c	ND	10	µg/L	UJ	ERPD-LCS, LR-LCS
Pyrene	SW8270C	OW-57	2206G22-003C	ND	1.0	µg/L	UJ	ERPD-LCS, LR-LCS
Pyrene	SW8270C	OW-58	2206G22-004C	ND	1.0	µg/L	UJ	ERPD-LCS, LR-LCS
Pyrene	SW8270C	OW-58A	2206G22-005C	ND	1.0	µg/L	UJ	ERPD-LCS, LR-LCS
Pyrene	SW8270C	DUP-6-29-22	2206G22-006C	ND	1.0	µg/L	UJ	ERPD-LCS, LR-LCS
sec-Butylbenzene	SW8260B	OW-58	2206G22-004A	7.3	50	µg/L	J	MDLRL
sec-Butylbenzene	SW8260B	OW-58A	2206G22-005A	7.9	50	µg/L	J	MDLRL
Selenium, Dissolved	E200.8	OW-58A	2206G22-005E	0.00041	0.0010	mg/L	J	MDLRL
Selenium, Total	E200.8	OW-58A	2206G22-005D	0.00053	0.0010	mg/L	J	MDLRL
Toluene	SW8260B	OW-57	2206G22-003A	28	50	µg/L	J	MDLRL
Toluene	SW8260B	OW-58	2206G22-004A	39	50	µg/L	J	MDLRL
Toluene	SW8260B	DUP-6-29-22	2206G22-006A	40	50	µg/L	J	MDLRL
TPH DRO	SW8015	OW-57	2206G22-003C	4.7	0.64	mg/L	J+	HR-LCS
TPH DRO	SW8015	OW-58	2206G22-004C	5.9	0.64	mg/L	J+	HR-LCS



Analyte	Method	Field Sample ID	Lab Sample ID	Result	Limit	Units	Reviewer Qualifier	DV Flag Reasons
TPH DRO	SW8015	OW-58A	2206G22-005C	3.2	0.064	mg/L	J+	HR-LCS
TPH DRO	SW8015	DUP-6-29-22	2206G22-006C	5.2	0.64	mg/L	J+	HR-LCS
TPH DRO	SW8015	EB-6-29-22	2206G22-001C	0.025	0.064	mg/L	U	HR-LCS, MBD, MDLRL
TPH DRO	SW8015	MKTF-44	2206G22-002C	0.042	0.064	mg/L	U	HR-LCS, MBD, MDLRL
Vanadium, Dissolved	E 200.7	OW-57	2206G22-003E	0.0029	0.050	mg/L	J	MDLRL
Vanadium, Dissolved	E 200.7	OW-58	2206G22-004E	0.0031	0.050	mg/L	J	MDLRL
Vanadium, Dissolved	E 200.7	DUP-6-29-22	2206G22-006E	0.0033	0.050	mg/L	J	MDLRL
Vanadium, Total	E 200.7	OW-57	2206G22-003D	0.43	1.0	mg/L	J	MDLRL
Vanadium, Total	E 200.7	OW-58	2206G22-004D	0.0049	0.050	mg/L	J	MDLRL
Vanadium, Total	E 200.7	OW-58A	2206G22-005D	0.015	0.050	mg/L	J	MDLRL
Vanadium, Total	E 200.7	DUP-6-29-22	2206G22-006D	0.004	0.050	mg/L	J	MDLRL
Zinc, Dissolved	E 200.7	MKTF-44	2206G22-002E	0.010	0.010	mg/L	JB	EBD
Zinc, Dissolved	E 200.7	OW-58	2206G22-004E	0.011	0.010	mg/L	JB	EBD
Zinc, Dissolved	E 200.7	OW-58A	2206G22-005E	0.015	0.010	mg/L	JB	EBD
Zinc, Dissolved	E 200.7	DUP-6-29-22	2206G22-006E	0.011	0.010	mg/L	JB	EBD
Zinc, Dissolved	E 200.7	OW-57	2206G22-003E	0.0078	0.010	mg/L	U	EBD, MDLRL
Zinc, Dissolved	E 200.7	EB-6-29-22	2206G22-001E	0.0098	0.010	mg/L	J	MDLRL
Zinc, Total	E 200.7	DUP-6-29-22	2206G22-006D	0.0060	0.010	mg/L	J	MDLRL





Client: Marathon Oil	Laboratory: Hall Environmental Analysis Laboratory					
Project Name: Western Refining Southwest, Q2 GW Sampling	Sample Matrix: Groundwater					
Project Number: 697-080-002 Task: 0006	Sample Start Date: 06/08/2022					
Date Validated: 09/20/2022	Sample End Date: 06/08/2022					
Parameters Included:						
Volatile Organic Compounds (VOCs) by Environmental Protection Agency (EPA) Test Methods for Evaluating Solid						

- Volatile Organic Compounds (VOCs) by Environmental Protection Agency (EPA) Test Methods for Evaluating Solid Waste (SW-846) Method 8260B
- 1,2-Dibromoethane (EDB) by EPA Method 504.1
- Semivolatile Organic Compounds (SVOCs) by SW-846 Method 8270C and Method 8270C with Selected Ion Monitoring (SIM)
- Total Petroleum Hydrocarbons (TPH) Gasoline Range Organics (GRO) by SW-846 Method 8015D
- TPH Diesel Range Organics (DRO) and Motor Oil Range Organics (MRO) by SW-846 Method 8015D Modified
- Total and Dissolved Metals by EPA Method 200.7 and Method 200.8
- Total and Dissolved Mercury by EPA Method 245.1
- Cyanide by Standard Methods for the Examination of Water and Wastewater (SM) Method 4500 CN E
- Per- and Polyfluorinated Alkyl Substances (PFAS) by Liquid Chromatography with Tandem Mass Spectrometry (LC-MS/MS) and Isotope Dilution (ID)

Laboratory Project ID: 2206528

Data Validator: Daran O'Hollearn, Lead Project Scientist

Reviewer: Mike Phillips, Senior Chemist

#### DATA EVALUATION CRITERIA SUMMARY

A Tier II Data Validation was performed by Trihydro Corporation's Chemical Data Evaluation Services Group on the analytical data report packages generated by Hall Environmental Analysis Laboratory of Albuquerque, New Mexico, with additional data from Pace National of Mount Juliet, Tennessee, and from Vista Analytical Laboratory of El Dorado Hills, California, evaluating samples from the Marathon Oil site, located in Gallup, New Mexico.

Precision, accuracy, method compliance, and completeness of this data package were assessed during this data review. Precision was determined by evaluating the calculated relative percent difference (RPD) values from:

- Field duplicate pairs
- Laboratory duplicate pairs
- Matrix spike (MS) and matrix spike duplicate (MSD) pairs
- Laboratory control sample (LCS) and laboratory control sample duplicate (LCSD) pairs

Laboratory accuracy was established by reviewing the demonstrated percent recoveries (%R) of the following items to verify that data are not biased.

- MS/MSD samples
- LCS/LCSD samples
- Organic system monitoring compounds (surrogates)





Field accuracy was established by collecting and analyzing the following samples to monitor for possible ambient or cross contamination during sampling and transportation.

- Trip blanks
- Field blanks
- Equipment blanks

Method compliance was established by reviewing sample integrity, holding times, detection limits, surrogate recoveries, laboratory blanks, initial and continuing calibrations (where applicable), and the LCS/LCSD percent recoveries against method-specific requirements.

Completeness was evaluated by determining the overall ratio of the number of samples and analyses planned versus the number of samples with valid analyses. Determination of completeness included a review of the chain-of-custody (CoC), laboratory analytical methods, and other laboratory and field documents associated with this analytical data set.

Client Sample ID	Laboratory Sample Number
EB-6-8-22	2206528-001
OW-63	2206528-002
OW-64	2206528-003
OW-10	2206528-004
FB-6-8-22	2206528-005
DUP-6-8-22	2206528-006
Trip Blank	2206528-007
Equipment Blank	2206528-008

#### SAMPLE NUMBERS TABLE





The laboratory data were reviewed to evaluate compliance with the methods and the quality of the reported data. Assessment of CoC completeness is included in Item 3 of the Data Validation Checklist. A check mark ( $\checkmark$ ) indicates that the referenced validation criteria were deemed acceptable, whereas a crossed circle ( $\otimes$ ) indicates validation criteria for which the data have been qualified by the data validator. An empty circle (O) indicates that the specified criterion does not apply to the reviewed data. Details are noted in the tables below.

#### Validation Criteria

- ✓ Data Completeness
- ✓ CoC Documentation (Item 3)
- ✓ Holding Times and Preservation (Items 6 and 7)
- O Initial and Continuing Calibrations (Items 9 and 10)
- ⊗ Laboratory Blanks (Items 11 and 12)
- ✓ MS/MSD (Items 13 and 14)
- ⊗ LCS/LCSD (Items 15 and 16)
- System Monitoring Compounds (i.e., Surrogates) (Item 17)
- 8 Field, Equipment, and Trip Blanks (Items 18 and 19)
- ✓ Field Duplicates (Items 20 and 21)
- ✓ Laboratory Duplicates (Item 22)

#### **Guidance References**

Chemical data validation was conducted in accordance with the United States Environmental Protection Agency (USEPA) Contract Laboratory Program (CLP) National Functional Guidelines for the analyses listed below, or by the appropriate method if not covered in the National Functional Guidelines.

- Data for organic analyses were evaluated according to validation criteria set forth in the USEPA CLP National Functional Guidelines for Organic Superfund Methods Data Review, document number EPA-540-R-20-005, November 2020 with additional reference to the USEPA CLP National Functional Guidelines for Organic Data Review, document number EPA 540/R-99/008, October 1999.
- Data for inorganic analyses were evaluated according to validation criteria set forth in the USEPA CLP National Functional Guidelines for Inorganic Superfund Methods Data Review, document number EPA-540-R-20-006, November 2020 with additional reference to the USEPA CLP National Functional Guidelines for Inorganic Data Review, document number EPA 540-R-04-004, October 2004.
- Review of field duplicates was conducted according to the USEPA Region I New England Environmental Data Review Supplement for Region 1 Data Review Elements and Superfund Specific Guidance/Procedures, EQADR-Supplement2, September 2020.
- Trihydro Data Validation Variance Documentation, April 2022.



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#### **OVERALL DATA PACKAGE ASSESSMENT**

Based on a data validation review, the data are acceptable as delivered. Data qualified by the laboratory are discussed in Item 2 of the Validation Criteria Checklist.

The purpose of validating data and assigning qualifiers is to assist in proper data interpretation. Data that are not qualified meet the site data quality objectives. If values are assigned qualifiers other than an R (rejected, data not usable), the data may be used for site evaluation; however, consideration should be given to the reasons for qualification when interpreting sample concentrations. Data points that are assigned an R qualifier should not be used for site evaluation purposes.

If applicable, text was identified in **bold font** in the Validation Criteria Checklist to indicate that further action and/or qualification of the data were required. Data may have been qualified with J data flags by the laboratory if the result was greater than or equal to the method detection limit (MDL) but less than the reporting limit (RL). These laboratory-applied J flags were preserved, if present, and included in the Data Qualification Summary table at the end of this report. If applicable, data validation qualifiers were added for the items noted with crossed circles in the Validation Criteria section above. Please see the Data Qualification Summary table at the end of this report.

If data would be qualified with more than one flag, one qualifier was assigned based on the severity; however, all reasons for qualification were retained. Data that would be qualified with both J+ and J- flags were evaluated based on validation criteria and assigned the appropriate flag. The hierarchy of qualifiers from the most to least severe is as follows:

Data qualifiers used during this validation are included in the following table.

<u>Qualifier</u>	Definition
J	Estimated concentration
J+	The result is an estimated concentration, but may be biased high
U	Evaluated to be undetected at the reporting limit
JB	Estimated concentration due to blank contamination

#### **Data Completeness**

The analyses were performed as requested on the CoC records. The associated samples were received by the laboratory and analyzed properly unless otherwise noted in the Criteria Checklist below. The complete data package consisted of 384 data points. The data completeness calculation does not include any submitted blank sample results. Data points were not rejected. The data completeness measure for this data package is calculated to be 100% and is acceptable.



VALIDATION CRITERIA CHECKLIST						
No						
o this data set.						
vas due to laboratory error. The						
<u>Method 8270C</u> : Naphthalene, 1-methylnaphthalene, and 2-methylnaphthalene may be reported by either EPA Method 8270 or EPA Method 8270 SIM, depending which method needs the least dilution. In this report naphthalene, 1-methylnaphthalene, and 2-methylnaphthalene were reported by EPA Method 8270 instead of EPA Method 8270 SIM for sample OW-63.						
ifuged prior to extraction.						
? No						
t.						
spike value is low.						
Yes						
s maintained as evidenced by field not present because the samples aboratory, and custody was						
P), Yes						
vere applied.						
Dilution Factor						
5						
5						
10						
10						
50						
50						
500						



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VALIDATION CRITERIA CHECKLIST						
<ol><li>Were the reported analytical methods and constituents in compliance with the QAPP, permit, or CoC?</li></ol>	No					
Comments: The reported analytical methods were in compliance with the CoC, and the laboratory reported the requested constituents in accordance with the CoC, with the following exceptions.						
The CoC requested total and dissolved metals using Method 200.7; however, the laboratory analyzed to both Method 200.7 and Method 200.8. This substituted analytical method, Method 200.8, met similar so and precision goals and, therefore, was an acceptable replacement.	he samples using ensitivity, accuracy,					
The CoC requested cyanide using Method 335.4; however, the laboratory analyzed the samples using This substituted analytical method met similar sensitivity, accuracy, and precision goals and, therefore, replacement.	Method 4500 CN E. was an acceptable					
6. Were samples received in good condition within method-specified requirements?	No					
Comments: Samples were received on ice, in good condition, and with the cooler temperatures within the temperature range of $4^{\circ}C \pm 2^{\circ}C$ at $3.5^{\circ}C$ , $3.8^{\circ}C$ , and $3.9^{\circ}C$ as noted on the CoC and the Sample Log-in Samples transferred to Pace National were received in good condition with the cooler temperature within range at 2.7°C as noted on the CoC. Samples transferred to Vista were received in good condition with temperature outside the recommended range at 1.1°C as noted on the Sample Log-in Checklist. The cobelow 2.0°C was judged as acceptable since the laboratory did not report the sample containers as brown.	the recommended in Check List. in the recommended in the cooler ooler temperature ken or frozen.					
7. Were samples extracted/digested and analyzed within method-specified or technical holding times?	Yes					
Comments: The samples were extracted/digested and analyzed within method-specific holding times.						
8. Were reported units appropriate for the sample matrix/matrices and analytical method(s)? Specify if wet or dry units were used for soil.	Yes					
Comments: The results were reported in concentration units of nanograms per liter (ng/L), micrograms milligrams per liter (mg/L), which were acceptable for the sample matrix and the analyses requested.	per liter (µg/L), and					
9. Did the laboratory provide any specific initial and/or continuing calibration results?	No					
Comments: Initial and continuing calibration data were not included as part of this data set.						
10. If initial and/or continuing calibration results were provided, were the results within acceptable limits?	N/A					
Comments: Initial and continuing calibration data were not included as part of this data set.						
11. Was the total number of laboratory blank samples prepared equal to at least 5% of the total number of samples or analyzed as required by the method?	Yes					
Comments: The total number of laboratory blank samples prepared was equal to at least 5% of the tota samples.	al number of					
12. Were target analytes reported as not detected in the laboratory blanks?	No					
Comments: Target analytes were reported as not detected in the laboratory blanks, with the following e	exception.					
TPH DRO was detected in the laboratory blank for Method 8015D batch 68038 at a concentration of 0.029 mg/L.						
The sample EB-6-8-22 TPH DRO result detected below the laboratory reporting limit was qualifie Samples DUP-6-8-22 and OW-10 TPH DRO results greater than the blank detection and/or the lab limit but less than 10 times the blank concentration were qualified with a JB flag. Detections of the than ten times the blank concentration did not require qualification.	d with a U flag. poratory reporting his analyte greater					


# VALIDATION CRITERIA CHECKLIST

13. Was the total number of MS samples prepared equal to at least 5% of the total number of samples or analyzed as required by the method?

Yes

Comments: The total number of matrix spike samples prepared was equal to at least 5% of the total number of samples, although MS samples were not prepared/reported for all analyses and/or batches. The matrix spike sample source for each analytical batch in this sample set has been indicated below.

Method	Analytes	Batch	MS Sample Source
200.7	Total Metals	68127	EB-6-8-22
200.7	Dissolved Metals	B88662	Not Prepared
200.8	Total Metals	68127	OW-64
200.8	Dissolved Metals	A88688	Not Prepared
245.1	Total and Dissolved Mercury	68088	Not Prepared
504.1	EDB	68078	Not Prepared
4500CN E	Cyanide	WG1882735	Not Associated
8015D	TPH DRO and MRO	68038	Not Prepared
8015D	TPH GRO	A88732	EB-6-8-22
8260B	Methylene Chloride	A88912	Not Prepared
8260B	VOCs	R88822	OW-64
8270C and 8270C SIM	SVOCs	68135	Not Prepared
PFAS Method	PFAs	B22F113	Not Prepared

Not Associated – The MS sample source was not associated with this project.

Not Prepared – Matrix spikes were not prepared/reported for this batch.

14. For MS/MSDs prepared from project samples, were percent recoveries and RPDs within data validation or laboratory quality control (QC) limits?

Yes

Comments: The percent recoveries and RPDs for MS/MSDs prepared from project samples were within data validation and laboratory QC limits.

The percent recoveries and RPD values for MS/MSDs prepared from non-project samples were evaluated and considered, but data were not qualified based on those results since matrix similarity to project samples could not be guaranteed.

 15. Was the total number of LCSs analyzed equal to at least 5% of the total number of samples or analyzed as required by the method?
 Yes

Comments: The total number of LCS samples analyzed was equal to at least 5% of the total number of samples.



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	VALIDATION CRITERIA CHECKLIST						
16. Were labor	16. Were LCS/LCSD percent recoveries and LCS/LCSD RPDs within data validation or No laboratory QC limits?						
Comments limits, with	Comments: The LCS and LCSD percent recoveries and LCS/LCSD RPDs were within data validation and laboratory QC limits, with the following exceptions.						
Method	Analyte	Analyte Batch LCS Recovery Recovery QC Limits RPD LCS/LCSD LCS/LCSD LCS/LCSD Limits					
200.7	Total Cobalt	68127	133%		70-130%		
200.7	Dissolved Zinc	B88662	144%		70-130%		
8015D	TPH DRO	68038	642%	77.6%	31.7-75.4%	157%	20%
TPH DRO precision	was detected in the assoc	iated sample	es, and these re	sults were qu	alified as J du	e to evidence	of poor
17. Were	surrogate recoveries within	aboratory Q0	Climits?			No	
Comment	s: Surrogate recoveries were	e within labor	atory QC limits, v	with the followin	ng exception.		
due to ev Qualificati samples v 18. Were collec	idence of potential high bia on of sample data was not re vere evaluated based on the the number of trip blank, fiel ted equal to at least 10% of	as. equired based r specific sur d blank, and/ the total num	l on surrogate no rogate recoveries or equipment bla ber of samples o	on-conformance s. ink samples r as required b	es in QC sampl	es as the envir Yes	ronmental
Comments One trip b Equipmen	ct guidelines, QAPP, SAP, or s: The number of trip, field, a lank sample, Trip Blank, one t Blank, were collected as pa	r permit? and equipmei field blank sa art of this sam	nt blanks collecte ample FB-6-8-22 iple set.	ed was equal to , and two equip	o at least 10% o oment blank sai	f the number o nples, EB-6-8-	f samples. 22 and
19. Were equip	target analytes reported as i ment blank samples?	not detected i	n the trip blank,	field blank, and	l/or	No	
Comments: Target analytes were not detected in the trip blank, field blank, and equipment blank samples with the following exceptions.							
	Blank Sample ID	Metho	d A	nalyte	Concentra	ation	
	EB-6-8-22	8015	) TP	HDRO	0.044 m	g/L	
	EB-6-8-22	8270 S	IM 1,4	Dioxane	0.30 µg	/L	
	EB-6-8-22	200.7	Disso	olved Zinc	0.0068 m	g/L	
Detections of dissolved zinc in the associated samples that were less than the blank result and less than the applicable reporting limits were assigned U qualifiers. The detection of dissolved zinc in the associated sample OW-63 that was greater than the reporting limit but less than 10 times the blank result was assigned a JB qualifier. Non-detections of 1,4-dioxane in the associated samples and detections that were above the reporting limit and greater than ten times the blank concentration did not require qualification. The TPH DRO results in batch 68038 were previously qualified due to laboratory blank contamination; therefore, additional							



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Yes

### VALIDATION CRITERIA CHECKLIST

20. Was the number of field duplicates collected equal to at least 10% of the total Yes number of samples or as required by the project guidelines, QAPP, SAP, or permit?

Comments: The number of field duplicates collected was equal to at least 10% of the number of samples. Sample DUP-6-8-22 was collected as a field duplicate of sample OW-10.

21. Were field duplicate RPD values within data validation QC limits (soil 0-50%, water 0-30%, or air 0-25%)?

Comments: As indicated in the Field Duplicate Summary Table at the end of this report, field duplicate RPD values were within data validation QC limits of 0-30% for water samples.



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		VALIDATIC	ON CRITERIA C	HECKLIST	
22. For laboratory duplica laboratory QC limits?	tes prepared fro	om project sa	amples, were RF	PDs within	N/A
Comments: Laboratory du summarized in the followin	iplicates were p ig table.	repared for t	hese analyses,	and the laboratory duplic	cate sample sources are
	Method	<u>Analytes</u>	<u>Batch</u>	Laboratory Duplicate Sample Source	
	4500CN E	Cyanide	WG1882735	Not Associated	
	4500CN E	Cyanide	WG1882735	EB-6-8-22	
ot Associated – The laborate	ory duplicate sam	ple source wa	s not associated v	vith this project.	
he RPDs for laboratory d neasurements were withir	uplicates prepar o 5 times the rep	red from proj porting limit.	ject samples we	re not applicable since t	he results for one or both
he RPD values for the lab out data were not qualified	boratory duplica based on these	te samples p e results sinc	prepared from no ce matrix similar	on-project samples were ty to project samples co	e evaluated and considered, uld not be guaranteed.
3. Were the following da	ta relationships	realistic?			
- Target englytee y	are reported by			0000/0070	N/A
• Farget analytes w EPH/8270)? Comments: Target analyte	es were not repo	orted by mor	one method (e.g re than one meth	nod in this data set.	
<ul> <li>Target analytes w EPH/8270)?</li> <li>Comments: Target analyte</li> <li>Both total and dis results were grea</li> </ul>	es were not repo solved metals a ter than or equa	nore than o orted by mor inalyses wer il to the disso	one method (e.g re than one meth re performed, an olved metals res	, 8200/8270, nod in this data set. d the total metals ults?	No
<ul> <li>Target analytes w EPH/8270)?</li> <li>Comments: Target analyte</li> <li>Both total and dis results were grea</li> <li>Comments: The following esults. The EPA has not netals results that exceed pased on these data.</li> </ul>	es were not repo solved metals a ter than or equa table contains t provided guidan the correspond	nore than of orted by mor analyses wer al to the disso the exception ace or require ing total met	one method (e.g re than one meth olved metals res ns in which the c ements for the e tals results. The	, 8200/8270, nod in this data set. d the total metals ults? lissolved metals results valuation, validation, and refore, qualification of re	No exceeded the total metals d qualification of dissolved esults was not performed
<ul> <li>Target analytes w EPH/8270)?</li> <li>Comments: Target analyte</li> <li>Both total and dis results were grea</li> <li>Comments: The following esults. The EPA has not netals results that exceed ased on these data.</li> </ul>	es were not repo solved metals a ter than or equa table contains t provided guidan the correspond	orted by mor analyses wer al to the disso he exceptior ace or require ing total met	re than one method (e.g re than one method olved metals resonance ons in which the c ements for the e tals results. The <u>alyte Total R</u>	nod in this data set. d the total metals ults? lissolved metals results valuation, validation, and refore, qualification of re <u>lesult</u> <u>Dissolved Resu</u> <u>(mg/L)</u>	No exceeded the total metals d qualification of dissolved esults was not performed
<ul> <li>Target analytes w EPH/8270)?</li> <li>Both total and dis results were grea</li> <li>Comments: The following esults. The EPA has not netals results that exceed ased on these data.</li> </ul>	es were not repo solved metals a ter than or equa table contains t provided guidan the correspond	orted by mor analyses wer al to the disso he exception ace or require ing total met	re than one method (e.g re than one meth re performed, an olved metals res ns in which the c ements for the e tals results. The alyte <u>Total R</u> (mg mony NE	., 8200/8270,         nod in this data set.         d the total metals         ults?         lissolved metals results         valuation, validation, and         refore, qualification of refore         (mg/L)         0       0.00061	No exceeded the total metals d qualification of dissolved esults was not performed
<ul> <li>Target analytes w EPH/8270)?</li> <li>Both total and dis results were grea</li> <li>Comments: The following esults. The EPA has not netals results that exceed ased on these data.</li> </ul>	es were not repo solved metals a ter than or equa table contains t provided guidan the correspond <u>Sample ID</u> OW-63 OW-10	more than of context by more than of contex by more than of context by more than of contex by more tha	re than one method (e.g re than one method olved metals resonant of the contract of the contra	and in this data set. the total metals ults? lissolved metals results valuation, validation, and refore, qualification of refore, <u>(mg/L)</u> 0.00061 0.00039	No exceeded the total metals d qualification of dissolved esults was not performed
<ul> <li>Target analytes w EPH/8270)?</li> <li>Both total and dis results were grea</li> <li>Comments: The following esults. The EPA has not netals results that exceed ased on these data.</li> </ul>	es were not repo solved metals a ter than or equa table contains t provided guidan the correspond <u>Sample ID</u> OW-63 OW-10 DUP-6-8-2	more than a         ported by more         ported by more         inalyses were         al to the disse         he exception         ing total met         0       Antir         0       Antir         2       Col	re than one method (e.g re than one meth re performed, an olved metals res ns in which the c ements for the e tals results. The alyte <u>Total R</u> <u>(mg.</u> <u>mony NE</u> balt <u>NE</u>	., 8200/8270,         nod in this data set.         d the total metals ults?         lissolved metals results ( valuation, validation, and refore, qualification of response) <u>L</u> <u>Dissolved Result</u> (mg/L)         0       0.00061         0       0.0028	No exceeded the total metals d qualification of dissolved esults was not performed
<ul> <li>Target analytes w EPH/8270)?</li> <li>Comments: Target analyte</li> <li>Both total and dis results were grea</li> <li>Comments: The following esults. The EPA has not netals results that exceed ased on these data.</li> </ul>	es were not reported by solved metals a ter than or equa table contains t provided guidan the correspond <u>Sample ID</u> OW-63 OW-10 DUP-6-8-2 OW-63	more than a control by more and the exception and the exceptical and the exception and the exception and the exception	re than one method (e.g re than one method olved metals resonant of the contract of the contra	., 8200/8270,         nod in this data set.         d the total metals ults?         lissolved metals results valuation, validation, and refore, qualification of results <u>L</u> <u>Dissolved Result</u> (mg/L)         0       0.00061         0       0.0028         0       0.0027	No exceeded the total metals d qualification of dissolved esults was not performed
<ul> <li>Target analytes w EPH/8270)?</li> <li>Comments: Target analyte</li> <li>Both total and dis results were grea</li> <li>Comments: The following esults. The EPA has not netals results that exceed ased on these data.</li> </ul>	es were not reported by solved metals a ter than or equa table contains t provided guidan the correspond <u>Sample ID</u> OW-63 OW-10 DUP-6-8-22 OW-63 EB-6-8-22	more than a         ported by more         ported by more         inalyses were         al to the disse         he exception         ing total met         0       Ana         0       Ana         2       Col         2       Col         2       Col         2       Zi         2       Zi	re than one method (e.g re than one method olved metals results results in which the c ements for the e tals results. The alyte Total F (mg, mony NE balt NE balt NE adjum NE	and in this data set. the total metals ults? lissolved metals results valuation, validation, and refore, qualification of refore, <u>(mg/L)</u> 0 0.00061 0 0.0028 0 0.0027 0 0.0068	No exceeded the total metals d qualification of dissolved esults was not performed



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Client Sample ID: OW-10 Field Duplicate Sample ID: DLIP-6-8-22						
Analyte	Method	Laboratory Result	Duplicate Result	Relative Percent Difference (RPD)		
Barium, Dissolved	E 200.7	0.046 mg/L	0.045 mg/L	2.2%		
Barium, Total	E 200.7	0.057 mg/L	0.055 mg/L	3.6%		
Cobalt, Dissolved	E 200.7	0.0039 mg/L	0.0028 mg/L	32.8% +/-RL		
Vanadium, Dissolved	E 200.7	0.0055 mg/L	0.0063 mg/L	13.6% +/-RL		
Vanadium, Total	E 200.7	0.0061 mg/L	0.0067 mg/L	9.4% +/-RL		
Zinc, Dissolved	E 200.7	0.0056 mg/L	0.0066 mg/L	16.4% +/-RL		
Zinc, Total	E 200.7	0.0081 mg/L	0.0071 mg/L	13.2% +/-RL		
Arsenic, Dissolved	E200.8	0.00065 mg/L	0.00067 mg/L	3.0% +/-RL		
Arsenic, Total	E200.8	0.0011 mg/L	0.0011 mg/L	0.0% +/-RL		
Lead, Dissolved	E200.8	0.00008 mg/L	0.000074 mg/L	7.8% +/-RL		
Lead, Total	E200.8	0.00021 mg/L	0.00021 mg/L	0.0% +/-RL		
Selenium, Dissolved	E200.8	0.010 mg/L	0.011 mg/L	9.5%		
Selenium, Total	E200.8	0.013 mg/L	0.012 mg/L	8.0%		
TPH DRO	SW8015	0.12 mg/L	0.091 mg/L	27.5% +/-RL		
TPH GRO	SW8015	0.012 mg/L	0.012 mg/L	0.0% +/-RL		
1,1-Dichloroethane	SW8260B	1.0 µg/L	ND (1.0 µg/L)	DL		
Methylene Chloride	SW8260B	47 µg/L	ND (3.0 µg/L)	DL		
MTBE	SW8260B	7.1 μg/L	7.3 µg/L	2.8%		
1,4-Dioxane	SW8270C	3.3 µg/L	3.1 μg/L	6.3%		
Pyrene	SW8270C	ND (1.0 μg/L)	0.60 µg/L	DL		

### FIELD DUPLICATE SUMMARY

Field duplicate RPD control limits are not to exceed 30% for water as established by USEPA Region I - New England Environmental Data Review Supplement for Region 1 Data Review Elements and Superfund Specific Guidance/Procedures, EQADR-Supplement2, September 2020.

DL – Indicates that the analyte was detected in one of the duplicate samples and was undetected in the other sample, and therefore an RPD could not be calculated. Data were not qualified since the detection was within two times the reporting limit. Non-detected results are indicated above with the applicable reporting limit as ND (RL).

+/-RL – Indicates that the detections in both of the samples were within two times the reporting limit. Qualification of data was not required.



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# DATA QUALIFICATION SUMMARY

Abbreviation	Reason
ERPD-LCS	The LCS/LCSD RPD exceeded the upper acceptable limit indicating poor precision.
FBD	Field blank detection
HR-LCS	The LCS and/or LCSD percent recovery was greater than the upper acceptable limit indicating a possible high bias.
HR-SUR	The surrogate percent recovery was greater than the upper acceptable limit indicating a possible high bias.
MBD	Method blank detection
MDLRL	Flagged by the laboratory: The result was greater than the MDL but less than the RL.

Analyte	Method	Field Sample ID	Lab Sample ID	Result	Limit	Units	Reviewer Qualifier	DV Flag Reasons
1,4-Dioxane	SW8270C	EB-6-8-22	2206528-001c	0.30	1.0	µg/L	J	MDLRL
Acenaphthene	SW8270C	OW-64	2206528-003c	0.16	0.30	µg/L	J	MDLRL
Anthracene	SW8270C	OW-64	2206528-003c	0.22	0.30	µg/L	J	MDLRL
Antimony, Dissolved	E200.8	OW-63	2206528-002E	0.00061	0.0010	µg/L	J	MDLRL
Arsenic, Dissolved	E200.8	OW-10	2206528-004E	0.00065	0.0010	mg/L	J	MDLRL
Arsenic, Dissolved	E200.8	DUP-6-8-22	2206528-006E	0.00067	0.0010	mg/L	J	MDLRL
Arsenic, Total	E200.8	OW-64	2206528-003D	0.0026	0.0050	mg/L	J	MDLRL
Chromium, Total	E 200.7	OW-64	2206528-003D	0.0033	0.0060	mg/L	J	MDLRL
Cobalt, Dissolved	E 200.7	OW-10	2206528-004E	0.0039	0.0060	mg/L	J	MDLRL
Cobalt, Dissolved	E 200.7	DUP-6-8-22	2206528-006E	0.0028	0.0060	mg/L	J	MDLRL
Lead, Dissolved	E200.8	OW-64	2206528-003E	0.000080	0.00050	mg/L	J	MDLRL
Lead, Dissolved	E200.8	OW-10	2206528-004E	0.000080	0.00050	mg/L	J	MDLRL
Lead, Dissolved	E200.8	DUP-6-8-22	2206528-006E	0.000074	0.00050	mg/L	J	MDLRL
Lead, Total	E200.8	OW-63	2206528-002D	0.000076	0.00050	mg/L	J	MDLRL



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Analyte	Method	Field Sample ID	Lab Sample ID	Result	Limit	Units	Reviewer Qualifier	DV Flag Reasons
Lead, Total	E200.8	OW-10	2206528-004D	0.00021	0.00050	mg/L	J	MDLRL
Lead, Total	E200.8	DUP-6-8-22	2206528-006D	0.00021	0.00050	mg/L	J	MDLRL
Pyrene	SW8270C	DUP-6-8-22	2206528-006c	0.60	1.0	µg/L	J	MDLRL
sec-Butylbenzene	SW8260B	OW-63	2206528-002a	8.3	50	µg/L	J	MDLRL
Toluene	SW8260B	OW-63	2206528-002a	46	50	µg/L	J	MDLRL
TPH DRO	SW8015	OW-63	2206528-002C	3.5	0.064	mg/L	J+	ERPD-LCS, HR-LCS
TPH DRO	SW8015	OW-64	2206528-003C	0.40	0.064	mg/L	J+	ERPD-LCS, HR-LCS
TPH DRO	SW8015	OW-10	2206528-004C	0.12	0.064	mg/L	JB	ERPD-LCS, HR-LCS, MBD
TPH DRO	SW8015	DUP-6-8-22	2206528-006C	0.091	0.064	mg/L	JB	ERPD-LCS, HR-LCS, MBD
TPH DRO	SW8015	EB-6-8-22	2206528-001C	0.044	0.064	mg/L	U	ERPD-LCS, HR-LCS, MBD, MDLRL
TPH GRO	SW8015	OW-64	2206528-003A	0.53	0.050	mg/L	J+	HR-SUR
TPH GRO	SW8015	OW-10	2206528-004A	0.012	0.050	mg/L	J	MDLRL
TPH GRO	SW8015	DUP-6-8-22	2206528-006A	0.012	0.050	mg/L	J	MDLRL
Vanadium, Dissolved	E 200.7	OW-63	2206528-002E	0.0027	0.050	mg/L	J	MDLRL
Vanadium, Dissolved	E 200.7	OW-64	2206528-003E	0.0035	0.050	mg/L	J	MDLRL
Vanadium, Dissolved	E 200.7	OW-10	2206528-004E	0.0055	0.050	mg/L	J	MDLRL
Vanadium, Dissolved	E 200.7	DUP-6-8-22	2206528-006E	0.0063	0.050	mg/L	J	MDLRL
Vanadium, Total	E 200.7	OW-64	2206528-003D	0.0080	0.050	mg/L	J	MDLRL
Vanadium, Total	E 200.7	OW-10	2206528-004D	0.0061	0.050	mg/L	J	MDLRL
Vanadium, Total	E 200.7	DUP-6-8-22	2206528-006D	0.0067	0.050	mg/L	J	MDLRL
Zinc, Dissolved	E 200.7	EB-6-8-22	2206528-001E	0.0068	0.010	mg/L	J+	HR-LCS, MDLRL
Zinc, Dissolved	E 200.7	OW-63	2206528-002E	0.014	0.010	mg/L	JB	FBD, HR-LCS
Zinc, Dissolved	E 200.7	OW-64	2206528-003E	0.0054	0.010	mg/L	U	FBD, HR-LCS, MDLRL



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Analyte	Method	Field Sample ID	Lab Sample ID	Result	Limit	Units	Reviewer Qualifier	DV Flag Reasons
Zinc, Dissolved	E 200.7	OW-10	2206528-004E	0.0056	0.010	mg/L	U	FBD, HR-LCS, MDLRL
Zinc, Dissolved	E 200.7	DUP-6-8-22	2206528-006E	0.0066	0.010	mg/L	U	FBD, HR-LCS, MDLRL
Zinc, Total	E 200.7	OW-64	2206528-003D	0.0057	0.010	mg/L	J	MDLRL
Zinc, Total	E 200.7	OW-10	2206528-004D	0.0081	0.010	mg/L	J	MDLRL
Zinc, Total	E 200.7	DUP-6-8-22	2206528-006D	0.0071	0.010	mg/L	J	MDLRL



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Client: Marathon Oil	Laboratory: Hall Environmental Analysis Laboratory				
Project Name: Western Refining Southwest, Quarterly GW	Sample Matrix: Groundwater				
Project Number: 697-080-002 Task: 0006	Sample Start Date: 06/09/2022				
Date Validated: 12/27/2022	Sample End Date: 06/09/2022				
Parameters Included:					
<ul> <li>Volatile Organic Compounds (VOC) by Environmental Pro Waste (SW-846) Method 8260B</li> </ul>	otection Agency (EPA) Test Methods for Evaluating Solid				
<ul> <li>1,2-Dibromoethane (EDB) by EPA Method 504.1</li> </ul>					
<ul> <li>Semivolatile Organic Compounds (SVOC) by SW-846 Me Monitoring (SIM)</li> </ul>	thod 8270C and Method 8270C with Selected Ion				
<ul> <li>Total Petroleum Hydrocarbons (TPH) Gasoline Range Or</li> </ul>	ganics (GRO) by SW-846 Method 8015D				
<ul> <li>TPH Diesel Range Organics (DRO) and Motor Oil Range</li> </ul>	Organics (MRO) by SW-846 Method 8015D Modified				
<ul> <li>Total and Dissolved Metals by EPA Method 200.7 and Method</li> </ul>	ethod 200.8				
<ul> <li>Total and Dissolved Mercury by EPA Method 245.1</li> </ul>					
<ul> <li>Cyanide by Standard Methods for the Examination of Wat</li> </ul>	ter and Wastewater (SM) Method 4500 CN E				
Laboratory Project ID: 2206602					
Data Validator: Daran O'Hollearn, Lead Project Scientist					
Reviewer: Mike Phillips, Senior Chemist					

# DATA EVALUATION CRITERIA SUMMARY

A Tier II Data Validation was performed by Trihydro Corporation's Chemical Data Evaluation Services Group on the analytical data report packages generated by Hall Environmental Analysis Laboratory of Albuquerque, New Mexico, with additional data from Pace Analytical National of Mount Juliet, Tennessee evaluating samples from the Marathon Oil site, located in Gallup, New Mexico.

Precision, accuracy, method compliance, and completeness of this data package were assessed during this data review. Precision was determined by evaluating the calculated relative percent difference (RPD) values from:

- Field duplicate pairs
- Laboratory duplicate pairs
- Matrix spike (MS) and matrix spike duplicate (MSD) pairs
- Laboratory control sample (LCS) and laboratory control sample duplicate (LCSD) pairs

Laboratory accuracy was established by reviewing the demonstrated percent recoveries (%R) of the following items to verify that data are not biased.

- MS/MSD samples
- LCS/LCSD samples
- Organic system monitoring compounds (surrogates)



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Field accuracy was established by collecting and analyzing the following samples to monitor for possible ambient or cross contamination during sampling and transportation.

- Trip blanks
- Field blanks
- Equipment blanks

Method compliance was established by reviewing sample integrity, holding times, detection limits, surrogate recoveries, laboratory blanks, initial and continuing calibrations (where applicable), and the LCS/LCSD percent recoveries against method-specific requirements.

Completeness was evaluated by determining the overall ratio of the number of samples and analyses planned versus the number of samples with valid analyses. Determination of completeness included a review of the chain-of-custody (CoC), laboratory analytical methods, and other laboratory and field documents associated with this analytical data set.

Client Sample ID	Laboratory Sample Number
EB-6-9-22	2206602-001
BW-5C	2206602-002
OW-50	2206602-003
OW-52	2206602-004
OW-29	2206602-005
OW-13	2206602-006
FB-6-9-22	2206602-007
DUP-6-9-22	2206602-008
BW-5B	2206602-009
Trip Blank	2206602-010

#### SAMPLE NUMBERS TABLE





The laboratory data were reviewed to evaluate compliance with the methods and the quality of the reported data. Assessment of CoC completeness is included in Item 3 of the Data Validation Checklist. A check mark ( $\checkmark$ ) indicates that the referenced validation criteria were deemed acceptable, whereas a crossed circle ( $\otimes$ ) indicates validation criteria for which the data have been qualified by the data validator. An empty circle (O) indicates that the specified criterion does not apply to the reviewed data. Details are noted in the tables below.

#### Validation Criteria

- ✓ Data Completeness
- ✓ CoC Documentation (Item 3)
- ✓ Holding Times and Preservation (Items 6 and 7)
- O Initial and Continuing Calibrations (Items 9 and 10)
- ⊗ Laboratory Blanks (Items 11 and 12)
- ✓ MS/MSD (Items 13 and 14)
- ⊗ LCS/LCSD (Items 15 and 16)
- System Monitoring Compounds (i.e., Surrogates) (Item 17)
- 8 Field, Equipment, and Trip Blanks (Items 18 and 19)
- ⊗ Field Duplicates (Items 20 and 21)
- ✓ Laboratory Duplicates (Item 22)

# **Guidance References**

Chemical data validation was conducted in accordance with the United States Environmental Protection Agency (USEPA) Contract Laboratory Program (CLP) National Functional Guidelines for the analyses listed below, or by the appropriate method if not covered in the National Functional Guidelines.

- Data for organic analyses were evaluated according to validation criteria set forth in the USEPA CLP National Functional Guidelines for Organic Superfund Methods Data Review, document number EPA-540-R-20-005, November 2020 with additional reference to the USEPA CLP National Functional Guidelines for Organic Data Review, document number EPA 540/R-99/008, October 1999.
- Data for inorganic analyses were evaluated according to validation criteria set forth in the USEPA CLP National Functional Guidelines for Inorganic Superfund Methods Data Review, document number EPA-540-R-20-006, November 2020 with additional reference to the USEPA CLP National Functional Guidelines for Inorganic Data Review, document number EPA 540-R-04-004, October 2004.
- Review of field duplicates was conducted according to the USEPA Region I New England Environmental Data Review Supplement for Region 1 Data Review Elements and Superfund Specific Guidance/Procedures, EQADR-Supplement2, September 2020.
- Trihydro Data Validation Variance Documentation, April 2022.



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# **OVERALL DATA PACKAGE ASSESSMENT**

Based on a data validation review, the data are acceptable as delivered. Data qualified by the laboratory are discussed in Item 2 of the Validation Criteria Checklist.

The purpose of validating data and assigning qualifiers is to assist in proper data interpretation. Data that are not qualified meet the site data quality objectives. If values are assigned qualifiers other than an R (rejected, data not usable), the data may be used for site evaluation; however, consideration should be given to the reasons for qualification when interpreting sample concentrations. Data points that are assigned an R qualifier should not be used for site evaluation purposes.

If applicable, text was identified in **bold font** in the Validation Criteria Checklist to indicate that further action and/or qualification of the data were required. Data may have been qualified with J data flags by the laboratory if the result was greater than or equal to the method detection limit (MDL) but less than the reporting limit (RL). These laboratory-applied J flags were preserved, if present, and included in the Data Qualification Summary table at the end of this report. If applicable, data validation qualifiers were added for the items noted with crossed circles in the Validation Criteria section above. Please see the Data Qualification Summary table at the end of this report.

If data would be qualified with more than one flag, one qualifier was assigned based on the severity; however, all reasons for qualification were retained. Data that would be qualified with both J+ and J- flags were evaluated based on validation criteria and assigned the appropriate flag. The hierarchy of qualifiers from the most to least severe is as follows:

Data qualifiers used during this validation are included in the following table.

<u>Qualifier</u>	Definition
J	Estimated concentration
J+	The result is an estimated concentration, but may be biased high
J-	The result is an estimated concentration, but may be biased low
UJ	Estimated reporting limit
U	Evaluated to be undetected at the reporting limit
JB	Estimated concentration due to blank contamination

#### **Data Completeness**

The analyses were performed as requested on the CoC records. The associated samples were received by the laboratory and analyzed properly unless otherwise noted in the Criteria Checklist below. The complete data package consisted of 630 data points. The data completeness calculation does not include any submitted blank sample results. Data points were not rejected. The data completeness measure for this data package is calculated to be 100% and is acceptable.



VALIDATION CRITERIA CHECKLIST						
1. Was the report	1. Was the report free of non-conformances identified by the laboratory? No					
Comments: The la	boratory note	ed the following analytical no	on-conformance related to	this data set.		
Method 8270C: Sa	mple OW-29	had poor surrogate recover	ries due to the emulsive na	ature of the sample	e.	
2. Were the data If no, define.	free of data	qualification flags and/or not	es used by the laboratory?	,	No	
Comments: The la	boratory use	d the following data qualifica	ation flags with this data se	t.		
J – Analyte detecte	d below qua	ntitation limits.				
J – The identificatio	n of the ana	lyte is acceptable; the report	ed value is an estimate.			
P1 – RPD value no	t applicable f	for sample concentrations le	ss than 5 times the reporti	ng limit.		
S – % Recovery ou	tside of rang	e due to dilution or matrix in	terference.			
3. Were sample 0	CoC forms ar	nd custody procedures comp	olete?		Yes	
Comments: The Co and laboratory pers coolers because the times.	oC records fi onnel signat e samples w	rom field to laboratory were oures, dates, and times of rec ere transferred to a courier f	complete, and custody was beipt. Custody seals were for delivery to the laborator	s maintained as e\ not present nor re y, and custody wa	ridenced by field quired on the s maintained at all	
4. Were detection permit, or method	limits in acc lod, or indica	cordance with the quality ass ated as acceptable?	surance project plan (QAPI	<sup>&gt;</sup> ),	Yes	
Comments: The de	etection limits	s appeared to be acceptable	. The following dilutions w	vere applied.		
	Method	Sample(s)	Analyte(s)	Dilution Factor	]	
	200.8	OW-29 OW-52 BW-5C	Select Dissolved and	5		
	8260B	EB 6.0.22	Total Metals	10		
	8260B	OW-29	MTBF	100		
	02002	00			]	
5. Were the repor QAPP, permit,	ted analytica or CoC?	al methods and constituents	in compliance with the		No	
Comments: The re constituents in acco	ported analy ordance with	tical methods were in compl the CoC, with the following	iance with the CoC, and the coc, and the coc, and the exceptions.	e laboratory repor	ted the requested	
The CoC requested using both Method accuracy, and prec	l total and di 200.7 and M ision goals a	ssolved metals using only M ethod 200.8. This substitute nd, therefore, was an accep	ethod 200.7; however, the ed analytical method, Meth table replacement.	laboratory analyz od 200.8, met sim	ed the samples ilar sensitivity,	
The CoC requested cyanide using Method 335.4; however, the laboratory analyzed the samples using Method 4500 CN E. This substituted analytical method met similar sensitivity, accuracy, and precision goals and, therefore, was an acceptable replacement.						
6. Were samples received in good condition within method-specified requirements? No						
Comments: Samples were received on ice, in good condition, and with the cooler temperatures both within and outside the recommended temperature range of $4^{\circ}C \pm 2^{\circ}C$ between $0.5^{\circ}C$ and $5.8^{\circ}C$ as noted on the CoC and the <i>Sample Log-in Check List</i> . Samples transferred to Pace National were received in good condition with the cooler temperature within the recommended range at $5.9^{\circ}C$ as noted on the CoC.						
The cooler tempera as broken or frozen	tures below	2.0°C were judged as accep	otable since the laboratory	did not report the	sample containers	
					😽 Trihydro	



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VALIDATION CRITERIA CHECKLIST									
7. Were samples extracted/digested and analyzed within method-specified or Yes technical holding times?									
Comments: The samples wer	Comments: The samples were extracted/digested and analyzed within method-specific holding times.								
<ol> <li>Were reported units appro method(s)? Specify if we</li> </ol>	priate for the sample matrix/matrice or dry units were used for soil.	es and analytical		Yes					
Comments: The results were which were acceptable for the	Comments: The results were reported in concentration units of micrograms per liter (µg/L) and milligrams per liter (mg/L), which were acceptable for the sample matrix and the analyses requested.								
9. Did the laboratory provide	any specific initial and/or continuin	g calibration res	ults?	No					
Comments: Initial and continu	ing calibration data were not includ	ed as part of this	data set.						
10. If initial and/or continuing acceptable limits?	calibration results were provided, w	ere the results w	/ithin	N/A					
Comments: Initial and continu	ing calibration data were not includ	ed as part of this	data set.						
11. Was the total number of lattice total number of sample	boratory blank samples prepared e s or analyzed as required by the m	equal to at least the st the states the states and the states are states as the states are states as the states and the states are states as the states are states are states as the states are states are states as the states are states	5% of	Yes					
Comments: The total number samples.	of laboratory blank samples prepar	ed was equal to	at least 5% of the total ı	number of					
12. Were target analytes repo	rted as not detected in the laborato	ry blanks?		No					
Comments: Target analytes v	ere reported as not detected in the	laboratory blank	s, with the following exc	ception.					
TPH DRO was detected in the Sample results detected bell flag. The TPH DRO result for to 10 times the blank concert OW-29 and OW-52 were great	e laboratory blank for Method 80 ow the blank concentration and/o r sample BW-5C was greater than tration and was assigned a JB q er than ten times the blank concent	15D batch 6812 or the laboratory n the laboratory ualifier. The TF tration and did n	3 at a concentration o y reporting limit were of reporting limit but less PH DRO results in the as ot require qualification.	f 0.021 mg/L. qualified with a U ss than or equal ssociated samples					
13. Was the total number of N number of samples or an	IS samples prepared equal to at lea lyzed as required by the method?	ast 5% of the tota	al	Yes					
Comments: The total number of matrix spike samples prepared was equal to at least 5% of the total number of samples, although MS samples were not prepared/reported for all analyses and/or batches. The matrix spike sample source for each analytical batch in this sample set has been indicated below.									
Method	Analytes	<u>Batch</u>	MS Sample Source						
200.7	Total Metals	68127	BW-5B						
200.7	Dissolved Metals	A88751	Not Prepared						
200.7	Dissolved Metals	B88784	EB-6-9-22						
200.8	Total Metals	68127	OW-29						
200.8	200.8 Dissolved Metals B88918 Not Prepared								
200.8	200.8 Dissolved Metals C88688 EB-6-9-22, BW-5C								
245.1	245.1 Total and Dissolved Mercury 68089 BW-5B								
504.1	EDB	68078	Not Prepared						
4500CN	Cyanide	WG1882743	Not Associated						
8015D	TPH DRO and MRO	68123	Not Prepared						
8015D	GRO	C88732	EB-6-9-22						



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		VALIDATION C		IECKLIST						
	<u>Method</u>	<u>Analytes</u>	es Batch MS Sample Source							
	8260B	MTBE	A	88912						
	8260B	Methylene Chloride	e A	88962	Not Prepared					
	8260B	VOC	F	88822	Not Prepared					
	8270C SIM	SVOC		68135	Not Prepared					
	8270C	SVOC		68135	Not Prepared					
Not Associated – The N Not Prepared – Matrix s	//S sample source v spikes were not pre	vas not associated with pared/reported for this b	this project. atch.							
14. For MS/MSDs p within data valid	repared from pro lation or laborato	ject samples, were pe ry quality control (QC)	ercent recove limits?	eries and RP	PDs	Yes				
Comments: The MS limits.	/MSD percent red	coveries and RPDs fo	r project sar	nples were v	vithin data validatio	on and laboratory QC				
The percent recoveri but data were not qu	ies and RPD valu alified based on t	es for MS/MSDs prep hose results since ma	oared from n atrix similarit	on-project sa y to project s	amples were evalua samples could not l	ated and considered, be guaranteed.				
15. Was the total nu samples or anal	ımber of LCSs an yzed as required	alyzed equal to at lea by the method?	st 5% of the	total numbe	er of	Yes				
Comments: The tota	al number of LCS	samples analyzed wa	as equal to a	at least 5% o	f the total number o	of samples.				
16. Were LCS/LCSD percent recoveries and LCS/LCSD RPDs within data validation or No laboratory QC limits?										
Comments: The LCS and LCSD percent recoveries and LCS/LCSD RPDs were within data validation and laboratory QC limits, with the following exceptions.										
	Method         Analyte         Batch         LCS         LCS/LCSD           Method         Analyte         Batch         Recovery         QC Limits									
	200.7	Total Cobalt 68127 133% 70-130%								
	200.7	200.7 Dissolved Nickel B88784 64.9% 70-130%								
Total cobalt was detected in the associated sample BW-5C, and this result was qualified as J+ due to evidence of potential high bias. The remaining associated total cobalt results were non-detections, and qualification of data was not required.										

Dissolved nickel was not detected in the associated sample EB-6-9-22. This result was qualified as UJ due to evidence of potential low bias.



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#### VALIDATION CRITERIA CHECKLIST 17. Were surrogate recoveries within laboratory QC limits? No Comments: Surrogate recoveries were within laboratory QC limits, with the following exceptions. Surrogate **QC** Limits Method Surrogate Sample Recovery 8270C 2-Fluorophenol **OW-29** 20.4% 29.4-87.7% 8270C Phenol-d₅ **OW-29** 16.6% 28.5-64.7% 8270C **OW-29** Nitrobenzene-d5 26.7% 36.9-103% 8270C 2-Fluorobiphenyl **OW-29** 26.7% 38.1-99.9% Since Method 8270C and 8270C SIM surrogate associations were not available from the laboratory, qualification was assigned to all of the target analytes in a given fraction (acid or base/neutral) when two or more surrogates from the same fraction (acid or base/neutral) were outside the acceptance range. This condition did not exist for the Method 8270C SIM analysis of sample OW-29, and qualification of sample data was not required. Di-n-butyl phthalate was detected in the Method 8270C analysis of sample OW-29, and this result was qualified as J- to indicate a potential low bias. The remaining Method 8270C SVOC results for sample OW-29 were non-detections, and these results were qualified as UJ due to the evidence of potential low bias. Qualification of sample data was not required based on surrogate non-conformances in QC samples as the environmental samples were evaluated based on their specific surrogate recoveries. 18. Were the number of trip blank, field blank, and/or equipment blank samples Yes collected equal to at least 10% of the total number of samples or as required by the project guidelines, QAPP, SAP, or permit? Comments: The number of trip, field, and equipment blanks collected was equal to at least 10% of the number of samples. One trip blank sample, Trip Blank, one field blank sample, FB-6-9-22, and one equipment blank sample, EB-6-9-22, were collected as part of this sample set. 19. Were target analytes reported as not detected in the trip blank, field blank, and/or No equipment blank samples? Comments: Target analytes were not detected in the trip blank, field blank, and equipment blank samples with the following exceptions. Blank Sample ID Method Analyte Concentration **Dissolved Zinc** EB-6-9-22 200.7 0.0065 mg/L 8015D TPH DRO EB-6-9-22 0.017 mg/L EB-6-9-22 8260B **Methylene Chloride** 370 µg/L Detections of dissolved zinc and methylene chloride in the associated samples that were less than the blank results and/or less than the applicable reporting limits were assigned U qualifiers. The detections of dissolved zinc in the associated samples OW-50 and OW-52 that were greater than the reporting limit but less than 10 times the blank result were assigned JB qualifiers. Non-detections of methylene chloride in the associated samples and dissolved zinc results greater than ten times the blank concentration did not require qualification. The TPH DRO results for the samples in batch 68123 were previously qualified due to a laboratory blank detection; therefore, additional qualification due to the equipment blank contamination was not required. 20. Was the number of field duplicates collected equal to at least 10% of the total Yes number of samples or as required by the project guidelines, QAPP, SAP, or permit? Comments: The number of field duplicates collected was equal to at least 10% of the number of samples. Sample DUP-6-9-22 was collected as a field duplicate of sample BW-5B. Trihydro

# VALIDATION CRITERIA CHECKLIST

21. Were field duplicate RPD values within data validation QC limits (soil 0-50%, water 0-30%, or air 0-25%)?

No

Comments: As indicated in the Field Duplicate Summary Table at the end of this report, field duplicate RPD values were within data validation QC limits of 0-30% for water samples, with the following exceptions.

The RPD value for MTBE exceeded the data validation limit of 30% at 53.2%, which was evidence of poor precision. The MTBE results were qualified as J for samples BW-5B and DUP-6-9-22.

An RPD value could not be calculated for methylene chloride for the field duplicate pair BW-5B and DUP-6-9-22 since the analyte was detected in the parent sample and was undetected in the duplicate sample. As the detection in the parent sample was greater than two times the reporting limit, methylene chloride was qualified as J and UJ for the parent and duplicate samples, respectively.



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VALIDATION CRITERIA CHECKLIST										
22. For laboratory dupli laboratory QC limits	22. For laboratory duplicates prepared from project samples, were RPDs within N/A laboratory QC limits?									
Comments: Laboratory associated with this data	Comments: Laboratory duplicates were prepared for the analysis of cyanide in batch WG1882743 from samples not associated with this data set.									
The RPD values for the but data were not qualifi	laboratory duplicate ed based on these re	samples prepared esults since matrix	from non-project similarity to pro	ct samples were eval ject samples could n	uated and considered, ot be guaranteed.					
23. Were the following	23. Were the following data relationships realistic?									
• Target analytes EPH/8270)?	• Target analytes were reported by more than one method (e.g., 8260/8270, N/A EPH/8270)?									
Comments: Target anal	lytes were not report	ed by more than o	ne method in thi	s data set.						
		,								
Both total and o	dissolved metals ana	lyses were perforr	ned, and the tot	al metals	No					
results were gr	eater than or equal to	o the dissolved me	etals results?							
Comments: The following results. The EPA has not metals results that excert based on these data.	ng table contains the ot provided guidance ed the corresponding	exceptions in whi or requirements f total metals resul	ch the dissolved or the evaluatior ts. Therefore, q	metals results exceent n, validation, and qua ualification of results	eded the total metals Ilification of dissolved was not performed					
	Sample ID	Analyte	Total Result (mg/L)	Dissolved Result (mg/L)						
	OW-29	Antimony	ND	0.00067						
	BW-5B	Antimony	ND	0.00070						
	OW-29	Arsenic	ND	0.00046						
	OW-29	Barium	0.082	0.085						
	BW-5B	Lead	ND	0.000064						
	BW-5C Selenium ND 0.00040									
	OW-13	Vanadium	ND	0.0031						
	BW-5B	Vanadium	0.0092	0.0096						
	OW-29 Zinc ND 0.12									
	OW-52 Zinc ND 0.013									
	OW-13 Zinc 0.0045 0.0076									
	DUP-6-9-22 Zinc ND 0.0075									
	BW-5B	Zinc	ND	0.0096						
	EB-6-9-22	Zinc	ND	0.0065						
	BW-5C	Zinc	0.0065	0.0086						
	OW-50 Zinc 0.0043 0.011									



	Client Sample ID: BW-5B Field Duplicate Sample ID: DUP-6-9-22							
Analyte	Method	Laboratory Result	Duplicate Result	Relative Percent Difference (RPD)				
Barium, Dissolved	E 200.7	0.26 mg/L	0.27 mg/L	3.8%				
Barium, Total	E 200.7	0.28 mg/L	0.28 mg/L	0.0%				
Vanadium, Dissolved	E 200.7	0.0096 mg/L	0.0095 mg/L	1.0% +/-RL				
Vanadium, Total	E 200.7	0.0092 mg/L	0.0096 mg/L	4.3% +/-RL				
Zinc, Dissolved	E 200.7	0.0096 mg/L	0.0075 mg/L	24.6% +/-RL				
Antimony, Dissolved	E200.8	0.00070 mg/L	ND (0.0010 mg/L)	DL				
Arsenic, Dissolved	E200.8	0.00088 mg/L	0.00089 mg/L	1.1% +/-RL				
Arsenic, Total	E200.8	0.0011 mg/L	0.0010 mg/L	9.5% +/-RL				
Lead, Dissolved	E200.8	0.000064 mg/L	ND (0.00050 mg/L)	DL				
Selenium, Dissolved	E200.8	0.00055 mg/L	0.00082 mg/L	39.4% +/-RL				
Selenium, Total	E200.8	0.0011 mg/L	0.0014 mg/L	24.0% +/-RL				
TPH DRO	SW8015	0.030 mg/L	0.016 mg/L	60.9% +/-RL				
TPH GRO	SW8015	0.014 mg/L	0.016 mg/L	13.3% +/-RL				
Methylene Chloride	SW8260B	52 μg/L	ND (3.0 μg/L)	DL				
МТВЕ	SW8260B	8.7 μg/L	15 μg/L	53.2%				
1,4-Dioxane	SW8270C	0.76 µg/L	0.80 µg/L	5.1% +/-RL				

### FIELD DUPLICATE SUMMARY

Field duplicate RPD control limits are not to exceed 30% for water as established by USEPA Region I - New England Environmental Data Review Supplement for Region 1 Data Review Elements and Superfund Specific Guidance/Procedures, EQADR-Supplement2, September 2020.

DL – Indicates that the analyte was detected in one of the duplicate samples and was undetected in the other sample, and therefore an RPD could not be calculated. Data were not qualified since the detection was within two times the reporting limit. Non-detected results are indicated above with the applicable reporting limit as ND (RL).

+/-RL – Indicates that the detections in both of the samples were within two times the reporting limit. Qualification of data was not required.

The RPD value for MTBE exceeded the data validation limit of 30% at 53.2%, which was evidence of poor precision. The MTBE results were qualified as J for samples BW-5B and DUP-6-9-22.

An RPD value could not be calculated for methylene chloride for the field duplicate pair BW-5B and DUP-6-9-22 since the analyte was detected in the parent sample and was undetected in the duplicate sample. As the detection in the parent sample was greater than two times the reporting limit, methylene chloride was qualified as J and UJ for the parent and duplicate samples, respectively.



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# DATA QUALIFICATION SUMMARY

Abbreviation	Reason
EBD	Equipment blank detection
ERPD-FD	High field duplicate RPD.
HR-LCS	The LCS and/or LCSD percent recovery was greater than the upper acceptable limit indicating a possible high bias.
LR-LCS	The LCS and/or LCSD percent recovery was less than the lower acceptable limit indicating a possible low bias.
LR-SUR	The surrogate percent recovery was less than the lower acceptable limit indicating a possible low bias.
MBD	Method blank detection
MDLRL	Flagged by the laboratory: The result was greater than the MDL but less than the RL.

Analyte	Method	Field Sample ID	Lab Sample ID	Result	Limit	Units	Reviewer Qualifier	DV Flag Reasons
1,2-Dichloroethane	SW8260B	OW-13	2206602-006a	0.77	1.0	µg/L	J	MDLRL
1,4-Dichlorobenzene	SW8270C	OW-29	2206602-005c	ND	5.0	µg/L	UJ	LR-SUR
1,4-Dioxane	SW8270C	OW-29	2206602-005c	0.46	1.0	µg/L	J	MDLRL
1,4-Dioxane	SW8270C	DUP-6-9-22	2206602-008c	0.80	1.0	µg/L	J	MDLRL
1,4-Dioxane	SW8270C	BW-5B	2206602-009c	0.76	1.0	µg/L	J	MDLRL
2,4,6-Trichlorophenol	SW8270C	OW-29	2206602-005c	ND	10	µg/L	UJ	LR-SUR
2,4-Dimethylphenol	SW8270C	OW-29	2206602-005c	ND	10	µg/L	UJ	LR-SUR
2,4-Dinitrophenol	SW8270C	OW-29	2206602-005c	ND	20	µg/L	UJ	LR-SUR
2-Methylphenol	SW8270C	OW-29	2206602-005c	ND	10	µg/L	UJ	LR-SUR
3,4-Methylphenol	SW8270C	OW-29	2206602-005c	ND	10	µg/L	UJ	LR-SUR
Antimony, Dissolved	E200.8	OW-29	2206602-005E	0.00067	0.0010	mg/L	J	MDLRL
Antimony, Dissolved	E200.8	BW-5B	2206602-009E	0.00070	0.0010	mg/L	J	MDLRL
Arsenic, Dissolved	E200.8	BW-5C	2206602-002E	0.00055	0.0010	mg/L	J	MDLRL
Arsenic, Dissolved	E200.8	OW-52	2206602-004E	0.00058	0.0010	mg/L	J	MDLRL
Arsenic, Dissolved	E200.8	OW-29	2206602-005E	0.00046	0.0010	mg/L	J	MDLRL



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Analyte	Method	Field Sample ID	Lab Sample ID	Result	Limit	Units	Reviewer Qualifier	DV Flag Reasons
Arsenic, Dissolved	E200.8	OW-13	2206602-006E	0.00069	0.0010	mg/L	J	MDLRL
Arsenic, Dissolved	E200.8	DUP-6-9-22	2206602-008E	0.00089	0.0010	mg/L	J	MDLRL
Arsenic, Dissolved	E200.8	BW-5B	2206602-009E	0.00088	0.0010	mg/L	J	MDLRL
Arsenic, Total	E200.8	BW-5C	2206602-002D	0.00076	0.0050	mg/L	J	MDLRL
Arsenic, Total	E200.8	OW-52	2206602-004D	0.00065	0.0010	mg/L	J	MDLRL
Benzoic Acid	SW8270C	OW-29	2206602-005c	ND	20	µg/L	UJ	LR-SUR
Bis(2-ethylhexyl)phthalate	SW8270C	OW-29	2206602-005c	ND	10	µg/L	UJ	LR-SUR
Cobalt, Dissolved	E 200.7	BW-5C	2206602-002E	0.0029	0.0060	mg/L	J	MDLRL
Cobalt, Total	E 200.7	BW-5C	2206602-002D	0.0040	0.0060	mg/L	J+	HR-LCS, MDLRL
Cyanide, Total	E335.4	OW-50	2206602-003F	2.18	5.0	µg/L	J	MDLRL
Diethylphthalate	SW8270C	OW-29	2206602-005c	ND	10	µg/L	UJ	LR-SUR
Dimethylphthalate	SW8270C	OW-29	2206602-005c	ND	10	µg/L	UJ	LR-SUR
Di-n-butylphthalate	SW8270C	OW-29	2206602-005c	9.7	10	µg/L	J-	LR-SUR, MDLRL
Di-n-octylphthalate	SW8270C	OW-29	2206602-005c	ND	20	µg/L	UJ	LR-SUR
Lead, Dissolved	E200.8	BW-5B	2206602-009E	0.000064	0.00050	mg/L	J	MDLRL
Lead, Total	E200.8	BW-5C	2206602-002D	0.0014	0.0025	mg/L	J	MDLRL
Mercury, Total	E245.1	BW-5C	2206602-002D	0.00019	0.00020	mg/L	J	MDLRL
Methylene Chloride	SW8260B	DUP-6-9-22	2206602-008a	ND	3.0	µg/L	UJ	ERPD-FD
Methylene Chloride	SW8260B	OW-29	2206602-005a	39	3.0	µg/L	U	EBD
Methylene Chloride	SW8260B	BW-5B	2206602-009a	52	3.0	µg/L	U	EBD, ERPD-FD
МТВЕ	SW8260B	DUP-6-9-22	2206602-008a	15	1.0	µg/L	J	ERPD-FD
MTBE	SW8260B	BW-5B	2206602-009a	8.7	1.0	µg/L	J	ERPD-FD
Nickel, Dissolved	E 200.7	EB-6-9-22	2206602-001E	ND	0.01	mg/L	UJ	LR-LCS
Phenol	SW8270C	OW-29	2206602-005c	ND	20	µg/L	UJ	LR-SUR
Pyridine	SW8270C	OW-29	2206602-005c	ND	60	µg/L	UJ	LR-SUR
Selenium, Dissolved	E200.8	BW-5C	2206602-002E	0.00040	0.0010	mg/L	J	MDLRL
Selenium, Dissolved	E200.8	DUP-6-9-22	2206602-008E	0.00082	0.0010	mg/L	J	MDLRL



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Analyte	Method	Field Sample ID	Lab Sample ID	Result	Limit	Units	Reviewer Qualifier	DV Flag Reasons
Selenium, Dissolved	E200.8	BW-5B	2206602-009E	0.00055	0.0010	mg/L	J	MDLRL
TPH DRO	SW8015	BW-5C	2206602-002C	0.078	0.064	mg/L	JB	MBD
TPH DRO	SW8015	EB-6-9-22	2206602-001C	0.017	0.064	mg/L	U	MBD, MDLRL
TPH DRO	SW8015	OW-50	2206602-003C	0.046	0.064	mg/L	U	MBD, MDLRL
TPH DRO	SW8015	OW-13	2206602-006C	0.039	0.064	mg/L	U	MBD, MDLRL
TPH DRO	SW8015	DUP-6-9-22	2206602-008C	0.016	0.064	mg/L	U	MBD, MDLRL
TPH DRO	SW8015	BW-5B	2206602-009C	0.030	0.064	mg/L	U	MBD, MDLRL
TPH GRO	SW8015	BW-5C	2206602-002a	0.023	0.050	mg/L	J	MDLRL
TPH GRO	SW8015	OW-52	2206602-004a	0.0094	0.050	mg/L	J	MDLRL
TPH GRO	SW8015	DUP-6-9-22	2206602-008a	0.016	0.050	mg/L	J	MDLRL
TPH GRO	SW8015	BW-5B	2206602-009a	0.014	0.050	mg/L	J	MDLRL
Vanadium, Dissolved	E 200.7	BW-5C	2206602-002E	0.0026	0.050	mg/L	J	MDLRL
Vanadium, Dissolved	E 200.7	OW-13	2206602-006E	0.0031	0.050	mg/L	J	MDLRL
Vanadium, Dissolved	E 200.7	DUP-6-9-22	2206602-008E	0.0095	0.050	mg/L	J	MDLRL
Vanadium, Dissolved	E 200.7	BW-5B	2206602-009E	0.0096	0.050	mg/L	J	MDLRL
Vanadium, Total	E 200.7	BW-5C	2206602-002D	0.0089	0.050	mg/L	J	MDLRL
Vanadium, Total	E 200.7	DUP-6-9-22	2206602-008D	0.0096	0.050	mg/L	J	MDLRL
Vanadium, Total	E 200.7	BW-5B	2206602-009D	0.0092	0.050	mg/L	J	MDLRL
Zinc, Dissolved	E 200.7	OW-50	2206602-003E	0.011	0.010	mg/L	JB	EBD
Zinc, Dissolved	E 200.7	OW-52	2206602-004E	0.013	0.010	mg/L	JB	EBD
Zinc, Dissolved	E 200.7	EB-6-9-22	2206602-001E	0.0065	0.010	mg/L	J	MDLRL
Zinc, Dissolved	E 200.7	BW-5C	2206602-002E	0.0086	0.010	mg/L	U	EBD, MDLRL
Zinc, Dissolved	E 200.7	OW-13	2206602-006E	0.0076	0.010	mg/L	U	EBD, MDLRL
Zinc, Dissolved	E 200.7	DUP-6-9-22	2206602-008E	0.0075	0.010	mg/L	U	EBD, MDLRL
Zinc, Dissolved	E 200.7	BW-5B	2206602-009E	0.0096	0.010	mg/L	U	EBD, MDLRL
Zinc, Total	E 200.7	BW-5C	2206602-002D	0.0065	0.010	mg/L	J	MDLRL
Zinc, Total	E 200.7	OW-50	2206602-003D	0.0043	0.010	mg/L	J	MDLRL



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Analyte	Method	Field Sample ID	Lab Sample ID	Result	Limit	Units	Reviewer Qualifier	DV Flag Reasons
Zinc, Total	E 200.7	OW-13	2206602-006D	0.0045	0.010	mg/L	J	MDLRL



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Client: Marathon Oil	Laboratory: Hall Environmental Analysis Laboratory				
Project Name: Western Refining Southwest, Q2 GW Sampling	Sample Matrix: Aqueous				
Project Number: 697-080-002 Task: 0006	Sample Start Date: 06/14/2022				
Date Validated: 09/20/2022	Sample End Date: 06/14/2022				
Parameters Included:					
<ul> <li>Volatile Organic Compounds (VOCs) by Environmental P Waste (SW-846) Method 8260B</li> </ul>	rotection Agency (EPA) Test Methods for Evaluating Solid				
<ul> <li>1,2-Dibromoethane (EDB) by EPA Method 504.1</li> </ul>					
<ul> <li>Semivolatile Organic Compounds (SVOCs) by SW-846 M Monitoring (SIM)</li> </ul>	lethod 8270C and Method 8270C with Selected Ion				
<ul> <li>Total Petroleum Hydrocarbons (TPH) Gasoline Range Or</li> </ul>	ganics (GRO) by SW-846 Method 8015D				
<ul> <li>TPH Diesel Range Organics (DRO) and Motor Oil Range</li> </ul>	Organics (MRO) by SW-846 Method 8015D Modified				
<ul> <li>Total and Dissolved Metals by EPA Method 200.7 and Method</li> </ul>	ethod 200.8				
<ul> <li>Total and Dissolved Mercury by EPA Method 245.1</li> </ul>					
<ul> <li>Cyanide by Standard Methods for the Examination of Water and Wastewater (SM) Method 4500 CN E</li> </ul>					
Laboratory Project ID: 2206781					
Data Validator: Daran O'Hollearn, Lead Project Scientist					
Reviewer: Charles Ballek, Senior Chemist					

# DATA EVALUATION CRITERIA SUMMARY

A Tier II Data Validation was performed by Trihydro Corporation's Chemical Data Evaluation Services Group on the analytical data report packages generated by Hall Environmental Analysis Laboratory of Albuquerque, New Mexico, with additional data from Pace National of Mount Juliet, Tennessee, evaluating samples from the Marathon Oil site, located in Gallup, New Mexico.

Precision, accuracy, method compliance, and completeness of this data package were assessed during this data review. Precision was determined by evaluating the calculated relative percent difference (RPD) values from:

- Field duplicate pairs
- Laboratory duplicate pairs
- Matrix spike (MS) and matrix spike duplicate (MSD) pairs
- Laboratory control sample (LCS) and laboratory control sample duplicate (LCSD) pairs

Laboratory accuracy was established by reviewing the demonstrated percent recoveries (%R) of the following items to verify that data are not biased.

- MS/MSD samples
- LCS/LCSD samples
- Organic system monitoring compounds (surrogates)



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Field accuracy was established by collecting and analyzing the following samples to monitor for possible ambient or cross contamination during sampling and transportation.

- Trip blanks
- Field blanks
- Equipment blanks

Method compliance was established by reviewing sample integrity, holding times, detection limits, surrogate recoveries, laboratory blanks, initial and continuing calibrations (where applicable), and the LCS/LCSD percent recoveries against method-specific requirements.

Completeness was evaluated by determining the overall ratio of the number of samples and analyses planned versus the number of samples with valid analyses. Determination of completeness included a review of the chain-of-custody (CoC), laboratory analytical methods, and other laboratory and field documents associated with this analytical data set.

Client Sample ID	Laboratory Sample Number
EB-6-14-22	2206781-001
PW-3	2206781-002
PW-4	2206781-003
East LDU	2206781-004
West LDU	2206781-005
FB-6-9-22	2206781-006
DUP-6-9-22	2206781-007
Trip Blank	2206781-008

### SAMPLE NUMBERS TABLE





The laboratory data were reviewed to evaluate compliance with the methods and the quality of the reported data. Assessment of CoC completeness is included in Item 3 of the Data Validation Checklist. A check mark ( $\checkmark$ ) indicates that the referenced validation criteria were deemed acceptable, whereas a crossed circle ( $\otimes$ ) indicates validation criteria for which the data have been qualified by the data validator. An empty circle (O) indicates that the specified criterion does not apply to the reviewed data. Details are noted in the tables below.

#### Validation Criteria

- ✓ Data Completeness
- ✓ CoC Documentation (Item 3)
- ✓ Holding Times and Preservation (Items 6 and 7)
- O Initial and Continuing Calibrations (Items 9 and 10)
- ⊗ Laboratory Blanks (Items 11 and 12)
- ⊗ MS/MSD (Items 13 and 14)
- ⊗ LCS/LCSD (Items 15 and 16)
- System Monitoring Compounds (i.e., Surrogates) (Item 17)
- 8 Field, Equipment, and Trip Blanks (Items 18 and 19)
- ⊗ Field Duplicates (Items 20 and 21)
- ✓ Laboratory Duplicates (Item 22)

# **Guidance References**

Chemical data validation was conducted in accordance with the United States Environmental Protection Agency (USEPA) Contract Laboratory Program (CLP) National Functional Guidelines for the analyses listed below, or by the appropriate method if not covered in the National Functional Guidelines.

- Data for organic analyses were evaluated according to validation criteria set forth in the USEPA CLP National Functional Guidelines for Organic Superfund Methods Data Review, document number EPA-540-R-20-005, November 2020 with additional reference to the USEPA CLP National Functional Guidelines for Organic Data Review, document number EPA 540/R-99/008, October 1999.
- Data for inorganic analyses were evaluated according to validation criteria set forth in the USEPA CLP National Functional Guidelines for Inorganic Superfund Methods Data Review, document number EPA-540-R-20-006, November 2020 with additional reference to the USEPA CLP National Functional Guidelines for Inorganic Data Review, document number EPA 540-R-04-004, October 2004.
- Review of field duplicates was conducted according to the USEPA Region I New England Environmental Data Review Supplement for Region 1 Data Review Elements and Superfund Specific Guidance/Procedures, EQADR-Supplement2, September 2020.
- Trihydro Data Validation Variance Documentation, April 2022.



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# **OVERALL DATA PACKAGE ASSESSMENT**

Based on a data validation review, the data are acceptable as delivered. Data qualified by the laboratory are discussed in Item 2 of the Validation Criteria Checklist.

The purpose of validating data and assigning qualifiers is to assist in proper data interpretation. Data that are not qualified meet the site data quality objectives. If values are assigned qualifiers other than an R (rejected, data not usable), the data may be used for site evaluation; however, consideration should be given to the reasons for qualification when interpreting sample concentrations. Data points that are assigned an R qualifier should not be used for site evaluation purposes.

If applicable, text was identified in **bold font** in the Validation Criteria Checklist to indicate that further action and/or qualification of the data were required. Data may have been qualified with J data flags by the laboratory if the result was greater than or equal to the method detection limit (MDL) but less than the reporting limit (RL). These laboratory-applied J flags were preserved, if present, and included in the Data Qualification Summary table at the end of this report. If applicable, data validation qualifiers were added for the items noted with crossed circles in the Validation Criteria section above. Please see the Data Qualification Summary table at the end of this report.

If data would be qualified with more than one flag, one qualifier was assigned based on the severity; however, all reasons for qualification were retained. Data that would be qualified with both J+ and J- flags were evaluated based on validation criteria and assigned the appropriate flag. The hierarchy of qualifiers from the most to least severe is as follows:

Data qualifiers used during this validation are included in the following table.

<u>Qualifier</u>	Definition
J	Estimated concentration
J+	The result is an estimated concentration, but may be biased high
J-	The result is an estimated concentration, but may be biased low
UJ	Estimated reporting limit
U	Evaluated to be undetected at the reporting limit
JB	Estimated concentration due to blank contamination

#### **Data Completeness**

The analyses were performed as requested on the CoC records. The associated samples were received by the laboratory and analyzed properly unless otherwise noted in the Criteria Checklist below. The complete data package consisted of 450 data points. The data completeness calculation does not include any submitted blank sample results. Data points were not rejected. The data completeness measure for this data package is calculated to be 100% and is acceptable.



	VALIDATION CRITERIA CHECKLIST						
1. Wa	s the report free	e of non-conformances identifie	d by the laboratory?	No			
Comme	ents: The labora	atory noted the following analyti	cal non-conformance related to this data s	set.			
Method	Method 8270C: Samples PW-3 and East LDU had poor surrogate recoveries due to the emulsive nature of the sample.						
2. We Ifn	<ol> <li>Were the data free of data qualification flags and/or notes used by the laboratory? No If no. define.</li> </ol>						
Comme	nts: The labora	atory used the following data gu	alification flags with this data set.				
D – San	nole diluted due	to matrix					
J – Ana	lyte detected be	elow quantitation limits					
R – RPI	D value outside	of range					
S – % F	ecovery outside	e of range due to dilution or ma	trix interference				
* _ \/alu	e exceeds max	imum contaminant level					
		farma and quaterly are and		Nia			
3. We	re sample CoC	forms and custody procedures	complete?	No			
and labo were tra maintair Sample	oratory personn ansferred to a la ned at all times s FB-6-14-22 ai	el signatures, dates, and times boratory field courier service fo nd DUP-6-14-22 were logged ir	of receipt. Custody seals were not present r transport from the field to the laboratory, not the laboratory system as FB-6-9-22 and	nt because the samples and custody was d DUP-6-9-22, respectively			
4 We	re detection lim	its in accordance with the quali	ty assurance project plan (QAPP)	Yes			
n. me	mit, or method,	or indicated as acceptable?		100			
Comme	nts: The detect	tion limits appeared to be accer	otable. The following dilutions were applie	d.			
	Method	Sample(s)	Analyte(s)	Dilution Factor			
	200.7	East LDU, DUP-6-9-22	Dissolved Chromium and Nickel	5			
	200.7	West LDU, DUP-6-9-22	Total Chromium and Nickel	5			
	200.8	Multiple Samples	Select Total and Dissolved Metals	5			
	200.7	East LDU	Total Chromium and Nickel	10			
	8015D	DUP-6-9-22	TPH DRO and TPH MRO	10			
	8260B	DUP-6-9-22	Methylene Chloride	10			
	200.8	DUP-6-9-22	Select Total Metals	20			
<ul> <li>5. Were the reported analytical methods and constituents in compliance with the No QAPP, permit, or CoC?</li> <li>Comments: The reported analytical methods were in compliance with the CoC, and the laboratory reported the requested constituents in accordance with the CoC, with the following exceptions.</li> </ul>							
The CoC requested total and dissolved metals using Method 200.7; however, the laboratory analyzed the samples using both Method 200.7 and Method 200.8. This substituted analytical method, Method 200.8, met similar sensitivity, accuracy, and precision goals and, therefore, was an acceptable replacement.							
The Co This sub replace	The CoC requested cyanide using Method 335.4; however, the laboratory analyzed the samples using Method 4500 CN E. This substituted analytical method met similar sensitivity, accuracy, and precision goals and, therefore, was an acceptable replacement.						



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VALIDATION CRITERIA CHECKLIST										
6. Were sample	es received ir	n good condition within method-s	pecified requirem	ents? No						
Comments: Samples were received on ice, in good condition, and with the cooler temperatures both within and outside the recommended temperature range of $4^{\circ}C \pm 2^{\circ}C$ at $0.8^{\circ}C$ , $3.1^{\circ}C$ , and $4.8^{\circ}C$ as noted on the CoC and the <i>Sample Log-in Check List</i> . Samples transferred to Pace National were received in good condition with the cooler temperature within the recommended range at $2.7^{\circ}C$ as noted on the CoC. The cooler temperature below $2.0^{\circ}C$ was judged as acceptable since the laboratory did not report the sample containers as broken or frozen.										
7. Were sample technical hol	7. Were samples extracted/digested and analyzed within method-specified or Yes technical holding times?									
Comments: The	Comments: The samples were extracted/digested and analyzed within method-specific holding times.									
8. Were reported units appropriate for the sample matrix/matrices and analytical method(s)? Specify if wet or dry units were used for soil.       Yes										
Comments: The which were accept	Comments: The results were reported in concentration units of micrograms per liter (µg/L) and milligrams per liter (mg/L), which were acceptable for the sample matrix and the analyses requested.									
9. Did the labor	atory provide	e any specific initial and/or contin	uing calibration re	esults? No						
Comments: Initia	al and continu	ing calibration data were not incl	uded as part of t	his data set.						
10. If initial and/c acceptable li	10. If initial and/or continuing calibration results were provided, were the results within N/A acceptable limits?									
Comments: Initia	al and continu	ing calibration data were not incl	uded as part of t	his data set.						
11. Was the tota the total num	l number of la	aboratory blank samples prepare es or analyzed as required by the	d equal to at leas e method?	st 5% of Yes						
Comments: The samples.	total number	of laboratory blank samples prep	bared was equal	to at least 5% of the total numbe	er of					
12. Were target a	analytes repo	orted as not detected in the laboration	atory blanks?	No						
Comments: Targ	jet analytes v	vere reported as not detected in t	he laboratory bla	inks, with the following exceptior	۱.					
TPH DRO was d TPH DRO was d reporting limit a results greater the	etected in th etected in as nd the resul an ten times	ne laboratory blank for Method ssociated samples EB-6-14-22 ts were qualified with U flags. the blank concentration did not re	8015D batch 68 and PW-3 at con Non-detections of equire qualification	185 at a concentration of 0.01 ncentrations less than the labor of this analyte in the associated son.	8 mg/L. pratory samples and					
13. Was the tota number of sa	l number of N amples or ana	AS samples prepared equal to at alyzed as required by the method	least 5% of the t  ?	otal Yes						
Comments: The although MS sam analytical batch ir	total number pples were no n this sample	of matrix spike samples prepare ot prepared/reported for all analys set has been indicated below.	d was equal to a ses and/or batche	t least 5% of the total number of es. The matrix spike sample sou	samples, irce for each					
	Method	<u>Analytes</u>	Batch	MS Sample Source						
	200.7	Total Metals	68172	West LDU, DUP-6-9-22						
	200.7	Dissolved Metals	B88784	EB-6-14-22						
	200.7 Dissolved Silver B88897 Not Prepared									
	200.8	Total Metals	68172	Not Prepared						
	200.8	Dissolved Metals	B88918	EB-6-14-22, PW-3						
	245.1	Total and Dissolved Mercury	68186	Not Prepared						
	504.1	EDB	68189	Not Prepared	-					
	Method	Analytes	<u>Batch</u>	MS Sample Source						
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VALIDATION CRITERIA CHECKLIST								
	4500CN E	Cvanide	w	G1883737	Not Assoc	iated		
	8015D TE	PH DRO and	MRO	68185	Not Pren	ared		
	8015D	TPH GRO		G88994	Not Prep	ared		
	8260B	VOCs		A88912	Not Prep	Not Prepared		
	8260B	VOCs		A88962	Not Prep			
	8270C and	SVOCs		68202	Not Prep	ared		
Not Associa Not Prepare	Not Associated – The MS sample source was not associated with this project. Not Prepared – Matrix spikes were not prepared/reported for this batch.							
14. For M within Comments	14. For MS/MSDs prepared from project samples, were percent recoveries and RPDs       No         within data validation or laboratory quality control (QC) limits?       No         Comments: The percent recoveries and RPDs for MS/MSDs prepared from project samples were within data validation       No							
The MS ar 46.5% and qualified a The percer but data we	The MS and MSD recoveries for total silver in Method 200.7 batch 68172 were outside the QC limits of 75-125% at 46.5% and 49.1%, respectively. Total silver was not detected in the associated samples and the results were qualified as UJ due to evidence of potential low bias. The percent recoveries and RPD values for MS/MSDs prepared from non-project samples were evaluated and considered but data were not qualified based on those results since matrix similarity to project samples could not be guaranteed.							
15. Was th sample Comments	<ul> <li>15. Was the total number of LCSs analyzed equal to at least 5% of the total number of Yes samples or analyzed as required by the method?</li> <li>Comments: The total number of LCS samples analyzed was equal to at least 5% of the total number of samples.</li> </ul>							
16. Were labora	LCS/LCSD percent recoveritory QC limits?	es and LCS/I	_CSD RPDs wit	hin data validati	on or	No		
Comments limits, with	: The LCS and LCSD perce the following exceptions.	ent recoveries	s and LCS/LCS	D RPDs were w	ithin data valida	tion and labora	tory QC	
<u>Method</u>	Analyte	<u>Batch</u>	<u>LCS</u> <u>Recovery</u>	<u>LCSD</u> <u>Recovery</u>	LCS/LCSD QC Limits	LCS/LCSD RPD	<u>RPD</u> <u>QC</u> Limits	
200.7	Total Barium	68172	137%		70-130%			
200.7	<b>Dissolved Nickel</b>	B88784	64.9%		70-130%			
245.1	Total Mercury	68186	145%		70-130%			
8015D	TPH DRO	68185	92.4%	90.2%	31.7-75.4%	Acceptable	20%	
8270C	1,4-Dichlorobenzene	68202	Acceptable	Acceptable	15-89.8%	47.0%	39.6%	
8270C	Phenol	68202	Acceptable	Acceptable	17-61.1%	52.4%	42.5%	
8270C	Pyrene	68202	Acceptable	Acceptable	61-123%	28.9%	11.8%	
Total barium and TPH DRO were detected in the associated samples and these results were qualified as J+ due to evidence of potential high bias. The non-detections of total barium in the associated sample EB-6-14-22 and TPH DRO in sample PW-4 did not require qualification. Total mercury was not detected in the associated samples in Method 245.1 batch 68186 and the results did not require qualification based on the evidence of potential high bias.								

Dissolved nickel was qualified as J- for detections and UJ for non-detections in the associated samples due to potential low bias.

The analytes with LCS/LCSD RPD values that exceeded the QC limit were qualified as J for detections and UJ for non-detections for the associated samples due to evidence of poor precision.



	VALIDATION CRITERIA CHECKLIST								
17. We	No								
Comments: Surrogate recoveries were within laboratory QC limits, with the following exceptions.									
	MethodSurrogateSampleSurrogateMethodSurrogateRecovery								
	8270C	2-Fluorophenol	PW-3	24.0%	29.4-87.7%				
	8270C	Phenol-d₅	PW-3	18.0%	28.5-64.7%				
	8270C	Nitrobenzene-d₅	PW-3	29.8%	36.9-103%				
	8270C	2-Fluorobiphenyl	PW-3	30.2%	38.1-99.9%				
	8015D	BFB	East LDU	213%	70-130%				
	8270C	2-Fluorophenol	East LDU	1.79%	29.4-87.7%				
	8270C	Phenol-d₅	East LDU	10.9%	28.5-64.7%				
	8270C	2,4,6-Tribromophenol	East LDU	10.7%	18.6-129%				
	8270C	Nitrobenzene-d₅	East LDU	33.5%	36.9-103%				
	8270C SIM	4-Terphenyl-d <sub>14</sub>	East LDU	56.9%	72.3-147%				
	8270C	Phenol-d₅	West LDU	0%	28.5-64.7%				
	8015D	BFB	DUP-6-9-22	230%	70-130%				
	8270C SIM	4-Terphenyl-d <sub>14</sub>	DUP-6-9-22	65.7%	72.3-147%				

Since Method 8270C and Method 8270C SIM surrogate associations were not available from the laboratory, qualification was assigned to all of the target analytes in a given fraction (acid or base/neutral) when two or more surrogates from the same fraction (acid or base/neutral) were outside the acceptance range. This condition did not exist for the samples West LDU and DUP-6-9-22 and qualification of sample data was not required.

The associated target analytes in the samples with surrogate recoveries that were less than lower laboratory QC limits were not detected, and the results were qualified as UJ due to evidence of potential low bias.

TPH GRO was detected in samples East LDU and DUP-6-9-22 and these results were qualified as J+ due to evidence of potential high bias.

The TPH DRO and TPH MRO results for sample DUP-6-9-22 were not qualified based on the surrogate non-conformances in the Method 8015D analyses since the applied dilution of 10 times resulted in a surrogate concentration below routinely calibrated levels and those results were deemed unreliable and possibly inaccurate

Qualification of sample data was not required based on surrogate non-conformances in QC samples as the environmental samples were evaluated based on their specific surrogate recoveries.

Were the number of trip blank, field blank, and/or equipment blank samples
 Yes collected equal to at least 10% of the total number of samples or as required by the project guidelines, QAPP, SAP, or permit?

Comments: The number of trip, field, and equipment blanks collected was equal to at least 10% of the number of samples. One trip blank sample, Trip Blank, one field blank sample FB-6-9-22, and one equipment blank sample, EB 6-14-22, were collected as part of this sample set.



# VALIDATION CRITERIA CHECKLIST

19. Were target analytes reported as not detected in the trip blank, field blank, and/or equipment blank samples?

No

Comments: Target analytes were not detected in the trip blank, field blank, and equipment blank samples with the following exceptions.

Blank Sample ID	Method	<u>Analyte</u>	Concentration
Trip Blank	8260B	Chloromethane	0.76 µg/L
Trip Blank	8260B	Methylene Chloride	0.52 μg/L
FB-6-9-22	8260B	Acetone	3.5 μg/L
FB-6-9-22	8260B	Methylene Chloride	0.72 μg/L
FB-6-9-22	8260B	Toluene	0.32 µg/L
EB-6-14-22	8015D	TPH DRO	0.035 mg/L
EB-6-14-22	8260B	Chloromethane	0.67 µg/L
EB-6-14-22	8260B	Methylene Chloride	0.92 µg/L
EB-6-14-22	200.7	Dissolved Zinc	0.0058 mg/L

Detections of the identified analytes in the associated samples that were less than the blank results and/or less than the applicable reporting limits were assigned U qualifiers. Detections of toluene and dissolved zinc in the associated samples that were greater than the reporting limits but less than 10 times the blank results were assigned JB qualifiers. Non-detections of the identified analytes in the associated samples and detections that were above the reporting limit and greater than ten times the blank concentration did not require qualification.

The TPH DRO results in batch 68185 were previously qualified due to laboratory blank contamination; therefore, additional qualification based on the equipment blank detection was not required.

20. Was the number of field duplicates collected equal to at least 10% of the total number of samples or as required by the project guidelines, QAPP, SAP, or permit?

Yes

No

Comments: The number of field duplicates collected was equal to at least 10% of the number of samples. Sample DUP-6-9-22 was collected as a field duplicate of sample East LDU.

 Were field duplicate RPD values within data validation QC limits (soil 0-50%, water 0-30%, or air 0-25%)?

Comments: As indicated in the Field Duplicate Summary Table at the end of this report, field duplicate RPD values were within data validation QC limits of 0-30% for water samples, with the following exceptions.

An RPD value could not be calculated for total zinc for the field duplicate pair LDU-East and DUP-6-9-22 since the analyte was detected in the duplicate sample and was undetected in the parent sample. As the detection in the duplicate sample was greater than two times the reporting limit, total zinc was qualified as J and UJ for the duplicate and parent samples, respectively.

The RPD value for methylene chloride greatly exceeded the data validation limit of 30% at 156.3%. The methylene chloride results were qualified as J for the parent and duplicate samples, LDU-East and DUP-6-9-22, as well as the remaining associated samples based on evidence of extremely poor precision (RPD > 100%).



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VALIDATION CRITERIA CHECKLIST								
22. For laborator laboratory Q0	N/A							
Comments: A laboratory duplicate was prepared for the analysis of total cyanide in batch WG1883737 from a sample not associated with this data set.								
The RPD values for the laboratory duplicate samples prepared from non-project samples were evaluated and considered, but data were not qualified based on these results since matrix similarity to project samples could not be guaranteed.								
23. Were the following data relationships realistic?								
• Target a EPH/827	• Target analytes were reported by more than one method (e.g., 8260/8270, N/A EPH/8270)?							
Comments: Targ	Comments: Target analytes were not reported by more than one method in this data set.							
<ul> <li>Both tota results w</li> </ul>	Both total and dissolved metals analyses were performed, and the total metals     No results were greater than or equal to the dissolved metals results?							
Comments: The results. The EPA metals results tha based on these d	Comments: The following table contains the exceptions in which the dissolved metals results exceeded the total metals results. The EPA has not provided guidance or requirements for the evaluation, validation, and qualification of dissolved metals results that exceed the corresponding total metals results. Therefore, qualification of results was not performed based on these data							
	Sample ID	Analyte	<u>Total Result</u> (mg/L)	Dissolved Result (mg/L)				
	DUP-6-9-22 Arsenic ND 0.00081							
	PW-4 Selenium ND 0.00070							
	PW-3 Silver ND 0.0058							
	PW-4	Silver	ND	0.0050				
	PW-3	Vanadium	ND	0.0019				
	EB-6-14-22	Zinc	ND	0.0058				
	PW-4 Zinc ND 0.0096							

Zinc

Zinc

ND

ND

0.12

0.064



East LDU

West LDU

Client Sample ID: East LDU Field Duplicate Sample ID: DUP-6-9-22						
Analyte	Method	Laboratory Result	Duplicate Result	Relative Percent Difference (RPD)		
Barium, Dissolved	E 200.7	0.053 mg/L	0.052 mg/L	1.9%		
Barium, Total	E 200.7	0.14 mg/L	0.14 mg/L	0.0%		
Beryllium, Dissolved	E 200.7	0.0045 mg/L	0.0044 mg/L	2.2%		
Beryllium, Total	E 200.7	0.0045 mg/L	0.0046 mg/L	2.2%		
Chromium, Dissolved	E 200.7	2.9 mg/L	2.8 mg/L	3.5%		
Chromium, Total	E 200.7	5.3 mg/L	4.7 mg/L	12.0%		
Cobalt, Dissolved	E 200.7	0.014 mg/L	0.014 mg/L	0.0%		
Cobalt, Total	E 200.7	0.021 mg/L	0.024 mg/L	13.3%		
Nickel, Dissolved	E 200.7	3.3 mg/L	3.2 mg/L	3.1%		
Nickel, Total	E 200.7	3.3 mg/L	3.4 mg/L	3.0%		
Vanadium, Dissolved	E 200.7	0.018 mg/L	0.018 mg/L	0.0% +/-RL		
Vanadium, Total	E 200.7	0.12 mg/L	0.13 mg/L	8.0%		
Zinc, Dissolved	E 200.7	0.12 mg/L	0.12 mg/L	0.0%		
Zinc, Total	E 200.7	ND (0.010 mg/L)	0.16 mg/L	DL		
Arsenic, Dissolved	E200.8	0.00098 mg/L	0.00081 mg/L	19.0% +/-RL		
Arsenic, Total	E200.8	0.0013 mg/L	ND (0.020 mg/L)	DL		
Lead, Total	E200.8	0.00048 mg/L	ND (0.010 mg/L)	DL		
TPH GRO	SW8015	0.41 mg/L	0.52 mg/L	23.7%		
TPH DRO	SW8015	3.6 mg/L	3.5 mg/L	2.8%		
TPH ORO	SW8015	0.061 mg/L	ND (0.80 mg/L)	DL		
1,2,4-Trimethylbenzene	SW8260B	10 µg/L	9.6 µg/L	4.1%		
1,3,5-Trimethylbenzene	SW8260B	8.4 µg/L	8.2 µg/L	2.4%		
Benzene	SW8260B	25 µg/L	21 µg/L	17.4%		
Chloroform	SW8260B	0.24 µg/L	ND (1.0 µg/L)	DL		
Chloromethane	SW8260B	0.94 µg/L	ND (3.0 µg/L)	DL		
Ethylbenzene	SW8260B	20 µg/L	19 µg/L	5.1%		
Isopropylbenzene	SW8260B	4.3 μg/L	4.2 µg/L	2.4%		
Methylene Chloride	SW8260B	27 µg/L	220 µg/L	156.3%		
MTBE	SW8260B	1.5 μg/L	1.5 µg/L	0.0% +/-RL		
n-Butylbenzene	SW8260B	0.87 µg/L	0.81 µg/L	7.1% +/-RL		
n-Propylbenzene	SW8260B	4.5 μg/L	4.3 µg/L	4.5%		
p-Isopropyltoluene	SW8260B	1.3 µg/L	1.3 µg/L	0.0% +/-RL		
sec-Butylbenzene	SW8260B	2.2 μg/L	2.0 µg/L	9.5%		
Toluene	SW8260B	1.7 μg/L	1.7 μg/L	0.0% +/-RL		
Vinyl Chloride	SW8260B	0.52 µg/L	ND (1.0 µg/L)	DL		
Xylenes, Total	SW8260B	14 µg/L	14 µg/L	0.0%		
1,4-Dioxane	SW8270C	0.40 µg/L	1.4 µg/L	111.1% +/-RL		
1-Methylnaphthalene	SW8270C	0.48 µg/L	0.34 µg/L	34.1% +/-RL		



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Analyte	yte Method Laboratory Result D		Duplicate Result	Relative Percent Difference (RPD)
Acenaphthene	SW8270C	0.64 µg/L	0.68 µg/L	6.1%
Anthracene	SW8270C	0.46 µg/L	0.52 µg/L	12.2% +/-RL
Fluoranthene	SW8270C	0.68 µg/L	0.76 µg/L	11.1%
Fluorene	SW8270C	1.2 µg/L	1.3 µg/L	8.0%
Phenanthrene	SW8270C	2.2 µg/L	2.5 µg/L	12.8%
Pyrene	SW8270C	ND (1.0 µg/L)	0.34 µg/L	DL

Field duplicate RPD control limits are not to exceed 30% for water as established by USEPA Region I - New England Environmental Data Review Supplement for Region 1 Data Review Elements and Superfund Specific Guidance/Procedures, EQADR-Supplement2, September 2020.

DL – Indicates that the analyte was detected in one of the duplicate samples and was undetected in the other sample, and therefore an RPD could not be calculated. Data were not qualified since the detection was within two times the reporting limit. Non-detected results are indicated above with the applicable reporting limit as ND (RL).

+/-RL – Indicates that the detections in both of the samples were within two times the reporting limit. Qualification of data was not required.

An RPD value could not be calculated for total zinc for the field duplicate pair LDU-East and DUP-6-9-22 since the analyte was detected in the duplicate sample and was undetected in the parent sample. As the detection in the duplicate sample was greater than two times the reporting limit, total zinc was qualified as J and UJ for the duplicate and parent samples, respectively.

The RPD value for methylene chloride greatly exceeded the data validation limit of 30% at 156.3%. The methylene chloride results were qualified as J for the parent and duplicate samples, LDU-East and DUP-6-9-22, as well as the remaining associated samples based on evidence of extremely poor precision (RPD > 100%).



# DATA QUALIFICATION SUMMARY

Abbreviation	Reason
MBD	Method blank detection
LR-MS	The MS and/or MSD percent recovery was less than the lower acceptable limit indicating possible matrix interference.
HR-LCS	The LCS and/or LCSD percent recovery was greater than the upper acceptable limit indicating a possible high bias.
LR-LCS	The LCS and/or LCSD percent recovery was less than the lower acceptable limit indicating a possible low bias.
ERPD-LCS	The LCS/LCSD RPD exceeded the upper acceptable limit indicating poor precision.
HR-SUR	The surrogate percent recovery was greater than the upper acceptable limit indicating a possible high bias.
LR-SUR	The surrogate percent recovery was less than the lower acceptable limit indicating a possible low bias.
FBD	Field blank detection
EBD	Equipment blank detection
TBD	Trip blank detection
ERPD-FD	High field duplicate RPD.
MDLRL	Flagged by the laboratory: The result was greater than the MDL but less than the RL.

Analyte	Method	Field Sample ID	Lab Sample ID	Result	Limit	Units	Reviewer Qualifier	DV Flag Reasons
1,3,5-Trimethylbenzene	SW8260B	West LDU	2206781-005a	0.18	1.0	µg/L	J	MDLRL
1,4-Dichlorobenzene	SW8270C	EB-6-14-22	2206781-001c	ND	5.0	µg/L	UJ	ERPD-LCS
1,4-Dichlorobenzene	SW8270C	PW-4	2206781-003c	ND	5.0	µg/L	UJ	ERPD-LCS
1,4-Dichlorobenzene	SW8270C	East LDU	2206781-004c	ND	5.0	µg/L	UJ	ERPD-LCS
1,4-Dichlorobenzene	SW8270C	West LDU	2206781-005c	ND	5.0	µg/L	UJ	ERPD-LCS
1,4-Dichlorobenzene	SW8270C	DUP-6-9-22	2206781-007c	ND	5.0	µg/L	UJ	ERPD-LCS
1,4-Dichlorobenzene	SW8270C	PW-3	2206781-002c	ND	5.0	µg/L	UJ	ERPD-LCS, LR-SUR
1,4-Dioxane	SW8270C	East LDU	2206781-004c	0.40	1.0	µg/L	J	MDLRL
2,4-Dimethylphenol	SW8270C	PW-3	2206781-002c	ND	10	µg/L	UJ	LR-SUR
2,4-Dimethylphenol	SW8270C	East LDU	2206781-004c	ND	10	µg/L	UJ	LR-SUR



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Analyte	Method	Field Sample ID	Lab Sample ID	Result	Limit	Units	Reviewer Qualifier	DV Flag Reasons
2,4-Dinitrophenol	SW8270C	PW-3	2206781-002c	ND	20	µg/L	UJ	LR-SUR
2,4-Dinitrophenol	SW8270C	East LDU	2206781-004c	ND	20	µg/L	UJ	LR-SUR
2,4,6-Trichlorophenol	SW8270C	East LDU	2206781-004c	ND	10	µg/L	UJ	LR-SUR
2-Methylphenol	SW8270C	PW-3	2206781-002c	ND	10	µg/L	UJ	LR-SUR
2-Methylphenol	SW8270C	East LDU	2206781-004c	ND	10	µg/L	UJ	LR-SUR
3,4-Methylphenol	SW8270C	PW-3	2206781-002c	ND	10	µg/L	UJ	LR-SUR
3,4-Methylphenol	SW8270C	East LDU	2206781-004c	ND	10	µg/L	UJ	LR-SUR
Acetone	SW8260B	West LDU	2206781-005a	8.5	10	µg/L	U	FBD, MDLRL
Acetone	SW8260B	FB-6-9-22	2206781-006a	3.5	10	µg/L	J	MDLRL
Arsenic, Dissolved	E200.8	East LDU	2206781-004E	0.00098	0.0050	mg/L	J	MDLRL
Arsenic, Dissolved	E200.8	DUP-6-9-22	2206781-007E	0.00081	0.0050	mg/L	J	MDLRL
Arsenic, Total	E200.8	PW-4	2206781-003D	0.0029	0.0050	mg/L	J	MDLRL
Arsenic, Total	E200.8	East LDU	2206781-004D	0.0013	0.0050	mg/L	J	MDLRL
Arsenic, Total	E200.8	West LDU	2206781-005D	0.00097	0.0050	mg/L	J	MDLRL
Barium, Total	E 200.7	PW-3	2206781-002D	0.012	0.0030	mg/L	J+	HR-LCS
Barium, Total	E 200.7	PW-4	2206781-003D	0.014	0.0030	mg/L	J+	HR-LCS
Barium, Total	E 200.7	East LDU	2206781-004D	0.14	0.0030	mg/L	J+	HR-LCS
Barium, Total	E 200.7	West LDU	2206781-005D	0.067	0.0030	mg/L	J+	HR-LCS
Barium, Total	E 200.7	DUP-6-9-22	2206781-007D	0.14	0.0030	mg/L	J+	HR-LCS
Benzene	SW8260B	West LDU	2206781-005a	0.43	1.0	µg/L	J	MDLRL
Benzoic Acid	SW8270C	PW-3	2206781-002c	ND	20	µg/L	UJ	LR-SUR
Bis(2-ethylhexyl)phthalate	SW8270C	PW-3	2206781-002c	ND	10	µg/L	UJ	LR-SUR
Chloroform	SW8260B	East LDU	2206781-004a	0.24	1.0	µg/L	J	MDLRL
Chloromethane	SW8260B	Trip Blank	2206781-008a	0.76	3.0	µg/L	J	MDLRL
Chloromethane	SW8260B	EB-6-14-22	2206781-001a	0.67	3.0	µg/L	U	MDLRL, TBD
Chloromethane	SW8260B	East LDU	2206781-004a	0.94	3.0	µg/L	U	MDLRL, TBD
Cobalt, Dissolved	E 200.7	West LDU	2206781-005E	0.0039	0.0060	mg/L	J	MDLRL



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Analyte	Method	Field Sample ID	Lab Sample ID	Result	Limit	Units	Reviewer Qualifier	DV Flag Reasons
Cobalt, Total	E 200.7	PW-3	2206781-002D	0.0036	0.0060	mg/L	J	MDLRL
Cobalt, Total	E 200.7	PW-4	2206781-003D	0.0036	0.0060	mg/L	J	MDLRL
Diethylphthalate	SW8270C	PW-3	2206781-002c	ND	10	µg/L	UJ	LR-SUR
Dimethylphthalate	SW8270C	PW-3	2206781-002c	ND	10	µg/L	UJ	LR-SUR
Di-n-butylphthalate	SW8270C	PW-3	2206781-002c	ND	10	µg/L	UJ	LR-SUR
Di-n-octylphthalate	SW8270C	PW-3	2206781-002c	ND	20	µg/L	UJ	LR-SUR
Lead, Dissolved	E200.8	West LDU	2206781-005E	0.00043	0.00050	mg/L	J	MDLRL
Lead, Total	E200.8	PW-3	2206781-002D	0.00021	0.00050	mg/L	J	MDLRL
Lead, Total	E200.8	East LDU	2206781-004D	0.00048	0.00250	mg/L	J	MDLRL
Lead, Total	E200.8	West LDU	2206781-005D	0.0017	0.00250	mg/L	J	MDLRL
Methylene Chloride	SW8260B	East LDU	2206781-004a	27	3.0	µg/L	J	ERPD-FD
Methylene Chloride	SW8260B	West LDU	2206781-005a	15	3.0	µg/L	J	ERPD-FD
Methylene Chloride	SW8260B	DUP-6-9-22	2206781-007a	220	30	µg/L	J	ERPD-FD
Methylene Chloride	SW8260B	Trip Blank	2206781-008a	0.52	3.0	µg/L	J	ERPD-FD, MDLRL
Methylene Chloride	SW8260B	EB-6-14-22	2206781-001a	0.92	3.0	µg/L	U	ERPD-FD, MDLRL, TBD
Methylene Chloride	SW8260B	PW-3	2206781-002a	2.1	3.0	µg/L	U	ERPD-FD, MDLRL, TBD
Methylene Chloride	SW8260B	PW-4	2206781-003a	1.6	3.0	µg/L	U	ERPD-FD, MDLRL, TBD
Methylene Chloride	SW8260B	FB-6-9-22	2206781-006a	0.72	3.0	µg/L	U	ERPD-FD, MDLRL, TBD
n-Butylbenzene	SW8260B	East LDU	2206781-004a	0.87	3.0	µg/L	J	MDLRL
n-Butylbenzene	SW8260B	DUP-6-9-22	2206781-007a	0.81	3.0	µg/L	J	MDLRL
Nickel, Dissolved	E 200.7	East LDU	2206781-004E	3.3	0.050	mg/L	J-	LR-LCS
Nickel, Dissolved	E 200.7	West LDU	2206781-005E	0.96	0.010	mg/L	J-	LR-LCS
Nickel, Dissolved	E 200.7	DUP-6-9-22	2206781-007E	3.2	0.050	mg/L	J-	LR-LCS
Nickel, Dissolved	E 200.7	EB-6-14-22	2206781-001E	ND	0.010	mg/L	UJ	LR-LCS
Nickel, Dissolved	E 200.7	PW-3	2206781-002E	ND	0.010	mg/L	UJ	LR-LCS
Nickel, Dissolved	E 200.7	PW-4	2206781-003E	ND	0.010	mg/L	UJ	LR-LCS
Phenol	SW8270C	EB-6-14-22	2206781-001c	ND	20	µg/L	UJ	ERPD-LCS



Analyte	Method	Field Sample ID	Lab Sample ID	Result	Limit	Units	Reviewer Qualifier	DV Flag Reasons
Phenol	SW8270C	PW-4	2206781-003c	ND	20	µg/L	UJ	ERPD-LCS
Phenol	SW8270C	West LDU	2206781-005c	ND	20	µg/L	UJ	ERPD-LCS
Phenol	SW8270C	DUP-6-9-22	2206781-007c	ND	20	µg/L	UJ	ERPD-LCS
Phenol	SW8270C	PW-3	2206781-002c	ND	20	µg/L	UJ	ERPD-LCS, LR-SUR
Phenol	SW8270C	East LDU	2206781-004c	ND	20	µg/L	UJ	ERPD-LCS, LR-SUR
Pyrene	SW8270C	EB-6-14-22	2206781-001c	ND	1.0	µg/L	UJ	ERPD-LCS
Pyrene	SW8270C	PW-3	2206781-002c	ND	1.0	µg/L	UJ	ERPD-LCS
Pyrene	SW8270C	PW-4	2206781-003c	ND	1.0	µg/L	UJ	ERPD-LCS
Pyrene	SW8270C	East LDU	2206781-004c	ND	1.0	µg/L	UJ	ERPD-LCS
Pyrene	SW8270C	West LDU	2206781-005c	ND	1.0	µg/L	UJ	ERPD-LCS
Pyrene	SW8270C	DUP-6-9-22	2206781-007c	0.34	1.0	µg/L	J	ERPD-LCS, MDLRL
Selenium, Dissolved	E200.8	PW-4	2206781-003E	0.0007	0.0010	mg/L	J	MDLRL
Silver, Total	E 200.7	EB-6-14-22	2206781-001D	ND	0.0050	mg/L	UJ	LR-MS
Silver, Total	E 200.7	PW-3	2206781-002D	ND	0.0050	mg/L	UJ	LR-MS
Silver, Total	E 200.7	PW-4	2206781-003D	ND	0.0050	mg/L	UJ	LR-MS
Silver, Total	E 200.7	East LDU	2206781-004D	ND	0.0050	mg/L	UJ	LR-MS
Silver, Total	E 200.7	West LDU	2206781-005D	ND	0.0050	mg/L	UJ	LR-MS
Silver, Total	E 200.7	DUP-6-9-22	2206781-007D	ND	0.0050	mg/L	UJ	LR-MS
Toluene	SW8260B	East LDU	2206781-004a	1.7	1.0	µg/L	JB	FBD
Toluene	SW8260B	DUP-6-9-22	2206781-007a	1.7	1.0	µg/L	JB	FBD
Toluene	SW8260B	FB-6-9-22	2206781-006a	0.32	1.0	µg/L	J	MDLRL
TPH DRO	SW8015	East LDU	2206781-004C	3.6	0.064	mg/L	J+	HR-LCS
TPH DRO	SW8015	West LDU	2206781-005C	2.3	0.064	mg/L	J+	HR-LCS
TPH DRO	SW8015	DUP-6-9-22	2206781-007C	3.5	0.64	mg/L	J+	HR-LCS
TPH DRO	SW8015	EB-6-14-22	2206781-001C	0.035	0.064	mg/L	U	HR-LCS, MBD, MDLRL
TPH DRO	SW8015	PW-3	2206781-002C	0.036	0.064	mg/L	U	HR-LCS, MBD, MDLRL
TPH GRO	SW8015	East LDU	2206781-004a	0.41	0.050	mg/L	J+	HR-SUR



Analyte	Method	Field Sample ID	Lab Sample ID	Result	Limit	Units	Reviewer Qualifier	DV Flag Reasons
TPH GRO	SW8015	DUP-6-9-22	2206781-007a	0.52	0.050	mg/L	J+	HR-SUR
TPH GRO	SW8015	West LDU	2206781-005a	0.050	0.050	mg/L	J	MDLRL
TPH ORO	SW8015	East LDU	2206781-004C	0.061	0.080	mg/L	J	MDLRL
Vanadium, Dissolved	E 200.7	PW-3	2206781-002E	0.0019	0.050	mg/L	J	MDLRL
Vanadium, Dissolved	E 200.7	East LDU	2206781-004E	0.018	0.050	mg/L	J	MDLRL
Vanadium, Dissolved	E 200.7	DUP-6-9-22	2206781-007E	0.018	0.050	mg/L	J	MDLRL
Vanadium, Total	E 200.7	West LDU	2206781-005D	0.025	0.050	mg/L	J	MDLRL
Vinyl Chloride	SW8260B	East LDU	2206781-004a	0.52	1.0	µg/L	J	MDLRL
Zinc, Dissolved	E 200.7	PW-3	2206781-002E	0.011	0.010	mg/L	JB	EBD
Zinc, Dissolved	E 200.7	PW-4	2206781-003E	0.0096	0.010	mg/L	U	EBD, MDLRL
Zinc, Dissolved	E 200.7	EB-6-14-22	2206781-001E	0.0058	0.010	mg/L	J	MDLRL
Zinc, Total	E 200.7	DUP-6-9-22	2206781-007D	0.16	0.010	mg/L	J	ERPD-FD
Zinc, Total	E 200.7	East LDU	2206781-004D	ND	0.010	mg/L	UJ	ERPD-FD





Client: Marathon Oil	Laboratory: Hall Environmental Analysis Laboratory						
Project Name: Western Refining Southwest, Q2 GW Sampling	Sample Matrix: Aqueous						
Project Number: 697-080-002 Task: 0006	Sample Start Date: 06/15/2022						
Date Validated: 09/22/2022	Sample End Date: 06/15/2022						
Parameters Included:							
<ul> <li>Volatile Organic Compounds (VOCs) by Environmental Protection Agency (EPA) Test Methods for Evaluating Solid Waste (SW-846) Method 8260B</li> </ul>							
<ul> <li>1,2-Dibromoethane (EDB) by EPA Method 504.1</li> </ul>							
<ul> <li>Semivolatile Organic Compounds (SVOCs) by SW-846 M Monitoring (SIM)</li> </ul>	<ul> <li>Semivolatile Organic Compounds (SVOCs) by SW-846 Method 8270C and Method 8270C with Selected Ion Monitoring (SIM)</li> </ul>						
<ul> <li>Total Petroleum Hydrocarbons (TPH) Gasoline Range Or</li> </ul>	ganics (GRO) by SW-846 Method 8015D						
<ul> <li>TPH Diesel Range Organics (DRO) and Motor Oil Range</li> </ul>	Organics (MRO) by SW-846 Method 8015D Modified						
<ul> <li>Total and Dissolved Metals by EPA Method 200.7 and Method</li> </ul>	ethod 200.8						
<ul> <li>Total and Dissolved Mercury by EPA Method 245.1</li> </ul>							
<ul> <li>Cyanide by Standard Methods for the Examination of Water</li> </ul>	ter and Wastewater (SM) Method 4500 CN E						
Laboratory Project ID: 2206866							
Data Validator: Daran O'Hollearn, Lead Project Scientist							
Reviewer: Mike Phillips, Senior Chemist							

#### DATA EVALUATION CRITERIA SUMMARY

A Tier II Data Validation was performed by Trihydro Corporation's Chemical Data Evaluation Services Group on the analytical data report packages generated by Hall Environmental Analysis Laboratory of Albuquerque, New Mexico, with additional data from Pace National of Mount Juliet, Tennessee, evaluating samples from the Marathon Oil site, located in Gallup, New Mexico.

Precision, accuracy, method compliance, and completeness of this data package were assessed during this data review. Precision was determined by evaluating the calculated relative percent difference (RPD) values from:

- Field duplicate pairs
- Laboratory duplicate pairs
- Matrix spike (MS) and matrix spike duplicate (MSD) pairs
- Laboratory control sample (LCS) and laboratory control sample duplicate (LCSD) pairs

Laboratory accuracy was established by reviewing the demonstrated percent recoveries (%R) of the following items to verify that data are not biased.

- MS/MSD samples
- LCS/LCSD samples
- Organic system monitoring compounds (surrogates)



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Field accuracy was established by collecting and analyzing the following samples to monitor for possible ambient or cross contamination during sampling and transportation.

- Trip blanks
- Field blanks
- Equipment blanks

Method compliance was established by reviewing sample integrity, holding times, detection limits, surrogate recoveries, laboratory blanks, initial and continuing calibrations (where applicable), and the LCS/LCSD percent recoveries against method-specific requirements.

Completeness was evaluated by determining the overall ratio of the number of samples and analyses planned versus the number of samples with valid analyses. Determination of completeness included a review of the chain-of-custody (CoC), laboratory analytical methods, and other laboratory and field documents associated with this analytical data set.

Client Sample ID	Laboratory Sample Number
EB-6-15-22	2206866-001
OW-1	2206866-002
OW-54	2206866-003
OW-66	2206866-004
OW-55	2206866-005
OW-56	2206866-006
OW-59	2206866-007
DUP-6-15-22	2206866-008
FB-6-15-22	2206866-009
Trip Blank	2206866-010

## SAMPLE NUMBERS TABLE





The laboratory data were reviewed to evaluate compliance with the methods and the quality of the reported data. Assessment of CoC completeness is included in Item 3 of the Data Validation Checklist. A check mark ( $\checkmark$ ) indicates that the referenced validation criteria were deemed acceptable, whereas a crossed circle ( $\otimes$ ) indicates validation criteria for which the data have been qualified by the data validator. An empty circle (O) indicates that the specified criterion does not apply to the reviewed data. Details are noted in the tables below.

#### Validation Criteria

- ✓ Data Completeness
- ✓ CoC Documentation (Item 3)
- ✓ Holding Times and Preservation (Items 6 and 7)
- O Initial and Continuing Calibrations (Items 9 and 10)
- ⊗ Laboratory Blanks (Items 11 and 12)
- ⊗ MS/MSD (Items 13 and 14)
- ⊗ LCS/LCSD (Items 15 and 16)
- System Monitoring Compounds (i.e., Surrogates) (Item 17)
- 8 Field, Equipment, and Trip Blanks (Items 18 and 19)
- ⊗ Field Duplicates (Items 20 and 21)
- ✓ Laboratory Duplicates (Item 22)

#### **Guidance References**

Chemical data validation was conducted in accordance with the United States Environmental Protection Agency (USEPA) Contract Laboratory Program (CLP) National Functional Guidelines for the analyses listed below, or by the appropriate method if not covered in the National Functional Guidelines.

- Data for organic analyses were evaluated according to validation criteria set forth in the USEPA CLP National Functional Guidelines for Organic Superfund Methods Data Review, document number EPA-540-R-20-005, November 2020 with additional reference to the USEPA CLP National Functional Guidelines for Organic Data Review, document number EPA 540/R-99/008, October 1999.
- Data for inorganic analyses were evaluated according to validation criteria set forth in the USEPA CLP National Functional Guidelines for Inorganic Superfund Methods Data Review, document number EPA-540-R-20-006, November 2020 with additional reference to the USEPA CLP National Functional Guidelines for Inorganic Data Review, document number EPA 540-R-04-004, October 2004.
- Review of field duplicates was conducted according to the USEPA Region I New England Environmental Data Review Supplement for Region 1 Data Review Elements and Superfund Specific Guidance/Procedures, EQADR-Supplement2, September 2020.
- Trihydro Data Validation Variance Documentation, April 2022.



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#### **OVERALL DATA PACKAGE ASSESSMENT**

Based on a data validation review, the data are acceptable as delivered. Data qualified by the laboratory are discussed in Item 2 of the Validation Criteria Checklist.

The purpose of validating data and assigning qualifiers is to assist in proper data interpretation. Data that are not qualified meet the site data quality objectives. If values are assigned qualifiers other than an R (rejected, data not usable), the data may be used for site evaluation; however, consideration should be given to the reasons for qualification when interpreting sample concentrations. Data points that are assigned an R qualifier should not be used for site evaluation purposes.

If applicable, text was identified in **bold font** in the Validation Criteria Checklist to indicate that further action and/or qualification of the data were required. Data may have been qualified with J data flags by the laboratory if the result was greater than or equal to the method detection limit (MDL) but less than the reporting limit (RL). These laboratory-applied J flags were preserved, if present, and included in the Data Qualification Summary table at the end of this report. If applicable, data validation qualifiers were added for the items noted with crossed circles in the Validation Criteria section above. Please see the Data Qualification Summary table at the end of this report.

If data would be qualified with more than one flag, one qualifier was assigned based on the severity; however, all reasons for qualification were retained. Data that would be qualified with both J+ and J- flags were evaluated based on validation criteria and assigned the appropriate flag. The hierarchy of qualifiers from the most to least severe is as follows:

Data qualifiers used during this validation are included in the following table.

<u>Qualifier</u>	Definition
J	Estimated concentration
J+	The result is an estimated concentration, but may be biased high
UJ	Estimated reporting limit
U	Evaluated to be undetected at the reporting limit
JB	Estimated concentration due to blank contamination

#### **Data Completeness**

The analyses were performed as requested on the CoC records. The associated samples were received by the laboratory and analyzed properly unless otherwise noted in the Criteria Checklist below. The complete data package consisted of 630 data points. The data completeness calculation does not include any submitted blank sample results. Data points were not rejected. The data completeness measure for this data package is calculated to be 100% and is acceptable.



	VALIDATION CRITERIA CHECKLIST								
1. Was the report free of nor	Ν	0							
Comments: The laboratory noted the following analytical non-conformances related to this data set.									
Method 8270C: Sample OW-	59 had poor surrogate	e recoveries due to the emulsive nature	e of the sample.						
Naphthalene, 1-methylnaphtha 8270 SIM, depending which m methylnaphthalene were repor	Naphthalene, 1-methylnaphthalene and 2-methylnaphthalene may be reported by either EPA Method 8270 or EPA Method 8270 SIM, depending which method needs the least dilution. In this report naphthalene, 1-methylnaphthalene and 2-methylnaphthalene were reported by EPA Method 8270 instead of EPA Method 8270 SIM for samples OW-66 and OW-55.								
2. Were the data free of data qualification flags and/or notes used by the laboratory? No lf no, define.									
Comments: The laboratory us	ed the following data	qualification flags with this data set.							
D – Sample diluted due to mat	trix.								
J – Analyte detected below qu	antitation limits.								
J6 – The sample matrix interfe	ered with the ability to	make any accurate determination; spil	ke value is low.						
P1 – RPD value not applicable	e for sample concentra	ations less than 5 times the reporting li	mit.						
R – RPD value outside of rang	je.								
S – % Recovery outside of rar	nge due to dilution or i	matrix interference.							
* – Value exceeds maximum of	contaminant level.								
3. Were sample CoC forms	and custody procedur	res complete?	Ye	es					
Comments: The CoC records	from field to laborato	ny were complete, and custody was m	pintained as evider	nced by field					
and laboratory personnel signa were transferred to a laborator maintained at all times.	atures, dates, and tim y field courier service	es of receipt. Custody seals were not for transport from the field to the labo	present because t ratory, and custod	the samples y was					
4. Were detection limits in a	ccordance with the qu	ality assurance project plan (QAPP),	Ye	es					
Comments: The detection lim	its appeared to be ac	ceptable. The following dilutions were	applied.						
Method	Sample(s)	Analyte(s)	Dilution Factor	1					
200.7	OW-66	Total and Dissolved Barium	5	-					
200.7	OW-59	Total Metals	5	-					
200.8	Multiple Samples	Select Total and Dissolved Metals	5	-					
8015D	OW-54	TPH GRO	5						
8260B	OW-54	VOCs	5	1					
200.8	OW-59	Total Metals	10						
8015D OW-66, OW-55 TPH DRO and TPH MRO 10									
8260B EB-6-15-22 Methylene Chloride 10									
8015D OW-66, OW-55 TPH GRO 50									
8260B OW-54 MTBE 50									
8260B	OW-66, OW-55	Select VOCs	50						
8260B	OW-66	Benzene, Toluene	500	_					
8260B	OW-55	Benzene	500						



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VALIDATION CRITERIA CHECKLIST						
5. Were the reported analytical methods and constituents in compliance with the QAPP, permit, or CoC?	No					
Comments: The reported analytical methods were in compliance with the CoC, and the laborator constituents in accordance with the CoC, with the following exceptions.	ry reported the requested					
The CoC requested total and dissolved metals using Method 200.7; however, the laboratory anal both Method 200.7 and Method 200.8. This substituted analytical method, Method 200.8, met sin and precision goals and, therefore, was an acceptable replacement.	lyzed the samples using milar sensitivity, accuracy,					
The CoC requested cyanide using Method 335.4; however, the laboratory analyzed the samples using Method 4500 CN E. This substituted analytical method met similar sensitivity, accuracy, and precision goals and, therefore, was an acceptable replacement.						
6. Were samples received in good condition within method-specified requirements?	No					
Comments: Samples were received on ice, in good condition, and with the cooler temperatures both within and outside the recommended temperature range of $4^{\circ}C \pm 2^{\circ}C$ between $1.5^{\circ}C$ and $5.1^{\circ}C$ as noted on the CoC and the <i>Sample Log-in Check List</i> . Samples transferred to Pace National were received in good condition with the cooler temperature below the recommended range at $1.8^{\circ}C$ as noted on the CoC. The cooler temperatures below $2.0^{\circ}C$ were judged as acceptable since the laboratory did not report the sample containers as broken or frozen.						
7. Were samples extracted/digested and analyzed within method-specified or technical holding times?	Yes					
Comments: The samples were extracted/digested and analyzed within method-specific holding t	imes.					
8. Were reported units appropriate for the sample matrix/matrices and analytical method(s)? Specify if wet or dry units were used for soil.	Yes					
Comments: The results were reported in concentration units of micrograms per liter ( $\mu$ g/L) and m which were acceptable for the sample matrix and the analyses requested.	nilligrams per liter (mg/L),					
9. Did the laboratory provide any specific initial and/or continuing calibration results?	No					
Comments: Initial and continuing calibration data were not included as part of this data set.						
10. If initial and/or continuing calibration results were provided, were the results within acceptable limits?	N/A					
Comments: Initial and continuing calibration data were not included as part of this data set.						
11. Was the total number of laboratory blank samples prepared equal to at least 5% of the total number of samples or analyzed as required by the method?	Yes					
Comments: The total number of laboratory blank samples prepared was equal to at least 5% of t samples.	the total number of					
12. Were target analytes reported as not detected in the laboratory blanks?	No					
Comments: Target analytes were reported as not detected in the laboratory blanks, with the follow	owing exception.					
TPH DRO was detected in the laboratory blank for Method 8015D batch 68185 at a concent The samples EB-6-15-22 and OW-1 TPH DRO results detected below the laboratory reporti with U flags. Non-detections of this analyte in the associated samples and results greater than a concentration did not require qualification.	tration of 0.018 mg/L. ng limit were qualified ten times the blank					



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## VALIDATION CRITERIA CHECKLIST

13. Was the total number of MS samples prepared equal to at least 5% of the total number of samples or analyzed as required by the method?

Yes

Comments: The total number of matrix spike samples prepared was equal to at least 5% of the total number of samples, although MS samples were not prepared/reported for all analyses and/or batches. The matrix spike sample source for each analytical batch in this sample set has been indicated below.

Method	<u>Analytes</u>	<u>Batch</u>	MS Sample Source
200.7	Total Metals	68172	Not Prepared
200.7	Dissolved Metals	B88897	EB-6-15-22
200.8	Total Metals	68172	DUP-6-15-22
200.8	Dissolved Metals	B88918	Not Prepared
200.8	Dissolved Metals	D88918	Not Prepared
245.1	Total and Dissolved Mercury	68219	Not Prepared
504.1	EDB	68190	Trip Blank
4500CN E	Cyanide	WG1884563	Not Associated, EB-6-15-22
4500CN E	Cyanide	WG1885513	Not Associated
8015D	TPH DRO and MRO	68185	Not Prepared
8015D	TPH GRO	G88994	Not Prepared
8260B	VOCs	R89027	EB-6-15-22
8260B	VOCs	W89041	Not Prepared
8270C and 8270C SIM	SVOCs	68202	Not Prepared
8270C and 8270C SIM	SVOCs	68218	Not Prepared

Not Associated – The MS sample source was not associated with this project.

Not Prepared - Matrix spikes were not prepared/reported for this batch.

14. For MS/MSDs prepared from project samples, were percent recoveries and RPDs within data validation or laboratory quality control (QC) limits?

No

Comments: The percent recoveries and RPDs for MS/MSDs prepared from project samples were within data validation and laboratory QC limits, with the following exceptions.

The MSD recovery for total selenium in Method 200.8 batch 68172 was outside the QC limits of 75-125% at 127%. Detections in the associated samples were qualified as J+ due to potential high bias. Non-detections in the associated samples did not require qualification due to this non-conformance.

The MS/MSD RPD value for EDB in Method 504.1 batch 68190 was outside the QC limit of 20% at 22.9%. EDB was not detected in the associated samples. These EDB results were qualified as UJ due to evidence of poor precision.

The percent recoveries and RPD values for MS/MSDs prepared from non-project samples were evaluated and considered, but data were not qualified based on those results since matrix similarity to project samples could not be guaranteed.

15. Was the total number of LCSs analyzed equal to at least 5% of the total number of Yes samples or analyzed as required by the method?

Comments: The total number of LCS samples analyzed was equal to at least 5% of the total number of samples.



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	VALIDATION CRITERIA CHECKLIST								
16. Were LCS laboratory	16. Were LCS/LCSD percent recoveries and LCS/LCSD RPDs within data validation or     1aboratory QC limits?								
Comments: T limits, with the	Comments: The LCS and LCSD percent recoveries and LCS/LCSD RPDs were within data validation and laboratory QC limits, with the following exceptions.								
<u>Method</u>	Analyte	<u>Batch</u>	LCS Recovery	<u>LCSD</u> <u>Recovery</u>	LCS/LCSD QC Limits	LCS/LCSD RPD	RPD QC Limits		
200.7	Total Barium	68172	137%		70-130%				
8015D	TPH DRO	68185	92.4%	90.2%	31.7-75.4%	Acceptable	20%		
8270C	1,4-Dichlorobenzene	68202	Acceptable	Acceptable	15-89.8%	47.0%	39.6%		
8270C	Phenol	68202	Acceptable	Acceptable	17-61.1%	52.4%	42.5%		
8270C	Pyrene	68202	Acceptable	Acceptable	61-123%	28.9%	11.8%		
8270C SIM	1-Methylnaphthalene	68218	82.0%	Acceptable	22.2-80.3%	Acceptable	25%		
8270C SIM	2-Methylnaphthalene	68218	85.0%	Acceptable	20.6-80.1%	Acceptable	25%		
8270C SIM	Fluorene	68218	93.0%	88.0%	33.3-86%	Acceptable	26.4%		
8270C SIM	Phenanthrene	68218	94.0%	Acceptable	38.2-93.9%	Acceptable	27.9%		
8270C SIM	Anthracene	68218	127%	102%	41.1-95.6%	Acceptable	25.6%		
8270C SIM	Fluoranthene	68218	158%	Acceptable	52.9-123%	Acceptable	22.8%		
8270C SIM	Benzo(a)anthracene	68218	170%	Acceptable	51-147%	33.1%	24.1%		
8270C SIM	Benzo(b)fluoranthene	68218	Acceptable	Acceptable	44.4-136%	28.6%	24.5%		
8270C SIM	Indeno(1,2,3-cd)pyrene	68218	Acceptable	166%	31.4-165%	59.4%	21.1%		

Analytes with LCS and/or LCSD recoveries greater than the laboratory or data validation QC limits were detected in the associated samples, and the results were qualified as J+ to indicate estimated concentrations that may be biased high. Non-detections of these analytes in the associated samples did not require qualification.

The analytes with LCS/LCSD RPD values that were above the QC limit were qualified as J for detections and UJ for non-detections for the associated samples due to evidence of poor precision.

17. Were surrogate recoveries within laboratory QC limits?

No

Comments: Surrogate recoveries were within laboratory QC limits, with the following exceptions.

Method	<u>Surrogate</u>	<u>Sample</u>	<u>Surrogate</u> <u>Recovery</u>	QC Limits
8270C SIM	4-Terphenyl-d <sub>14</sub>	OW-54	70.2%	72.3-147%
8270C	2-Fluorophenol	OW-66	0%	29.4-87.7%
8270C SIM	4-Terphenyl-d <sub>14</sub>	OW-66	71.3%	72.3-147%
8270C SIM	4-Terphenyl-d <sub>14</sub>	OW-55	71.4%	72.3-147%
8015D	BFB	OW-56	1,240%	70-130%
8270C SIM	4-Terphenyl-d <sub>14</sub>	OW-56	71.9%	72.3-147%
8015D	BFB	OW-59	6,400%	70-130%
8270C	2-Fluorophenol	OW-59	27.8%	29.4-87.7%
8270C	2,4,6-Tribromophenol	OW-59	12.1%	18.6-129%

Since Method 8270C and Method 8270C SIM surrogate associations were not available from the laboratory, qualification was assigned to all of the target analytes in a given fraction (acid or base/neutral) when two or more surrogates from the same fraction (acid or base/neutral) were outside the acceptance range. This condition did not exist for the samples OW-54, OW-66, OW-55, and OW-56, and qualification of sample data was not required.



#### VALIDATION CRITERIA CHECKLIST

The associated target analytes in sample OW-59 with surrogate recoveries that were less than the lower laboratory QC limits were not detected in sample OW-59, and these results were qualified as UJ due to evidence of potential low bias.

TPH GRO was detected in samples OW-56 and OW-59, and these TPH GRO results were qualified as J+ due to evidence of potential high bias.

The TPH DRO and TPH MRO results for samples OW-66 and OW-55 were not qualified based on the surrogate nonconformances in the Method 8015D analyses since the applied dilutions of 10 times resulted in surrogate concentrations below routinely calibrated levels, and those results were deemed unreliable and possibly inaccurate.

Qualification of sample data was not required based on surrogate non-conformances in QC samples as the environmental samples were evaluated based on their specific surrogate recoveries.

Were the number of trip blank, field blank, and/or equipment blank samples
 Yes collected equal to at least 10% of the total number of samples or as required by the project guidelines, QAPP, SAP, or permit?

Comments: The number of trip, field, and equipment blanks collected was equal to at least 10% of the number of samples. One trip blank sample, Trip Blank, one field blank sample FB-6-15-22, and one equipment blank sample, EB 6-15-22, were collected as part of this sample set.

19. Were target analytes reported as not detected in the trip blank, field blank, and/or No equipment blank samples?

Comments: Target analytes were not detected in the trip blank, field blank, and equipment blank samples with the following exceptions.

Blank Sample ID	<u>Method</u>	<u>Analyte</u>	Concentration
FB-6-15-22	8260B	Acetone	4.2 μg/L
EB-6-15-22	8260B	Acetone	3.4 µg/L
EB-6-15-22	8260B	Methylene Chloride	8.5 μg/L
EB-6-15-22	8015	TPH DRO	0.019 mg/L
EB-6-15-22	200.7	Dissolved Zinc	0.0054 mg/L

Detections of acetone and dissolved zinc in the associated samples that were less than the blank results and/or less than the applicable reporting limits were assigned U qualifiers. Detections of dissolved zinc in the associated samples that were greater than the reporting limits but less than 10 times the blank results were assigned JB qualifiers. Non-detections of the identified analytes in the associated samples did not require qualification.

The TPH DRO results in batch 68185 were previously qualified due to laboratory blank contamination; therefore, additional qualification due to the equipment blank contamination was not required.

20. Was the number of field duplicates collected equal to at least 10% of the total Yes number of samples or as required by the project guidelines, QAPP, SAP, or permit?

Comments: The number of field duplicates collected was equal to at least 10% of the number of samples. Sample DUP-6-15-22 was collected as a field duplicate of sample OW-01.

21. Were field duplicate RPD values within data validation QC limits (soil 0-50%, water 0-30%, or air 0-25%)?

Comments: As indicated in the Field Duplicate Summary Table at the end of this report, field duplicate RPD values were within data validation QC limits of 0-30% for water samples, with the following exception.

The RPD value for dissolved zinc exceeded the data validation limit of 30% at 82.4%, which was evidence of poor precision. The dissolved zinc results were qualified as J for samples OW-1 and DUP-6-15-22.



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No

	VA	LIDATION CRI	TERIA CHECK	LIST				
22. For laboratory duplicates prepared from project samples, were RPDs within N/A laboratory QC limits?								
Comments: Laboratory duplicates were prepared for these analyses, and the laboratory duplicate sample sources are summarized in the following table.								
	Method Ana	<u>ytes</u> <u>Bate</u>	ch Lat	ooratory Duplicate Sample Source				
	4500CN E Cya	nide WG188	34563	Not Associated				
	4500CN E Cya	nide WG188	35513	Not Associated				
The RPD values for the I but data were not qualifie	aboratory duplicate s ed based on these re	amples prepare sults since matr	ed from non-proj ix similarity to p	ect samples were ev roject samples could	valuated and considered, not be guaranteed.			
<ul> <li>Were the following c</li> <li>Target analytes EPH/8270)?</li> </ul>	ata relationships rea	nstic? ore than one me	ethod (e.g., 8260	)/8270,	N/A			
Both total and d results were gre Comments: The followin	issolved metals anal eater than or equal to g table contains the	yses were perfo the dissolved n exceptions in wl	ormed, and the t netals results? hich the dissolve	otal metals ed metals results exc	No ceeded the total metals			
results. The EPA has no metals results that excee based on these data.	t provided guidance d the corresponding	or requirements total metals res	for the evaluati ults. Therefore	on, validation, and q , qualification of resu	ualification of dissolved Its was not performed			
	Sample ID	<u>Analyte</u>	<u>Total Result</u> (mg/L)	Dissolved Result (mg/L)				
	OW-56	Selenium	ND	0.00068				
	OW-59	Selenium	ND	0.0018				
	OW-54	Silver	ND	0.0013				
	OW-55	Silver	ND	0.0018				
	OW-56	Silver	ND	0.0017				
	OW-59	Silver	ND	0.0050				
	OW-59	Vanadium	ND	0.0052				
	EB-6-15-22	Zinc	ND	0.0054				
	OW-1	Zinc	ND	0.048				
	OW-66	Zinc	0.013	0.016				
	OW-55	Zinc	0.022	0.048				
	OW-56	Zinc	0.0066	0.011				
	OW-59	Zinc	ND	0.0062				



DUP-6-15-22

Zinc

ND

0.020

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Client Sample ID: OW-1 Field Duplicate Sample ID: DUP-6-15-22							
Analyte	Method	Laboratory Result	Duplicate Result	Relative Percent Difference (RPD)			
Barium, Dissolved	E 200.7	0.037 mg/L	0.037 mg/L	0.0%			
Barium, Total	E 200.7	0.044 mg/L	0.045 mg/L	2.2%			
Chromium, Total	E 200.7	0.0045 mg/L	0.0044 mg/L	2.2% +/-RL			
Vanadium, Dissolved	E 200.7	0.039 mg/L	0.038 mg/L	2.6% +/-RL			
Vanadium, Total	E 200.7	0.043 mg/L	0.045 mg/L	4.5% +/-RL			
Zinc, Dissolved	E 200.7	0.048 mg/L	0.020 mg/L	82.4%			
Arsenic, Dissolved	E200.8	0.00070 mg/L	0.00066 mg/L	5.9% +/-RL			
Arsenic, Total	E200.8	0.00078 mg/L	0.00074 mg/L	5.3% +/-RL			
Lead, Total	E200.8	0.00025 mg/L	0.00024 mg/L	4.1% +/-RL			
Selenium, Dissolved	E200.8	0.0021 mg/L	0.0021 mg/L	0.0%			
Selenium, Total	E200.8	0.0026 mg/L	0.0023 mg/L	12.2%			
TPH DRO	SW8015	0.027 mg/L	ND (0.064 mg/L)	DL			
MTBE	SW8260B	1.9 µg/L	2.2 µg/L	14.6%			
1,4-Dioxane	SW8270C	0.26 µg/L	0.22 µg/L	16.7% +/-RL			

#### FIELD DUPLICATE SUMMARY

Field duplicate RPD control limits are not to exceed 30% for water as established by USEPA Region I - New England Environmental Data Review Supplement for Region 1 Data Review Elements and Superfund Specific Guidance/Procedures, EQADR-Supplement2, September 2020.

DL – Indicates that the analyte was detected in one of the duplicate samples and was undetected in the other sample, and therefore an RPD could not be calculated. Data were not qualified since the detection was within two times the reporting limit. Non-detected results are indicated above with the applicable reporting limit as ND (RL).

+/-RL – Indicates that the detections in both of the samples were within two times the reporting limit. Qualification of data was not required.

The RPD value for dissolved zinc exceeded the data validation limit of 30% at 82.4%, which was evidence of poor precision. The dissolved zinc results were qualified as J for samples OW-1 and DUP-6-15-22.



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## DATA QUALIFICATION SUMMARY

Abbreviation	Reason
EBD	Equipment blank detection
ERPD-FD	High field duplicate RPD.
ERPD-LCS	The LCS/LCSD RPD exceeded the upper acceptable limit indicating poor precision.
ERPD-MS	The MS/MSD RPD exceeded the upper acceptable limit indicating poor precision.
FBD	Field blank detection
HR-LCS	The LCS and/or LCSD percent recovery was greater than the upper acceptable limit indicating a possible high bias.
HR-MS	The MS and/or MSD percent recovery was greater than the upper acceptable limit indicating possible matrix interference.
HR-SUR	The surrogate percent recovery was greater than the upper acceptable limit indicating a possible high bias.
LR-SUR	The surrogate percent recovery was less than the lower acceptable limit indicating a possible low bias.
MBD	Method blank detection
MDLRL	Flagged by the laboratory: The result was greater than the MDL but less than the RL.

Analyte	Method	Field Sample ID	Lab Sample ID	Result	Limit	Units	Reviewer Qualifier	DV Flag Reasons
1,1-Dichloroethane	SW8260B	OW-56	2206866-006a	0.35	1.0	µg/L	J	MDLRL
1,2,4-Trimethylbenzene	SW8260B	OW-54	2206866-003a	2.4	5.0	µg/L	J	MDLRL
1,2,4-Trimethylbenzene	SW8260B	OW-56	2206866-006a	0.23	1.0	µg/L	J	MDLRL
1,2,4-Trimethylbenzene	SW8260B	OW-59	2206866-007a	0.19	1.0	µg/L	J	MDLRL
1,2-Dibromoethane	E504.1	EB-6-15-22	2206866-001B	ND	0.0093	µg/L	UJ	ERPD-MS
1,2-Dibromoethane	E504.1	OW-1	2206866-002B	ND	0.0094	µg/L	UJ	ERPD-MS
1,2-Dibromoethane	E504.1	OW-54	2206866-003B	ND	0.0093	µg/L	UJ	ERPD-MS
1,2-Dibromoethane	E504.1	OW-66	2206866-004B	ND	0.0094	µg/L	UJ	ERPD-MS
1,2-Dibromoethane	E504.1	OW-55	2206866-005B	ND	0.0094	µg/L	UJ	ERPD-MS
1,2-Dibromoethane	E504.1	OW-56	2206866-006B	ND	0.0094	µg/L	UJ	ERPD-MS
1,2-Dibromoethane	E504.1	OW-59	2206866-007B	ND	0.0094	µg/L	UJ	ERPD-MS



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Analyte	Method	Field Sample ID	Lab Sample ID	Result	Limit	Units	Reviewer Qualifier	DV Flag Reasons
1,2-Dibromoethane	E504.1	DUP-6-15-22	2206866-008B	ND	0.0095	µg/L	UJ	ERPD-MS
1,2-Dibromoethane	E504.1	Trip Blank	2206866-010B	ND	0.0093	µg/L	UJ	ERPD-MS
1,4-Dichlorobenzene	SW8270C	EB-6-15-22	2206866-001c	ND	5.0	µg/L	UJ	ERPD-LCS
1,4-Dichlorobenzene	SW8270C	OW-1	2206866-002c	ND	5.0	µg/L	UJ	ERPD-LCS
1,4-Dichlorobenzene	SW8270C	OW-54	2206866-003c	ND	5.0	µg/L	UJ	ERPD-LCS
1,4-Dichlorobenzene	SW8270C	OW-66	2206866-004c	ND	5.0	µg/L	UJ	ERPD-LCS
1,4-Dichlorobenzene	SW8270C	OW-55	2206866-005c	ND	5.0	µg/L	UJ	ERPD-LCS
1,4-Dichlorobenzene	SW8270C	OW-56	2206866-006c	ND	5.0	µg/L	UJ	ERPD-LCS
1,4-Dioxane	SW8270C	OW-1	2206866-002c	0.26	1.0	µg/L	J	MDLRL
1,4-Dioxane	SW8270C	DUP-6-15-22	2206866-008c	0.22	1.0	µg/L	J	MDLRL
1-Methylnaphthalene	SW8270C	OW-54	2206866-003c	0.24	0.30	µg/L	J	MDLRL
2,4,6-Trichlorophenol	SW8270C	OW-59	2206866-007c	ND	10	µg/L	UJ	LR-SUR
2,4-Dimethylphenol	SW8270C	OW-59	2206866-007c	ND	10	µg/L	UJ	LR-SUR
2,4-Dinitrophenol	SW8270C	OW-59	2206866-007c	ND	20	µg/L	UJ	LR-SUR
2-Methylphenol	SW8270C	OW-59	2206866-007c	ND	10	µg/L	UJ	LR-SUR
3,4-Methylphenol	SW8270C	OW-59	2206866-007c	ND	10	µg/L	UJ	LR-SUR
Acenaphthene	SW8270C	OW-66	2206866-004C	0.28	0.3	µg/L	J	MDLRL
Acetone	SW8260B	EB-6-15-22	2206866-001a	3.4	10	µg/L	U	FBD, MDLRL
Acetone	SW8260B	OW-55	2206866-005a	180	500	µg/L	U	FBD, MDLRL
Acetone	SW8260B	OW-56	2206866-006a	5.3	10	µg/L	U	FBD, MDLRL
Acetone	SW8260B	OW-59	2206866-007a	2.9	10	µg/L	U	FBD, MDLRL
Acetone	SW8260B	FB-6-15-22	2206866-009a	4.2	10	µg/L	J	MDLRL
Arsenic, Dissolved	E200.8	OW-1	2206866-002E	0.00070	0.0010	mg/L	J	MDLRL
Arsenic, Dissolved	E200.8	OW-59	2206866-007E	0.0043	0.0050	mg/L	J	MDLRL
Arsenic, Dissolved	E200.8	DUP-6-15-22	2206866-008E	0.00066	0.0010	mg/L	J	MDLRL
Arsenic, Total	E200.8	OW-1	2206866-002D	0.00078	0.0010	mg/L	J	MDLRL
Arsenic, Total	E200.8	OW-56	2206866-006D	0.0042	0.0050	mg/L	J	MDLRL



Analyte	Method	Field Sample ID	Lab Sample ID	Result	Limit	Units	Reviewer Qualifier	DV Flag Reasons
Arsenic, Total	E200.8	OW-59	2206866-007D	0.0059	0.010	mg/L	J	MDLRL
Arsenic, Total	E200.8	DUP-6-15-22	2206866-008D	0.00074	0.0010	mg/L	J	MDLRL
Barium, Total	E 200.7	OW-1	2206866-002D	0.044	0.0030	mg/L	J+	HR-LCS
Barium, Total	E 200.7	OW-54	2206866-003D	0.47	0.0030	mg/L	J+	HR-LCS
Barium, Total	E 200.7	OW-66	2206866-004D	2.0	0.015	mg/L	J+	HR-LCS
Barium, Total	E 200.7	OW-55	2206866-005D	0.74	0.0030	mg/L	J+	HR-LCS
Barium, Total	E 200.7	OW-56	2206866-006D	0.46	0.0030	mg/L	J+	HR-LCS
Barium, Total	E 200.7	OW-59	2206866-007D	0.092	0.015	mg/L	J+	HR-LCS
Barium, Total	E 200.7	DUP-6-15-22	2206866-008D	0.045	0.0030	mg/L	J+	HR-LCS
Benzo(a)anthracene	SW8270C	OW-59	2206866-007c	ND	0.30	µg/L	UJ	ERPD-LCS
Benzo(a)anthracene	SW8270C	DUP-6-15-22	2206866-008c	ND	0.30	µg/L	UJ	ERPD-LCS
Benzo(b)fluoranthene	SW8270C	OW-59	2206866-007c	ND	0.30	µg/L	UJ	ERPD-LCS
Benzo(b)fluoranthene	SW8270C	DUP-6-15-22	2206866-008c	ND	0.30	µg/L	UJ	ERPD-LCS
Benzoic Acid	SW8270C	OW-59	2206866-007c	ND	20	µg/L	UJ	LR-SUR
Chloromethane	SW8260B	OW-56	2206866-006a	0.93	3.0	µg/L	J	MDLRL
Chromium, Total	E 200.7	OW-1	2206866-002D	0.0045	0.0060	mg/L	J	MDLRL
Chromium, Total	E 200.7	OW-54	2206866-003D	0.0059	0.0060	mg/L	J	MDLRL
Chromium, Total	E 200.7	DUP-6-15-22	2206866-008D	0.0044	0.0060	mg/L	J	MDLRL
Cobalt, Dissolved	E 200.7	OW-66	2206866-004E	0.0033	0.0060	mg/L	J	MDLRL
Cobalt, Total	E 200.7	OW-56	2206866-006D	0.0047	0.0060	mg/L	J	MDLRL
Indeno(1,2,3-cd)pyrene	SW8270C	OW-59	2206866-007c	ND	0.30	µg/L	UJ	ERPD-LCS
Indeno(1,2,3-cd)pyrene	SW8270C	DUP-6-15-22	2206866-008c	ND	0.30	µg/L	UJ	ERPD-LCS
Isopropylbenzene	SW8260B	OW-66	2206866-004a	17	50	µg/L	J	MDLRL
Isopropylbenzene	SW8260B	OW-55	2206866-005a	26	50	µg/L	J	MDLRL
Isopropylbenzene	SW8260B	OW-56	2206866-006a	0.76	1.0	µg/L	J	MDLRL
Isopropylbenzene	SW8260B	OW-59	2206866-007a	0.38	1.0	µg/L	J	MDLRL
Lead, Dissolved	E200.8	OW-66	2206866-004E	0.00032	0.00050	mg/L	J	MDLRL



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Analyte	Method	Field Sample ID	Lab Sample ID	Result	Limit	Units	Reviewer Qualifier	DV Flag Reasons
Lead, Dissolved	E200.8	OW-55	2206866-005E	0.000059	0.00050	mg/L	J	MDLRL
Lead, Dissolved	E200.8	OW-56	2206866-006E	0.00025	0.00050	mg/L	J	MDLRL
Lead, Total	E200.8	OW-1	2206866-002D	0.00025	0.00050	mg/L	J	MDLRL
Lead, Total	E200.8	OW-59	2206866-007D	0.0016	0.0050	mg/L	J	MDLRL
Lead, Total	E200.8	DUP-6-15-22	2206866-008D	0.00024	0.00050	mg/L	J	MDLRL
Methylene Chloride	SW8260B	EB-6-15-22	2206866-001a	8.5	30	µg/L	J	MDLRL
Naphthalene	SW8270C	OW-54	2206866-003c	0.20	0.30	µg/L	J	MDLRL
n-Butylbenzene	SW8260B	OW-66	2206866-004a	16	150	µg/L	J	MDLRL
Nickel, Total	E 200.7	OW-59	2206866-007D	0.037	0.050	mg/L	J	MDLRL
n-Propylbenzene	SW8260B	OW-55	2206866-005a	50	50	µg/L	J	MDLRL
Phenol	SW8270C	OW-59	2206866-007c	ND	20	µg/L	UJ	LR-SUR
Phenol	SW8270C	OW-66	2206866-004c	32	20	µg/L	J	ERPD-LCS
Phenol	SW8270C	OW-55	2206866-005c	24	20	µg/L	J	ERPD-LCS
Phenol	SW8270C	EB-6-15-22	2206866-001c	ND	20	µg/L	UJ	ERPD-LCS
Phenol	SW8270C	OW-1	2206866-002c	ND	20	µg/L	UJ	ERPD-LCS
Phenol	SW8270C	OW-54	2206866-003c	ND	20	µg/L	UJ	ERPD-LCS
Phenol	SW8270C	OW-56	2206866-006c	ND	20	µg/L	UJ	ERPD-LCS
p-Isopropyltoluene	SW8260B	OW-66	2206866-004a	12	50	µg/L	J	MDLRL
Pyrene	SW8270C	EB-6-15-22	2206866-001c	ND	1.0	µg/L	UJ	ERPD-LCS
Pyrene	SW8270C	OW-1	2206866-002c	ND	1.0	µg/L	UJ	ERPD-LCS
Pyrene	SW8270C	OW-54	2206866-003c	ND	1.0	µg/L	UJ	ERPD-LCS
Pyrene	SW8270C	OW-66	2206866-004C	ND	1.0	µg/L	UJ	ERPD-LCS
Pyrene	SW8270C	OW-55	2206866-005C	ND	1.0	µg/L	UJ	ERPD-LCS
Pyrene	SW8270C	OW-56	2206866-006c	ND	1.0	µg/L	UJ	ERPD-LCS
sec-Butylbenzene	SW8260B	OW-56	2206866-006a	0.16	1.0	µg/L	J	MDLRL
Selenium, Dissolved	E200.8	OW-66	2206866-004E	0.00038	0.0010	mg/L	J	MDLRL
Selenium, Dissolved	E200.8	OW-56	2206866-006E	0.00068	0.0010	mg/L	J	MDLRL



Analyte	Method	Field Sample ID	Lab Sample ID	Result	Limit	Units	Reviewer Qualifier	DV Flag Reasons
Selenium, Dissolved	E200.8	OW-59	2206866-007E	0.0018	0.0050	mg/L	J	MDLRL
Selenium, Total	E200.8	OW-1	2206866-002D	0.0026	0.0010	mg/L	J+	HR-MS
Selenium, Total	E200.8	DUP-6-15-22	2206866-008D	0.0023	0.0010	mg/L	J+	HR-MS
Selenium, Total	E200.8	OW-66	2206866-004D	0.0020	0.0050	mg/L	J+	HR-MS, MDLRL
Silver, Dissolved	E 200.7	OW-54	2206866-003E	0.0013	0.0050	mg/L	J	MDLRL
Silver, Dissolved	E 200.7	OW-55	2206866-005E	0.0018	0.0050	mg/L	J	MDLRL
Silver, Dissolved	E 200.7	OW-56	2206866-006E	0.0017	0.0050	mg/L	J	MDLRL
Silver, Dissolved	E 200.7	OW-59	2206866-007E	0.0050	0.0050	mg/L	J	MDLRL
Styrene	SW8260B	OW-55	2206866-005a	9.3	50	µg/L	J	MDLRL
TPH DRO	SW8015	OW-54	2206866-003C	2.2	0.064	mg/L	J+	HR-LCS
TPH DRO	SW8015	OW-66	2206866-004C	5.1	0.64	mg/L	J+	HR-LCS
TPH DRO	SW8015	OW-55	2206866-005C	3.9	0.64	mg/L	J+	HR-LCS
TPH DRO	SW8015	OW-56	2206866-006C	1.1	0.064	mg/L	J+	HR-LCS
TPH DRO	SW8015	OW-59	2206866-007C	0.58	0.064	mg/L	J+	HR-LCS
TPH DRO	SW8015	EB-6-15-22	2206866-001C	0.019	0.064	mg/L	U	HR-LCS, MBD, MDLRL
TPH DRO	SW8015	OW-1	2206866-002C	0.027	0.064	mg/L	U	HR-LCS, MBD, MDLRL
TPH GRO	SW8015	OW-56	2206866-006a	0.45	0.050	mg/L	J+	HR-SUR
TPH GRO	SW8015	OW-59	2206866-007a	0.35	0.050	mg/L	J+	HR-SUR
TPH ORO	SW8015	OW-56	2206866-006C	0.064	0.080	mg/L	J	MDLRL
Vanadium, Dissolved	E 200.7	OW-1	2206866-002E	0.039	0.050	mg/L	J	MDLRL
Vanadium, Dissolved	E 200.7	OW-66	2206866-004E	0.0022	0.050	mg/L	J	MDLRL
Vanadium, Dissolved	E 200.7	OW-55	2206866-005E	0.0032	0.050	mg/L	J	MDLRL
Vanadium, Dissolved	E 200.7	OW-56	2206866-006E	0.0018	0.050	mg/L	J	MDLRL
Vanadium, Dissolved	E 200.7	OW-59	2206866-007E	0.0052	0.050	mg/L	J	MDLRL
Vanadium, Dissolved	E 200.7	DUP-6-15-22	2206866-008E	0.038	0.050	mg/L	J	MDLRL
Vanadium, Total	E 200.7	OW-1	2206866-002D	0.043	0.050	mg/L	J	MDLRL
Vanadium, Total	E 200.7	OW-54	2206866-003D	0.016	0.050	mg/L	J	MDLRL



Analyte	Method	Field Sample ID	Lab Sample ID	Result	Limit	Units	Reviewer Qualifier	DV Flag Reasons
Vanadium, Total	E 200.7	OW-66	2206866-004D	0.026	0.050	mg/L	J	MDLRL
Vanadium, Total	E 200.7	OW-55	2206866-005D	0.020	0.050	mg/L	J	MDLRL
Vanadium, Total	E 200.7	OW-56	2206866-006D	0.0063	0.050	mg/L	J	MDLRL
Vanadium, Total	E 200.7	DUP-6-15-22	2206866-008D	0.045	0.050	mg/L	J	MDLRL
Xylenes, Total	SW8260B	OW-54	2206866-003a	2.2	7.5	µg/L	J	MDLRL
Zinc, Dissolved	E 200.7	OW-54	2206866-003E	0.012	0.010	mg/L	JB	EBD
Zinc, Dissolved	E 200.7	OW-66	2206866-004E	0.016	0.010	mg/L	JB	EBD
Zinc, Dissolved	E 200.7	OW-55	2206866-005E	0.048	0.010	mg/L	JB	EBD
Zinc, Dissolved	E 200.7	OW-56	2206866-006E	0.011	0.010	mg/L	JB	EBD
Zinc, Dissolved	E 200.7	OW-1	2206866-002E	0.048	0.010	mg/L	JB	EBD, ERPD-FD
Zinc, Dissolved	E 200.7	DUP-6-15-22	2206866-008E	0.020	0.010	mg/L	JB	EBD, ERPD-FD
Zinc, Dissolved	E 200.7	OW-59	2206866-007E	0.0062	0.010	mg/L	U	EBD, MDLRL
Zinc, Dissolved	E 200.7	EB-6-15-22	2206866-001E	0.0054	0.010	mg/L	J	MDLRL
Zinc, Total	E 200.7	OW-56	2206866-006D	0.0066	0.010	mg/L	J	MDLRL



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Client: Marathon Oil	Laboratory: Hall Environmental Analysis Laboratory
Project Name: Western Refining Southwest, Q2 GW Sampling	Sample Matrix: Aqueous
Project Number: 697-080-002 Task: 0006	Sample Start Date: 06/15/2022
Date Validated: 09/22/2022	Sample End Date: 06/16/2022
Parameters Included:	
<ul> <li>Volatile Organic Compounds (VOCs) by Environmental P Waste (SW-846) Method 8260B</li> </ul>	rotection Agency (EPA) Test Methods for Evaluating Solid
<ul> <li>1,2-Dibromoethane (EDB) by EPA Method 504.1</li> </ul>	
<ul> <li>Semivolatile Organic Compounds (SVOCs) by SW-846 M Monitoring (SIM)</li> </ul>	lethod 8270C and Method 8270C with Selected Ion
<ul> <li>Total Petroleum Hydrocarbons (TPH) Gasoline Range Or</li> </ul>	ganics (GRO) by SW-846 Method 8015D
<ul> <li>TPH Diesel Range Organics (DRO) and Motor Oil Range</li> </ul>	Organics (MRO) by SW-846 Method 8015D Modified
<ul> <li>Total and Dissolved Metals by EPA Method 200.7 and Method</li> </ul>	ethod 200.8
<ul> <li>Total and Dissolved Mercury by EPA Method 245.1</li> </ul>	
<ul> <li>Cyanide by Standard Methods for the Examination of Wa</li> </ul>	ter and Wastewater (SM) Method 4500 CN E
Laboratory Project ID: 2206938	
Data Validator: Daran O'Hollearn, Lead Project Scientist	
Reviewer: Mike Phillips, Senior Chemist	

#### DATA EVALUATION CRITERIA SUMMARY

A Tier II Data Validation was performed by Trihydro Corporation's Chemical Data Evaluation Services Group on the analytical data report packages generated by Hall Environmental Analysis Laboratory of Albuquerque, New Mexico, with additional data from Pace National of Mount Juliet, Tennessee, evaluating samples from the Marathon Oil site, located in Gallup, New Mexico.

Precision, accuracy, method compliance, and completeness of this data package were assessed during this data review. Precision was determined by evaluating the calculated relative percent difference (RPD) values from:

- Field duplicate pairs
- Laboratory duplicate pairs
- Matrix spike (MS) and matrix spike duplicate (MSD) pairs
- Laboratory control sample (LCS) and laboratory control sample duplicate (LCSD) pairs

Laboratory accuracy was established by reviewing the demonstrated percent recoveries (%R) of the following items to verify that data are not biased.

- MS/MSD samples
- LCS/LCSD samples
- Organic system monitoring compounds (surrogates)



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Field accuracy was established by collecting and analyzing the following samples to monitor for possible ambient or cross contamination during sampling and transportation.

- Trip blanks
- Field blanks
- Equipment blanks

Method compliance was established by reviewing sample integrity, holding times, detection limits, surrogate recoveries, laboratory blanks, initial and continuing calibrations (where applicable), and the LCS/LCSD percent recoveries against method-specific requirements.

Completeness was evaluated by determining the overall ratio of the number of samples and analyses planned versus the number of samples with valid analyses. Determination of completeness included a review of the chain-of-custody (CoC), laboratory analytical methods, and other laboratory and field documents associated with this analytical data set.

Client Sample ID	Laboratory Sample Number
EB-6-16-22	2206938-001
OW-60	2206938-002
OW-68	2206938-003
OW-67	2206938-004
MKTF-43	2206938-005
MKTF-41	2206938-006
FB-6-16-22	2206938-007
DUP-6-16-22	2206938-008
Trip Blank	2206938-009
MKTF-32	2206938-010

## SAMPLE NUMBERS TABLE





The laboratory data were reviewed to evaluate compliance with the methods and the quality of the reported data. Assessment of CoC completeness is included in Item 3 of the Data Validation Checklist. A check mark ( $\checkmark$ ) indicates that the referenced validation criteria were deemed acceptable, whereas a crossed circle ( $\otimes$ ) indicates validation criteria for which the data have been qualified by the data validator. An empty circle (O) indicates that the specified criterion does not apply to the reviewed data. Details are noted in the tables below.

#### Validation Criteria

- ✓ Data Completeness
- ⊗ Laboratory Qualifiers (Item 2)
- ✓ CoC Documentation (Item 3)
- ✓ Holding Times and Preservation (Items 6 and 7)
- O Initial and Continuing Calibrations (Items 9 and 10)
- ⊗ Laboratory Blanks (Items 11 and 12)
- ✓ MS/MSD (Items 13 and 14)
- ⊗ LCS/LCSD (Items 15 and 16)
- System Monitoring Compounds (i.e., Surrogates) (Item 17)
- ⊗ Field, Equipment, and Trip Blanks (Items 18 and 19)
- ✓ Field Duplicates (Items 20 and 21)
- ✓ Laboratory Duplicates (Item 22)

#### **Guidance References**

Chemical data validation was conducted in accordance with the United States Environmental Protection Agency (USEPA) Contract Laboratory Program (CLP) National Functional Guidelines for the analyses listed below, or by the appropriate method if not covered in the National Functional Guidelines.

- Data for organic analyses were evaluated according to validation criteria set forth in the USEPA CLP National Functional Guidelines for Organic Superfund Methods Data Review, document number EPA-540-R-20-005, November 2020 with additional reference to the USEPA CLP National Functional Guidelines for Organic Data Review, document number EPA 540/R-99/008, October 1999.
- Data for inorganic analyses were evaluated according to validation criteria set forth in the USEPA CLP National Functional Guidelines for Inorganic Superfund Methods Data Review, document number EPA-540-R-20-006, November 2020 with additional reference to the USEPA CLP National Functional Guidelines for Inorganic Data Review, document number EPA 540-R-04-004, October 2004.
- Review of field duplicates was conducted according to the USEPA Region I New England Environmental Data Review Supplement for Region 1 Data Review Elements and Superfund Specific Guidance/Procedures, EQADR-Supplement2, September 2020.
- Trihydro Data Validation Variance Documentation, April 2022.



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#### **OVERALL DATA PACKAGE ASSESSMENT**

Based on a data validation review, the data are acceptable as delivered. Data qualified by the laboratory are discussed in Item 2 of the Validation Criteria Checklist.

The purpose of validating data and assigning qualifiers is to assist in proper data interpretation. Data that are not qualified meet the site data quality objectives. If values are assigned qualifiers other than an R (rejected, data not usable), the data may be used for site evaluation; however, consideration should be given to the reasons for qualification when interpreting sample concentrations. Data points that are assigned an R qualifier should not be used for site evaluation purposes.

If applicable, text was identified in **bold font** in the Validation Criteria Checklist to indicate that further action and/or qualification of the data were required. Data may have been qualified with J data flags by the laboratory if the result was greater than or equal to the method detection limit (MDL) but less than the reporting limit (RL). These laboratory-applied J flags were preserved, if present, and included in the Data Qualification Summary table at the end of this report. If applicable, data validation qualifiers were added for the items noted with crossed circles in the Validation Criteria section above. Please see the Data Qualification Summary table at the end of this report.

If data would be qualified with more than one flag, one qualifier was assigned based on the severity; however, all reasons for qualification were retained. Data that would be qualified with both J+ and J- flags were evaluated based on validation criteria and assigned the appropriate flag. The hierarchy of qualifiers from the most to least severe is as follows:

Data qualifiers used during this validation are included in the following table.

<u>Qualifier</u>	Definition
J	Estimated concentration
J+	The result is an estimated concentration, but may be biased high
J-	The result is an estimated concentration, but may be biased low
UJ	Estimated reporting limit
U	Evaluated to be undetected at the reporting limit
JB	Estimated concentration due to blank contamination
R	Rejected, data not usable

#### **Data Completeness**

The analyses were performed as requested on the CoC records. The associated samples were received by the laboratory and analyzed properly unless otherwise noted in the Criteria Checklist below. The complete data package consisted of 630 data points. The data completeness calculation does not include any submitted blank sample results. Twenty-eight points were rejected. The data completeness measure for this data package is calculated to be 95.56% and is acceptable.



VALIDATION CRITERIA CHECKLIST							
1. Was the r	1. Was the report free of non-conformances identified by the laboratory? No						
Comments: T	Comments: The laboratory noted the following analytical non-conformance related to this data set.						
<u>Method 82700</u> The LCS had	<u>C</u> : Analyt acceptab	ical Notes Regarding sample MKTF- le recoveries for all compounds.	32. The 8270 LCSD had low recoverie	es for the phenol spikes.			
2. Were the If no, defi	data free ne.	e of data qualification flags and/or not	tes used by the laboratory?	No			
Comments: T	he labora	atory used the following data qualifica	ation flags with this data set.				
E – Estimated 32. This resu	Value. T I <b>lt was a</b> s	The target analyte 1,4-dioxane was ssigned a J qualifier due to this ca	s flagged by the laboratory with the libration range non-conformance.	E flag for sample MKTF-			
J – Analyte de	tected be	elow quantitation limits.					
R – RPD value	e outside	of range.					
S – % Recove	ry outsid	e of range due to dilution or matrix in	iterference.				
* – Value exce	eds max	imum contaminant level.					
3. Were san	nple CoC	forms and custody procedures com	plete?	Yes			
Comments: T and laboratory were transferr maintained at	he CoC r personn ed to a la all times.	records from field to laboratory were lel signatures, dates, and times of re- lboratory field courier service for tran	complete, and custody was maintained ceipt. Custody seals were not present sport from the field to the laboratory, a	d as evidenced by field because the samples and custody was			
4. Were deto permit, or	ection lim method,	its in accordance with the quality as or indicated as acceptable?	surance project plan (QAPP),	Yes			
Comments: T	he detec	tion limits appeared to be acceptable	e. The following dilutions were applied				
Me	ethod	Sample(s)	Analyte(s)	Dilution Factor			
82	260B	MKTF-32	VOCs	2			
20	00.7	Multiple Samples	Select Total Metals	5			
20	00.8	OW-60, OW-67	Select Dissolved Metals	5			
20	8.00	MKTF-41	Total Arsenic and Selenium	5			
20	200.8 MKTF-43, DUP-6-16-22 Dissolved Antimony 10						
20	200.8 OW-60, OW-67 Total Metals 10						
20	200.8 OW-68 Dissolved Metals 10						
82	260B	MKTF-32	MTBE	20			
2	8.00	OW-67, MKTF-43, DUP-6-16-22	Select Total and Dissolved Metals	20			
20	00.8	MKTF-43	Dissolved Arsenic and Selenium	50			

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VALIDATION CRITERIA CHECKLIST				
<ol><li>Were the reported analytical methods and constituents in compliance with the QAPP, permit, or CoC?</li></ol>	No			
Comments: The reported analytical methods were in compliance with the CoC, and the labor constituents in accordance with the CoC, with the following exceptions.	pratory reported the requested			
The CoC requested total and dissolved metals using Method 200.7; however, the laboratory both Method 200.7 and Method 200.8. This substituted analytical method, Method 200.8, m and precision goals and, therefore, was an acceptable replacement.	analyzed the samples using et similar sensitivity, accuracy,			
The CoC requested cyanide using Method 335.4; however, the laboratory analyzed the sam This substituted analytical method met similar sensitivity, accuracy, and precision goals and, replacement.	ples using Method 4500 CN E. , therefore, was an acceptable			
6. Were samples received in good condition within method-specified requirements?	No			
Comments: Samples were received on ice, in good condition, and with the cooler temperature recommended temperature range of $4^{\circ}C \pm 2^{\circ}C$ between $1.0^{\circ}C$ and $4.7^{\circ}C$ as noted on the Control Check List. Samples transferred to Pace National were received in good condition with the control outside the recommended range at $1.0^{\circ}C$ and $2.1^{\circ}C$ as noted on the CoC. The cooler to judged as acceptable since the laboratory did not report the sample containers as broken or	ures both within and outside the oC and the <i>Sample Log-in</i> cooler temperature both within emperatures below 2.0°C were frozen.			
<ol><li>Were samples extracted/digested and analyzed within method-specified or technical holding times?</li></ol>	Yes			
Comments: The samples were extracted/digested and analyzed within method-specific hold	ling times.			
8. Were reported units appropriate for the sample matrix/matrices and analytical method(s)? Specify if wet or dry units were used for soil.	Yes			
Comments: The results were reported in concentration units of micrograms per liter ( $\mu$ g/L) a which were acceptable for the sample matrix and the analyses requested.	and milligrams per liter (mg/L),			
9. Did the laboratory provide any specific initial and/or continuing calibration results?	No			
Comments: Initial and continuing calibration data were not included as part of this data set.				
10. If initial and/or continuing calibration results were provided, were the results within acceptable limits?	N/A			
Comments: Initial and continuing calibration data were not included as part of this data set.				
11. Was the total number of laboratory blank samples prepared equal to at least 5% of the total number of samples or analyzed as required by the method?	Yes			
Comments: The total number of laboratory blank samples prepared was equal to at least 5% samples.	% of the total number of			
12. Were target analytes reported as not detected in the laboratory blanks?	No			
Comments: Target analytes were reported as not detected in the laboratory blanks, with the	following exceptions.			
TPH DRO was detected in the laboratory blank for Method 8015D batch 68262 at a concentration of 0.019 mg/L. The sample EB-6-16-22 TPH DRO result detected below the laboratory reporting limit was qualified with a U flag. Results greater than the blank detection and/or the laboratory reporting limit but less than 10 times the blank concentration were qualified with a JB flag. Detections of this analyte in the associated samples greater than ten times the blank concentration did not require qualification.				
Pyrene was detected in the laboratory blank for Method 8270C SIM batch 68278 at a concer detection of this analyte in the associated sample MKTF-32 did not require qualification.	ntration of 0.36 μg/L. The non-			



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## VALIDATION CRITERIA CHECKLIST

13. Was the total number of MS samples prepared equal to at least 5% of the total number of samples or analyzed as required by the method?

Yes

Comments: The total number of matrix spike samples prepared was equal to at least 5% of the total number of samples, although MS samples were not prepared/reported for all analyses and/or batches. The matrix spike sample source for each analytical batch in this sample set has been indicated below.

Method	<u>Analytes</u>	<u>Batch</u>	MS Sample Source
200.7	Total Metals	68213	Not Prepared
200.7	Total Metals	68301	Not Prepared
200.7	Dissolved Metals	A88936	Not Prepared
200.7	Dissolved Metals	C88897	EB-6-16-22
200.8	Total Metals	68213	Not Prepared
200.8	Total Metals	68301	Not Prepared
200.8	Dissolved Metals	A88981	Not Prepared
200.8	Dissolved Metals	C88918	Not Prepared
245.1	Total and Dissolved Mercury	68220	EB-6-16-22
245.1	Total Mercury	68247	Not Prepared
245.1	Dissolved Mercury	68304	Not Prepared
504.1	EDB	68190	Not Prepared
504.1	EDB	68319	Not Prepared
4500CN E	Cyanide	WG1886384	OW-68, DUP-6-16-22
4500CN E	Cyanide	WG1886402	Not Associated
8015D	TPH DRO and MRO	68262	Not Prepared
8015D	TPH GRO	A89029	MKTF-41
8015D	TPH GRO	G88994	Not Prepared
8260B	VOCs	R89017	Not Prepared
8270C and 8270C SIM	SVOCs	68218	Not Prepared
8270C and 8270C SIM	SVOCs	68278	Not Prepared

Not Associated – The MS sample source was not associated with this project. Not Prepared – Matrix spikes were not prepared/reported for this batch.

14. For MS/MSDs prepared from project samples, were percent recoveries and RPDs within data validation or laboratory quality control (QC) limits?

Yes

Comments: The percent recoveries and RPDs for MS/MSDs prepared from project samples were within data validation and laboratory QC limits.

The percent recoveries and RPD values for MS/MSDs prepared from non-project samples were evaluated and considered, but data were not qualified based on those results since matrix similarity to project samples could not be guaranteed.

15. Was the total number of LCSs analyzed equal to at least 5% of the total number of samples or analyzed as required by the method?

Yes

Comments: The total number of LCS samples analyzed was equal to at least 5% of the total number of samples.



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VALIDATION CRITERIA CHECKLIST								
16. Were LCS laboratory	16. Were LCS/LCSD percent recoveries and LCS/LCSD RPDs within data validation or No laboratory QC limits?							
Comments: T limits, with the	he LCS and LCSD percen following exceptions.	t recoveries	s and LCS/LCSD	) RPDs were wit	thin data valida	ition and labora	itory QC	
Method	Analyte	<u>Batch</u>	LCS Recovery	<u>LCSD</u> <u>Recovery</u>	LCS/LCSD QC Limits	LCS/LCSD RPD	RPD QC Limits	
200.7	Total Nickel	68213	53.3%		70-130%			
200.7	Total Zinc	68301	137%		70-130%			
200.7	Dissolved Cadmium	A88936	138%		70-130%			
504.1	EDB	68319	Acceptable	Acceptable	70-130%	21.9%	20%	
8270C	Phenol	68278	Acceptable	Acceptable	17-61.1%	91.3%	42.5%	
8270C SIM	1-Methylnaphthalene	68218	82.0%	Acceptable	22.2-80.3%	Acceptable	25%	
8270C SIM	2-Methylnaphthalene	68218	85.0%	Acceptable	20.6-80.1%	Acceptable	25%	
8270C SIM	Fluorene	68218	93.0%	88.0%	33.3-86%	Acceptable	26.4%	
8270C SIM	Phenanthrene	68218	94.0%	Acceptable	38.2-93.9%	Acceptable	27.9%	
8270C SIM	Anthracene	68218	127%	102%	41.1-95.6%	Acceptable	25.6%	
8270C SIM	Fluoranthene	68218	158%	Acceptable	52.9-123%	Acceptable	22.8%	
8270C SIM	Benzo(a)anthracene	68218	170%	Acceptable	51-147%	33.1%	24.1%	
8270C SIM	Benzo(b)fluoranthene	68218	Acceptable	Acceptable	44.4-136%	28.6%	24.5%	
8270C SIM	Indeno(1,2,3-cd)pyrene	68218	Acceptable	166%	31.4-165%	59.4%	21.1%	
8270C SIM	1,4-Dioxane	68278	53.0%	49.0%	20.2-48.4%	Acceptable	30.1%	
8270C SIM	Acenaphthene	68278	85.0%	Acceptable	29.8-82.7%	Acceptable	27.8%	
8270C SIM	Fluorene	68278	88.0%	Acceptable	33.3-86%	Acceptable	26.4%	
8270C SIM	Phenanthrene	68278	96.0%	Acceptable	38.2-93.9%	Acceptable	27.9%	
8270 SIM	Fluoranthene	68278	Acceptable	Acceptable	52.9-123%	24.6%	22.8%	

Total nickel with a MS percent recovery that was less than the lower laboratory QC limit was qualified as J- if detected and UJ if not detected in the associated samples due to evidence of potential low bias.

Analytes with LCS and/or LCSD recoveries greater than the laboratory or data validation QC limits were detected in the associated samples, and the results were qualified as J+ to indicate estimated concentrations that may be biased high. Non-detections of these analytes in the associated samples did not require qualification.

The analytes with LCS/LCSD RPD values that were above the QC limit were not detected in the associated samples. These results were qualified UJ due to evidence of poor precision.

17. Were surrogate recoveries within laboratory QC limits?

No

Comments: Surrogate recoveries were within laboratory QC limits, with the following exceptions.

Method	<u>Surrogate</u>	<u>Sample</u>	<u>Surrogate</u> <u>Recovery</u>	QC Limits
8015D	BFB	OW-60	145%	70-130%
8015D	BFB	OW-68	3,120%	70-130%
8270C	2-Fluorophenol	OW-68	2.09%	29.4-87.7%
8270C	Phenol-d₅	OW-68	10.4%	28.5-64.7%
8270C	2,4,6-Tribromophenol	OW-68	2.60%	18.6-129%
8015D	BFB	OW-67	1,310%	70-130%

VALIDATION CRITERIA CHECKLIST							
Method	<u>Surrogate</u>	<u>Sample</u>	<u>Surrogate</u> <u>Recovery</u>	QC Limits			
8270C	2-Fluorophenol	OW-67	1.47%	29.4-87.7%			
8270C	Phenol-d₅	OW-67	9.05%	28.5-64.7%			
8270C	2,4,6-Tribromophenol	OW-67	0.0%	18.6-129%			
8270C	2-Fluorophenol	MKTF-43	1.31%	29.4-87.7%			
8270C	Phenol-d₅	MKTF-43	8.24%	28.5-64.7%			
8270C	2,4,6-Tribromophenol	MKTF-43	2.35%	18.6-129%			
8270C	2-Fluorophenol	MKTF-41	6.97%	29.4-87.7%			
8270C	Phenol-d₅	MKTF-41	15.1%	28.5-64.7%			
8270C	2,4,6-Tribromophenol	MKTF-41	11.4%	18.6-129%			
8270C	Nitrobenzene-d₅	MKTF-41	32.5%	36.9-103%			
8270C	2-Fluorobiphenyl	MKTF-41	31.5%	38.1-99.9%			
8270C	2-Fluorophenol	DUP-6-16-22	1.27%	29.4-87.7%			
8270C	Phenol-d₅	DUP-6-16-22	7.83%	28.5-64.7%			
8270C	2,4,6-Tribromophenol	DUP-6-16-22	2.30%	18.6-129%			

Since Method 8270C and Method 8270C SIM surrogate associations were not available from the laboratory, qualification was assigned to all of the target analytes in a given fraction (acid or base/neutral) when two or more surrogates from the same fraction (acid or base/neutral) were outside the acceptance range. This condition did not exist for the sample OW-60 Method 8270C analysis and the sample MKTF-41 Method 8270C SIM analysis, and qualification of sample data was not required.

The Method 8270C associated target analytes in samples OW-68, OW-67, MKTF-43, and DUP-6-16-22 with surrogate recoveries that were less than the lower laboratory QC limits, and 2 of 3 surrogate recoveries below 10%, were not detected in samples OW-68, OW-67, MKTF-43, and DUP-6-16-22. These results were qualified with R in the associated samples to indicate rejected (not usable) data based on evidence of extreme low bias (recovery less than 10%).

The Method 8270C associated target analyte in sample MKTF-41 with surrogate recoveries that were less than the lower laboratory QC limits were not detected in sample MKTF-41, and these results were qualified with UJ due to evidence of potential low bias.

TPH GRO was detected in samples OW-68 and OW-67, and these TPH GRO results were qualified as J+ due to evidence of potential high bias. TPH GRO was not detected in sample OW-60, and qualification of data was not required.

Qualification of sample data was not required based on surrogate non-conformances in QC samples as the environmental samples were evaluated based on their specific surrogate recoveries.

18. Were the number of trip blank, field blank, and/or equipment blank samples Yes collected equal to at least 10% of the total number of samples or as required by the project guidelines, QAPP, SAP, or permit?

Comments: The number of trip, field, and equipment blanks collected was equal to at least 10% of the number of samples. One trip blank sample, Trip Blank, one field blank sample FB-6-16-22, and one equipment blank sample, EB 6-16-22, were collected as part of this sample set.



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#### VALIDATION CRITERIA CHECKLIST

19. Were target analytes reported as not detected in the trip blank, field blank, and/or equipment blank samples?

No

Comments: Target analytes were not detected in the trip blank, field blank, and equipment blank samples with the following exceptions.

Blank Sample ID	<u>Method</u>	<u>Analyte</u>	Concentration
Trip Blank	8260B	1,2,3-Trichlorobenzene	0.25 µg/L
Trip Blank	8260B	1-Methylnaphthalene	1.0 µg/L
Trip Blank	8260B	2-Methylnaphthalene	1.0 µg/L
Trip Blank	8260B	Acetone	2.7 μg/L
Trip Blank	8260B	Styrene	0.14 µg/L
FB-6-16-22	8260B	Acetone	3.6 µg/L
FB-6-16-22	8260B	Toluene	0.24 μg/L
EB-6-16-22	200.7	Dissolved Zinc	0.0058 mg/L
EB-6-16-22	200.8	Total Lead	0.000065 mg/L
EB-6-16-22	8015D	TPH DRO	0.039 mg/L
EB-6-16-22	8260B	Acetone	3.4 µg/L
EB-6-16-22	8260B	Toluene	0.43 µg/L
EB-6-16-22	8260B	Total Xylenes	0.41 µg/L

Detections of the identified analytes in the associated samples that were less than or equal to the blank results and/or less than or equal to the applicable reporting limits were assigned U qualifiers. Detections of dissolved zinc and total xylenes in the associated samples that were greater than the reporting limits but less than 10 times the blank results were assigned JB qualifiers. Non-detections of these analytes in the associated samples and results greater than 10 times the blank detection did not require qualification.

The analytes 1,2,3-trichlorobenzene, 1-methylnaphthalene, and 2-methylnaphthalene were only reported in the trip blank sample, Trip Blank, or analyzed and reported by Method 8270C SIM. Qualification was not required.

The TPH DRO results in batch 68262 were previously qualified due to laboratory blank contamination; therefore, additional qualification due to the equipment blank contamination was not required.

20. Was the number of field duplicates collected equal to at least 10% of the total number of samples or as required by the project guidelines, QAPP, SAP, or permit?

Comments: The number of field duplicates collected was equal to at least 10% of the number of samples. Sample DUP-6-16-22 was collected as a field duplicate of sample MKTF-43.

21. Were field duplicate RPD values within data validation QC limits (soil 0-50%, water 0-30%, or air 0-25%)?

Comments: As indicated in the Field Duplicate Summary Table at the end of this report, field duplicate RPD values were within data validation QC limits of 0-30% for water samples.

22. For laboratory duplicates prepared from project samples, were RPDs within laboratory QC limits?

Comments: Laboratory duplicates were prepared for these analyses, and the laboratory duplicate sample sources are summarized in the following table.

Method	<u>Analytes</u>	<u>Batch</u>	Laboratory Duplicate Sample Source
4500CN E	Cyanide	WG1886384	EB-6-16-22

# 🔊 Trihydro

Yes

Yes

Yes

VALIDATION CRITERIA CHECKLIST							
Method         Analytes         Batch         Laboratory Duplicate           Sample Source         Sample Source							
4500CN E	Cyanide	WG1886384	OW-67				
4500CN E	Cyanide	WG1886402	Not Associated				
/ duplicate san	ple source wa	as not associated w	vith this project.				
The RPDs for laboratory duplicates prepared from project samples were within laboratory acceptance limits or were not applicable since the results for one or both measurements were within 5 times the reporting limit.							
The RPD values for the laboratory duplicate samples prepared from non-project samples were evaluated and considered, but data were not qualified based on these results since matrix similarity to project samples could not be guaranteed.							
23. Were the following data relationships realistic?							
• Target analytes were reported by more than one method (e.g., 8260/8270, N/A EPH/8270)?							
Comments: Target analytes were not reported by more than one method in this data set.							
	Method 4500CN E 4500CN E duplicate san licates prepa or one or bot ratory duplicates ased on these relationships re reported b were not rep	VALIDATION           Method         Analytes           4500CN E         Cyanide           4500CN E         Cyanide           4500CN E         Cyanide           duplicate sample source was         dicates prepared from properties           for one or both measurement         reatory duplicate samples           ratory duplicate samples         ased on these results sin           relationships realistic?         readily more than           were not reported by more than         more than	VALIDATION CRITERIA C           Method         Analytes         Batch           4500CN E         Cyanide         WG1886384           4500CN E         Cyanide         WG1886384           4500CN E         Cyanide         WG1886402           duplicate sample source was not associated w         licates prepared from project samples we for one or both measurements were within ratory duplicate samples prepared from not assed on these results since matrix similari           relationships realistic?         re reported by more than one method (e.g           were not reported by more than one method than one method         reference of the sample samp	VALIDATION CRITERIA CHECKLIST           Method         Analytes         Batch         Laboratory Duplicate Sample Source           4500CN E         Cyanide         WG1886384         OW-67           4500CN E         Cyanide         WG1886402         Not Associated           duplicate sample source was not associated with this project.         Icates prepared from project samples were within laboratory acceptation one or both measurements were within 5 times the reporting limit.           ratory duplicate samples prepared from non-project samples were evased on these results since matrix similarity to project samples could relationships realistic?           re reported by more than one method (e.g., 8260/8270,			

 Both total and dissolved metals analyses were performed, and the total metals results were greater than or equal to the dissolved metals results?

Comments: The following table contains the exceptions in which the dissolved metals results exceeded the total metals results. The EPA has not provided guidance or requirements for the evaluation, validation, and qualification of dissolved metals results that exceed the corresponding total metals results. Therefore, qualification of results was not performed based on these data.

Sample ID	<u>Analyte</u>	<u>Total Result</u> (mg/L)	Dissolved Result (mg/L)
OW-68	Cadmium	ND	0.0020 mg/L
MKTF-43	Nickel	ND	0.0064 mg/L
DUP-6-16-22	Nickel	ND	0.0042 mg/L
MKTF-32	Nickel	ND	0.0038 mg/L
OW-60	Silver	ND	0.0029 mg/L
OW-68	Silver	ND	0.011 mg/L
OW-67	Silver	ND	0.020 mg/L
MKTF-43	Silver	ND	0.037 mg/L
DUP-6-16-22	Silver	ND	0.035 mg/L
MKTF-43	Vanadium	ND	0.0067 mg/L
DUP-6-16-22	Vanadium	ND	0.0057 mg/L
EB-6-16-22	Zinc	ND	0.0058 mg/L

No

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Client Sample ID: MKTF-43								
Field Duplicate Sample ID: DUP-6-16-22								
Analyte	Method	Laboratory Result	Duplicate Result	Relative Percent Difference (RPD)				
Barium, Dissolved	E 200.7	0.040 mg/L	0.040 mg/L	0.0%				
Barium, Total	E 200.7	0.077 mg/L	0.071 mg/L	8.1%				
Cobalt, Total	E 200.7	0.031 mg/L	0.028 mg/L	10.2% +/-RL				
Nickel, Dissolved	E 200.7	0.0064 mg/L	0.0042 mg/L	41.5% +/-RL				
Silver, Dissolved	E 200.7	0.037 mg/L	0.035 mg/L	5.6%				
Vanadium, Dissolved	E 200.7	0.0067 mg/L	0.0057 mg/L	16.1% +/-RL				
Zinc, Dissolved	E 200.7	0.0074 mg/L	0.0055 mg/L	29.5% +/-RL				
Zinc, Total	E 200.7	0.021 mg/L	0.022 mg/L	4.7% +/-RL				
Arsenic, Total	E200.8	0.0034 mg/L	0.0034 mg/L	0.0% +/-RL				
Lead, Total	E200.8	0.0022 mg/L	0.0022 mg/L	0.0% +/-RL				
TPH DRO	SW8015	0.15 mg/L	0.15 mg/L	0.0%				

#### FIELD DUPLICATE SUMMARY

Field duplicate RPD control limits are not to exceed 30% for water as established by USEPA Region I - New England Environmental Data Review Supplement for Region 1 Data Review Elements and Superfund Specific Guidance/Procedures, EQADR-Supplement2, September 2020.

+/-RL – Indicates that the detections in both of the samples were within two times the reporting limit. Qualification of data was not required.



## DATA QUALIFICATION SUMMARY

Abbreviation	Reason
EBD	Equipment blank detection
ECAL	The result exceeds the calibration range.
ERPD-LCS	The LCS/LCSD RPD exceeded the upper acceptable limit indicating poor precision.
FBD	Field blank detection
HR-LCS	The LCS and/or LCSD percent recovery was greater than the upper acceptable limit indicating a possible high bias.
HR-SUR	The surrogate percent recovery was greater than the upper acceptable limit indicating a possible high bias.
LR-LCS	The LCS and/or LCSD percent recovery was less than the lower acceptable limit indicating a possible low bias.
LR-SUR	The surrogate percent recovery was less than the lower acceptable limit indicating a possible low bias.
MDLRL	Flagged by the laboratory: The result was greater than the MDL but less than the RL.
MBD	Method blank detection
TBD	Trip blank detection

Analyte	Method	Field Sample ID	Lab Sample ID	Result	Limit	Units	Reviewer Qualifier	DV Flag Reasons
1,2,3-Trichlorobenzene	SW8260B	Trip Blank	2206938-009a	0.25	1.0	µg/L	J	MDLRL
1,2,4-Trimethylbenzene	SW8260B	OW-67	2206938-004a	0.14	1.0	µg/L	J	MDLRL
1,2-Dibromoethane	E504.1	MKTF-43	2206938-005B	ND	0.0094	µg/L	UJ	ERPD-LCS
1,2-Dibromoethane	E504.1	MKTF-41	2206938-006B	ND	0.0095	µg/L	UJ	ERPD-LCS
1,2-Dibromoethane	E504.1	DUP-6-16-22	2206938-008B	ND	0.0092	µg/L	UJ	ERPD-LCS
1,2-Dibromoethane	E504.1	Trip Blank	2206938-009B	ND	0.0095	µg/L	UJ	ERPD-LCS
1,2-Dibromoethane	E504.1	MKTF-32	2206938-010B	ND	0.0093	µg/L	UJ	ERPD-LCS
1,3,5-Trimethylbenzene	SW8260B	OW-68	2206938-003a	0.27	1.0	µg/L	J	MDLRL
1,3,5-Trimethylbenzene	SW8260B	MKTF-41	2206938-006a	0.98	1.0	µg/L	J	MDLRL
1,4-Dichlorobenzene	SW8270C	MKTF-41	2206938-006c	ND	5.0	µg/L	UJ	LR-SUR
1,4-Dioxane	SW8270C	OW-60	2206938-002c	0.24	1.0	µg/L	J	MDLRL



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Analyte	Method	Field Sample ID	Lab Sample ID	Result	Limit	Units	Reviewer Qualifier	DV Flag Reasons
1,4-Dioxane	SW8270C	MKTF-32	2206938-010c	63	1.0	µg/L	J+	ECAL, HR-LCS
1-Methylnaphthalene	SW8270C	MKTF-41	2206938-006c	0.40	0.30	µg/L	J+	HR-LCS
1-Methylnaphthalene	SW8260B	Trip Blank	2206938-009a	1.0	4.0	µg/L	J	MDLRL
2,4,6-Trichlorophenol	SW8270C	OW-68	2206938-003c	ND	10	µg/L	R	LR-SUR
2,4,6-Trichlorophenol	SW8270C	OW-67	2206938-004c	ND	10	µg/L	R	LR-SUR
2,4,6-Trichlorophenol	SW8270C	MKTF-43	2206938-005c	ND	10	µg/L	R	LR-SUR
2,4,6-Trichlorophenol	SW8270C	DUP-6-16-22	2206938-008c	ND	10	µg/L	R	LR-SUR
2,4,6-Trichlorophenol	SW8270C	MKTF-41	2206938-006c	ND	10	µg/L	UJ	LR-SUR
2,4-Dimethylphenol	SW8270C	OW-68	2206938-003c	ND	10	µg/L	R	LR-SUR
2,4-Dimethylphenol	SW8270C	OW-67	2206938-004c	ND	10	µg/L	R	LR-SUR
2,4-Dimethylphenol	SW8270C	MKTF-43	2206938-005c	ND	10	µg/L	R	LR-SUR
2,4-Dimethylphenol	SW8270C	DUP-6-16-22	2206938-008c	ND	10	µg/L	R	LR-SUR
2,4-Dimethylphenol	SW8270C	MKTF-41	2206938-006c	ND	10	µg/L	UJ	LR-SUR
2,4-Dinitrophenol	SW8270C	OW-68	2206938-003c	ND	20	µg/L	R	LR-SUR
2,4-Dinitrophenol	SW8270C	OW-67	2206938-004c	ND	20	µg/L	R	LR-SUR
2,4-Dinitrophenol	SW8270C	MKTF-43	2206938-005c	ND	20	µg/L	R	LR-SUR
2,4-Dinitrophenol	SW8270C	DUP-6-16-22	2206938-008c	ND	20	µg/L	R	LR-SUR
2,4-Dinitrophenol	SW8270C	MKTF-41	2206938-006c	ND	20	µg/L	UJ	LR-SUR
2-Methylnaphthalene	SW8270C	MKTF-41	2206938-006c	0.28	0.30	µg/L	J+	HR-LCS, MDLRL
2-Methylnaphthalene	SW8260B	Trip Blank	2206938-009a	1.0	4.0	µg/L	J	MDLRL
2-Methylphenol	SW8270C	OW-68	2206938-003c	ND	10	µg/L	R	LR-SUR
2-Methylphenol	SW8270C	OW-67	2206938-004c	ND	10	µg/L	R	LR-SUR
2-Methylphenol	SW8270C	MKTF-43	2206938-005c	ND	10	µg/L	R	LR-SUR
2-Methylphenol	SW8270C	DUP-6-16-22	2206938-008c	ND	10	µg/L	R	LR-SUR
2-Methylphenol	SW8270C	MKTF-41	2206938-006c	ND	10	µg/L	UJ	LR-SUR
3,4-Methylphenol	SW8270C	OW-68	2206938-003c	ND	10	µg/L	R	LR-SUR
3,4-Methylphenol	SW8270C	OW-67	2206938-004c	ND	10	µg/L	R	LR-SUR



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Analyte	Method	Field Sample ID	Lab Sample ID	Result	Limit	Units	Reviewer Qualifier	DV Flag Reasons
3,4-Methylphenol	SW8270C	MKTF-43	2206938-005c	ND	10	µg/L	R	LR-SUR
3,4-Methylphenol	SW8270C	DUP-6-16-22	2206938-008c	ND	10	µg/L	R	LR-SUR
3,4-Methylphenol	SW8270C	MKTF-41	2206938-006c	ND	10	µg/L	UJ	LR-SUR
Acetone	SW8260B	Trip Blank	2206938-009a	2.7	10	µg/L	J	MDLRL
Acetone	SW8260B	EB-6-16-22	2206938-001a	3.4	10	µg/L	U	MDLRL, TBD
Acetone	SW8260B	OW-68	2206938-003a	9.8	10	µg/L	U	MDLRL, TBD
Acetone	SW8260B	MKTF-41	2206938-006a	3.2	10	µg/L	U	MDLRL, TBD
Acetone	SW8260B	FB-6-16-22	2206938-007a	3.6	10	µg/L	U	MDLRL, TBD
Arsenic, Dissolved	E200.8	OW-60	2206938-002E	0.0014	0.0050	mg/L	J	MDLRL
Arsenic, Dissolved	E200.8	OW-67	2206938-004E	0.0027	0.020	mg/L	J	MDLRL
Arsenic, Total	E200.8	OW-60	2206938-002D	0.0077	0.010	mg/L	J	MDLRL
Arsenic, Total	E200.8	OW-68	2206938-003D	0.020	0.020	mg/L	J	MDLRL
Arsenic, Total	E200.8	OW-67	2206938-004D	0.0063	0.010	mg/L	J	MDLRL
Arsenic, Total	E200.8	MKTF-43	2206938-005D	0.0034	0.020	mg/L	J	MDLRL
Arsenic, Total	E200.8	MKTF-41	2206938-006D	0.0025	0.0050	mg/L	J	MDLRL
Arsenic, Total	E200.8	DUP-6-16-22	2206938-008D	0.0034	0.020	mg/L	J	MDLRL
Benzene	SW8260B	MKTF-41	2206938-006a	0.28	1.0	µg/L	J	MDLRL
Benzo(a)anthracene	SW8270C	EB-6-16-22	2206938-001c	ND	0.30	µg/L	UJ	ERPD-LCS
Benzo(a)anthracene	SW8270C	OW-60	2206938-002c	ND	0.30	µg/L	UJ	ERPD-LCS
Benzo(a)anthracene	SW8270C	OW-68	2206938-003c	ND	0.30	µg/L	UJ	ERPD-LCS
Benzo(a)anthracene	SW8270C	OW-67	2206938-004c	ND	0.30	µg/L	UJ	ERPD-LCS
Benzo(a)anthracene	SW8270C	MKTF-43	2206938-005c	ND	0.30	µg/L	UJ	ERPD-LCS
Benzo(a)anthracene	SW8270C	MKTF-41	2206938-006c	ND	0.30	µg/L	UJ	ERPD-LCS
Benzo(a)anthracene	SW8270C	DUP-6-16-22	2206938-008c	ND	0.30	µg/L	UJ	ERPD-LCS
Benzo(b)fluoranthene	SW8270C	EB-6-16-22	2206938-001c	ND	0.30	µg/L	UJ	ERPD-LCS
Benzo(b)fluoranthene	SW8270C	OW-60	2206938-002c	ND	0.30	µg/L	UJ	ERPD-LCS
Benzo(b)fluoranthene	SW8270C	OW-68	2206938-003c	ND	0.30	µg/L	UJ	ERPD-LCS



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Analyte	Method	Field Sample ID	Lab Sample ID	Result	Limit	Units	Reviewer Qualifier	DV Flag Reasons
Benzo(b)fluoranthene	SW8270C	OW-67	2206938-004c	ND	0.30	µg/L	UJ	ERPD-LCS
Benzo(b)fluoranthene	SW8270C	MKTF-43	2206938-005c	ND	0.30	µg/L	UJ	ERPD-LCS
Benzo(b)fluoranthene	SW8270C	MKTF-41	2206938-006c	ND	0.30	µg/L	UJ	ERPD-LCS
Benzo(b)fluoranthene	SW8270C	DUP-6-16-22	2206938-008c	ND	0.30	µg/L	UJ	ERPD-LCS
Benzoic Acid	SW8270C	OW-68	2206938-003c	ND	20	µg/L	R	LR-SUR
Benzoic Acid	SW8270C	OW-67	2206938-004c	ND	20	µg/L	R	LR-SUR
Benzoic Acid	SW8270C	MKTF-43	2206938-005c	ND	20	µg/L	R	LR-SUR
Benzoic Acid	SW8270C	DUP-6-16-22	2206938-008c	ND	20	µg/L	R	LR-SUR
Benzoic Acid	SW8270C	MKTF-41	2206938-006c	ND	20	µg/L	UJ	LR-SUR
Beryllium, Total	E 200.7	OW-60	2206938-002D	0.0011	0.0020	mg/L	J	MDLRL
Bis(2-ethylhexyl)phthalate	SW8270C	MKTF-41	2206938-006c	ND	10	µg/L	UJ	LR-SUR
Cadmium, Dissolved	E 200.7	OW-68	2206938-003E	0.0020	0.0020	mg/L	J+	HR-LCS, MDLRL
Chromium, Dissolved	E 200.7	OW-60	2206938-002E	0.0054	0.0060	mg/L	J	MDLRL
Chromium, Total	E 200.7	OW-67	2206938-004D	0.014	0.030	mg/L	J	MDLRL
Cobalt, Total	E 200.7	OW-67	2206938-004D	0.029	0.030	mg/L	J	MDLRL
Cobalt, Total	E 200.7	DUP-6-16-22	2206938-008D	0.028	0.030	mg/L	J	MDLRL
Diethylphthalate	SW8270C	MKTF-41	2206938-006c	ND	10	µg/L	UJ	LR-SUR
Dimethylphthalate	SW8270C	MKTF-41	2206938-006c	ND	10	µg/L	UJ	LR-SUR
Di-n-butylphthalate	SW8270C	MKTF-41	2206938-006c	ND	10	µg/L	UJ	LR-SUR
Di-n-octylphthalate	SW8270C	MKTF-41	2206938-006c	ND	20	µg/L	UJ	LR-SUR
Ethylbenzene	SW8260B	MKTF-41	2206938-006a	0.83	1.0	µg/L	J	MDLRL
Fluoranthene	SW8270C	MKTF-32	2206938-010c	ND	0.30	µg/L	UJ	HR-LCS
Indeno(1,2,3-cd)pyrene	SW8270C	EB-6-16-22	2206938-001c	ND	0.30	µg/L	UJ	ERPD-LCS
Indeno(1,2,3-cd)pyrene	SW8270C	OW-60	2206938-002c	ND	0.30	µg/L	UJ	ERPD-LCS
Indeno(1,2,3-cd)pyrene	SW8270C	OW-68	2206938-003c	ND	0.30	µg/L	UJ	ERPD-LCS
Indeno(1,2,3-cd)pyrene	SW8270C	OW-67	2206938-004c	ND	0.30	µg/L	UJ	ERPD-LCS
Indeno(1,2,3-cd)pyrene	SW8270C	MKTF-43	2206938-005c	ND	0.30	µg/L	UJ	ERPD-LCS



Analyte	Method	Field Sample ID	Lab Sample ID	Result	Limit	Units	Reviewer Qualifier	DV Flag Reasons
Indeno(1,2,3-cd)pyrene	SW8270C	MKTF-41	2206938-006c	ND	0.30	µg/L	UJ	ERPD-LCS
Indeno(1,2,3-cd)pyrene	SW8270C	DUP-6-16-22	2206938-008c	ND	0.30	µg/L	UJ	ERPD-LCS
Isopropylbenzene	SW8260B	MKTF-41	2206938-006a	0.30	1.0	µg/L	J	MDLRL
Lead, Dissolved	E200.8	MKTF-32	2206938-010E	0.000087	0.0005	mg/L	J	MDLRL
Lead, Total	E200.8	MKTF-43	2206938-005D	0.0022	0.010	mg/L	U	EBD, MDLRL
Lead, Total	E200.8	MKTF-41	2206938-006D	0.00011	0.00050	mg/L	U	EBD, MDLRL
Lead, Total	E200.8	DUP-6-16-22	2206938-008D	0.0022	0.010	mg/L	U	EBD, MDLRL
Lead, Total	E200.8	EB-6-16-22	2206938-001D	0.000065	0.00050	mg/L	J	MDLRL
MTBE	SW8260B	OW-60	2206938-002a	0.43	1.0	µg/L	J	MDLRL
MTBE	SW8260B	OW-68	2206938-003a	0.71	1.0	µg/L	J	MDLRL
MTBE	SW8260B	MKTF-41	2206938-006a	0.65	1.0	µg/L	J	MDLRL
Naphthalene	SW8270C	MKTF-41	2206938-006c	0.28	0.30	µg/L	J	MDLRL
n-Butylbenzene	SW8260B	OW-68	2206938-003a	0.67	3.0	µg/L	J	MDLRL
n-Butylbenzene	SW8260B	MKTF-41	2206938-006a	0.26	3.0	µg/L	J	MDLRL
Nickel, Dissolved	E 200.7	OW-60	2206938-002E	0.0037	0.010	mg/L	J	MDLRL
Nickel, Dissolved	E 200.7	MKTF-43	2206938-005E	0.0064	0.010	mg/L	J	MDLRL
Nickel, Dissolved	E 200.7	DUP-6-16-22	2206938-008E	0.0042	0.010	mg/L	J	MDLRL
Nickel, Dissolved	E 200.7	MKTF-32	2206938-010E	0.0038	0.010	mg/L	J	MDLRL
Nickel, Total	E 200.7	OW-60	2206938-002D	0.077	0.010	mg/L	J-	LR-LCS
Nickel, Total	E 200.7	OW-68	2206938-003D	0.18	0.050	mg/L	J-	LR-LCS
Nickel, Total	E 200.7	OW-67	2206938-004D	0.14	0.050	mg/L	J-	LR-LCS
Nickel, Total	E 200.7	EB-6-16-22	2206938-001D	ND	0.010	mg/L	UJ	LR-LCS
Nickel, Total	E 200.7	MKTF-43	2206938-005D	ND	0.050	mg/L	UJ	LR-LCS
Nickel, Total	E 200.7	MKTF-41	2206938-006D	ND	0.010	mg/L	UJ	LR-LCS
Nickel, Total	E 200.7	DUP-6-16-22	2206938-008D	ND	0.050	mg/L	UJ	LR-LCS
n-Propylbenzene	SW8260B	MKTF-41	2206938-006a	0.35	1.0	µg/L	J	MDLRL
Phenol	SW8270C	OW-68	2206938-003c	ND	20	µg/L	R	LR-SUR



Analyte	Method	Field Sample ID	Lab Sample ID	Result	Limit	Units	Reviewer Qualifier	DV Flag Reasons
Phenol	SW8270C	OW-67	2206938-004c	ND	20	µg/L	R	LR-SUR
Phenol	SW8270C	MKTF-43	2206938-005c	ND	20	µg/L	R	LR-SUR
Phenol	SW8270C	DUP-6-16-22	2206938-008c	ND	20	µg/L	R	LR-SUR
Phenol	SW8270C	MKTF-41	2206938-006c	ND	20	µg/L	UJ	LR-SUR
Phenol	SW8270C	MKTF-32	2206938-010c	ND	20	µg/L	UJ	ERPD-LCS
p-Isopropyltoluene	SW8260B	OW-68	2206938-003a	0.29	1.0	µg/L	J	MDLRL
p-Isopropyltoluene	SW8260B	MKTF-41	2206938-006a	0.26	1.0	µg/L	J	MDLRL
Pyridine	SW8270C	MKTF-41	2206938-006c	ND	40	µg/L	UJ	LR-SUR
sec-Butylbenzene	SW8260B	OW-68	2206938-003a	0.65	1.0	µg/L	J	MDLRL
sec-Butylbenzene	SW8260B	MKTF-41	2206938-006a	0.18	1.0	µg/L	J	MDLRL
sec-Butylbenzene	SW8260B	MKTF-32	2206938-010a	0.44	2.0	µg/L	J	MDLRL
Selenium, Dissolved	E200.8	OW-68	2206938-003E	0.0075	0.010	mg/L	J	MDLRL
Selenium, Total	E200.8	OW-68	2206938-003D	0.016	0.020	mg/L	J	MDLRL
Selenium, Total	E200.8	MKTF-32	2206938-010D	0.00052	0.0010	mg/L	J	MDLRL
Silver, Dissolved	E 200.7	OW-60	2206938-002E	0.0029	0.0050	mg/L	J	MDLRL
Styrene	SW8260B	Trip Blank	2206938-009a	0.14	1.0	µg/L	J	MDLRL
Styrene	SW8260B	OW-68	2206938-003a	0.14	1.0	µg/L	U	MDLRL, TBD
Styrene	SW8260B	MKTF-41	2206938-006a	0.21	1.0	µg/L	U	MDLRL, TBD
Toluene	SW8260B	OW-68	2206938-003a	1.0	1.0	µg/L	U	FBD
Toluene	SW8260B	EB-6-16-22	2206938-001a	0.43	1.0	µg/L	U	FBD, MDLRL
Toluene	SW8260B	OW-60	2206938-002a	0.24	1.0	µg/L	U	FBD, MDLRL
Toluene	SW8260B	MKTF-41	2206938-006a	0.21	1.0	µg/L	U	FBD, MDLRL
Toluene	SW8260B	FB-6-16-22	2206938-007a	0.24	1.0	µg/L	J	MDLRL
TPH DRO	SW8015	OW-60	2206938-002C	0.082	0.064	mg/L	JB	MBD
TPH DRO	SW8015	MKTF-43	2206938-005C	0.15	0.064	mg/L	JB	MBD
TPH DRO	SW8015	DUP-6-16-22	2206938-008C	0.15	0.064	mg/L	JB	MBD
TPH DRO	SW8015	EB-6-16-22	2206938-001C	0.039	0.064	mg/L	U	MBD, MDLRL



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Analyte	Method	Field Sample ID	Lab Sample ID	Result	Limit	Units	Reviewer Qualifier	DV Flag Reasons
TPH GRO	SW8015	OW-68	2206938-003a	0.95	0.050	mg/L	J+	HR-SUR
TPH GRO	SW8015	OW-67	2206938-004a	0.27	0.050	mg/L	J+	HR-SUR
TPH GRO	SW8015	MKTF-41	2206938-006a	0.038	0.050	mg/L	J	MDLRL
Vanadium, Dissolved	E 200.7	OW-60	2206938-002E	0.012	0.050	mg/L	J	MDLRL
Vanadium, Dissolved	E 200.7	OW-68	2206938-003E	0.012	0.050	mg/L	J	MDLRL
Vanadium, Dissolved	E 200.7	OW-67	2206938-004E	0.0055	0.050	mg/L	J	MDLRL
Vanadium, Dissolved	E 200.7	MKTF-43	2206938-005E	0.0067	0.050	mg/L	J	MDLRL
Vanadium, Dissolved	E 200.7	MKTF-41	2206938-006E	0.027	0.050	mg/L	J	MDLRL
Vanadium, Dissolved	E 200.7	DUP-6-16-22	2206938-008E	0.0057	0.050	mg/L	J	MDLRL
Vanadium, Dissolved	E 200.7	MKTF-32	2206938-010E	0.0049	0.050	mg/L	J	MDLRL
Vanadium, Total	E 200.7	OW-68	2206938-003D	0.024	0.25	mg/L	J	MDLRL
Vanadium, Total	E 200.7	OW-67	2206938-004D	0.042	0.25	mg/L	J	MDLRL
Vanadium, Total	E 200.7	MKTF-41	2206938-006D	0.028	0.050	mg/L	J	MDLRL
Vanadium, Total	E 200.7	MKTF-32	2206938-010D	0.0085	0.050	mg/L	J	MDLRL
Xylenes, Total	SW8260B	OW-68	2206938-003a	4.1	1.5	µg/L	JB	EBD
Xylenes, Total	SW8260B	EB-6-16-22	2206938-001a	0.41	1.5	µg/L	J	MDLRL
Zinc, Dissolved	E 200.7	OW-60	2206938-002E	0.011	0.010	mg/L	JB	EBD
Zinc, Dissolved	E 200.7	OW-68	2206938-003E	0.016	0.010	mg/L	JB	EBD
Zinc, Dissolved	E 200.7	OW-67	2206938-004E	0.0072	0.010	mg/L	U	EBD, MDLRL
Zinc, Dissolved	E 200.7	MKTF-43	2206938-005E	0.0074	0.010	mg/L	U	EBD, MDLRL
Zinc, Dissolved	E 200.7	MKTF-41	2206938-006E	0.0075	0.010	mg/L	U	EBD, MDLRL
Zinc, Dissolved	E 200.7	DUP-6-16-22	2206938-008E	0.0055	0.010	mg/L	U	EBD, MDLRL
Zinc, Dissolved	E 200.7	MKTF-32	2206938-010E	0.0087	0.010	mg/L	U	EBD, MDLRL
Zinc, Dissolved	E 200.7	EB-6-16-22	2206938-001E	0.0058	0.010	mg/L	J	MDLRL
Zinc, Total	E 200.7	OW-60	2206938-002D	0.12	0.010	mg/L	J+	HR-LCS
Zinc, Total	E 200.7	MKTF-41	2206938-006D	0.016	0.010	mg/L	J+	HR-LCS
Zinc, Total	E 200.7	MKTF-32	2206938-010D	0.011	0.010	mg/L	J+	HR-LCS



Analyte	Method	Field Sample ID	Lab Sample ID	Result	Limit	Units	Reviewer Qualifier	DV Flag Reasons
Zinc, Total	E 200.7	OW-68	2206938-003D	0.039	0.050	mg/L	J+	HR-LCS, MDLRL
Zinc, Total	E 200.7	OW-67	2206938-004D	0.035	0.050	mg/L	J+	HR-LCS, MDLRL
Zinc, Total	E 200.7	MKTF-43	2206938-005D	0.021	0.050	mg/L	J+	HR-LCS, MDLRL
Zinc, Total	E 200.7	DUP-6-16-22	2206938-008D	0.022	0.050	mg/L	J+	HR-LCS, MDLRL



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Client: Marathon Oil	Laboratory: Hall Environmental Analysis Laboratory					
Project Name: Western Refining Southwest, Quarterly GW	Sample Matrix: Groundwater					
Project Number: 697-080-002 Task: 0006	Sample Start Date: 06/30/2022					
Date Validated: 01/16/2023	Sample End Date: 06/30/2022					
Parameters Included:						
<ul> <li>Volatile Organic Compounds (VOC) by Environmental Pro Waste (SW-846) Method 8260B</li> </ul>	otection Agency (EPA) Test Methods for Evaluating Solid					
<ul> <li>1,2-Dibromoethane (EDB) by EPA Method 504.1</li> </ul>						
<ul> <li>Semivolatile Organic Compounds (SVOC) by SW-846 Method 8270C and Method 8270C with Selected Ion Monitoring (SIM)</li> </ul>						
<ul> <li>Total Petroleum Hydrocarbons (TPH) Gasoline Range Or</li> </ul>	ganics (GRO) by SW-846 Method 8015D					
<ul> <li>TPH Diesel Range Organics (DRO) and Motor Oil Range</li> </ul>	Organics (MRO) by SW-846 Method 8015D Modified					
<ul> <li>Total and Dissolved Metals by EPA Method 200.7 and Method</li> </ul>	ethod 200.8					
<ul> <li>Total and Dissolved Mercury by EPA Method 245.1</li> </ul>						
<ul> <li>Cyanide by Standard Methods for the Examination of Water</li> </ul>	ter and Wastewater (SM) Method 4500 CN E					
Laboratory Project ID: 2207002						
Data Validator: Daran O'Hollearn, Lead Project Scientist						
Reviewer: Charles Ballek, Senior Chemist						

### DATA EVALUATION CRITERIA SUMMARY

A Tier II Data Validation was performed by Trihydro Corporation's Chemical Data Evaluation Services Group on the analytical data report packages generated by Hall Environmental Analysis Laboratory of Albuquerque, New Mexico, with additional data from Pace Analytical National of Mount Juliet, Tennessee evaluating samples from the Marathon Oil site, located in Gallup, New Mexico.

Precision, accuracy, method compliance, and completeness of this data package were assessed during this data review. Precision was determined by evaluating the calculated relative percent difference (RPD) values from:

- Field duplicate pairs
- Laboratory duplicate pairs
- Matrix spike (MS) and matrix spike duplicate (MSD) pairs
- Laboratory control sample (LCS) and laboratory control sample duplicate (LCSD) pairs

Laboratory accuracy was established by reviewing the demonstrated percent recoveries (%R) of the following items to verify that data are not biased.

- MS/MSD samples
- LCS/LCSD samples
- Organic system monitoring compounds (surrogates)



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Field accuracy was established by collecting and analyzing the following samples to monitor for possible ambient or cross contamination during sampling and transportation.

- Trip blanks
- Field blanks
- Equipment blanks

Method compliance was established by reviewing sample integrity, holding times, detection limits, surrogate recoveries, laboratory blanks, initial and continuing calibrations (where applicable), and the LCS/LCSD percent recoveries against method-specific requirements.

Completeness was evaluated by determining the overall ratio of the number of samples and analyses planned versus the number of samples with valid analyses. Determination of completeness included a review of the chain-of-custody (CoC), laboratory analytical methods, and other laboratory and field documents associated with this analytical data set.

Client Sample ID	Laboratory Sample Number
EB-6-30-22	2207002-001
OW-14	2207002-002
OW-30	2207002-003
DUP-6-30-22	2207002-004
FB-6-30-22	2207002-005
Trip Blank	2207002-006

#### SAMPLE NUMBERS TABLE





The laboratory data were reviewed to evaluate compliance with the methods and the quality of the reported data. Assessment of CoC completeness is included in Item 3 of the Data Validation Checklist. A check mark ( $\checkmark$ ) indicates that the referenced validation criteria were deemed acceptable, whereas a crossed circle ( $\otimes$ ) indicates validation criteria for which the data have been qualified by the data validator. An empty circle (O) indicates that the specified criterion does not apply to the reviewed data. Details are noted in the tables below.

#### Validation Criteria

- ✓ Data Completeness
- ✓ CoC Documentation (Item 3)
- ✓ Holding Times and Preservation (Items 6 and 7)
- O Initial and Continuing Calibrations (Items 9 and 10)
- ⊗ Laboratory Blanks (Items 11 and 12)
- ✓ MS/MSD (Items 13 and 14)
- ⊗ LCS/LCSD (Items 15 and 16)
- System Monitoring Compounds (i.e., Surrogates) (Item 17)
- 8 Field, Equipment, and Trip Blanks (Items 18 and 19)
- ✓ Field Duplicates (Items 20 and 21)
- ✓ Laboratory Duplicates (Item 22)

### **Guidance References**

Chemical data validation was conducted in accordance with the United States Environmental Protection Agency (USEPA) Contract Laboratory Program (CLP) National Functional Guidelines for the analyses listed below, or by the appropriate method if not covered in the National Functional Guidelines.

- Data for organic analyses were evaluated according to validation criteria set forth in the USEPA CLP National Functional Guidelines for Organic Superfund Methods Data Review, document number EPA-540-R-20-005, November 2020 with additional reference to the USEPA CLP National Functional Guidelines for Organic Data Review, document number EPA 540/R-99/008, October 1999.
- Data for inorganic analyses were evaluated according to validation criteria set forth in the USEPA CLP National Functional Guidelines for Inorganic Superfund Methods Data Review, document number EPA-540-R-20-006, November 2020 with additional reference to the USEPA CLP National Functional Guidelines for Inorganic Data Review, document number EPA 540-R-04-004, October 2004.
- Review of field duplicates was conducted according to the USEPA Region I New England Environmental Data Review Supplement for Region 1 Data Review Elements and Superfund Specific Guidance/Procedures, EQADR-Supplement2, September 2020.
- Trihydro Data Validation Variance Documentation, April 2022.



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### **OVERALL DATA PACKAGE ASSESSMENT**

Based on a data validation review, the data are acceptable as delivered. Data qualified by the laboratory are discussed in Item 2 of the Validation Criteria Checklist.

The purpose of validating data and assigning qualifiers is to assist in proper data interpretation. Data that are not qualified meet the site data quality objectives. If values are assigned qualifiers other than an R (rejected, data not usable), the data may be used for site evaluation; however, consideration should be given to the reasons for qualification when interpreting sample concentrations. Data points that are assigned an R qualifier should not be used for site evaluation purposes.

If applicable, text was identified in **bold font** in the Validation Criteria Checklist to indicate that further action and/or qualification of the data were required. Data may have been qualified with J data flags by the laboratory if the result was greater than or equal to the method detection limit (MDL) but less than the reporting limit (RL). These laboratory-applied J flags were preserved, if present, and included in the Data Qualification Summary table at the end of this report. If applicable, data validation qualifiers were added for the items noted with crossed circles in the Validation Criteria section above. Please see the Data Qualification Summary table at the end of this report.

If data would be qualified with more than one flag, one qualifier was assigned based on the severity; however, all reasons for qualification were retained. Data that would be qualified with both J+ and J- flags were evaluated based on validation criteria and assigned the appropriate flag. The hierarchy of qualifiers from the most to least severe is as follows:

Data qualifiers used during this validation are included in the following table.

<u>Qualifier</u>	Definition
J	Estimated concentration
J+	The result is an estimated concentration, but may be biased high
J-	The result is an estimated concentration, but may be biased low
UJ	Estimated reporting limit
U	Evaluated to be undetected at the reporting limit
JB	Estimated concentration due to blank contamination

#### **Data Completeness**

The analyses were performed as requested on the CoC records. The associated samples were received by the laboratory and analyzed properly unless otherwise noted in the Criteria Checklist below. The complete data package consisted of 270 data points. The data completeness calculation does not include any submitted blank sample results. Data points were not rejected. The data completeness measure for this data package is calculated to be 100% and is acceptable.



		VALIDATION (	CRITERIA CHECKLIST					
1. Was the re	port free of	non-conformances identified by	y the laboratory?	Yes				
Comments: Th	ne laboratory	did not report non-conformand	ces related to the analytical data	for this sample set.				
2. Were the data free of data qualification flags and/or notes used by the laboratory? No If no, define.								
Comments: Th	ne laboratory	used the following data qualifi	cation flags with this data set.					
D – Sample dil	uted due to r	natrix.						
J – Analyte detected below quantitation limits.								
J6 – The samp	le matrix inte	erfered with the ability to make	any accurate determination; spik	e value is low.				
P1 – RPD valu	e not applica	ble for sample concentrations	less than 5 times the reporting lir	nit.				
R – % RPD ou	tside of rang	e.						
S – % Recover	y outside of	range due to dilution or matrix	interference.					
* – Value exce	eds maximur	n contaminant level.						
3. Were sam	ple CoC forn	ns and custody procedures cor	mplete?	No				
and laboratory were transferre maintained at a The analyses r and completed	personnel si ed to a labora all times. equired for s the appropri	gnatures, dates, and times of r tory field courier service for tra ample Trip Blank were not iden ate analyses for this sample ty	receipt. Custody seals were not plansport from the field to the labor ntified on the CoC for this sample rpe. Further validation action was	atory, and custody v set. The laboratory not required.	vas vas vasigned			
4. Were dete permit, or	ction limits ir method, or ir	n accordance with the quality a ndicated as acceptable?	ssurance project plan (QAPP),	Yes				
Comments: Th	ne detection	limits appeared to be acceptab	ble. The following dilutions were	applied.				
	Method	Sample(s)	Analyte(s)	Dilution Factor				
	200.7	OW-14, DUP-6-30-22	Total and Dissolved Barium	5				
	8015D			5 20				
	8260B	OW_14, DUF-0-30-22	Select V/OCs	50				
	8260B	OW-30	MTRF	50				
	8260B	OW-14, DUP-6-30-22	Benzene	500				
		- ,						
5. Were the r QAPP, per	eported ana mit, or CoC	lytical methods and constituent	ts in compliance with the	No				
Comments: Th constituents in	ne reported a accordance	nalytical methods were in com with the CoC, with the followin	pliance with the CoC, and the lal g exceptions.	poratory reported the	e requeste			
The CoC reque	ested total ar	d dissolved metals using only	Method 200.7; however, the labo	oratory analyzed the	samples			

The CoC requested cyanide using Method 335.4; however, the laboratory analyzed the samples using Method 4500 CN E. This substituted analytical method met similar sensitivity, accuracy, and precision goals and, therefore, was an acceptable replacement.



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	VALIDATION CRITERIA CHECKLIST							
6. Were sample	s received in go	od condition within method-spec	ified requiremer	nts?	No			
Comments: Samples were received on ice, in good condition, and with the cooler temperatures within the recommended temperature range of $4^{\circ}C \pm 2^{\circ}C$ at 2.2°C and 2.3°C as noted on the CoC and the Sample Log-in Check List. Samples transferred to Pace National were received in good condition with the cooler temperature outside the recommended range at 0.4°C as noted on the CoC.								
The cooler temperature below 2.0°C was judged as acceptable since the laboratory did not report the sample containers as broken or frozen.								
7. Were samples extracted/digested and analyzed within method-specified or Yes technical holding times?								
Comments: The	samples were ex	tracted/digested and analyzed v	within method-sp	pecific holding times.				
8. Were reporte method(s)? \$	d units appropria Specify if wet or	ate for the sample matrix/matrice dry units were used for soil.	es and analytical		Yes			
Comments: The which were accept	results were repo table for the sar	orted in concentration units of m nple matrix and the analyses rec	icrograms per lit quested.	er (μg/L) and milligrams	s per liter (mg/L),			
9. Did the labora	atory provide an	y specific initial and/or continuin	g calibration res	ults?	No			
Comments: Initia	l and continuing	calibration data were not include	ed as part of this	data set.				
10. If initial and/o acceptable lir	r continuing cali nits?	bration results were provided, w	ere the results w	vithin	N/A			
Comments: Initia	l and continuing	calibration data were not include	ed as part of this	data set.				
11. Was the total the total num	number of labor ber of samples o	ratory blank samples prepared e or analyzed as required by the m	equal to at least the st the states the states the states of the states	5% of	Yes			
Comments: The total number of laboratory blank samples prepared was equal to at least 5% of the total number of samples.								
samples.								
samples. 12. Were target a	analytes reported	as not detected in the laborato	ry blanks?		No			
samples. 12. Were target a Comments: Targe	nalytes reported	as not detected in the laborator reported as not detected in the	ry blanks? laboratory blank	s, with the following exc	No ceptions.			
samples. 12. Were target a Comments: Targe TPH DRO was de TPH DRO was de limit and the resu above the reportir	analytes reported et analytes were etected in the la etected in the as ult was qualifien ng limit and grea	as not detected in the laborator reported as not detected in the boratory blank for Method 80 ssociated sample EB-6-30-22a d with a U flag. TPH DRO was ter than ten times the blank cond	ry blanks? laboratory blank 15D batch 6857 It a concentration detected in the centration and th	at load of of the total as, with the following exc 2 at a concentration o on less than the labor associated samples at o he results did not require	No ceptions. f 0.022 mg/L. atory reporting concentrations e qualification.			
samples. 12. Were target a Comments: Targe TPH DRO was de Imit and the resu above the reportin 13. Was the total number of sa	analytes reported et analytes were etected in the la etected in the a ult was qualifien ng limit and grea number of MS s mples or analyze	d as not detected in the laborator reported as not detected in the <b>boratory blank for Method 80</b> <b>ssociated sample EB-6-30-22a</b> <b>d with a U flag.</b> TPH DRO was ter than ten times the blank conc samples prepared equal to at lea ed as required by the method?	ry blanks? laboratory blank 15D batch 6857 at a concentration detected in the centration and the ast 5% of the tota	at load of of the total and total and total and the following exc 2 at a concentration of the labor on less than the labor associated samples at the results did not require	No ceptions. f 0.022 mg/L. atory reporting concentrations e qualification. Yes			
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	VALIDATION CRITERIA CHECKLIST										
	Method	An	alytes	Batch	MS Sample	e Source					
	8015D	TPH DR	O and MRO	68572	Not Pre	pared					
	8015D	TPI	H GRO	G89271	Not Pre	pared					
	8260B	V	OCs	R89347	Not Pre	pared					
	8270C SIM	S	/OCs	68563	Not Pre	pared	<u> </u>				
	8270C	S	/OCs	68563	Not Pre	pared					
Not Associated – Not Prepared – N	The MS sample source Natrix spikes were not pr	was not asso repared/repor	ociated with this pr ted for this batch.	oject.							
14. For MS/MS within data	SDs prepared from pro a validation or laborate	oject sample ory quality c	es, were percent ontrol (QC) limit	recoveries and s?	RPDs	Yes					
Comments: Th laboratory QC I	e percent recoveries imits.	and RPDs f	or MS/MSD pre	pared from proje	ect samples we	re within data v	alidation and				
The percent red but data were r	coveries and RPD val not qualified based on	ues for MS/ those resul	MSDs prepared ts since matrix s	from non-projec imilarity to proje	ct samples were ct samples cou	e evaluated and uld not be guara	considered, inteed.				
15. Was the to samples or	tal number of LCSs a r analyzed as required	nalyzed equ d by the met	ual to at least 5% thod?	of the total nur	nber of	Yes					
Comments: Th	e total number of LCS	S samples a	nalyzed was eq	ual to at least 59	% of the total n	umber of sampl	es.				
16. Were LCS laboratory	/LCSD percent recove QC limits?	eries and LC	CS/LCSD RPDs	within data valid	lation or	No					
Comments: Th limits, with the f	ne LCS and LCSD per following exceptions.	rcent recove	ries and LCS/LO	CSD RPDs were	e within data va	lidation and lab	oratory QC				
<u>Method</u>	Analyte	<u>Batch</u>	<u>LCS</u> <u>Recovery</u>	<u>LCSD</u> <u>Recovery</u>	LCS/LCSD QC Limits	LCS/LCSD RPD	RPD QC Limits				
200.7	Total Nickel	68545	132%		70-130%						
8015D	TPH DRO	68572	77.8%	Acceptable	31.7-75.4%	25.5%	20%				
8270C	Pyrene	68563	60.3%	57.4%	61-123%	Acceptable	11.8%				
8270C SIM	1,4-Dioxane	68563	51.0%	53.0%	20.2-48.4%	Acceptable	30.1%				
8270C SIM	Acenaphthene	68563	Acceptable	83.0%	29.8-82.7%	Acceptable	27.8%				
8270C SIM	Fluorene	68563	Acceptable	87.0%	33.3-86%	Acceptable	26.4%				
8270C SIM	Phenanthrene	68563	Acceptable	94.0%	38.2-93.9%	Acceptable	27.9%				
Pyrene was de	etected in sample EE	3-6-30-22 aı	nd the result wa	as qualified as	J- due to evid	ence of potent	ial low bias.				

Pyrene was not detected in the remaining associated samples and the results were assigned UJ qualifiers. Detections of the remaining identified analytes in the associated samples were qualified as J+ due to evidence of

potential high bias. Non-detection of these analytes in the associated samples did not require qualification.

TPD DRO was detected in the associated samples and the results were qualified as J due to evidence of poor precision.

			VALIDATIO	ON CRITERIA CHECKLIS	т						
17. Were su	rrogate recoverie	s within labo	oratory QC li	imits?		No					
Comments:	Surrogate recove	ries were w	ithin laborate	ory QC limits, with the follo	wing exception	ns.					
	<u>Method</u>	<u>Sur</u>	rogate	Sample	<u>Surrogate</u> <u>Recovery</u>	QC Limits					
	8270C	2-Fluo	prophenol	EB-6-30-22	24.7%	29.4-87.7%					
	8270C Phenol-d₅ EB-6-30-22 18.1% 28.5-64.7%										
	8270C Nitrobenzene-d₅ EB-6-30-22 33.1% 36.9-103%										
	8270C 2-Fluorobiphenyl EB-6-30-22 32.2% 38.1-99.9%										
	8270C	4-Terp	henyl-d <sub>14</sub>	EB-6-30-22	47.0%	48-155%					
	8270C-SIM	4-Terp	ohenyl-d <sub>14</sub>	EB-6-30-22	48.8%	72.3-147%					
	8270C-SIM	4-Terp	ohenyl-d <sub>14</sub>	OW-30	67.2%	72.3-147%					
	8270C-SIM	4-Terp	ohenyl-d <sub>14</sub>	DUP-6-30-22	67.6%	72.3-147%					
Since Metho	d 8270C and 827	0C-SIM suri	rogate asso	ciations were not available	from the labor	atory, qualificatio	on was				
assigned to a	all of the target an	alytes in a g	given fraction	n (acid or base/neutral) wh	en two or more	e surrogates fror	n the same				
analyses of s	amples FB-6-30-	.22 OW-30	and DUP-6	-30-22 and qualification of	f sample data v	vas not required	Di-n-butyl				
phthalate wa	as detected in th	e Method 8	8270C analy	sis of sample EB-6-30-22	2, and this res	ult was qualifie	d as J- due				
to evidence	of potential low	bias. The	remaining N	Method 8270C SVOC ana	lytes were not	t detected in sa	mple EB-6-				
30-22, and t	hese results we	e qualified	as UJ due t	to the evidence of potent	tial low bias.						
Qualification samples wer	of sample data w e evaluated base	as not requi	ired based o becific surro	on surrogate non-conforma gate recoveries.	inces in QC sa	mples as the env	vironmental				
18 Were the	e number of trip h	lank field h	lank and/or	equinment blank samples		Ves					
collected project g	d equal to at least juidelines, QAPP	: 10% of the , SAP, or pe	total numbe ermit?	er of samples or as require	d by the	103					
Comments: One trip blan collected as	The number of tri k sample, Trip Bl part of this sampl	p, field, and ank, one fie e set.	equipment ld blank sam	blanks collected was equa ple, FB 6-30-22, and one	l to at least 10 equipment bla	% of the number nk sample, EB-6	of samples. -30-22, were				
19. Were tai equipme	rget analytes repo ent blank samples	orted as not s?	detected in	the trip blank, field blank, a	and/or	No					
Comments:	Target analytes v	vere not det	ected in the	trip, field, and equipment b	olank samples	with the following	g exceptions.				
	Blank S	ample ID	<u>Method</u>	Analyte	Concer	ntration					
	Trip	Blank	8260B	Acetone	3.8	µg/L					
	EB-6	-30-22	200.7	<b>Dissolved Zinc</b>	0.0067	7 mg/L					
	EB-6-	-30-22	8015D	TPH DRO	0.047	′ mg/L					
	EB-6-	-30-22	8260B	Toluene	0.20	µg/L					
	EB-6-	-30-22	8270C	Di-n-butylphthalate	17 (	ug/L					
	EB-6-	-30-22	8270C	Pyrene	0.34	µg/L					
Dotoctions		in the sea		nlos that were loss than	the applicable	o roporting limi	te wore				
assigned U	qualifiers. Dete	ctions of di	ssolved zin	ic in the associated samp	oles that were	greater than th	e reporting				
the associate	ss than 10 times	the blank i	results were	e assigned JB qualifiers.	Non-detection	ns of the identifie	ed analytes in				
						فحاج والمرجا والمراجع	ti a ma				
therefore, ad	ditional qualificati	ion due to th	e equipmen	t blank contamination was	not required.	nory diank detec	uon;				



VALIDATION CRITERIA CHECKLIST							
20. Was the number of field duplicates collected equal to at least 10% of the total Yes number of samples or as required by the project guidelines, QAPP, SAP, or permit?							
Comments: The numb	Comments: The number of field duplicates collected was equal to at least 10% of the number of samples.						
Sample DUP-6-30-22	was collected as a fie	ld duplicate of sa	mple OW-14.				
21. Were field duplica 0-30%, or air 0-25	te RPD values within %)?	data validation Q	C limits (soil 0-50%	o, water	Yes		
Comments: As indicat within data validation G	ed in the Field Duplic QC limits of 0-30% for	ate Summary Tab water samples.	ble at the end of thi	s report, field duplicat	e RPD values were		
22. For laboratory dup validation or laboration	licates prepared from atory QC limits?	n project samples	, were RPDs within	data	N/A		
Comments: Laborator associated with this da	y duplicates were pre ta set.	pared for the ana	lysis of cyanide in l	batch WG1893803 fro	om samples not		
The RPD values for the but data were not quali	e laboratory duplicate fied based on these r	samples prepare results since matr	ed from non-project ix similarity to proje	samples were evalua ect samples could not	ated and considered, be guaranteed.		
<ul> <li>23. Were the following data relationships realistic?</li> <li>Target analytes were reported by more than one method (e.g., 8260/8270, N/A</li> </ul>							
EPH/8270)?							
Comments: Target an	alytes were not repor	ted by more than	one method in this	data set.			
<ul> <li>Both total and results were g</li> </ul>	l dissolved metals an greater than or equal	alyses were perfo to the dissolved n	rmed, and the tota netals results?	l metals	No		
Comments: The follow results.	ving table contains the	e exceptions in wh	nich the dissolved r	netals results exceed	ed the total metals		
	Sample ID	<u>Analyte</u>	<u>Total Result</u> (mg/L)	Dissolved Result (mg/L)			
	OW-14	Barium	2.3	2.4			
	OW-30	Nickel	0.088	0.089			
OW-14 Zinc 0.0071 0.0084							
OW-30 Zinc 0.0097 0.013							
	DUP-6-30-22	Zinc	0.0090	0.0092			
The EPA has not provi results that exceed the these data.	ded guidance or requ corresponding total r	irements for the entry of the e	evaluation, validation nerefore, qualificati	on, and qualification o on of results was not	f dissolved metals performed based on		



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Client Sample ID: OW-14 Field Duplicate Sample ID: DUP-6-30-22								
Analyte	Method	Laboratory Result	Duplicate Result	Relative Percent Difference (RPD)				
Barium, Dissolved	E 200.7	2.4 mg/L	2.4 mg/L	0.0%				
Barium, Total	E 200.7	2.3 mg/L	2.5 mg/L	8.3%				
Cobalt, Dissolved	E 200.7	0.0077 mg/L	0.0079 mg/L	2.6% +/-RL				
Cobalt, Total	E 200.7	0.010 mg/L	0.0095 mg/L	5.1% +/-RL				
Nickel, Dissolved	E 200.7	0.097 mg/L	0.10 mg/L	3.0%				
Nickel, Total	E 200.7	0.10 mg/L	0.10 mg/L	0.0%				
Zinc, Dissolved	E 200.7	0.0084 mg/L	0.0092 mg/L	9.1% +/-RL				
Zinc, Total	E 200.7	0.0071 mg/L	0.0090 mg/L	23.6% +/-RL				
Arsenic, Dissolved	E200.8	0.0034 mg/L	0.0032 mg/L	6.1%				
Arsenic, Total	E200.8	0.0038 mg/L	0.0038 mg/L	0.0%				
Lead, Total	E200.8	0.00074 mg/L	0.00051 mg/L	36.8% +/-RL				
Cyanide, Total	E335.4	ND (0.00500 mg/L)	0.00873 mg/L	DL				
TPH DRO	SW8015	2.5 mg/L	2.1 mg/L	17.4%				
TPH GRO	SW8015	61 mg/L	61 mg/L	0.0%				
TPH ORO	SW8015	ND (0.080 mg/L)	0.074 mg/L	DL				
Benzene	SW8260B	22,000 µg/L	23,000 µg/L	4.4%				
Ethylbenzene	SW8260B	930 μg/L	870 μg/L	6.7%				
Isopropylbenzene	SW8260B	19 µg/L	18 µg/L	5.4% +/-RL				
MTBE	SW8260B	610 µg/L	600 µg/L	1.7%				
n-Propylbenzene	SW8260B	50 μg/L	47 μg/L	6.2% +/-RL				
1,4-Dioxane	SW8270C	ND (1.0 μg/L)	1.3 µg/L	DL				
1-Methylnaphthalene	SW8270C	17 μg/L	16 µg/L	6.1%				
Acenaphthene	SW8270C	0.48 µg/L	0.46 µg/L	4.3% +/-RL				
Fluorene	SW8270C	0.68 µg/L	0.62 µg/L	9.2%				
Naphthalene	SW8270C	15 µg/L	14 µg/L	6.9%				
Phenanthrene	SW8270C	0.36 µg/L	0.30 µg/L	18.2% +/-RL				
Phenol	SW8270C	38 µg/L	34 µg/L	11.1% +/-RL				

#### FIELD DUPLICATE SUMMARY

Field duplicate RPD control limits are not to exceed 30% for water as established by USEPA Region I - New England Environmental Data Review Supplement for Region 1 Data Review Elements and Superfund Specific Guidance/Procedures, EQADR-Supplement2, September 2020.

DL – Indicates that the analyte was detected in one of the duplicate samples and was undetected in the other sample, and therefore an RPD could not be calculated. Data were not qualified since the detection was within two times the reporting limit. Non-detected results are indicated above with the applicable reporting limit as ND (RL).

+/-RL – Indicates that the detections in both of the samples were within two times the reporting limit. Qualification of data was not required.



### DATA QUALIFICATION SUMMARY

Abbreviation	Reason
MBD	Method blank detection
HR-LCS	The LCS and/or LCSD percent recovery was greater than the upper acceptable limit indicating a possible high bias.
LR-LCS	The LCS and/or LCSD percent recovery was less than the lower acceptable limit indicating a possible low bias.
ERPD-LCS	The LCS/LCSD RPD exceeded the upper acceptable limit indicating poor precision.
LR-SUR	The surrogate percent recovery was less than the lower acceptable limit indicating a possible low bias.
EBD	Equipment blank detection
MDLRL	Flagged by the laboratory: The result was greater than the MDL but less than the RL.

Analyte	Method	Field Sample ID	Lab Sample ID	Result	Limit	Units	Reviewer Qualifier	DV Flag Reasons
1,4-Dichlorobenzene	SW8270C	EB-6-30-22	2207002-001C	ND	5.0	µg/L	UJ	LR-SUR
1,4-Dioxane	SW8270C	DUP-6-30-22	2207002-004c	1.3	1.0	µg/L	J+	HR-LCS
1,4-Dioxane	SW8270C	OW-30	2207002-003c	0.50	1.0	µg/L	J+	HR-LCS, MDLRL
2,4,6-Trichlorophenol	SW8270C	EB-6-30-22	2207002-001C	ND	10	µg/L	UJ	LR-SUR
2,4-Dimethylphenol	SW8270C	EB-6-30-22	2207002-001C	ND	10	µg/L	UJ	LR-SUR
2,4-Dinitrophenol	SW8270C	EB-6-30-22	2207002-001C	ND	20	µg/L	UJ	LR-SUR
2-Methylphenol	SW8270C	EB-6-30-22	2207002-001C	ND	10	µg/L	UJ	LR-SUR
3,4-Methylphenol	SW8270C	EB-6-30-22	2207002-001C	ND	10	µg/L	UJ	LR-SUR
Acenaphthene	SW8270C	OW-14	2207002-002c	0.48	0.30	µg/L	J+	HR-LCS
Acenaphthene	SW8270C	DUP-6-30-22	2207002-004c	0.46	0.30	µg/L	J+	HR-LCS
Acetone	SW8260B	Trip Blank	2207002-006a	3.8	10	µg/L	J	MDLRL
Anthracene	SW8270C	OW-30	2207002-003c	0.20	0.30	µg/L	J	MDLRL
Arsenic, Dissolved	E200.8	OW-30	2207002-003E	0.00079	0.0010	mg/L	J	MDLRL
Arsenic, Total	E200.8	OW-30	2207002-003D	0.00092	0.0010	mg/L	J	MDLRL
Benzoic Acid	SW8270C	EB-6-30-22	2207002-001C	ND	20	µg/L	UJ	LR-SUR
Bis(2-ethylhexyl)phthalate	SW8270C	EB-6-30-22	2207002-001C	ND	10	µg/L	UJ	LR-SUR



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Analyte	Method	Field Sample ID	Lab Sample ID	Result	Limit	Units	Reviewer Qualifier	DV Flag Reasons
Cobalt, Dissolved	E 200.7	OW-30	2207002-003E	0.0037	0.0060	mg/L	J	MDLRL
Cobalt, Total	E 200.7	OW-30	2207002-003D	0.0043	0.0060	mg/L	J	MDLRL
Diethylphthalate	SW8270C	EB-6-30-22	2207002-001C	ND	10	µg/L	UJ	LR-SUR
Dimethylphthalate	SW8270C	EB-6-30-22	2207002-001C	ND	10	µg/L	UJ	LR-SUR
Di-n-butylphthalate	SW8270C	EB-6-30-22	2207002-001C	17	10	µg/L	J-	LR-SUR
Di-n-octylphthalate	SW8270C	EB-6-30-22	2207002-001C	ND	20	µg/L	UJ	LR-SUR
Fluorene	SW8270C	OW-14	2207002-002c	0.68	0.30	µg/L	J+	HR-LCS
Fluorene	SW8270C	DUP-6-30-22	2207002-004c	0.62	0.30	µg/L	J+	HR-LCS
Isopropylbenzene	SW8260B	OW-14	2207002-002a	19	50	µg/L	J	MDLRL
Isopropylbenzene	SW8260B	DUP-6-30-22	2207002-004a	18	50	µg/L	J	MDLRL
Lead, Dissolved	E200.8	OW-30	2207002-003E	0.00035	0.00050	mg/L	J	MDLRL
Nickel, Total	E 200.7	OW-14	2207002-002D	0.10	0.010	mg/L	J+	HR-LCS
Nickel, Total	E 200.7	OW-30	2207002-003D	0.088	0.010	mg/L	J+	HR-LCS
Nickel, Total	E 200.7	DUP-6-30-22	2207002-004D	0.10	0.010	mg/L	J+	HR-LCS
n-Propylbenzene	SW8260B	DUP-6-30-22	2207002-004a	47	50	µg/L	J	MDLRL
Phenanthrene	SW8270C	OW-14	2207002-002c	0.36	0.30	µg/L	J+	HR-LCS
Phenanthrene	SW8270C	DUP-6-30-22	2207002-004c	0.30	0.30	µg/L	J+	HR-LCS
Phenol	SW8270C	EB-6-30-22	2207002-001C	ND	20	µg/L	UJ	LR-SUR
Pyrene	SW8270C	OW-14	2207002-002c	ND	1.0	µg/L	UJ	LR-LCS
Pyrene	SW8270C	OW-30	2207002-003c	ND	1.0	µg/L	UJ	LR-LCS
Pyrene	SW8270C	DUP-6-30-22	2207002-004c	ND	1.0	µg/L	UJ	LR-LCS
Pyrene	SW8270C	EB-6-30-22	2207002-001c	0.34	1.0	µg/L	J-	LR-LCS, MDLRL
Pyridine	SW8270C	EB-6-30-22	2207002-001C	ND	40	µg/L	UJ	LR-SUR
Toluene	SW8260B	EB-6-30-22	2207002-001a	0.20	1.0	µg/L	J	MDLRL
TPH DRO	SW8015	OW-14	2207002-002C	2.5	0.064	mg/L	J+	ERPD-LCS, HR-LCS
TPH DRO	SW8015	OW-30	2207002-003C	2.6	0.064	mg/L	J+	ERPD-LCS, HR-LCS
TPH DRO	SW8015	DUP-6-30-22	2207002-004C	2.1	0.064	mg/L	J+	ERPD-LCS, HR-LCS



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Analyte	Method	Field Sample ID	Lab Sample ID	Result	Limit	Units	Reviewer Qualifier	DV Flag Reasons
TPH DRO	SW8015	EB-6-30-22	2207002-001C	0.047	0.064	mg/L	U	ERPD-LCS, HR-LCS, MBD, MDLRL
TPH ORO	SW8015	OW-30	2207002-003C	0.056	0.080	mg/L	U	MBD, MDLRL
TPH ORO	SW8015	DUP-6-30-22	2207002-004C	0.074	0.080	mg/L	U	MBD, MDLRL
Zinc, Dissolved	E 200.7	OW-30	2207002-003E	0.013	0.010	mg/L	JB	EBD
Zinc, Dissolved	E 200.7	OW-14	2207002-002E	0.0084	0.010	mg/L	U	EBD, MDLRL
Zinc, Dissolved	E 200.7	DUP-6-30-22	2207002-004E	0.0092	0.010	mg/L	U	EBD, MDLRL
Zinc, Dissolved	E 200.7	EB-6-30-22	2207002-001E	0.0067	0.010	mg/L	J	MDLRL
Zinc, Total	E 200.7	OW-14	2207002-002D	0.0071	0.010	mg/L	J	MDLRL
Zinc, Total	E 200.7	OW-30	2207002-003D	0.0097	0.010	mg/L	J	MDLRL
Zinc, Total	E 200.7	DUP-6-30-22	2207002-004D	0.0090	0.010	mg/L	J	MDLRL



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Western Refining Southwest LLC D/B/A Marathon Gallup Refinery 2022 Annual Groundwater Monitoring Report

Appendix D-3. 3<sup>rd</sup> Quarter Data Validation Reports



Client: Marathon Oil	Laboratory: Hall Environmental Analysis Laboratory			
Project Name: Western Refining Southwest, Quarterly GW	Sample Matrix: Groundwater			
Project Number: 697-080-002 Task: 0006	Sample Start Date: 09/20/2022			
Date Validated: 01/24/2023	Sample End Date: 09/20/2022			
Parameters Included:				
<ul> <li>Volatile Organic Compounds (VOC) by Environmental Protection Agency (EPA) Test Methods for Evaluating S Waste (SW-846) Method 8260B</li> </ul>				

- 1,2-Dibromoethane (EDB) by EPA Method 504.1
- Semivolatile Organic Compounds (SVOC) by SW-846 Method 8270C and Method 8270C with Selected Ion Monitoring (SIM)
- Total Petroleum Hydrocarbons (TPH) Gasoline Range Organics (GRO) by SW-846 Method 8015D
- TPH Diesel Range Organics (DRO) and Motor Oil Range Organics (MRO) by SW-846 Method 8015D Modified
- Total and Dissolved Metals by EPA Method 200.7 and Method 200.8
- Total and Dissolved Mercury by EPA Method 245.1
- Cyanide by Standard Methods for the Examination of Water and Wastewater (SM) Method 4500 CN E
- Per- and Polyfluorinated Alkyl Substances (PFAS) by Liquid Chromatography with Tandem Mass Spectrometry (LC-MS/MS) and Isotope Dilution (ID)

Laboratory Project ID: 2209A41

Data Validator: Daran O'Hollearn, Lead Project Scientist

Reviewer: Mike Phillips, Senior Chemist

### DATA EVALUATION CRITERIA SUMMARY

A Tier II Data Validation was performed by Trihydro Corporation's Chemical Data Evaluation Services Group on the analytical data report packages generated by Hall Environmental Analysis Laboratory of Albuquerque, New Mexico, with additional data from Pace Analytical National of Mount Juliet, Tennessee, and Vista Analytical Laboratory of El Dorado Hills, California, evaluating samples from the Marathon Oil site, located in Gallup, New Mexico.

Precision, accuracy, method compliance, and completeness of this data package were assessed during this data review. Precision was determined by evaluating the calculated relative percent difference (RPD) values from:

- Field duplicate pairs
- Laboratory duplicate pairs
- Matrix spike (MS) and matrix spike duplicate (MSD) pairs
- Laboratory control sample (LCS) and laboratory control sample duplicate (LCSD) pairs

Laboratory accuracy was established by reviewing the demonstrated percent recoveries (%R) of the following items to verify that data are not biased.

- MS/MSD samples
- LCS/LCSD samples
- Organic system monitoring compounds (surrogates)





Field accuracy was established by collecting and analyzing the following samples to monitor for possible ambient or cross contamination during sampling and transportation.

- Trip blanks
- Field blanks
- Equipment blanks

Method compliance was established by reviewing sample integrity, holding times, detection limits, surrogate recoveries, laboratory blanks, initial and continuing calibrations (where applicable), and the LCS/LCSD percent recoveries against method-specific requirements.

Completeness was evaluated by determining the overall ratio of the number of samples and analyses planned versus the number of samples with valid analyses. Determination of completeness included a review of the chain-of-custody (CoC), laboratory analytical methods, and other laboratory and field documents associated with this analytical data set.

Client Sample ID	Laboratory Sample Number
EB-09-20-22	2209A41-001
EB-09-20-22	2209A41-002
OW-63	2209A41-003
OW-58A	2209A41-004
OW-58	2209A41-005
OW-64	2209A41-006
STP-1-NW	2209A41-007
OW-60	2209A41-008
OW-68	2209A41-009
OW-67	2209A41-010
FB 9-20-22	2209A41-011
DUP 9-20-22	2209A41-012
Trip Blank	2209A41-013

### SAMPLE NUMBERS TABLE





The laboratory data were reviewed to evaluate compliance with the methods and the quality of the reported data. Assessment of CoC completeness is included in Item 3 of the Data Validation Checklist. A check mark ( $\checkmark$ ) indicates that the referenced validation criteria were deemed acceptable, whereas a crossed circle ( $\otimes$ ) indicates validation criteria for which the data have been qualified by the data validator. An empty circle (O) indicates that the specified criterion does not apply to the reviewed data. Details are noted in the tables below.

#### Validation Criteria

- ✓ Data Completeness
- ⊗ Laboratory Qualifiers (Item 2)
- ✓ CoC Documentation (Item 3)
- ⊗ Holding Times and Preservation (Items 6 and 7)
- O Initial and Continuing Calibrations (Items 9 and 10)
- ⊗ Laboratory Blanks (Items 11 and 12)
- ✓ MS/MSD (Items 13 and 14)
- ⊗ LCS/LCSD (Items 15 and 16)
- System Monitoring Compounds (i.e., Surrogates) (Item 17)
- 8 Field, Equipment, and Trip Blanks (Items 18 and 19)
- ⊗ Field Duplicates (Items 20 and 21)
- ✓ Laboratory Duplicates (Item 22)

#### **Guidance References**

Chemical data validation was conducted in accordance with the United States Environmental Protection Agency (USEPA) Contract Laboratory Program (CLP) National Functional Guidelines for the analyses listed below, or by the appropriate method if not covered in the National Functional Guidelines.

- Data for organic analyses were evaluated according to validation criteria set forth in the USEPA CLP National Functional Guidelines for Organic Superfund Methods Data Review, document number EPA-540-R-20-005, November 2020 with additional reference to the USEPA CLP National Functional Guidelines for Organic Data Review, document number EPA 540/R-99/008, October 1999.
- Data for inorganic analyses were evaluated according to validation criteria set forth in the USEPA CLP National Functional Guidelines for Inorganic Superfund Methods Data Review, document number EPA-540-R-20-006, November 2020 with additional reference to the USEPA CLP National Functional Guidelines for Inorganic Data Review, document number EPA 540-R-04-004, October 2004.
- Data review and evaluation was performed following criteria set forth in Data Review and Validation Guidelines for Perfluoroalkyl Substances (PFASs) Analyzed Using EPA Method 537, document number EPA 910-R-18-001, November 2018.
- Data were reviewed and evaluated according to criteria set forth in the Department of Defense (DoD) / Department of Energy (DOE) Quality Systems Manual (QSM) for Environmental Laboratories, Version 5.3, 2019.



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- Data were reviewed and evaluated according to criteria set forth in Data Validation Guidelines Module 3: Data Validation Procedure for Per- and Polyfluoroalkyl Substances Analysis by QSM Table B-15, United States Department of Defense, Environmental Data Quality Workgroup, May 2020.
- Review of field duplicates was conducted according to the USEPA Region I New England Environmental Data Review Supplement for Region 1 Data Review Elements and Superfund Specific Guidance/Procedures, EQADR-Supplement2, September 2020.
- Trihydro Data Validation Variance Documentation, April 2022.

### OVERALL DATA PACKAGE ASSESSMENT

Based on a data validation review, the data are acceptable as delivered. Data qualified by the laboratory are discussed in Item 2 of the Validation Criteria Checklist.

The purpose of validating data and assigning qualifiers is to assist in proper data interpretation. Data that are not qualified meet the site data quality objectives. If values are assigned qualifiers other than an R (rejected, data not usable), the data may be used for site evaluation; however, consideration should be given to the reasons for qualification when interpreting sample concentrations. Data points that are assigned an R qualifier should not be used for site evaluation purposes.

If applicable, text was identified in **bold font** in the Validation Criteria Checklist to indicate that further action and/or qualification of the data were required. Data may have been qualified with J data flags by the laboratory if the result was greater than or equal to the method detection limit (MDL) but less than the reporting limit (RL). These laboratory-applied J flags were preserved, if present, and included in the Data Qualification Summary table at the end of this report. If applicable, data validation qualifiers were added for the items noted with crossed circles in the Validation Criteria section above. Please see the Data Qualification Summary table at the end of this report.

If data would be qualified with more than one flag, one qualifier was assigned based on the severity; however, all reasons for qualification were retained. Data that would be qualified with both J+ and J- flags were evaluated based on validation criteria and assigned the appropriate flag. The hierarchy of qualifiers from the most to least severe is as follows:

R > JB/U > NJ > J+/J- > J/UJ

Data qualifiers used during this validation are included in the following table.

<u>Qualifier</u>	Definition
J	Estimated concentration
J+	The result is an estimated concentration, but may be biased high
J-	The result is an estimated concentration, but may be biased low
UJ	Estimated reporting limit
U	Evaluated to be undetected at the reporting limit
JB	Estimated concentration due to blank contamination
R	Rejected, data not usable

### **Data Completeness**

The analyses were performed as requested on the CoC records. The associated samples were received by the laboratory and analyzed properly unless otherwise noted in the Criteria Checklist below. The complete data package consisted of 810 data points. The data completeness calculation does not include any submitted blank sample results. Fourteen data points were rejected. The data completeness measure for this data package is calculated to be 98.27% and is acceptable.



VALIDATION CRITERIA CHECKLIST							
1. Was the	e report free	of non-conformances identified by th	e laboratory?	No			
Comments:	The laborate	ory noted the following analytical nor	n-conformances related to this data set				
<u>Method 827</u> EPA Method OW-63, Dup	Method 8270C and Method 8270C SIM: Naphthalene, 1-methylnaphthalene, and 2-methylnaphthalene were reported by EPA Method 8270 instead of EPA Method 8270 SIM because of their elevated concentrations for sample OW-58, OW-58A, OW-63, Dup 9-20-22.						
Method 801	<u>5D DRO</u> : Th	e LCS/LCSD had slightly elevated re	ecoveries.				
2. Were th If no, de	2. Were the data free of data qualification flags and/or notes used by the laboratory? No lf no, define.						
Comments:	The laborate	ory used the following data qualificat	ion flags with this data set.				
D – Sample	diluted due t	o matrix.					
E – Estimate samples. T lab identifie	ed value. TP hese result: ed non-confe	H DRO and TPH MRO results were s were assigned J qualifiers if dete ormance.	e flagged by the laboratory with the ected, and non-detections were assi	E flag in the gned UJ due	submitted to this		
J – Analyte	detected belo	ow quantitation limits.					
P1 – RPD v	alue not appl	icable for sample concentrations les	s than 5 times the reporting limit.				
S – % Reco	very outside	of range due to dilution or matrix inte	erference.				
* – Value ex	ceeds maxin	num contaminant level.					
3. Were sa	ample CoC fo	orms and custody procedures compl	ete?	No			
Comments: and laborato sealed, and	The CoC re ory personne custody seal	cords from field to laboratory were co I signatures, dates, and times of rece Is were present and intact on the shi	omplete, and custody was maintained a eipt. The laboratory noted that the ship pping containers.	as evidenced ping containe	by field ers were		
The trip blar the appropri	nk sample wa ate volatile a	as received but was not included on t nalysis. Validation action was not re	the CoC. The laboratory logged in the equired.	sample and p	performed		
4. Were de permit,	etection limits or method, o	s in accordance with the quality assu r indicated as acceptable?	ırance project plan (QAPP),	Yes			
Comments:	The detection	on limits appeared to be acceptable.	The following dilutions were applied.				
	Method	Sample(s)	<u>Analyte(s)</u>	Dilution Factor			
	8015D	OW-58	TPH DRO and MRO	2			
	200.7	Multiple Samples	Total and Dissolved Barium	5			
	200.8	OW-67, OW-68	Select Total and Dissolved Metals	5			
	245.1	OW-67	Total Mercury	5			
	8015D	OW-58A	TPH DRO and MRO	5			
	8015D	DUP 9-20-22	TPH DRO and MRO	10			
	8015D	OW-58A	TPH GRO	20			
	8260B	OW-58A	Select VOC	20			
8015D OW-63, OW-58, DUP 9-20-22 TPH GRO 50							
	8260B	OW-63, OW-58, DUP 9-20-22	Select VOC	50			
	8260B	OW-58A	Benzene, Toluene	200			
	8260B	OW-58, DUP 9-20-22	Benzene	500			



VALIDATION CRITERIA CHECKLIST						
<ol> <li>Were the reported analytical methods and constituents in compliance with the QAPP, permit, or CoC?</li> </ol>	No					
Comments: The reported analytical methods were in compliance with the CoC, and the laboratory reported constituents in accordance with the CoC, with the following exceptions.	d the requested					
The CoC requested total and dissolved metals using only Method 200.7; however, the laboratory analyzed using both Method 200.7 and Method 200.8. This substituted analytical method, Method 200.8, met simila accuracy, and precision goals and, therefore, was an acceptable replacement.	the samples r sensitivity,					
The CoC requested cyanide using Method 335.4; however, the laboratory analyzed the samples using Met This substituted analytical method met similar sensitivity, accuracy, and precision goals and, therefore, was replacement.	hod 4500 CN E. s an acceptable					
6. Were samples received in good condition within method-specified requirements?	No					
Comments: Samples were received on ice, in good condition, and with the cooler temperatures within the temperature range of $4^{\circ}C \pm 2^{\circ}C$ between $3.1^{\circ}C$ and $5.4^{\circ}C$ as noted on the Sample Log-in Check List. San to Pace National were received in good condition with the cooler temperature within the recommended range of the CoC. Samples transferred to Vista Analytical Laboratory were received in good condition with temperature outside the recommended range at $1.4^{\circ}C$ as noted on the CoC and the Sample Login Checklin	recommended nples transferred ge at 2.0°C as n the cooler st.					
The cooler temperature below 2.0°C was judged as acceptable since the laboratory did not report the sample broken or frozen.	ple containers as					
7. Were samples extracted/digested and analyzed within method-specified or technical holding times?	No					
Comments: The samples were extracted/digested and analyzed within method-specific holding times.						
<u>PFAS Method:</u> Samples EB-09-20-22 and OW-63 were extracted for PFAs outside the defined holdin days by approximately 21 days. Detected results for samples EB-09-20-22 and OW-63 by Method P assigned J qualifiers based on the holding time exceedances. Non-detect results were assigned U based on the holding time exceedances.	ng time of 14 FAS were J qualifiers					
8. Were reported units appropriate for the sample matrix/matrices and analytical method(s)? Specify if wet or dry units were used for soil.	/es					
Comments: The results were reported in concentration units of nanograms per liter (ng/L), micrograms per milligrams per liter (mg/L), which were acceptable for the sample matrix and the analyses requested.	r liter (µg/L), and					
9. Did the laboratory provide any specific initial and/or continuing calibration results?	No					
Comments: Initial and continuing calibration data were not included as part of this data set.						
10. If initial and/or continuing calibration results were provided, were the results within acceptable limits?	N/A					
Comments: Initial and continuing calibration data were not included as part of this data set.						
11. Was the total number of laboratory blank samples prepared equal to at least 5% of the total number of samples or analyzed as required by the method?	Yes					
Comments: The total number of laboratory blank samples prepared was equal to at least 5% of the total number.	umber of					



	VALIDATION CRITERIA CHECKLIST								
12. Were t	arget analytes re	ported as	not detected in the labo	oratory blanks?		No			
Comments	: Target analytes	were repo	orted as not detected in	the laboratory b	planks, with the follo	wing exceptions	3.		
		Method	<u>Analyte</u>	Batch	<b>Concentration</b>				
		8015D	TPH DRO	70323	0.021 mg/L				
		8015D	TPH DRO	70376	0.025 mg/L				
The detect	tion of TPH DRO	in the as	sociated sample EB-0	9-20-22 that wa	is less than the ap	blicable report	ina limit		
was assigi	ned a U qualifier	. TPH DR	O results in samples	OW-60 and STI	P-1-NW that were g	reater than the	blank		
detection a	and/or the labor	atory repo	rting limit but less th	an 10 times the	blank concentrati	on were qualif	ed with		
JB flags. I	Non-detections of	the identi	fied analytes in the ass	ociated samples	and detections that	t were above th	e reporting		
innit and gr									
13. Was th	ne total number of	f MS samp	les prepared equal to a	at least 5% of the	e total	Yes			
numbe	er of samples of a	nalyzeu a:	s required by the metho	)u ?					
Comments	: The total numb	er of matri	k spike samples prepar	ed was equal to	at least 5% of the to	otal number of s	amples,		
analytical b	S samples were l	not prepar le set has	ed/reported for all analy	yses and/or batc	nes. The matrix spi	ike sample sour	ce for each		
anaryticar s	Method		Analytes	Batch	MS Sample	Source	]		
	200.7		Total Metals	70359	Not Prep	ared			
	200.7	Г	issolved Silver	A91423	DUP 9-2	0-22			
	200.7		issolved Silver	A91594	EB-09-2	0-22			
	200.7	D	issolved Metals	B91392	Not Prep	ared			
	200.8		Total Metals	70359	Not Prep	ared			
	200.8	D	issolved Metals	B91237	EB-09-2	0-22			
	245.1	Total ar	nd Dissolved Mercurv	70390	OW-6	57			
	504.1		EDB	70321	DUP 9-2	0-22			
	PFAS Method		PFAs	B22J201	Not Prep	ared			
	4500CN E		Cyanide	WG1930995	Not Associated,	EB-09-20-22			
	8015D	TPI	H DRO and MRO	70323	Not Prep	ared			
	8015D	TPI	H DRO and MRO	70376	Not Prep	ared			
	8015D		TPH GRO	A91300	Not Prep	ared			
	8015D		TPH GRO	R91291	OW-6	3			
	8260B		VOCs	R91223	Not Prep	ared			
	8270C SIM		SVOCs	70340	Not Prep	ared			
	8270C		SVOCs	70340	Not Prep	ared	1		
		1		1	I		J		

Not Associated – The MS sample source was not associated with this project.

Not Prepared – Matrix spikes were not prepared/reported for this batch.

14. For MS/MSDs prepared from project samples, were percent recoveries and RPDs within data validation or laboratory quality control (QC) limits?

Yes

Comments: The MS/MSD percent recoveries and RPDs for project samples were within data validation and laboratory QC limits.

The percent recoveries and RPD values for MS/MSDs prepared from non-project samples were evaluated and considered, but data were not qualified based on those results since matrix similarity to project samples could not be guaranteed.



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<ul> <li>The second second</li></ul>									
Comme	nts: The total nu	mber of LCS samples analyzed was	s equal to at least 5% of	the total numb	er of samples.				
16. Wei labo	re LCS/LCSD pe oratory QC limits	rcent recoveries and LCS/LCSD RF ?	PDs within data validatio	n or	No				
Comme limits, wi	nts: The LCS an ith the following e	d LCSD percent recoveries and LC exceptions.	S/LCSD RPDs were wit	hin data validat	ion and laborato	ry QC			
The LCS 31.7-75. for TPH detection	S and LCSD rec 4% at 77.7% an DRO or TPH M ns for TPH DRO	overies for TPH DRO in Method 8 d 76.9%, respectively, indicating RO were qualified with J+ flags d or TPH MRO did not require qualifie	015D batch 70376 wer a potential high bias. ue to potential high bia cation.	e outside the a Associated sa as. Associated	acceptance limi mples with deta samples with no	its of ections on-			
17. Wei	re surrogate reco	overies within laboratory QC limits?			No				
Comme	nts: Surrogate re	ecoveries were within laboratory QC	limits, with the following	g exceptions.					
	Method	Surrogate	Sample	<u>Surrogate</u> Recovery	QC Limits				
	8270 SIM	8270 SIM Nitrobenzene-d₅ EB-09-20-22 23.3%							
	8270 SIM	2-Fluorobiphenyl	EB-09-20-22	25.5%	26.7-90.1%				
	8270 SIM	4-Terphenyl-d₁₄	EB-09-20-22	31.9%	72.3-147%				
	8015D	BFB	OW-58A	171%	70-130%				
	8015D	BFB	OW-64	278%	70-130%				
	8015D	BFB	OW-60	189%	70-130%				
	8015D	BFB	OW-68	3,180%	70-130%				
	8270C	2-Fluorophenol	OW-68	2.59%	15-84.5%				
	8270C	Phenol-d₅	OW-68	10.2%	15-67%				
	8270C	2,4,6-Tribromophenol	OW-68	2.97%	15-108%				
	8015D	BFB	OW-67	1,060%	70-130%				
	8270C	2-Fluorophenol	OW-67	0.299%	15-84.5%				
	8270C	Phenol-d₅	OW-67	0.653%	15-67%				

VALIDATION CRITERIA CHECKLIST

TPH GRO was detected in the Method 8015D analysis of samples OW-58A, OW-64, OW-68, and OW-67, and these results were qualified as J+ to indicate a potential high bias. TPH GRO was not detected in sample OW-60, and qualification of data was not required.

2,4,6-Tribromophenol

**OW-67** 

0.0%

15-108%

Since Method 8270C and 8270C SIM surrogate associations were not available from the laboratory, qualification was assigned to all of the target analytes in a given fraction (acid or base/neutral) when two or more surrogates from the same fraction (acid or base/neutral) were outside the acceptance range. This condition did not exist for the Method 8270C SIM analysis of samples OW-63, OW-58A, OW-58, OW-64, STP-1-NW, OW-60, OW-68, OW-67, and DUP 9-20-22, and for the Method 8270C analysis of samples EB-09-20-22 and OW-58A, and qualification of sample data was not required.

The analyte pyrene was detected in the sample EB-09-20-22 Method 8270C SIM analysis, and this result was qualified as J- due to evidence of potential low bias. The remaining associated analytes in the sample EB-09-20-22 Method 8270C SIM analysis were not detected, and these results were qualified as UJ.

The analytes in the acid fraction of samples OW-68 and OW-67 were not detected. Since at least 2 of 3 surrogates were recovered below 10%, these results were qualified as R to indicate rejected (not usable) data based on evidence of extreme low bias.



8270C

### VALIDATION CRITERIA CHECKLIST

The TPH DRO and TPH MRO results for sample DUP 9-20-22 were not qualified based on the surrogate non-conformance in the Method 8015D analysis since the applied dilution of 10 times resulted in a surrogate concentration below routinely calibrated levels, and that result was deemed unreliable and possibly inaccurate.

Qualification of sample data was not required based on surrogate non-conformances in QC samples as the environmental samples were evaluated based on their specific surrogate recoveries.

Were the number of trip blank, field blank, and/or equipment blank samples
 Yes collected equal to at least 10% of the total number of samples or as required by the project guidelines, QAPP, SAP, or permit?

Comments: The number of trip, field, and equipment blanks collected was equal to at least 10% of the number of samples. One trip blank sample, Trip Blank, one field blank sample, FB 9-20-22, and one equipment blank sample, EB-09-20-22, were collected as part of this sample set.

19. Were target analytes reported as not detected in the trip blank, field blank, and/or equipment blank samples?

No

Comments: Target analytes were not detected in the trip blank, field blank, and equipment blank samples with the following exceptions.

Blank Sample ID	Method	Analyte	Concentration
Trip Blank	8260B	Acetone	6.8 µg/L
FB 9-20-22	8260B	Acetone	11 µg/L
EB-09-20-22	200.7	Dissolved Chromium	0.0023 mg/L
EB-09-20-22	200.7	Dissolved Vanadium	0.0022 mg/L
EB-09-20-22	200.7	Dissolved Zinc	0.0066 mg/L
EB-09-20-22	8015D	TPH DRO	0.027 mg/L
EB-09-20-22	8260B	Acetone	7.0 μg/L
EB-09-20-22	8270C	Di-n-butylphthalate	12 µg/L
EB-09-20-22	8270C SIM	Pyrene	0.34 μg/L

Detections of the identified analytes in the associated samples that were less than the blank results and/or less than the applicable reporting limits were assigned U qualifiers. Detections of acetone and dissolved zinc in the associated samples that were greater than the reporting limits but less than or equal to 10 times the blank results were assigned JB qualifiers. Non-detections of the identified analytes in the associated samples did not require qualification.

The TPH DRO results for the samples in batches 70323 and 70376 were previously qualified due to laboratory blank detections; therefore, additional qualification due to the equipment blank contamination was not required.

20. Was the number of field duplicates collected equal to at least 10% of the total Yes number of samples or as required by the project guidelines, QAPP, SAP, or permit?

Comments: The number of field duplicates collected was equal to at least 10% of the number of samples.

Sample DUP 9-20-22 was collected as a field duplicate of sample OW-58A.



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VALIDATION CRITERIA CHECKLIST									
21. Were field duplicate RPD values within data validation QC limits (soil 0-50%, water No 0-30%, or air 0-25%)?									
Comments: As indicated in the Field Duplicate Summary Table at the end of this report, field duplicate RPD values were within data validation QC limits of 0-30% for water samples, with the following exceptions.									
The RPD values for multiple analytes exceeded the data validation limit of 30%. The results for these analytes in samples OW-58A and DUP 9-20-22 were assigned J qualifiers due to evidence of poor precision.									
The RPD value TPH DRO were TPH DRO in th	e for TPH DRO greatly ex e assigned J qualifiers for ne associated samples d	cceeded the data validati or the parent and field du ue to evidence of extrem	ion limit of 30% at uplicate samples, a nely poor precision	113.7%. The reportend and J qualifiers for t (RPD > 100%).	ed results for he results for				
22. For laboratory duplicates prepared from project samples, were RPDs within data N/A validation or laboratory QC limits?									
Comments: La associated with	boratory duplicates were this data set.	prepared for the analysis o	of cyanide in batch V	VG1930995 from sar	nples not				
The RPD value but data were r	es for the laboratory duplic not qualified based on the	ate samples prepared from se results since matrix sim	n non-project sampl ilarity to project sam	es were evaluated ar ples could not be gu	nd considered, aranteed.				
23. Were the f	ollowing data relationship	s realistic?							
• Targe EPH/8	t analytes were reported b 3270)?	y more than one method (	(e.g., 8260/8270,	N	/A				
Comments: Ta	arget analytes were not re	oorted by more than one m	nethod						
Boin to results Comments: Th	s were greater than or equine following table contains	the exceptions in which th	, and the total metals results? ne dissolved metals	results exceeded the	total metals				
results.	Sample ID	Analyte	<u>Total Result</u> (mg/L)	Dissolved Result (mg/L)					
	OW-58	Mercury	ND	0.00016					
	OW-64	Mercury	0.00016	0.00017					
	OW-68	Mercury	0.00025	0.00027					
	OW-64	Arsenic	0.0024	0.0026					
	EB-09-20-22	Chromium	ND	0.0023					
	OW-58	Nickel	0.037	0.038					
	OW-58	Selenium	ND	0.00044					
	STP-1-NW	Selenium	0.0050	0.0059					
	OW-63	Silver	ND	0.0015					
	OW-58	Silver	ND	0.0013					
	STP-1-NW	Silver	ND	0.0020					
	OW-60	Silver	ND	0.0021					
	OW-68	Silver	0.0059	0.0087					
	OW-67	Silver	0.015	0.020					



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VALIDATION CRITERIA CHECKLIST									
	Sample ID	<u>Analyte</u>	<u>Total Result</u> (mg/L)	Dissolved Result (mg/L)					
	DUP 9-20-22	Silver	ND	0.0016					
	EB-09-20-22	Vanadium	ND	0.0022					
	OW-63	Vanadium	ND	0.0045					
	OW-58	Vanadium	0.0045	0.0050					
	OW-64	Vanadium	0.0068	0.0074					
	STP-1-NW	Vanadium	0.0033	0.0039					
	EB-09-20-22	Zinc	ND	0.0066					
	OW-63	Zinc	ND	0.012					
	OW-58	Zinc	ND	0.0059					
	OW-64	Zinc	ND	0.038					
	OW-68	Zinc	0.013	0.036					
	OW-67	Zinc	0.011	0.035					
The EPA has no	t provided guidance or re	equirements for the evalua	tion, validation, and	qualification of disso					

results that exceed the corresponding total metals results. Therefore, qualification of results was not performed based on these data.



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Client Sample ID: OW-58A Field Duplicate Sample ID: DUP 9-20-22									
Analyte	Method	Laboratory Result	Duplicate Result	Relative Percent Difference (RPD)					
Barium, Dissolved	E 200.7	0.92 mg/L	0.90 mg/L	2.2%					
Barium, Total	E 200.7	1.1 mg/L	1.1 mg/L	0.0%					
Chromium, Total	E 200.7	0.0045 mg/L	0.0037 mg/L	19.5% +/-RL					
Cobalt, Total	E 200.7	ND (0.0060 mg/L)	0.0086 mg/L	DL					
Nickel, Dissolved	E 200.7	0.038 mg/L	0.035 mg/L	8.2%					
Nickel, Total	E 200.7	0.037 mg/L	0.037 mg/L	0.0%					
Silver, Dissolved	E 200.7	ND (0.0050 mg/L)	0.0016 mg/L	DL					
Vanadium, Dissolved	E 200.7	0.0059 mg/L	0.0045 mg/L	26.9% +/-RL					
Vanadium, Total	E 200.7	0.016 mg/L	0.020 mg/L	22.2% +/-RL					
Zinc, Dissolved	E 200.7	0.011 mg/L	0.0099 mg/L	10.5% +/-RL					
Zinc, Total	E 200.7	0.014 mg/L	0.013 mg/L	7.4% +/-RL					
Arsenic, Dissolved	E200.8	0.0036 mg/L	0.0037 mg/L	2.7%					
Arsenic, Total	E200.8	0.0047 mg/L	0.0050 mg/L	6.2%					
Lead, Dissolved	E200.8	0.0012 mg/L	0.0011 mg/L	8.7%					
Lead, Total	E200.8	0.012 mg/L	0.0089 mg/L	29.7%					
Selenium, Dissolved	E200.8	0.00042 mg/L	ND (0.0010 mg/L)	DL					
Selenium, Total	E200.8	0.00081 mg/L	0.00070 mg/L	14.6% +/-RL					
TPH DRO	SW8015	16 mg/L	4.4 mg/L	113.7%					
TPH GRO	SW8015	58 mg/L	46 mg/L	23.1%					
1,2,4-Trimethylbenzene	SW8260B	780 μg/L	520 μg/L	40.0%					
1,3,5-Trimethylbenzene	SW8260B	210 μg/L	140 µg/L	40.0%					
Benzene	SW8260B	8900 µg/L	8700 μg/L	2.3%					
Ethylbenzene	SW8260B	1000 µg/L	840 µg/L	17.4%					
lsopropylbenzene	SW8260B	71 µg/L	58 µg/L	20.2%					
MTBE	SW8260B	2200 µg/L	2200 µg/L	0.0%					
n-Butylbenzene	SW8260B	19 µg/L	19 µg/L	0.0% +/-RL					
n-Propylbenzene	SW8260B	130 µg/L	110 µg/L	16.7%					
p-Isopropyltoluene	SW8260B	13 µg/L	12 µg/L	8.0% +/-RL					
sec-Butylbenzene	SW8260B	16 µg/L	14 µg/L	13.3% +/-RL					
Toluene	SW8260B	6,300 µg/L	4,600 µg/L	31.2%					
Xylenes, Total	SW8260B	4,300 µg/L	3,100 µg/L	32.4%					
1-Methylnaphthalene	SW8270C	76 µg/L	64 µg/L	17.1%					
2,4-Dimethylphenol	SW8270C	6.5 µg/L	7.7 μg/L	16.9% +/-RL					
2-Methylnaphthalene	SW8270C	87 µg/L	71 µg/L	20.3%					
2-Methylphenol	SW8270C	11 µg/L	8.5 µg/L	25.6% +/-RL					

### FIELD DUPLICATE SUMMARY



Analyte	Method	Laboratory Result	Duplicate Result	Relative Percent Difference (RPD)
3,4-Methylphenol	SW8270C	5.4 μg/L	ND (10 µg/L)	DL
Acenaphthene	SW8270C	2.6 µg/L	2.3 µg/L	12.2%
Anthracene	SW8270C	0.66 µg/L	0.48 μg/L	31.6%
Benzo(a)anthracene	SW8270C	0.20 µg/L	ND (0.30 µg/L)	DL
Fluoranthene	SW8270C	0.50 µg/L	0.34 µg/L	38.1% +/-RL
Fluorene	SW8270C	4.7 μg/L	3.9 µg/L	18.6%
Naphthalene	SW8270C	160 µg/L	130 µg/L	20.7%
Phenanthrene	SW8270C	5.8 µg/L	4.5 µg/L	25.2%
Phenol	SW8270C	22 µg/L	ND (20 µg/L)	DL
Pyrene	SW8270C	0.58 µg/L	0.38 µg/L	41.7% +/-RL

Field duplicate RPD control limits are not to exceed 30% for water as established by USEPA Region I - New England Environmental Data Review Supplement for Region 1 Data Review Elements and Superfund Specific Guidance/Procedures, EQADR-Supplement2, September 2020.

DL – Indicates that the analyte was detected in one of the duplicate samples and was undetected in the other sample, and therefore an RPD could not be calculated. Data were not qualified since the detection was within two times the reporting limit. Non-detected results are indicated above with the applicable reporting limit as ND (RL).

+/-RL – Indicates that the detections in both of the samples were within two times the reporting limit. Qualification of data was not required.

The RPD values for multiple analytes exceeded the data validation limit of 30%, which was evidence of poor precision. These analyte results were qualified as J for samples OW-58A and DUP 9-20-22.

The RPD value for TPH DRO greatly exceeded the data validation limit of 30% at 113.7%. The reported results for TPH DRO were assigned J qualifiers for the parent and field duplicate samples, and J qualifiers for the results for TPH DRO in the associated samples due to evidence of extremely poor precision (RPD > 100%).



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### DATA QUALIFICATION SUMMARY

Abbreviation	Reason
EBD	Equipment blank detection
EBL	Flagged as estimated by the laboratory.
ERPD-FD	High field duplicate RPD.
HT-EX	Sample was extracted outside of the method holding time.
HR-LCS	The LCS and/or LCSD percent recovery was greater than the upper acceptable limit indicating a possible high bias.
HR-SUR	The surrogate percent recovery was greater than the upper acceptable limit indicating a possible high bias.
LR-SUR	The surrogate percent recovery was less than the lower acceptable limit indicating a possible low bias.
MBD	Method blank detection
MDLRL	Flagged by the laboratory: The result was greater than the MDL but less than the RL.
TBD	Trip blank detection

Analyte	Method	Field Sample ID	Lab Sample ID	Result	Limit	Units	Reviewer Qualifier	DV Flag Reasons
1,2,4-Trimethylbenzene	SW8260B	OW-58A	2209A41-004a	780	20	µg/L	J	ERPD-FD
1,2,4-Trimethylbenzene	SW8260B	DUP 9-20-22	2209A41-012a	520	50	µg/L	J	ERPD-FD
1,2,4-Trimethylbenzene	SW8260B	OW-58	2209A41-005a	8.6	50	µg/L	J	MDLRL
1,3,5-Trimethylbenzene	SW8260B	OW-58A	2209A41-004a	210	20	µg/L	J	ERPD-FD
1,3,5-Trimethylbenzene	SW8260B	DUP 9-20-22	2209A41-012a	140	50	µg/L	J	ERPD-FD
1,4-Dioxane	SW8270C	EB-09-20-22	2209a41-001c	ND	1.0	µg/L	UJ	LR-SUR
1,4-Dioxane	SW8270C	OW-60	2209a41-008c	0.26	1.0	µg/L	J	MDLRL
1-Methylnaphthalene	SW8270C	EB-09-20-22	2209a41-001c	ND	0.30	µg/L	UJ	LR-SUR
2,4,6-Trichlorophenol	SW8270C	OW-68	2209A41-009C	ND	10	µg/L	R	LR-SUR
2,4,6-Trichlorophenol	SW8270C	OW-67	2209A41-010C	ND	10	µg/L	R	LR-SUR
2,4-Dimethylphenol	SW8270C	OW-68	2209A41-009C	ND	10	µg/L	R	LR-SUR
2,4-Dimethylphenol	SW8270C	OW-67	2209A41-010C	ND	10	µg/L	R	LR-SUR



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Analyte	Method	Field Sample ID	Lab Sample ID	Result	Limit	Units	Reviewer Qualifier	DV Flag Reasons
2,4-Dimethylphenol	SW8270C	OW-58A	2209A41-004C	6.5	10	µg/L	J	MDLRL
2,4-Dimethylphenol	SW8270C	DUP 9-20-22	2209A41-012C	7.7	10	µg/L	J	MDLRL
2,4-Dinitrophenol	SW8270C	OW-68	2209A41-009C	ND	20	µg/L	R	LR-SUR
2,4-Dinitrophenol	SW8270C	OW-67	2209A41-010C	ND	20	µg/L	R	LR-SUR
2-Methylnaphthalene	SW8270C	EB-09-20-22	2209a41-001c	ND	0.30	µg/L	UJ	LR-SUR
2-Methylphenol	SW8270C	OW-68	2209A41-009C	ND	10	µg/L	R	LR-SUR
2-Methylphenol	SW8270C	OW-67	2209A41-010C	ND	10	µg/L	R	LR-SUR
2-Methylphenol	SW8270C	DUP 9-20-22	2209A41-012C	8.5	10	µg/L	J	MDLRL
3,4-Methylphenol	SW8270C	OW-68	2209A41-009C	ND	10	µg/L	R	LR-SUR
3,4-Methylphenol	SW8270C	OW-67	2209A41-010C	ND	10	µg/L	R	LR-SUR
3,4-Methylphenol	SW8270C	OW-58A	2209A41-004C	5.4	10	µg/L	J	MDLRL
Acenaphthene	SW8270C	EB-09-20-22	2209a41-001c	ND	0.30	µg/L	UJ	LR-SUR
Acenaphthene	SW8270C	OW-64	2209a41-006c	0.16	0.30	µg/L	J	MDLRL
Acetone	SW8260B	FB 9-20-22	2209A41-011a	11	10	µg/L	JB	TBD
Acetone	SW8260B	Trip Blank	2209A41-013a	6.8	10	µg/L	J	MDLRL
Acetone	SW8260B	EB-09-20-22	2209A41-001a	7.0	10	µg/L	U	MDLRL, TBD
Acetone	SW8260B	OW-64	2209A41-006a	9.0	10	µg/L	U	MDLRL, TBD
Acetone	SW8260B	STP-1-NW	2209A41-007a	7.1	10	µg/L	U	MDLRL, TBD
Acetone	SW8260B	OW-60	2209A41-008a	5.0	10	µg/L	U	MDLRL, TBD
Acetone	SW8260B	OW-68	2209A41-009a	7.2	10	µg/L	U	MDLRL, TBD
Anthracene	SW8270C	EB-09-20-22	2209a41-001c	ND	0.30	µg/L	UJ	LR-SUR
Anthracene	SW8270C	OW-58A	2209a41-004c	0.66	0.30	µg/L	J	ERPD-FD
Anthracene	SW8270C	DUP 9-20-22	2209a41-012c	0.48	0.30	µg/L	J	ERPD-FD
Anthracene	SW8270C	OW-64	2209a41-006c	0.24	0.30	µg/L	J	MDLRL
Benzo(a)anthracene	SW8270C	EB-09-20-22	2209a41-001c	ND	0.30	µg/L	UJ	LR-SUR
Benzo(a)anthracene	SW8270C	OW-58A	2209a41-004c	0.2	0.30	µg/L	J	MDLRL
Benzo(b)fluoranthene	SW8270C	EB-09-20-22	2209a41-001c	ND	0.30	µg/L	UJ	LR-SUR



Analyte	Method	Field Sample ID	Lab Sample ID	Result	Limit	Units	Reviewer Qualifier	DV Flag Reasons
Benzoic Acid	SW8270C	OW-68	2209A41-009C	ND	20	µg/L	R	LR-SUR
Benzoic Acid	SW8270C	OW-67	2209A41-010C	ND	20	µg/L	R	LR-SUR
Beryllium, Total	E 200.7	OW-60	2209A41-008D	0.0012	0.0020	mg/L	J	MDLRL
Beryllium, Total	E 200.7	OW-68	2209A41-009D	0.0011	0.0020	mg/L	J	MDLRL
Beryllium, Total	E 200.7	OW-67	2209A41-010D	0.0014	0.0020	mg/L	J	MDLRL
Chromium, Dissolved	E 200.7	OW-60	2209A41-008E	0.0046	0.0060	mg/L	U	EBD, MDLRL
Chromium, Dissolved	E 200.7	EB-09-20-22	2209A41-001E	0.0023	0.0060	mg/L	J	MDLRL
Chromium, Total	E 200.7	OW-58A	2209A41-004D	0.0045	0.0060	mg/L	J	MDLRL
Chromium, Total	E 200.7	DUP 9-20-22	2209A41-012D	0.0037	0.0060	mg/L	J	MDLRL
Chrysene	SW8270C	EB-09-20-22	2209a41-001c	ND	0.30	µg/L	UJ	LR-SUR
Fluoranthene	SW8270C	EB-09-20-22	2209a41-001c	ND	0.30	µg/L	UJ	LR-SUR
Fluoranthene	SW8270C	OW-58	2209a41-005c	0.2	0.30	µg/L	J	MDLRL
Fluorene	SW8270C	EB-09-20-22	2209a41-001c	ND	0.30	µg/L	UJ	LR-SUR
Fluorene	SW8270C	OW-68	2209a41-009c	0.18	0.30	µg/L	J	MDLRL
Indeno(1,2,3-cd)pyrene	SW8270C	EB-09-20-22	2209a41-001c	ND	0.30	µg/L	UJ	LR-SUR
Isopropylbenzene	SW8260B	OW-58	2209A41-005a	28	50	µg/L	J	MDLRL
Lead, Dissolved	E200.8	OW-64	2209A41-006E	0.000065	0.00050	mg/L	J	MDLRL
Lead, Total	E200.8	OW-63	2209A41-003D	0.000087	0.00050	mg/L	J	MDLRL
Lead, Total	E200.8	OW-58	2209A41-005D	0.00020	0.00050	mg/L	J	MDLRL
Lead, Total	E200.8	OW-64	2209A41-006D	0.00039	0.00050	mg/L	J	MDLRL
Mercury, Dissolved	E245.1	OW-58	2209A41-005E	0.00016	0.00020	mg/L	J	MDLRL
Mercury, Dissolved	E245.1	OW-64	2209A41-006E	0.00017	0.00020	mg/L	J	MDLRL
Mercury, Total	E245.1	OW-64	2209A41-006D	0.00016	0.00020	mg/L	J	MDLRL
МТВЕ	SW8260B	OW-68	2209A41-009a	0.60	1.0	µg/L	J	MDLRL
Naphthalene	SW8270C	EB-09-20-22	2209a41-001c	ND	0.30	µg/L	UJ	LR-SUR
n-Butylbenzene	SW8260B	OW-58A	2209A41-004a	19	60	µg/L	J	MDLRL
n-Butylbenzene	SW8260B	OW-58	2209A41-005a	14	150	µg/L	J	MDLRL



Analyte	Method	Field Sample ID	Lab Sample ID	Result	Limit	Units	Reviewer Qualifier	DV Flag Reasons
n-Butylbenzene	SW8260B	OW-68	2209A41-009a	0.66	3.0	µg/L	J	MDLRL
n-Butylbenzene	SW8260B	DUP 9-20-22	2209A41-012a	19	150	µg/L	J	MDLRL
Nickel, Dissolved	E 200.7	OW-60	2209A41-008E	0.0038	0.01	mg/L	J	MDLRL
Phenanthrene	SW8270C	EB-09-20-22	2209a41-001c	ND	0.30.	µg/L	UJ	LR-SUR
Phenol	SW8270C	OW-68	2209A41-009C	ND	20	µg/L	R	LR-SUR
Phenol	SW8270C	OW-67	2209A41-010C	ND	20	µg/L	R	LR-SUR
p-Isopropyltoluene	SW8260B	OW-58A	2209A41-004a	13	20	µg/L	J	MDLRL
p-Isopropyltoluene	SW8260B	OW-68	2209A41-009a	0.24	10	µg/L	J	MDLRL
p-Isopropyltoluene	SW8260B	DUP 9-20-22	2209A41-012a	12	50	µg/L	J	MDLRL
Pyrene	SW8270C	EB-09-20-22	2209a41-001c	0.34	1.0	µg/L	J-	LR-SUR, MDLRL
Pyrene	SW8270C	OW-58A	2209a41-004c	0.58	1.0	µg/L	U	EBD, MDLRL
Pyrene	SW8270C	OW-64	2209a41-006c	0.36	1.0	µg/L	U	EBD, MDLRL
Pyrene	SW8270C	DUP 9-20-22	2209a41-012c	0.38	1.0	µg/L	U	EBD, MDLRL
sec-Butylbenzene	SW8260B	OW-58A	2209A41-004a	16	20	µg/L	J	MDLRL
sec-Butylbenzene	SW8260B	OW-68	2209A41-009a	0.60	1.0	µg/L	J	MDLRL
sec-Butylbenzene	SW8260B	DUP 9-20-22	2209A41-012a	14	50	µg/L	J	MDLRL
Selenium, Dissolved	E200.8	OW-58A	2209A41-004E	0.00042	0.0010	mg/L	J	MDLRL
Selenium, Dissolved	E200.8	OW-58	2209A41-005E	0.00044	0.0010	mg/L	J	MDLRL
Selenium, Dissolved	E200.8	OW-67	2209A41-010E	0.00095	0.0010	mg/L	J	MDLRL
Selenium, Total	E200.8	OW-58A	2209A41-004D	0.00081	0.0010	mg/L	J	MDLRL
Selenium, Total	E200.8	DUP 9-20-22	2209A41-012D	0.0007	0.0010	mg/L	J	MDLRL
Silver, Dissolved	E 200.7	OW-63	2209A41-003E	0.0015	0.0050	mg/L	J	MDLRL
Silver, Dissolved	E 200.7	OW-58	2209A41-005E	0.0013	0.0050	mg/L	J	MDLRL
Silver, Dissolved	E 200.7	STP-1-NW	2209A41-007E	0.0020	0.0050	mg/L	J	MDLRL
Silver, Dissolved	E 200.7	OW-60	2209A41-008E	0.0021	0.0050	mg/L	J	MDLRL
Silver, Dissolved	E 200.7	DUP 9-20-22	2209A41-012E	0.0016	0.0050	mg/L	J	MDLRL
Toluene	SW8260B	OW-58A	2209A41-004a	6300	200	µg/L	J	ERPD-FD


Analyte	Method	Field Sample ID	Lab Sample ID	Result	Limit	Units	Reviewer Qualifier	DV Flag Reasons
Toluene	SW8260B	DUP 9-20-22	2209A41-012a	4600	50	µg/L	J	ERPD-FD
Toluene	SW8260B	OW-63	2209A41-003a	43	50	µg/L	J	MDLRL
Toluene	SW8260B	OW-58	2209A41-005a	42	50	µg/L	J	MDLRL
Toluene	SW8260B	OW-64	2209A41-006a	0.71	1.0	µg/L	J	MDLRL
Toluene	SW8260B	OW-68	2209A41-009a	0.80	1.0	µg/L	J	MDLRL
TPH DRO	SW8015	OW-63	2209A41-003C	2.8	0.064	mg/L	J	EBL, ERPD-FD
TPH DRO	SW8015	OW-58A	2209A41-004C	16	0.32	mg/L	J	EBL, ERPD-FD
TPH DRO	SW8015	OW-58	2209A41-005C	7.3	0.13	mg/L	J	EBL, ERPD-FD
TPH DRO	SW8015	OW-64	2209A41-006C	0.57	0.064	mg/L	J	EBL, ERPD-FD
TPH DRO	SW8015	OW-68	2209A41-009C	1.5	0.064	mg/L	J+	EBL, ERPD-FD, HR-LCS
TPH DRO	SW8015	OW-67	2209A41-010C	0.73	0.064	mg/L	J+	EBL, ERPD-FD, HR-LCS
TPH DRO	SW8015	DUP 9-20-22	2209A41-012C	4.4	0.64	mg/L	J+	EBL, ERPD-FD, HR-LCS
TPH DRO	SW8015	STP-1-NW	2209A41-007C	0.16	0.064	mg/L	JB	EBL, ERPD-FD, MBD
TPH DRO	SW8015	OW-60	2209A41-008C	0.097	0.064	mg/L	JB	EBL, ERPD-FD, MBD
TPH DRO	SW8015	EB-09-20-22	2209A41-001C	0.027	0.064	mg/L	U	EBL, ERPD-FD, MBD, MDLRL
TPH GRO	SW8015	OW-58A	2209a41-004a	58	1.0	mg/L	J+	HR-SUR
TPH GRO	SW8015	OW-64	2209a41-006a	0.52	0.050	mg/L	J+	HR-SUR
TPH GRO	SW8015	OW-68	2209a41-009a	0.84	0.050	mg/L	J+	HR-SUR
TPH GRO	SW8015	OW-67	2209a41-010a	0.12	0.050	mg/L	J+	HR-SUR
TPH ORO	SW8015	EB-09-20-22	2209A41-001C	ND	0.080	mg/L	UJ	EBL
TPH ORO	SW8015	OW-63	2209A41-003C	ND	0.080	mg/L	UJ	EBL
TPH ORO	SW8015	OW-58A	2209A41-004C	ND	0.40	mg/L	UJ	EBL
TPH ORO	SW8015	OW-58	2209A41-005C	ND	0.16	mg/L	UJ	EBL
TPH ORO	SW8015	OW-64	2209A41-006C	ND	0.080	mg/L	UJ	EBL
TPH ORO	SW8015	STP-1-NW	2209A41-007C	ND	0.080	mg/L	UJ	EBL
TPH ORO	SW8015	OW-60	2209A41-008C	ND	0.080	mg/L	UJ	EBL
TPH ORO	SW8015	OW-67	2209A41-010C	ND	0.08	mg/L	UJ	EBL



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Analyte	Method	Field Sample ID	Lab Sample ID	Result	Limit	Units	Reviewer Qualifier	DV Flag Reasons
TPH ORO	SW8015	DUP 9-20-22	2209A41-012C	ND	0.80	mg/L	UJ	EBL
TPH ORO	SW8015	OW-68	2209A41-009C	0.076	0.080	mg/L	J+	EBL, HR-LCS, MDLRL
Vanadium, Dissolved	E 200.7	OW-63	2209A41-003E	0.0045	0.050	mg/L	U	EBD, MDLRL
Vanadium, Dissolved	E 200.7	OW-58A	2209A41-004E	0.0059	0.050	mg/L	U	EBD, MDLRL
Vanadium, Dissolved	E 200.7	OW-58	2209A41-005E	0.005	0.050	mg/L	U	EBD, MDLRL
Vanadium, Dissolved	E 200.7	OW-64	2209A41-006E	0.0074	0.050	mg/L	U	EBD, MDLRL
Vanadium, Dissolved	E 200.7	STP-1-NW	2209A41-007E	0.039	0.050	mg/L	U	EBD, MDLRL
Vanadium, Dissolved	E 200.7	OW-60	2209A41-008E	0.013	0.050	mg/L	U	EBD, MDLRL
Vanadium, Dissolved	E 200.7	OW-68	2209A41-009E	0.016	0.050	mg/L	U	EBD, MDLRL
Vanadium, Dissolved	E 200.7	OW-67	2209A41-010E	0.0068	0.050	mg/L	U	EBD, MDLRL
Vanadium, Dissolved	E 200.7	DUP 9-20-22	2209A41-012E	0.0045	0.050	mg/L	U	EBD, MDLRL
Vanadium, Dissolved	E 200.7	EB-09-20-22	2209A41-001E	0.0022	0.050	mg/L	J	MDLRL
Vanadium, Total	E 200.7	OW-58A	2209A41-004D	0.016	0.050	mg/L	J	MDLRL
Vanadium, Total	E 200.7	OW-58	2209A41-005D	0.0045	0.050	mg/L	J	MDLRL
Vanadium, Total	E 200.7	OW-64	2209A41-006D	0.0068	0.050	mg/L	J	MDLRL
Vanadium, Total	E 200.7	STP-1-NW	2209A41-007D	0.033	0.050	mg/L	J	MDLRL
Vanadium, Total	E 200.7	OW-60	2209A41-008D	0.042	0.050	mg/L	J	MDLRL
Vanadium, Total	E 200.7	OW-68	2209A41-009D	0.031	0.050	mg/L	J	MDLRL
Vanadium, Total	E 200.7	OW-67	2209A41-010D	0.030	0.050	mg/L	J	MDLRL
Vanadium, Total	E 200.7	DUP 9-20-22	2209A41-012D	0.020	0.050	mg/L	J	MDLRL
Xylenes, Total	SW8260B	OW-58A	2209A41-004a	4,300	30	µg/L	J	ERPD-FD
Xylenes, Total	SW8260B	DUP 9-20-22	2209A41-012a	3,100	75	µg/L	J	ERPD-FD
Zinc, Dissolved	E 200.7	OW-63	2209A41-003E	0.012	0.010	mg/L	JB	EBD
Zinc, Dissolved	E 200.7	OW-58A	2209A41-004E	0.011	0.010	mg/L	JB	EBD
Zinc, Dissolved	E 200.7	OW-64	2209A41-006E	0.038	0.010	mg/L	JB	EBD
Zinc, Dissolved	E 200.7	STP-1-NW	2209A41-007E	0.011	0.010	mg/L	JB	EBD
Zinc, Dissolved	E 200.7	OW-60	2209A41-008E	0.011	0.010	mg/L	JB	EBD



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Analyte	Method	Field Sample ID	Lab Sample ID	Result	Limit	Units	Reviewer Qualifier	DV Flag Reasons
Zinc, Dissolved	E 200.7	OW-68	2209A41-009E	0.036	0.010	mg/L	JB	EBD
Zinc, Dissolved	E 200.7	OW-67	2209A41-010E	0.035	0.010	mg/L	JB	EBD
Zinc, Dissolved	E 200.7	OW-58	2209A41-005E	0.0059	0.010	mg/L	U	EBD, MDLRL
Zinc, Dissolved	E 200.7	DUP 9-20-22	2209A41-012E	0.0099	0.010	mg/L	U	EBD, MDLRL
Zinc, Dissolved	E 200.7	EB-09-20-22	2209A41-001E	0.0066	0.010	mg/L	J	MDLRL



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Client: Marathon Oil	Laboratory: Hall Environmental Analysis Laboratory					
Project Name: Western Refining Southwest, Q3 GW Sampling	Sample Matrix: Groundwater					
Project Number: 697-080-002 Task 0006	Sample Start Date: 09/27/2022					
Date Validated: 12/02/2022	Sample End Date: 09/27/2022					
Parameters Included:						
<ul> <li>Volatile Organic Compounds (VOC) by Environmental Protection Agency (EPA) Test Methods for Evaluating Solid Waste (SW-846) Method 8260B</li> </ul>						
<ul> <li>1,2-Dibromoethane (EDB) by EPA Method 504.1</li> </ul>						
<ul> <li>Semivolatile Organic Compounds (SVOC) by SW-846 Me Monitoring (SIM)</li> </ul>	ethod 8270C and Method 8270 with Selected Ion					
<ul> <li>Total Petroleum Hydrocarbons (TPH) Gasoline Range Or</li> </ul>	ganics (GRO) by SW-846 Method 8015D					
<ul> <li>TPH Diesel Range Organics (DRO) and Motor Oil Range</li> </ul>	Organics (MRO) by SW-846 Modified Method 8015D					
<ul> <li>Total and Dissolved Metals by EPA Methods 200.7 and 2</li> </ul>	00.8					
<ul> <li>Total and Dissolved Mercury by EPA Method 245.1</li> </ul>						
<ul> <li>Cyanide by Standard Methods for the Examination of Water and Wastewater (SM) Method 4500 CN E</li> </ul>						
Laboratory Project ID: 2209E92						
Data Validator: Kyle Power, Environmental Chemist						
Reviewer: Charles Ballek, Senior Chemist						

# DATA EVALUATION CRITERIA SUMMARY

A Tier II Data Validation was performed by Trihydro Corporation's Chemical Data Evaluation Services Group on the analytical data report packages generated by Hall Environmental Analysis Laboratory of Albuquerque, New Mexico, with additional data from Pace Analytical National of Mount Juliet, Tennessee evaluating samples from the Marathon Oil site, located in Gallup, New Mexico.

Precision, accuracy, method compliance, and completeness of this data package were assessed during this data review. Precision was determined by evaluating the calculated relative percent difference (RPD) values from:

- Field duplicate pairs
- Laboratory duplicate pairs
- Matrix spike (MS) and matrix spike duplicate (MSD) pairs
- Laboratory control sample (LCS) and laboratory control sample duplicate (LCSD) pairs

Laboratory accuracy was established by reviewing the demonstrated percent recoveries (%R) of the following items to verify that data are not biased.

- MS/MSD samples
- LCS/LCSD samples
- Organic system monitoring compounds (surrogates)





Field accuracy was established by collecting and analyzing the following samples to monitor for possible ambient or cross contamination during sampling and transportation.

- Trip blank
- Field blank
- Equipment blank

Method compliance was established by reviewing sample integrity, holding times, detection limits, surrogate recoveries, laboratory blanks, initial and continuing calibrations (where applicable), and the LCS/LCSD percent recoveries against method-specific requirements.

Completeness was evaluated by determining the overall ratio of the number of samples and analyses planned versus the number of samples with valid analyses. Determination of completeness included a review of the chain-of-custody (CoC), laboratory analytical methods, and other laboratory and field documents associated with this analytical data set.

Client Sample ID	Laboratory Sample Number
EB-09-27-22	2209E92-001
OW-1	2209E92-002
BW-4B	2209E92-003
BW-5C	2209E92-004
BW-5B	2209E92-005
MKTF-44	2209E92-006
MKTF-43	2209E92-007
OW-10	2209E92-008
MKTF-32	2209E92-009
MKTF-41	2209E92-010
DUP-9-27-22	2209E92-011
FB 9-27-22	2209E92-012
Trip Blank	2209E92-013

### SAMPLE NUMBERS TABLE





The laboratory data were reviewed to evaluate compliance with the methods and the quality of the reported data. Assessment of CoC completeness is included in Item 3 of the Data Validation Checklist. A check mark ( $\checkmark$ ) indicates that the referenced validation criteria were deemed acceptable, whereas a crossed circle ( $\otimes$ ) indicates validation criteria for which the data have been qualified by the data validator. An empty circle ( $\bigcirc$ ) indicates that the specified criterion does not apply to the reviewed data. Details are noted in the tables below.

## Validation Criteria

- ✓ Data Completeness
- ⊗ Calibration Ranges (Item 2)
- ✓ CoC Documentation (Item 3)
- ✓ Holding Times and Preservation (Items 6 and 7)
- ✓ Initial and Continuing Calibrations (Items 9 and 10)
- ⊗ Laboratory Blanks (Items 11 and 12)
- ✓ MS/MSD (Items 13 and 14)
- ⊗ LCS/LCSD (Items 15 and 16)
- System Monitoring Compounds (i.e., Surrogates) (Item 17)
- 8 Field, Equipment, and Trip Blanks (Items 18 and 19)
- ⊗ Field Duplicate (Items 20 and 21)
- ✓ Laboratory Duplicates (Item 22)

### **Guidance References**

Chemical data validation was conducted in accordance with the United States Environmental Protection Agency (USEPA) Contract Laboratory Program (CLP) National Functional Guidelines for the analyses listed below, or by the appropriate method if not covered in the National Functional Guidelines.

- Data for organic analyses were evaluated according to validation criteria set forth in the USEPA CLP National Functional Guidelines for Organic Superfund Methods Data Review, document number EPA-540-R-20-005, November 2020 with additional reference to the USEPA CLP National Functional Guidelines for Organic Data Review, document number EPA 540/R-99/008, October 1999.
- Data for inorganic analyses were evaluated according to validation criteria set forth in the USEPA CLP National Functional Guidelines for Inorganic Superfund Methods Data Review, document number EPA-540-R-20-006, November 2020 with additional reference to the USEPA CLP National Functional Guidelines for Inorganic Data Review, document number EPA 540-R-04-004, October 2004.
- Review of field duplicates was conducted according to the USEPA Region I New England Environmental Data Review Supplement for Region 1 Data Review Elements and Superfund Specific Guidance/Procedures, EQADR-Supplement2, September 2020.
- Trihydro Data Validation Variance Documentation, April 2022.



Trihydro



## **OVERALL DATA PACKAGE ASSESSMENT**

Based on a data validation review, the data are acceptable as delivered. Data qualified by the laboratory are discussed in Item 2 of the Validation Criteria Checklist.

The purpose of validating data and assigning qualifiers is to assist in proper data interpretation. Data that are not qualified meet the site data quality objectives. If values are assigned qualifiers other than an R (rejected, data not usable), the data may be used for site evaluation; however, consideration should be given to the reasons for qualification when interpreting sample concentrations. Data points that are assigned an R qualifier should not be used for site evaluation purposes.

If applicable, text was identified in **bold font** in the Validation Criteria Checklist to indicate that further action and/or qualification of the data were required. Data may have been qualified with J data flags by the laboratory if the result was greater than or equal to the method detection limit (MDL) but less than the reporting limit (RL). These laboratory-applied J flags were preserved, if present, and included in the Data Qualification Summary table at the end of this report. If applicable, data validation qualifiers were added for the items noted with crossed circles in the Validation Criteria section above. Please see the Data Qualification Summary table at the end of this report.

If data would be qualified with more than one flag, one qualifier was assigned based on the severity; however, all reasons for qualification were retained. Data that would be qualified with both J+ and J- flags were evaluated based on validation criteria and assigned the appropriate flag. The hierarchy of qualifiers from the most to least severe is as follows:

R > JB/U > NJ > J+/J- > J/UJ

Data qualifiers used during this validation are included in the following table.

<u>Qualifier</u>	Definition
J	Estimated concentration
J+	The result is an estimated concentration, but may be biased high
J-	The result is an estimated concentration, but may be biased low
UJ	Estimated reporting limit
U	Evaluated to be undetected at the reporting limit
JB	Estimated concentration due to blank contamination
R	Rejected, data not usable

## **Data Completeness**

The analyses were performed as requested on the CoC records. The associated samples were received by the laboratory and analyzed properly unless otherwise noted in the Criteria Checklist below. The complete data package consisted of 900 data points. The data completeness calculation does not include any submitted blank sample results. Six data points were rejected. The data completeness measure for this data package is calculated to be 99.33% and is acceptable.



VALIDATION CRITERIA CHECKLIST							
1. Was the report free of non-conformances identified by the laboratory?	No						
Comments: The laboratory noted the following non-conformances regarding the analytical data.							
"S" flagged surrogate/spikes denote that the analyte recovery was outside of the standard limits.							
Method 8270C: 1,4-Dioxane is "E" flagged for sample MKTF-32 because the result was slightly above the calibration range.							
Method 8015D (DRO): The LCS had slightly elevated recovery. The LCSD had acceptable recoveries.							
<ol> <li>Were the data free of data qualification flags and/or notes used by the laboratory? If no, define.</li> </ol>	No						
Comments: The laboratory used the following data qualification flags with this data set.							
E – Estimated value. The 1,4-dioxane result for sample MKTF-32 with this laboratory flag was qua indicate an estimated concentration.	lified as J to						
J – Analyte detected below quantitation limits							
R – RPD outside of range							
S – % Recovery outside of range due to dilution or matrix interference.							
* – Value exceeds maximum contaminant level.							
3. Were sample CoC forms and custody procedures complete?	Yes						
Comments: The CoC records from field to laboratory were complete, and custody was maintained as evand laboratory personnel signatures, dates, and times of receipt. Custody seals were not present or requestions were delivered to the laboratory by courier, and custody was maintained at all times.	videnced by field uired since the						
4. Were detection limits in accordance with the quality assurance project plan (QAPP), permit, or method, or indicated as acceptable?	Yes						
Comments: The detection limits appeared to be acceptable. The following dilutions were applied.							
Method 8260B: A dilution of 10 times was applied for the methyl tert-butyl ether (MTBE) analysis of sam	ple MKTF-32.						
Method 200.7: A dilution of 5 times was applied for the total metals analyses of sample MKTF-43.							
Method 200.8: Dilutions of 5 times were applied for the total and dissolved metals analysis of select san	nples.						
<ol><li>Were the reported analytical methods and constituents in compliance with the QAPP, permit, or CoC?</li></ol>	No						
Comments: The reported analytical methods were in compliance with the CoC, and the laboratory repor constituents in accordance with the CoC, with the following exceptions.	ted the requested						
The CoC requested total and dissolved metals using Method 200.7; however, the laboratory analyzed th both Method 200.7 and Method 200.8. This substituted analytical method, Method 200.8, met similar se and precision goals and, therefore, was an acceptable replacement.	e samples using nsitivity, accuracy,						
The CoC requested cyanide using Method 335.4; however, the laboratory analyzed the samples using N This substituted analytical method met similar sensitivity, accuracy, and precision goals and, therefore, v replacement.	lethod 4500 CN E. vas an acceptable						
6. Were samples received in good condition within method-specified requirements?	No						
Comments: Samples were received on ice, in good condition, and with the cooler temperatures both with recommended temperature range of $4^{\circ}C \pm 2^{\circ}C$ between $1.0^{\circ}C$ and $3.9^{\circ}C$ as noted on the Sample Log-II CoC. The cooler temperature below $2^{\circ}C$ was judged as acceptable since the samples were not reported receipt at the laboratory, and the sample containers were reported to be intact.	hin and outside the n <i>Check List</i> and d to be frozen upon						



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VALIDATION CRITERIA CHECKLIST									
7. Were sa technica	7. Were samples extracted/digested and analyzed within method-specified or Yes technical holding times?								
Comments: The samples were extracted/digested and analyzed within method-specific holding times.									
8. Were rep method(	<ol> <li>Were reported units appropriate for the sample matrix/matrices and analytical method(s)? Specify if wet or dry units were used for soil.</li> </ol>								
Comments: The results were reported in concentration units of micrograms per liter ( $\mu$ g/L) and milligrams per liter (mg/L), which were acceptable for the sample matrix and the analyses requested.									
9. Did the la	9. Did the laboratory provide any specific initial and/or continuing calibration results? No								
Comments:	Initial and contir	nuing calibration data were not in	cluded as part of	this data set.					
10. If initial a acceptat	and/or continuin ple limits?	g calibration results were provide	ed, were the resu	Its within N/A					
Comments:	Initial and contir	nuing calibration data were not in	cluded as part of	this data set.					
11. Was the the total	total number of number of sam	laboratory blank samples prepa ples or analyzed as required by t	red equal to at lea he method?	ast 5% of Yes					
Comments: samples.	The total numbe	er of laboratory blank samples pr	epared was equa	l to at least 5% of the total numb	er of				
12. Were tar	get analytes re	ported as not detected in the labo	oratory blanks?	No					
Comments:	Target analytes	were reported as not detected ir	n the laboratory b	lanks, with the following exception	on.				
Modified Met	hod 8015D: Th	e analyte TPH DRO was detect	ted in the metho	d blank from batch 70480 at 0.	043 mg/L.				
Detections of	of TPH DRO in	the associated samples that w	ere less than th	e reporting limits were qualifie	d as U.				
Results grea	ater than the bl	ank detection but less than 10	times the blank	concentration were qualified	as JB.				
TPH-DRO wa	as detected in s ication	ample MKTF-41 at a concentration	on greater than 1	0 times the blank detection and	did not				
13 Was the	total number of	MS samples prepared equal to	at least 5% of the	total Ves					
number	of samples or a	nalyzed as required by the method	od?						
Comments:	The total numbe	er of matrix spike samples prepa	red was equal to	at least 5% of the total number o	f samples,				
although MS	samples were r	not prepared/reported for all anal	yses and/or batcl	nes. The matrix spike sample so	urce for each				
analytical bat	ch in this samp	le set has been indicated below.			1				
	Method	<u>Analytes</u>	<u>Batch</u>	MS Sample Source					
	200.7	Total Metals	70455	Not Prepared					
	200.7	Dissolved Metals	A91551	Not Prepared					
	200.8	Dissolved Metals	A91411	Not Prepared					
	200.8	I otal Metals	70455	Not Prepared					
	200.8	Dissolved Metals	B91411	Not Prepared					
	200.8 Dissolved Selenium B91488 OW-1								
	200.8 Dissolved Selenium A91522 Not Prepared								
	245.1	I otal Mercury	70473	MK1F-41					
	504.1	EDR	70493	Not Prepared					
	8015D	TPU ODO	/0480	Not Prepared					
	8015D		A91419	Not Prepared					
	020UB	VUC	B91469	Not Prepared					



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VALIDATION CRITERIA CHECKLIST									
	Method	Analytes		B	Batch MS Sam		IS Sample Source		
	8260B	Methyl tert-Butyl Ether		ner A9	1498	Not Prepared			
	8270C	S	SVOC	7(	0506	Not Prepared			
	8270 SIM	5	SVOC	70	)506	Not Prepa	red		
	4500 CN E	C	yanide	WG1	935264	BW-4B			
	4500 CN E	C	yanide	WG1	935876	Not Associ	ated		
Not Associated – The MS sample source was not associated with this project. Not Prepared – Matrix spikes were not prepared/reported for this batch.									
14. For MS/MSDs prepared from project samples, were percent recoveries and RPDs       Yes         within data validation or laboratory quality control (QC) limits?       Yes									
Comments: limits.	The MS/MSD p	ercent recover	ies and RP	Ds for project s	samples were v	within data vali	dation and lab	oratory QC	
Recoveries a based on the	and RPDs for M ese results since	S/MSDs prepa matrix similar	ired from no ity to projec	on-project sam ct samples cou	ples were cons ld not be guara	idered, but dat inteed.	a were not qu	alified	
15. Was the samples	e total number of s or analyzed as	LCSs analyze required by th	ed equal to e method?	at least 5% of i	the total numbe	er of	Yes		
Comments:	The total number	er of LCS sam	ples analyz	ed was equal t	o at least 5% c	of the total num	ber of sample	3.	
16. Were Lo laborato	CS/LCSD percer bry QC limits?	nt recoveries a	IND LCS/LC	SD RPDs with	in data validati	on or	No		
Comments: limits, with th	The LCS and Lone exceptions lis	CSD percent retend in the follo	ecoveries a wing table.	Ind LCS/LCSD	RPDs were wi	thin data valida	ation and labo	atory QC	
Method	Ana	lyte	<u>Batch</u>	<u>LCS</u> <u>Recovery</u>	LCSD Recovery	LCS/LCSD QC Limits	LCS/LCSD RPD	<u>RPD</u> <u>QC</u> Limits	
200.7	Cadmiu	m, Total	70455	133%		70-130%			
200.7	Nickel	, Total	70455	69.1%		70-130%			
200.7	Beryllium,	Dissolved	A91551	64.9%		70-130%			
200.8	Selenium,	Dissolved	B91488	59.6%		70-130%			
8015D	TPH	DRO	70480	90.9%	Acceptable	31.7-75.4%	20.7%	20%	
8270 SIM	1,4-Di	oxane	70506	Acceptable	Acceptable	15-60.5%	30.1%	29.7%	
8270 SIM	Naphtl	halene	70506	Acceptable	Acceptable	15-78.3%	41.6%	31.7%	
8270 SIM	1-Methylna	aphthalene	70506	Acceptable	Acceptable	15-79.6%	43.1%	31.4%	
8270 SIM	8270 SIM 2-Methylnaphthalene 70506 Acceptable Acceptable 15-78.6% 44.0% 30.5%						30.5%		
8270 SIM	Acenap	hthene	70506	Acceptable	Acceptable	15-92%	38.0%	30.5%	
8270 SIM	Phenar	Phenanthrene         70506         Acceptable         Acceptable         21-103%         31.9           Anthreasure         70506         Acceptable         Acceptable         21.4 100%         24.8					31.9%	26.4%	
8270 SIM	8270 SIM         Anthracene         70506         Acceptable         Acceptable         21.1-106%         31.8%					31.8%	14.4%		
8270 SIM	Fluora	nthene	70506	Acceptable	Acceptable	32.8-119%	29.5%	14.8%	
8270 SIM	Pyr	ene	70506	Acceptable	Acceptable	34.1-110%	27.8%	19.2%	
8270 SIM	Chry	sene	70506	Acceptable	Acceptable	31.3-112%	26.3%	19%	
8270 SIM	Indeno(1,2,3	3-cd)pyrene	70506	Acceptable	Acceptable	24.7-152%	30.4%	21.3%	

TPH DRO was detected in the associated samples, and the results were qualified as J+ due to evidence of high bias. Qualification was not required for total cadmium based on evidence of potential high bias as it was not detected in the associated samples.



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Results for total detected in the a Analytes with LC detected in the a 17. Were surroga Comments: Surro 8	nickel, dis ssociated S/LCSD R ssociated te recoveri	solved bariu samples due PD values ex samples due	m, and dissol to possible lo cceeding labo	ved selenium were qu ow bias. ratory QC limits were	alified as J- if	detected and	UJ if not
Analytes with LC detected in the a 17. Were surroga Comments: Surro <u>M</u> 8	S/LCSD R ssociated te recoveri	PD values ex samples due	ceeding labo	ratory QC limits were			
I7. Were surroga Comments: Surro <u>M</u> 8	te recoveri		e to poor preci	ision.	qualified as J	if detected an	d UJ if not
Comments: Surro	acto recev	es within labo	oratory QC limit	s?		No	
	gale recov	eries were wi	thin laboratory	QC limits, with the exc	eptions listed in	the following t	able.
8	lethod	Surr	ogate	Sample	Surrogate Bosovoru	QC Limits	]
-	270C	2-Fluor	ophenol	MKTF-43	1.82%	15-84.5%	-
8	270C	Phe	nol-d₅	MKTF-43	5.85%	15-67%	-
8	270C	2,4,6-Tribr	omophenol	MKTF-43	<b>2.98%</b>	15-108%	1
e acid surrogat xtremely low bia ualification was	e, and ass as (recove not require	<b>sociated anal</b> ries less than d based on su	<b>ytes were qua</b> n 10%). ırrogate nonco	alified as R to indicate	erejected data	due to eviden	i <b>ce of</b> ples were
valuated based o	n their spe	cific surrogate	e recoveries.				
<ol> <li>Were the nun collected equ project guidel</li> </ol>	ber of trip al to at leas ines, QAPF	blank, field bl st 10% of the P, SAP, or pe	ank, and/or eq total number o rmit?	uipment blank samples f samples or as require	d by the	Yes	;
Comments: The r One trip blank san vere collected as	number of t nple, Trip E part of this	rip, field, and Blank, one fiel sample set.	equipment bla d blank sample	nks collected was equa e, FB 9-27-22, and one	al to at least 10% equipment blar	<sup>℅</sup> of the numbe ιk sample, EΒ-	r of samples 09-27-22,
9. Were target a equipment bl	nalytes rep ank sample	oorted as not o	detected in the	trip blank, field blank, a	and/or	No	
Comments: Targe xceptions listed i	et analytes n the follow	were not dete ving table.	ected in the trip	blank, field blank, and	equipment blar	ık samples, wit	th the
	Blank	Sample ID	<u>Method</u>	Analyte	Concent	ration	
	FB	9-27-22	8260B	2-Butanone	7.5 µ	g/L	
	EB-	09-27-22	200.7	<b>Dissolved Zinc</b>	0.0077	mg/L	
	EB-0	)9-27-22	8015D	TPH DRO	0.022 r	ng/L	
<b>lissolved zinc w</b> lank result and ssociated sample he TPH DRO res	as detecte was assig es. sults were r	ed in the asso ned JB quali	<b>ciated sampl</b> <b>fiers.</b> Qualifica	es greater than the re ation was not required f	porting limits for 2-butanone a	b <b>ut less than</b> as it was not de	<b>10 times the</b> etected in the
ualification due to	the equip	ment blank de	etection was no	ot required.		· ···-	,
0. Was the num number of sa	per of field nples or as	duplicates co s required by	llected equal to the project guid	o at least 10% of the to delines, QAPP, SAP, o	tal r permit?	Yes	;
	umber of f	All dualicato		equal to at least 10%	of the number (	foomstar C	



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## VALIDATION CRITERIA CHECKLIST

21. Were field duplicate RPD values within data validation QC limits (soil 0-50%, water 0-30%, or air 0-25%)?

Comments: As indicated in the Field Duplicate Summary Table at the end of this report, field duplicate RPD values were within data validation QC limits of 0-30% for water samples, with the following exception.

The RPD value for dissolved zinc greatly exceeded the data validation QC limit for samples OW-1 and DUP-9-27-22 at 105.1%. Dissolved zinc was qualified as J for the parent, field duplicate, and associated samples.

22. For laboratory duplicates prepared from project samples, were RPDs within data validation or laboratory QC limits?

Yes

No

Comments: Laboratory duplicates prepared for these analyses and laboratory duplicate sample sources are summarized in the following table.

<u>Method</u>	Analytes	<u>Batch</u>	Laboratory Duplicate Sample Source
4500 CN E	Cyanide	WG1935264	EB-09-27-22 and OW-1
4500CN E	Cyanide	WG1935876	Not Associated

Not Associated – The laboratory duplicate sample source was not associated with this project.

Laboratory duplicate RPDs were within laboratory QC limits.

The RPD values for laboratory duplicate samples prepared from non-project samples were considered, but data were not qualified based on these results since matrix similarity to project samples could not be guaranteed.

23. Were the following data relationships realistic?

 Target analytes were reported by more than one method (e.g., 8260/8270, N/A EPH/8270)?

Comments: Target analytes were not reported by more than one method.

• Both total and dissolved metals analyses were performed, and the total metals No results were greater than or equal to the dissolved metals results?

Comments: The following table contains the exceptions in which the dissolved metals results exceeded the total metals results. The EPA has not provided guidance or requirements for the evaluation, validation, and qualification of dissolved metals results that exceed the corresponding total metals results. Therefore, qualification of results was not performed based on these data.

Sample ID	Analyte	<u>Total Result</u> (mg/L)	Dissolved Result (mg/L)	
MKTF-43	Antimony	ND	0.004	
MKTF-44	Antimony	ND	0.0007	
MKTF-41	Arsenic	0.0017	0.0019	
OW-10	Arsenic	0.00051	0.00058	
OW-10	Barium	0.048	0.049	
OW-10	Lead	0.000088	0.0001	
BW-4B	Nickel	0.0069	0.016	
MKTF-32	Nickel	ND	0.0033	
MKTF-43	Nickel	ND	0.027	
BW-5B	Selenium	0.00057	0.00081	
DUP-9-27-22	Selenium	0.0024	0.0025	
OW-1	Selenium	0.002	0.0025	



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VALIDATION CRITERIA CHECKLISTSample IDAnalyteTotal Result (mg/L)Dissolved F (mg/L)BW-5CSilverND0.0022MKTF-43Silver0.0310.039OW-10SilverND0.0022	<u>Result</u> ) 2
Sample IDAnalyteTotal Result (mg/L)Dissolved F (mg/L)BW-5CSilverND0.0023MKTF-43Silver0.0310.039OW-10SilverND0.0023	<u>Result</u> <u>)</u> 2
BW-5C         Silver         ND         0.002           MKTF-43         Silver         0.031         0.039           OW-10         Silver         ND         0.0025	2
MKTF-43         Silver         0.031         0.039           OW-10         Silver         ND         0.0023	
OW-10 Silver ND 0.002	
	3
MKTF-43 Vanadium ND 0.008	1
DUP-9-27-22 Zinc ND 0.014	
EB-09-27-22 Zinc ND 0.007	7
MKTF-32 Zinc ND 0.014	
MKTF-41 Zinc ND 0.016	
MKTF-43 Zinc ND 0.016	
OW-1 Zinc ND 0.045	
OW-10 Zinc ND 0.066	



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	C Field Dup	lient Sample ID: OW-1	9-27-22								
Analyte	Method	Laboratory Result	Duplicate Result	Relative Percent Difference (RPD)							
МТВЕ	8260B	2.7 μg/L	3.0 µg/L	10.5%							
TPH DRO	8015D	0.031 mg/L	0.045 mg/L	36.8% +/-RL							
Bis(2-ethylhexyl)phthalate	8270C	9.0 µg/L	ND (10 µg/L)	DL							
Di-n-butyl phthalate	8270C	18 µg/L	ND (10 µg/L)	DL							
1,4-Dioxane	8270 SIM	ND (1.0 µg/L)	0.28 µg/L	DL							
Pyrene	8270 SIM	0.32 µg/L	ND (1.0 µg/L)	DL							
Barium, Dissolved	200.7	0.041 mg/L	0.041 mg/L	0.0%							
Barium, Total	200.7	0.041 mg/L	0.043 mg/L	4.8%							
Vanadium, Dissolved	200.7	0.036 mg/L	0.037 mg/L	2.7% +/-RL							
Vanadium, Total	200.7	0.041 mg/L	0.042 mg/L	2.4% +/-RL							
Zinc, Dissolved	200.7	0.045 mg/L	0.014 mg/L	105.1%							
Arsenic, Dissolved	200.8	0.00060 mg/L	0.00064 mg/L	6.5% +/-RL							
Arsenic, Total	200.8	0.00065 mg/L	0.00065 mg/L	0.0% +/-RL							
Lead, Total	200.8	0.00014 mg/L	0.00014 mg/L	0.0% +/-RL							
Selenium, Dissolved	200.8	0.0025 mg/L	0.0025 mg/L	0.0%							
Selenium, Total	200.8	0.0020 mg/L	0.0024 mg/L	18.2%							

### FIELD DUPLICATE SUMMARY

Field duplicate RPD control limits are not to exceed 30% for water as established by USEPA Region I - New England Environmental Data Review Supplement for Region 1 Data Review Elements and Superfund Specific Guidance/Procedures, EQADR-Supplement2, September 2020.

DL – Indicates that the analyte was detected in one of the duplicate samples and was undetected in the other sample, and therefore an RPD could not be calculated. Data were not qualified since the detection was within two times the reporting limit. Non-detected results are indicated above with the applicable reporting limit as ND (RL).

+/-RL – Indicates that the detections in both of the samples were within two times the reporting limit. Qualification of data was not required.

The RPD value for dissolved zinc greatly exceeded the data validation QC limit and the results were qualified as J for the associated samples due to evidence of poor precision.



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## DATA QUALIFICATION SUMMARY

Abbreviation	Reason
ECAL	The result exceeds the calibration range.
MBD	Method blank detection
HR-LCS	The LCS and/or LCSD percent recovery was greater than the upper acceptable limit indicating a possible high bias.
LR-LCS	The LCS and/or LCSD percent recovery was less than the lower acceptable limit indicating a possible low bias.
ERPD-LCS	The LCS/LCSD RPD exceeded the upper acceptable limit indicating poor precision.
LR-SUR	The surrogate percent recovery was less than the lower acceptable limit indicating a possible low bias.
EBD	Equipment blank detection
ERPD-FD	High field duplicate RPD.
MDLRL	Flagged by the laboratory: The result was greater than the MDL but less than the RL.

Analyte	Method	Field Sample ID	Lab Sample ID	Result	Limit	Units	Reviewer Qualifier	DV Flag Reasons
1,1-Dichloroethane	SW8260B	BW-5C	2209e92-004a	0.76	1	µg/L	J	MDLRL
1,1-Dichloroethane	SW8260B	BW-5B	2209e92-005a	0.42	1	µg/L	J	MDLRL
1,1-Dichloroethane	SW8260B	OW-10	2209e92-008a	0.55	1	µg/L	J	MDLRL
1,1-Dichloroethene	SW8260B	OW-10	2209e92-008a	0.43	1	µg/L	J	MDLRL
1,2,4-Trimethylbenzene	SW8260B	MKTF-41	2209e92-010a	0.17	1	µg/L	J	MDLRL
1,2-Dichloroethane	SW8260B	BW-5C	2209e92-004a	0.59	1	µg/L	J	MDLRL
1,2-Dichloroethane	SW8260B	BW-5B	2209e92-005a	0.37	1	µg/L	J	MDLRL
1,2-Dichloroethane	SW8260B	OW-10	2209e92-008a	0.37	1	µg/L	J	MDLRL
1,4-Dioxane	SW8270C	MKTF-32	2209e92-009c	27	1	µg/L	J	ECAL, ERPD-LCS
1,4-Dioxane	SW8270C	BW-5C	2209e92-004c	3.5	1	µg/L	J	ERPD-LCS
1,4-Dioxane	SW8270C	OW-10	2209e92-008c	1	1	µg/L	J	ERPD-LCS
1,4-Dioxane	SW8270C	MKTF-41	2209e92-010c	1.9	1	µg/L	J	ERPD-LCS
1,4-Dioxane	SW8270C	EB-09-27-22	2209e92-001c	ND	1	µg/L	UJ	ERPD-LCS



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Analyte	Method	Field Sample ID	Lab Sample ID	Result	Limit	Units	Reviewer Qualifier	DV Flag Reasons
1,4-Dioxane	SW8270C	OW-1	2209e92-002c	ND	1	µg/L	UJ	ERPD-LCS
1,4-Dioxane	SW8270C	BW-4B	2209e92-003c	ND	1	µg/L	UJ	ERPD-LCS
1,4-Dioxane	SW8270C	MKTF-44	2209e92-006c	ND	1	µg/L	UJ	ERPD-LCS
1,4-Dioxane	SW8270C	MKTF-43	2209E92-007C	ND	1	µg/L	UJ	ERPD-LCS
1,4-Dioxane	SW8270C	BW-5B	2209e92-005c	0.96	1	µg/L	J	ERPD-LCS, MDLRL
1,4-Dioxane	SW8270C	DUP-9-27-22	2209e92-011c	0.28	1	µg/L	J	ERPD-LCS, MDLRL
1-Methylnaphthalene	SW8270C	EB-09-27-22	2209e92-001c	ND	0.3	µg/L	UJ	ERPD-LCS
1-Methylnaphthalene	SW8270C	OW-1	2209e92-002c	ND	0.3	µg/L	UJ	ERPD-LCS
1-Methylnaphthalene	SW8270C	BW-4B	2209e92-003c	ND	0.3	µg/L	UJ	ERPD-LCS
1-Methylnaphthalene	SW8270C	BW-5C	2209e92-004c	ND	0.3	µg/L	UJ	ERPD-LCS
1-Methylnaphthalene	SW8270C	BW-5B	2209e92-005c	ND	0.3	µg/L	UJ	ERPD-LCS
1-Methylnaphthalene	SW8270C	MKTF-44	2209e92-006c	ND	0.3	µg/L	UJ	ERPD-LCS
1-Methylnaphthalene	SW8270C	MKTF-43	2209E92-007C	ND	0.3	µg/L	UJ	ERPD-LCS
1-Methylnaphthalene	SW8270C	OW-10	2209e92-008c	ND	0.3	µg/L	UJ	ERPD-LCS
1-Methylnaphthalene	SW8270C	MKTF-32	2209e92-009c	ND	0.3	µg/L	UJ	ERPD-LCS
1-Methylnaphthalene	SW8270C	MKTF-41	2209e92-010c	ND	0.3	µg/L	UJ	ERPD-LCS
1-Methylnaphthalene	SW8270C	DUP-9-27-22	2209e92-011c	ND	0.3	µg/L	UJ	ERPD-LCS
2,4,6-Trichlorophenol	SW8270C	MKTF-43	2209E92-007C	ND	10	µg/L	R	LR-SUR
2,4-Dimethylphenol	SW8270C	MKTF-43	2209E92-007C	ND	10	µg/L	R	LR-SUR
2,4-Dinitrophenol	SW8270C	MKTF-43	2209E92-007C	ND	20	µg/L	R	LR-SUR
2-Butanone	SW8260B	FB 9-27-22	2209e92-012a	7.5	10	µg/L	J	MDLRL
2-Methylnaphthalene	SW8270C	EB-09-27-22	2209e92-001c	ND	0.3	µg/L	UJ	ERPD-LCS
2-Methylnaphthalene	SW8270C	OW-1	2209e92-002c	ND	0.3	µg/L	UJ	ERPD-LCS
2-Methylnaphthalene	SW8270C	BW-4B	2209e92-003c	ND	0.3	µg/L	UJ	ERPD-LCS
2-Methylnaphthalene	SW8270C	BW-5C	2209e92-004c	ND	0.3	µg/L	UJ	ERPD-LCS
2-Methylnaphthalene	SW8270C	BW-5B	2209e92-005c	ND	0.3	µg/L	UJ	ERPD-LCS



Analyte	Method	Field Sample ID	Lab Sample ID	Result	Limit	Units	Reviewer Qualifier	DV Flag Reasons
2-Methylnaphthalene	SW8270C	MKTF-44	2209e92-006c	ND	0.3	µg/L	UJ	ERPD-LCS
2-Methylnaphthalene	SW8270C	MKTF-43	2209E92-007C	ND	0.3	µg/L	UJ	ERPD-LCS
2-Methylnaphthalene	SW8270C	OW-10	2209e92-008c	ND	0.3	µg/L	UJ	ERPD-LCS
2-Methylnaphthalene	SW8270C	MKTF-32	2209e92-009c	ND	0.3	µg/L	UJ	ERPD-LCS
2-Methylnaphthalene	SW8270C	MKTF-41	2209e92-010c	ND	0.3	µg/L	UJ	ERPD-LCS
2-Methylnaphthalene	SW8270C	DUP-9-27-22	2209e92-011c	ND	0.3	µg/L	UJ	ERPD-LCS
2-Methylphenol	SW8270C	MKTF-43	2209E92-007C	ND	10	µg/L	R	LR-SUR
3,4-Methylphenol	SW8270C	MKTF-43	2209E92-007C	ND	10	µg/L	R	LR-SUR
Acenaphthene	SW8270C	EB-09-27-22	2209e92-001c	ND	0.3	µg/L	UJ	ERPD-LCS
Acenaphthene	SW8270C	OW-1	2209e92-002c	ND	0.3	µg/L	UJ	ERPD-LCS
Acenaphthene	SW8270C	BW-4B	2209e92-003c	ND	0.3	µg/L	UJ	ERPD-LCS
Acenaphthene	SW8270C	BW-5C	2209e92-004c	ND	0.3	µg/L	UJ	ERPD-LCS
Acenaphthene	SW8270C	BW-5B	2209e92-005c	ND	0.3	µg/L	UJ	ERPD-LCS
Acenaphthene	SW8270C	MKTF-44	2209e92-006c	ND	0.3	µg/L	UJ	ERPD-LCS
Acenaphthene	SW8270C	MKTF-43	2209E92-007C	ND	0.3	µg/L	UJ	ERPD-LCS
Acenaphthene	SW8270C	OW-10	2209e92-008c	ND	0.3	µg/L	UJ	ERPD-LCS
Acenaphthene	SW8270C	MKTF-32	2209e92-009c	ND	0.3	µg/L	UJ	ERPD-LCS
Acenaphthene	SW8270C	MKTF-41	2209e92-010c	ND	0.3	µg/L	UJ	ERPD-LCS
Acenaphthene	SW8270C	DUP-9-27-22	2209e92-011c	ND	0.3	µg/L	UJ	ERPD-LCS
Acetone	SW8260B	BW-5B	2209e92-005a	4.3	10	µg/L	J	MDLRL
Anthracene	SW8270C	EB-09-27-22	2209e92-001c	ND	0.3	µg/L	UJ	ERPD-LCS
Anthracene	SW8270C	OW-1	2209e92-002c	ND	0.3	µg/L	UJ	ERPD-LCS
Anthracene	SW8270C	BW-4B	2209e92-003c	ND	0.3	µg/L	UJ	ERPD-LCS
Anthracene	SW8270C	BW-5C	2209e92-004c	ND	0.3	µg/L	UJ	ERPD-LCS
Anthracene	SW8270C	BW-5B	2209e92-005c	ND	0.3	µg/L	UJ	ERPD-LCS
Anthracene	SW8270C	MKTF-44	2209e92-006c	ND	0.3	µg/L	UJ	ERPD-LCS



Analyte	Method	Field Sample ID	Lab Sample ID	Result	Limit	Units	Reviewer Qualifier	DV Flag Reasons
Anthracene	SW8270C	MKTF-43	2209E92-007C	ND	0.3	µg/L	UJ	ERPD-LCS
Anthracene	SW8270C	OW-10	2209e92-008c	ND	0.3	µg/L	UJ	ERPD-LCS
Anthracene	SW8270C	MKTF-32	2209e92-009c	ND	0.3	µg/L	UJ	ERPD-LCS
Anthracene	SW8270C	MKTF-41	2209e92-010c	ND	0.3	µg/L	UJ	ERPD-LCS
Anthracene	SW8270C	DUP-9-27-22	2209e92-011c	ND	0.3	µg/L	UJ	ERPD-LCS
Antimony, Dissolved	E200.8	MKTF-44	2209E92-006E	0.0007	0.001	mg/L	J	MDLRL
Antimony, Dissolved	E200.8	MKTF-43	2209E92-007E	0.004	0.005	mg/L	J	MDLRL
Arsenic, Dissolved	E200.8	OW-1	2209E92-002E	0.0006	0.001	mg/L	J	MDLRL
Arsenic, Dissolved	E200.8	BW-5C	2209E92-004E	0.00031	0.001	mg/L	J	MDLRL
Arsenic, Dissolved	E200.8	BW-5B	2209E92-005E	0.00085	0.001	mg/L	J	MDLRL
Arsenic, Dissolved	E200.8	MKTF-43	2209E92-007E	0.0026	0.005	mg/L	J	MDLRL
Arsenic, Dissolved	E200.8	OW-10	2209E92-008E	0.00058	0.001	mg/L	J	MDLRL
Arsenic, Dissolved	E200.8	DUP-9-27-22	2209E92-011E	0.00064	0.001	mg/L	J	MDLRL
Arsenic, Total	E200.8	OW-1	2209E92-002D	0.00065	0.001	mg/L	J	MDLRL
Arsenic, Total	E200.8	BW-5B	2209E92-005D	0.00094	0.001	mg/L	J	MDLRL
Arsenic, Total	E200.8	OW-10	2209E92-008D	0.00051	0.001	mg/L	J	MDLRL
Arsenic, Total	E200.8	DUP-9-27-22	2209E92-011D	0.00065	0.001	mg/L	J	MDLRL
Benzene	SW8260B	MKTF-32	2209e92-009a	0.35	1	µg/L	J	MDLRL
Benzene	SW8260B	MKTF-41	2209e92-010a	0.4	1	µg/L	J	MDLRL
Beryllium, Dissolved	E 200.7	EB-09-27-22	2209E92-001E	ND	0.002	mg/L	UJ	LR-LCS
Beryllium, Dissolved	E 200.7	OW-1	2209E92-002E	ND	0.002	mg/L	UJ	LR-LCS
Beryllium, Dissolved	E 200.7	BW-4B	2209E92-003E	ND	0.002	mg/L	UJ	LR-LCS
Beryllium, Dissolved	E 200.7	BW-5C	2209E92-004E	ND	0.002	mg/L	UJ	LR-LCS
Beryllium, Dissolved	E 200.7	BW-5B	2209E92-005E	ND	0.002	mg/L	UJ	LR-LCS
Beryllium, Dissolved	E 200.7	MKTF-44	2209E92-006E	ND	0.002	mg/L	UJ	LR-LCS
Beryllium, Dissolved	E 200.7	MKTF-43	2209E92-007E	ND	0.002	mg/L	UJ	LR-LCS



Analyte	Method	Field Sample ID	Lab Sample ID	Result	Limit	Units	Reviewer Qualifier	DV Flag Reasons
Beryllium, Dissolved	E 200.7	OW-10	2209E92-008E	ND	0.002	mg/L	UJ	LR-LCS
Beryllium, Dissolved	E 200.7	MKTF-32	2209E92-009E	ND	0.002	mg/L	UJ	LR-LCS
Beryllium, Dissolved	E 200.7	MKTF-41	2209E92-010E	ND	0.002	mg/L	UJ	LR-LCS
Beryllium, Dissolved	E 200.7	DUP-9-27-22	2209E92-011E	ND	0.002	mg/L	UJ	LR-LCS
Bis(2-ethylhexyl)phthalate	SW8270C	OW-1	2209E92-002C	9	10	µg/L	J	MDLRL
Chrysene	SW8270C	EB-09-27-22	2209e92-001c	ND	0.3	µg/L	UJ	ERPD-LCS
Chrysene	SW8270C	OW-1	2209e92-002c	ND	0.3	µg/L	UJ	ERPD-LCS
Chrysene	SW8270C	BW-4B	2209e92-003c	ND	0.3	µg/L	UJ	ERPD-LCS
Chrysene	SW8270C	BW-5C	2209e92-004c	ND	0.3	µg/L	UJ	ERPD-LCS
Chrysene	SW8270C	BW-5B	2209e92-005c	ND	0.3	µg/L	UJ	ERPD-LCS
Chrysene	SW8270C	MKTF-44	2209e92-006c	ND	0.3	µg/L	UJ	ERPD-LCS
Chrysene	SW8270C	MKTF-43	2209E92-007C	ND	0.3	µg/L	UJ	ERPD-LCS
Chrysene	SW8270C	OW-10	2209e92-008c	ND	0.3	µg/L	UJ	ERPD-LCS
Chrysene	SW8270C	MKTF-32	2209e92-009c	ND	0.3	µg/L	UJ	ERPD-LCS
Chrysene	SW8270C	MKTF-41	2209e92-010c	ND	0.3	µg/L	UJ	ERPD-LCS
Chrysene	SW8270C	DUP-9-27-22	2209e92-011c	ND	0.3	µg/L	UJ	ERPD-LCS
Cobalt, Total	E 200.7	OW-10	2209E92-008D	0.0042	0.006	mg/L	J	MDLRL
Fluoranthene	SW8270C	EB-09-27-22	2209e92-001c	ND	0.3	µg/L	UJ	ERPD-LCS
Fluoranthene	SW8270C	OW-1	2209e92-002c	ND	0.3	µg/L	UJ	ERPD-LCS
Fluoranthene	SW8270C	BW-4B	2209e92-003c	ND	0.3	µg/L	UJ	ERPD-LCS
Fluoranthene	SW8270C	BW-5C	2209e92-004c	ND	0.3	µg/L	UJ	ERPD-LCS
Fluoranthene	SW8270C	BW-5B	2209e92-005c	ND	0.3	µg/L	UJ	ERPD-LCS
Fluoranthene	SW8270C	MKTF-44	2209e92-006c	ND	0.3	µg/L	UJ	ERPD-LCS
Fluoranthene	SW8270C	MKTF-43	2209E92-007C	ND	0.3	µg/L	UJ	ERPD-LCS
Fluoranthene	SW8270C	OW-10	2209e92-008c	ND	0.3	µg/L	UJ	ERPD-LCS
Fluoranthene	SW8270C	MKTF-32	2209e92-009c	ND	0.3	µg/L	UJ	ERPD-LCS



Analyte	Method	Field Sample ID	Lab Sample ID	Result	Limit	Units	Reviewer Qualifier	DV Flag Reasons
Fluoranthene	SW8270C	MKTF-41	2209e92-010c	ND	0.3	µg/L	UJ	ERPD-LCS
Fluoranthene	SW8270C	DUP-9-27-22	2209e92-011c	ND	0.3	µg/L	UJ	ERPD-LCS
Indeno(1,2,3-cd)pyrene	SW8270C	EB-09-27-22	2209e92-001c	ND	0.3	µg/L	UJ	ERPD-LCS
Indeno(1,2,3-cd)pyrene	SW8270C	OW-1	2209e92-002c	ND	0.3	µg/L	UJ	ERPD-LCS
Indeno(1,2,3-cd)pyrene	SW8270C	BW-4B	2209e92-003c	ND	0.3	µg/L	UJ	ERPD-LCS
Indeno(1,2,3-cd)pyrene	SW8270C	BW-5C	2209e92-004c	ND	0.3	µg/L	UJ	ERPD-LCS
Indeno(1,2,3-cd)pyrene	SW8270C	BW-5B	2209e92-005c	ND	0.3	µg/L	UJ	ERPD-LCS
Indeno(1,2,3-cd)pyrene	SW8270C	MKTF-44	2209e92-006c	ND	0.3	µg/L	UJ	ERPD-LCS
Indeno(1,2,3-cd)pyrene	SW8270C	MKTF-43	2209E92-007C	ND	0.3	µg/L	UJ	ERPD-LCS
Indeno(1,2,3-cd)pyrene	SW8270C	OW-10	2209e92-008c	ND	0.3	µg/L	UJ	ERPD-LCS
Indeno(1,2,3-cd)pyrene	SW8270C	MKTF-32	2209e92-009c	ND	0.3	µg/L	UJ	ERPD-LCS
Indeno(1,2,3-cd)pyrene	SW8270C	MKTF-41	2209e92-010c	ND	0.3	µg/L	UJ	ERPD-LCS
Indeno(1,2,3-cd)pyrene	SW8270C	DUP-9-27-22	2209e92-011c	ND	0.3	µg/L	UJ	ERPD-LCS
Lead, Dissolved	E200.8	MKTF-44	2209E92-006E	0.00013	0.0005	mg/L	J	MDLRL
Lead, Dissolved	E200.8	MKTF-43	2209E92-007E	0.00047	0.0025	mg/L	J	MDLRL
Lead, Dissolved	E200.8	OW-10	2209E92-008E	0.0001	0.0005	mg/L	J	MDLRL
Lead, Dissolved	E200.8	MKTF-32	2209E92-009E	0.000094	0.0005	mg/L	J	MDLRL
Lead, Total	E200.8	OW-1	2209E92-002D	0.00014	0.0005	mg/L	J	MDLRL
Lead, Total	E200.8	BW-5B	2209E92-005D	0.00021	0.0005	mg/L	J	MDLRL
Lead, Total	E200.8	MKTF-43	2209E92-007D	0.002	0.0025	mg/L	J	MDLRL
Lead, Total	E200.8	OW-10	2209E92-008D	0.000088	0.0005	mg/L	J	MDLRL
Lead, Total	E200.8	DUP-9-27-22	2209E92-011D	0.00014	0.0005	mg/L	J	MDLRL
Naphthalene	SW8270C	EB-09-27-22	2209e92-001c	ND	0.3	µg/L	UJ	ERPD-LCS
Naphthalene	SW8270C	OW-1	2209e92-002c	ND	0.3	µg/L	UJ	ERPD-LCS
Naphthalene	SW8270C	BW-4B	2209e92-003c	ND	0.3	µg/L	UJ	ERPD-LCS
Naphthalene	SW8270C	BW-5C	2209e92-004c	ND	0.3	µg/L	UJ	ERPD-LCS



Analyte	Method	Field Sample ID	Lab Sample ID	Result	Limit	Units	Reviewer Qualifier	DV Flag Reasons
Naphthalene	SW8270C	BW-5B	2209e92-005c	ND	0.3	µg/L	UJ	ERPD-LCS
Naphthalene	SW8270C	MKTF-44	2209e92-006c	ND	0.3	µg/L	UJ	ERPD-LCS
Naphthalene	SW8270C	MKTF-43	2209E92-007C	ND	0.3	µg/L	UJ	ERPD-LCS
Naphthalene	SW8270C	OW-10	2209e92-008c	ND	0.3	µg/L	UJ	ERPD-LCS
Naphthalene	SW8270C	MKTF-32	2209e92-009c	ND	0.3	µg/L	UJ	ERPD-LCS
Naphthalene	SW8270C	MKTF-41	2209e92-010c	ND	0.3	µg/L	UJ	ERPD-LCS
Naphthalene	SW8270C	DUP-9-27-22	2209e92-011c	ND	0.3	µg/L	UJ	ERPD-LCS
Nickel, Dissolved	E 200.7	MKTF-32	2209E92-009E	0.0033	0.01	mg/L	J	MDLRL
Nickel, Total	E 200.7	BW-5C	2209E92-004D	0.013	0.01	mg/L	J-	LR-LCS
Nickel, Total	E 200.7	EB-09-27-22	2209E92-001D	ND	0.01	mg/L	UJ	LR-LCS
Nickel, Total	E 200.7	OW-1	2209E92-002D	ND	0.01	mg/L	UJ	LR-LCS
Nickel, Total	E 200.7	BW-5B	2209E92-005D	ND	0.01	mg/L	UJ	LR-LCS
Nickel, Total	E 200.7	MKTF-44	2209E92-006D	ND	0.01	mg/L	UJ	LR-LCS
Nickel, Total	E 200.7	MKTF-43	2209E92-007D	ND	0.05	mg/L	UJ	LR-LCS
Nickel, Total	E 200.7	OW-10	2209E92-008D	ND	0.01	mg/L	UJ	LR-LCS
Nickel, Total	E 200.7	MKTF-32	2209E92-009D	ND	0.01	mg/L	UJ	LR-LCS
Nickel, Total	E 200.7	MKTF-41	2209E92-010D	ND	0.01	mg/L	UJ	LR-LCS
Nickel, Total	E 200.7	DUP-9-27-22	2209E92-011D	ND	0.01	mg/L	UJ	LR-LCS
Nickel, Total	E 200.7	BW-4B	2209E92-003D	0.0069	0.01	mg/L	J-	LR-LCS, MDLRL
Phenanthrene	SW8270C	MKTF-41	2209e92-010c	0.42	0.3	µg/L	J	ERPD-LCS
Phenanthrene	SW8270C	EB-09-27-22	2209e92-001c	ND	0.3	µg/L	UJ	ERPD-LCS
Phenanthrene	SW8270C	OW-1	2209e92-002c	ND	0.3	µg/L	UJ	ERPD-LCS
Phenanthrene	SW8270C	BW-4B	2209e92-003c	ND	0.3	µg/L	UJ	ERPD-LCS
Phenanthrene	SW8270C	BW-5C	2209e92-004c	ND	0.3	µg/L	UJ	ERPD-LCS
Phenanthrene	SW8270C	BW-5B	2209e92-005c	ND	0.3	µg/L	UJ	ERPD-LCS
Phenanthrene	SW8270C	MKTF-44	2209e92-006c	ND	0.3	µg/L	UJ	ERPD-LCS



Analyte	Method	Field Sample ID	Lab Sample ID	Result	Limit	Units	Reviewer Qualifier	DV Flag Reasons
Phenanthrene	SW8270C	MKTF-43	2209E92-007C	ND	0.3	µg/L	UJ	ERPD-LCS
Phenanthrene	SW8270C	OW-10	2209e92-008c	ND	0.3	µg/L	UJ	ERPD-LCS
Phenanthrene	SW8270C	MKTF-32	2209e92-009c	ND	0.3	µg/L	UJ	ERPD-LCS
Phenanthrene	SW8270C	DUP-9-27-22	2209e92-011c	ND	0.3	µg/L	UJ	ERPD-LCS
Phenol	SW8270C	MKTF-43	2209E92-007C	ND	20	µg/L	R	LR-SUR
Pyrene	SW8270C	EB-09-27-22	2209e92-001c	ND	1	µg/L	UJ	ERPD-LCS
Pyrene	SW8270C	BW-4B	2209e92-003c	ND	1	µg/L	UJ	ERPD-LCS
Pyrene	SW8270C	BW-5C	2209e92-004c	ND	1	µg/L	UJ	ERPD-LCS
Pyrene	SW8270C	BW-5B	2209e92-005c	ND	1	µg/L	UJ	ERPD-LCS
Pyrene	SW8270C	MKTF-44	2209e92-006c	ND	1	µg/L	UJ	ERPD-LCS
Pyrene	SW8270C	MKTF-43	2209E92-007C	ND	1	µg/L	UJ	ERPD-LCS
Pyrene	SW8270C	OW-10	2209e92-008c	ND	1	µg/L	UJ	ERPD-LCS
Pyrene	SW8270C	MKTF-32	2209e92-009c	ND	1	µg/L	UJ	ERPD-LCS
Pyrene	SW8270C	MKTF-41	2209e92-010c	ND	1	µg/L	UJ	ERPD-LCS
Pyrene	SW8270C	DUP-9-27-22	2209e92-011c	ND	1	µg/L	UJ	ERPD-LCS
Pyrene	SW8270C	OW-1	2209e92-002c	0.32	1	µg/L	J	ERPD-LCS, MDLRL
sec-Butylbenzene	SW8260B	MKTF-32	2209e92-009a	0.41	1	µg/L	J	MDLRL
Selenium, Dissolved	E200.8	OW-1	2209E92-002E	0.0025	0.001	mg/L	J-	LR-LCS
Selenium, Dissolved	E200.8	MKTF-44	2209E92-006E	0.012	0.001	mg/L	J-	LR-LCS
Selenium, Dissolved	E200.8	BW-5C	2209E92-004E	0.00036	0.001	mg/L	J	MDLRL
Selenium, Dissolved	E200.8	BW-5B	2209E92-005E	0.00081	0.001	mg/L	J	MDLRL
Selenium, Dissolved	E200.8	DUP-9-27-22	2209E92-011E	0.0025	0.005	mg/L	J	MDLRL
Selenium, Total	E200.8	BW-4B	2209E92-003D	0.00046	0.001	mg/L	J	MDLRL
Selenium, Total	E200.8	BW-5B	2209E92-005D	0.00057	0.001	mg/L	J	MDLRL
Selenium, Total	E200.8	MKTF-32	2209E92-009D	0.00076	0.001	mg/L	J	MDLRL
Silver, Dissolved	E 200.7	BW-5C	2209E92-004E	0.0022	0.005	mg/L	J	MDLRL



Analyte	Method	Field Sample ID	Lab Sample ID	Result	Limit	Units	Reviewer Qualifier	DV Flag Reasons
Silver, Dissolved	E 200.7	OW-10	2209E92-008E	0.0023	0.005	mg/L	J	MDLRL
TPH DRO	SW8015	MKTF-41	2209E92-010C	1.9	0.064	mg/L	J+	ERPD-LCS, HR-LCS
TPH DRO	SW8015	MKTF-43	2209E92-007C	0.1	0.064	mg/L	JB	ERPD-LCS, HR-LCS, MBD
TPH DRO	SW8015	OW-10	2209E92-008C	0.068	0.064	mg/L	JB	ERPD-LCS, HR-LCS, MBD
TPH DRO	SW8015	MKTF-32	2209E92-009C	0.21	0.064	mg/L	JB	ERPD-LCS, HR-LCS, MBD
TPH DRO	SW8015	EB-09-27-22	2209E92-001C	0.039	0.064	mg/L	U	ERPD-LCS, HR-LCS, MBD, MDLRL
TPH DRO	SW8015	OW-1	2209E92-002C	0.031	0.064	mg/L	U	ERPD-LCS, HR-LCS, MBD, MDLRL
TPH DRO	SW8015	BW-4B	2209E92-003C	0.041	0.064	mg/L	U	ERPD-LCS, HR-LCS, MBD, MDLRL
TPH DRO	SW8015	BW-5C	2209E92-004C	0.064	0.064	mg/L	U	ERPD-LCS, HR-LCS, MBD, MDLRL
TPH DRO	SW8015	BW-5B	2209E92-005C	0.06	0.064	mg/L	U	ERPD-LCS, HR-LCS, MBD, MDLRL
TPH DRO	SW8015	MKTF-44	2209E92-006C	0.048	0.064	mg/L	U	ERPD-LCS, HR-LCS, MBD, MDLRL
TPH DRO	SW8015	DUP-9-27-22	2209E92-011C	0.045	0.064	mg/L	U	ERPD-LCS, HR-LCS, MBD, MDLRL
TPH GRO	SW8015	BW-5C	2209e92-004a	0.023	0.05	mg/L	J	MDLRL
TPH GRO	SW8015	BW-5B	2209e92-005a	0.013	0.05	mg/L	J	MDLRL
TPH GRO	SW8015	MKTF-41	2209e92-010a	0.014	0.05	mg/L	J	MDLRL
TPH ORO	SW8015	MKTF-41	2209E92-010C	0.061	0.08	mg/L	J	MDLRL
Trichloroethene	SW8260B	MKTF-32	2209e92-009a	0.28	1	µg/L	J	MDLRL
Vanadium, Dissolved	E 200.7	OW-1	2209E92-002E	0.036	0.05	mg/L	J	MDLRL
Vanadium, Dissolved	E 200.7	BW-4B	2209E92-003E	0.0094	0.05	mg/L	J	MDLRL
Vanadium, Dissolved	E 200.7	BW-5B	2209E92-005E	0.007	0.05	mg/L	J	MDLRL
Vanadium, Dissolved	E 200.7	MKTF-43	2209E92-007E	0.0081	0.05	mg/L	J	MDLRL
Vanadium, Dissolved	E 200.7	OW-10	2209E92-008E	0.0055	0.05	mg/L	J	MDLRL
Vanadium, Dissolved	E 200.7	MKTF-32	2209E92-009E	0.0042	0.05	mg/L	J	MDLRL
Vanadium, Dissolved	E 200.7	MKTF-41	2209E92-010E	0.024	0.05	mg/L	J	MDLRL
Vanadium, Dissolved	E 200.7	DUP-9-27-22	2209E92-011E	0.037	0.05	mg/L	J	MDLRL
Vanadium, Total	E 200.7	OW-1	2209E92-002D	0.041	0.05	mg/L	J	MDLRL



Analyte	Method	Field Sample ID	Lab Sample ID	Result	Limit	Units	Reviewer Qualifier	DV Flag Reasons
Vanadium, Total	E 200.7	BW-5C	2209E92-004D	0.036	0.05	mg/L	J	MDLRL
Vanadium, Total	E 200.7	BW-5B	2209E92-005D	0.013	0.05	mg/L	J	MDLRL
Vanadium, Total	E 200.7	OW-10	2209E92-008D	0.0072	0.05	mg/L	J	MDLRL
Vanadium, Total	E 200.7	MKTF-32	2209E92-009D	0.012	0.05	mg/L	J	MDLRL
Vanadium, Total	E 200.7	MKTF-41	2209E92-010D	0.024	0.05	mg/L	J	MDLRL
Vanadium, Total	E 200.7	DUP-9-27-22	2209E92-011D	0.042	0.05	mg/L	J	MDLRL
Xylenes, Total	SW8260B	MKTF-41	2209e92-010a	0.8	1.5	µg/L	J	MDLRL
Zinc, Dissolved	E 200.7	EB-09-27-22	2209E92-001E	0.0077	0.01	mg/L	J	ERPD-FD, MDLRL
Zinc, Dissolved	E 200.7	OW-1	2209E92-002E	0.045	0.01	mg/L	JB	EBD, ERPD-FD
Zinc, Dissolved	E 200.7	BW-4B	2209E92-003E	0.014	0.01	mg/L	JB	EBD, ERPD-FD
Zinc, Dissolved	E 200.7	BW-5C	2209E92-004E	0.036	0.01	mg/L	JB	EBD, ERPD-FD
Zinc, Dissolved	E 200.7	BW-5B	2209E92-005E	0.048	0.01	mg/L	JB	EBD, ERPD-FD
Zinc, Dissolved	E 200.7	MKTF-44	2209E92-006E	0.014	0.01	mg/L	JB	EBD, ERPD-FD
Zinc, Dissolved	E 200.7	MKTF-43	2209E92-007E	0.016	0.01	mg/L	JB	EBD, ERPD-FD
Zinc, Dissolved	E 200.7	OW-10	2209E92-008E	0.066	0.01	mg/L	JB	EBD, ERPD-FD
Zinc, Dissolved	E 200.7	MKTF-32	2209E92-009E	0.014	0.01	mg/L	JB	EBD, ERPD-FD
Zinc, Dissolved	E 200.7	MKTF-41	2209E92-010E	0.016	0.01	mg/L	JB	EBD, ERPD-FD
Zinc, Dissolved	E 200.7	DUP-9-27-22	2209E92-011E	0.014	0.01	mg/L	JB	EBD, ERPD-FD





Client: Marathon Oil	Laboratory: Hall Environmental Analysis Laboratory			
Project Name: Western Refining Southwest, Quarterly GW	Sample Matrix: Groundwater			
Project Number: 697-080-002 Task: 0004	Sample Start Date: 09/28/2022			
Date Validated: 01/30/2023	Sample End Date: 09/28/2022			
Parameters Included:				
<ul> <li>Volatile Organic Compounds (VOC) by Environmental Pro Waste (SW-846) Method 8260B</li> </ul>	otection Agency (EPA) Test Methods for Evaluating Solid			
<ul> <li>1,2-Dibromoethane (EDB) by EPA Method 504.1</li> </ul>				
<ul> <li>Semivolatile Organic Compounds (SVOC) by SW-846 Me Monitoring (SIM)</li> </ul>	thod 8270C and Method 8270C with Selected Ion			
<ul> <li>Total Petroleum Hydrocarbons (TPH) Gasoline Range Or</li> </ul>	ganics (GRO) by SW-846 Method 8015D			
<ul> <li>TPH Diesel Range Organics (DRO) and Motor Oil Range</li> </ul>	Organics (MRO) by SW-846 Method 8015D Modified			
<ul> <li>Total and Dissolved Metals by EPA Method 200.7 and Method</li> </ul>	ethod 200.8			
<ul> <li>Total and Dissolved Mercury by EPA Method 245.1</li> </ul>				
<ul> <li>Cyanide by Standard Methods for the Examination of Water and Wastewater (SM) Method 4500 CN E</li> </ul>				
Laboratory Project ID: 2209F93				
Data Validator: Daran O'Hollearn, Lead Project Scientist				
Reviewer: Mike Phillips, Senior Chemist				

# DATA EVALUATION CRITERIA SUMMARY

A Tier II Data Validation was performed by Trihydro Corporation's Chemical Data Evaluation Services Group on the analytical data report packages generated by Hall Environmental Analysis Laboratory of Albuquerque, New Mexico, with additional data from Pace Analytical National of Mount Juliet, Tennessee evaluating samples from the Marathon Oil site, located in Gallup, New Mexico.

Precision, accuracy, method compliance, and completeness of this data package were assessed during this data review. Precision was determined by evaluating the calculated relative percent difference (RPD) values from:

- Field duplicate pairs
- Laboratory duplicate pairs
- Matrix spike (MS) and matrix spike duplicate (MSD) pairs
- Laboratory control sample (LCS) and laboratory control sample duplicate (LCSD) pairs

Laboratory accuracy was established by reviewing the demonstrated percent recoveries (%R) of the following items to verify that data are not biased.

- MS/MSD samples
- LCS/LCSD samples
- Organic system monitoring compounds (surrogates)



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Field accuracy was established by collecting and analyzing the following samples to monitor for possible ambient or cross contamination during sampling and transportation.

- Trip blanks
- Field blanks
- Equipment blanks

Method compliance was established by reviewing sample integrity, holding times, detection limits, surrogate recoveries, laboratory blanks, initial and continuing calibrations (where applicable), and the LCS/LCSD percent recoveries against method-specific requirements.

Completeness was evaluated by determining the overall ratio of the number of samples and analyses planned versus the number of samples with valid analyses. Determination of completeness included a review of the chain-of-custody (CoC), laboratory analytical methods, and other laboratory and field documents associated with this analytical data set.

Client Sample ID	Laboratory Sample Number
EB-09-28-22	2209F93-001
BW-1C	2209F93-002
BW-2C	2209F93-003
BW-2B	2209F93-004
BW-3C	2209F93-005
BW-3B	2209F93-006
DUP-9-28-22	2209F93-007
FB 9-28-22	2209F93-008
Trip Blank	2209F93-009

## SAMPLE NUMBERS TABLE





The laboratory data were reviewed to evaluate compliance with the methods and the quality of the reported data. Assessment of CoC completeness is included in Item 3 of the Data Validation Checklist. A check mark ( $\checkmark$ ) indicates that the referenced validation criteria were deemed acceptable, whereas a crossed circle ( $\otimes$ ) indicates validation criteria for which the data have been qualified by the data validator. An empty circle (O) indicates that the specified criterion does not apply to the reviewed data. Details are noted in the tables below.

### Validation Criteria

- ✓ Data Completeness
- ✓ CoC Documentation (Item 3)
- ✓ Holding Times and Preservation (Items 6 and 7)
- O Initial and Continuing Calibrations (Items 9 and 10)
- ⊗ Laboratory Blanks (Items 11 and 12)
- ⊗ MS/MSD (Items 13 and 14)
- ⊗ LCS/LCSD (Items 15 and 16)
- ✓ System Monitoring Compounds (i.e., Surrogates) (Item 17)
- 8 Field, Equipment, and Trip Blanks (Items 18 and 19)
- ✓ Field Duplicates (Items 20 and 21)
- ✓ Laboratory Duplicates (Item 22)

## **Guidance References**

Chemical data validation was conducted in accordance with the United States Environmental Protection Agency (USEPA) Contract Laboratory Program (CLP) National Functional Guidelines for the analyses listed below, or by the appropriate method if not covered in the National Functional Guidelines.

- Data for organic analyses were evaluated according to validation criteria set forth in the USEPA CLP National Functional Guidelines for Organic Superfund Methods Data Review, document number EPA-540-R-20-005, November 2020 with additional reference to the USEPA CLP National Functional Guidelines for Organic Data Review, document number EPA 540/R-99/008, October 1999.
- Data for inorganic analyses were evaluated according to validation criteria set forth in the USEPA CLP National Functional Guidelines for Inorganic Superfund Methods Data Review, document number EPA-540-R-20-006, November 2020 with additional reference to the USEPA CLP National Functional Guidelines for Inorganic Data Review, document number EPA 540-R-04-004, October 2004.
- Review of field duplicates was conducted according to the USEPA Region I New England Environmental Data Review Supplement for Region 1 Data Review Elements and Superfund Specific Guidance/Procedures, EQADR-Supplement2, September 2020.
- Trihydro Data Validation Variance Documentation, April 2022.



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## **OVERALL DATA PACKAGE ASSESSMENT**

Based on a data validation review, the data are acceptable as delivered. Data qualified by the laboratory are discussed in Item 2 of the Validation Criteria Checklist.

The purpose of validating data and assigning qualifiers is to assist in proper data interpretation. Data that are not qualified meet the site data quality objectives. If values are assigned qualifiers other than an R (rejected, data not usable), the data may be used for site evaluation; however, consideration should be given to the reasons for qualification when interpreting sample concentrations. Data points that are assigned an R qualifier should not be used for site evaluation purposes.

If applicable, text was identified in **bold font** in the Validation Criteria Checklist to indicate that further action and/or qualification of the data were required. Data may have been qualified with J data flags by the laboratory if the result was greater than or equal to the method detection limit (MDL) but less than the reporting limit (RL). These laboratory-applied J flags were preserved, if present, and included in the Data Qualification Summary table at the end of this report. If applicable, data validation qualifiers were added for the items noted with crossed circles in the Validation Criteria section above. Please see the Data Qualification Summary table at the end of this report.

If data would be qualified with more than one flag, one qualifier was assigned based on the severity; however, all reasons for qualification were retained. Data that would be qualified with both J+ and J- flags were evaluated based on validation criteria and assigned the appropriate flag. The hierarchy of qualifiers from the most to least severe is as follows:

Data qualifiers used during this validation are included in the following table.

<u>Qualifier</u>	Definition
J	Estimated concentration
J+	The result is an estimated concentration, but may be biased high
UJ	Estimated reporting limit
U	Evaluated to be undetected at the reporting limit
JB	Estimated concentration due to blank contamination

### **Data Completeness**

The analyses were performed as requested on the CoC records. The associated samples were received by the laboratory and analyzed properly unless otherwise noted in the Criteria Checklist below. The complete data package consisted of 540 data points. The data completeness calculation does not include any submitted blank sample results. Data points were not rejected. The data completeness measure for this data package is calculated to be 100% and is acceptable.



VALIDATION CRITERIA CHECKLIST	
1. Was the report free of non-conformances identified by the laboratory?	No
Comments: The laboratory noted the following analytical non-conformance related to this data set.	
Method 8270C SIM: The method blank had a low surrogate recovery for 2,4,6-tribromophenol.	
2. Were the data free of data qualification flags and/or notes used by the laboratory? If no, define.	No
Comments: The laboratory used the following data qualification flags with this data set.	
J – Analyte detected below quantitation limits.	
R – % RPD outside of range.	
S – % Recovery outside of range due to dilution or matrix interference.	
3. Were sample CoC forms and custody procedures complete?	Yes
Comments: The CoC records from field to laboratory were complete, and custody was maintained as evand laboratory personnel signatures, dates, and times of receipt. The laboratory noted that the shipping sealed, and custody seals were present and intact on the shipping containers.	videnced by field I containers were
4. Were detection limits in accordance with the quality assurance project plan (QAPP), permit, or method, or indicated as acceptable?	Yes
Comments: The detection limits appeared to be acceptable. The following dilution was applied.	
Method 200.8: Sample EB-09-28-22 was diluted by a factor of 5 times for the analysis of dissolved anti	mony.
<ol> <li>Were the reported analytical methods and constituents in compliance with the QAPP, permit, or CoC?</li> </ol>	No
Comments: The reported analytical methods were in compliance with the CoC, and the laboratory report constituents in accordance with the CoC, with the following exceptions.	rted the requested
The CoC requested total and dissolved metals using only Method 200.7; however, the laboratory analyz using both Method 200.7 and Method 200.8. This substituted analytical method, Method 200.8, met sim accuracy, and precision goals and, therefore, was an acceptable replacement.	ed the samples nilar sensitivity,
The CoC requested cyanide using Method 335.4; however, the laboratory analyzed the samples using Method substituted analytical method met similar sensitivity, accuracy, and precision goals and, therefore, we replacement.	Method 4500 CN E. was an acceptable
6. Were samples received in good condition within method-specified requirements?	No
Comments: Samples were received on ice, in good condition, and with the cooler temperatures both wirecommended temperature range of $4^{\circ}C \pm 2^{\circ}C$ at $0.2^{\circ}C$ , $0.3^{\circ}C$ , and $3.3^{\circ}C$ as noted on the CoC and Sat List. Samples transferred to Pace National were received in good condition with the cooler temperature recommended range at $3.1^{\circ}C$ as noted on the CoC. The cooler temperatures below $2.0^{\circ}C$ were judged since the laboratory did not report the sample containers as broken or frozen.	thin and outside the mple Log-in Check within the as acceptable
7. Were samples extracted/digested and analyzed within method-specified or technical holding times?	Yes
Comments: The samples were extracted/digested and analyzed within method-specific holding times.	
<ol> <li>Were reported units appropriate for the sample matrix/matrices and analytical method(s)? Specify if wet or dry units were used for soil.</li> </ol>	Yes
Comments: The results were reported in concentration units of micrograms per liter ( $\mu$ g/L) and milligram which were acceptable for the sample matrix and the analyses requested.	ns per liter (mg/L),

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VALIDATION CRITERIA CHECKLIST									
9. Did the laboratory provide any specific initial and/or continuing calibration results?									
Comments: Initia	l and continuing	calibration data were not include	ed as part of this	data set.					
10. If initial and/o acceptable lir	r continuing cali nits?	bration results were provided, w	ere the results w	vithin	N/A				
Comments: Initia	l and continuing	calibration data were not include	ed as part of this	data set.					
11. Was the total the total num	11. Was the total number of laboratory blank samples prepared equal to at least 5% of Yes the total number of samples or analyzed as required by the method?								
Comments: The t samples.	total number of l	aboratory blank samples prepar	ed was equal to	at least 5% of the total	number of				
12. Were target a	analytes reporte	d as not detected in the laborato	ry blanks?		No				
Comments: Targe	et analytes were	e reported as not detected in the	laboratory blank	s, with the following ex	ception.				
TPH DRO was de Sample results d qualified with a U blank concentration	etected in the la letected below J flag. Non-det on did not requir	aboratory blank for Method 80 or equal to the blank concentre ections of this analyte in the asso re qualification.	15D batch 7049 ration and/or th ociated samples	2 at a concentration of e laboratory reporting and results greater that	of 0.019 mg/L. g limit were In ten times the				
13. Was the total number of sa	number of MS mples or analyz	samples prepared equal to at lea ed as required by the method?	ast 5% of the tota	al	Yes				
Comments: The t although MS sam analytical batch in	total number of i ples were not pr i this sample set	matrix spike samples prepared w repared/reported for all analyses t has been indicated below.	vas equal to at le and/or batches.	east 5% of the total nun The matrix spike sam	nber of samples, ple source for each				
	Method	Analytes	Batch	MS Sample Source					
	200.7	Total Metals	70489	Not Prepared					
	200.7	Dissolved Metals	B91551	Not Prepared					
	200.7	Dissolved Metals	C91551	DUP-9-28-22					
	200.8	Total Metals	70489	EB-09-28-22					
	200.8	Dissolved Metals	A91411	DUP-9-28-22					
	200.8	Dissolved Antimony	B91488	Not Prepared					
	245.1	Total and Dissolved Mercury	70626	DUP-9-28-22					
	504.1	EDB	70493	EB-09-28-22					
	504.1	EDB	70550	Not Prepared					
	4500CN E	Cyanide	WG1935876	BW-1C					
	8015D	TPH DRO and MRO	70492	Not Prepared					
	8015D	TPH GRO	A91437	EB-09-28-22					
8270C SIM SVOCs 70506 Not Prepared									
	8270C	SVOCs	70506	Not Prepared					
	8270C SIM	SVOCs	70536	Not Prepared	1				
	8270C	SVOCs	70536	Not Prepared					
Not Prepared – Matrix spikes were not prepared/reported for this batch.									



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No

Yes

No

## VALIDATION CRITERIA CHECKLIST

14. For MS/MSDs prepared from project samples, were percent recoveries and RPDs within data validation or laboratory quality control (QC) limits?

Comments: The percent recoveries and RPDs for MS/MSDs prepared from project samples were within data validation and laboratory QC limits, with the following exception.

The MS/MSD RPD for benzene in batch B91553 exceeded the QC limit of 20% at 20.5%. Benzene was not detected in the associated samples, and these results were qualified as UJ due to evidence of poor precision.

15. Was the total number of LCSs analyzed equal to at least 5% of the total number of samples or analyzed as required by the method?

Comments: The total number of LCS samples analyzed was equal to at least 5% of the total number of samples.

16. Were LCS/LCSD percent recoveries and LCS/LCSD RPDs within data validation or laboratory QC limits?

Comments: The LCS and LCSD percent recoveries and LCS/LCSD RPDs were within data validation and laboratory QC limits, with the following exceptions.

Method	Analyte	<u>Batch</u>	<u>LCS</u> <u>Recovery</u>	<u>LCSD</u> <u>Recovery</u>	LCS/LCSD QC Limits	LCS/LCS D RPD	<u>RPD</u> <u>QC</u> <u>Limits</u>
200.7	Total Cobalt	70489	135%		70-130%		
200.7	<b>Dissolved Beryllium</b>	B91551	61.9%		70-130%		
200.7	<b>Dissolved Beryllium</b>	C91551	67.2%		70-130%		
200.7	<b>Dissolved Zinc</b>	C91551	137%		70-130%		
200.8	Total Selenium	70489	149%		70-130%		
8270C SIM	1,4-Dioxane	70506	Acceptable	Acceptable	15-60.5%	<b>30.1%</b>	29.7%
8270C SIM	Naphthalene	70506	Acceptable	Acceptable	15-78.3%	<b>41.6%</b>	31.7%
8270C SIM	1-Methylnaphthalene	70506	Acceptable	Acceptable	15-79.6%	43.1%	31.4%
8270C SIM	2-Methylnaphthalene	70506	Acceptable	Acceptable	15-78.6%	44.0%	30.5%
8270C SIM	Acenaphthene	70506	Acceptable	Acceptable	15-92%	38.0%	30.5%
8270C SIM	Phenanthrene	70506	Acceptable	Acceptable	21-103%	31.9%	26.4%
8270C SIM	Anthracene	70506	Acceptable	Acceptable	21.1-106%	31.8%	14.4%
8270C SIM	Fluoranthene	70506	Acceptable	Acceptable	32.8-119%	<b>29.5%</b>	14.8%
8270C SIM	Pyrene	70506	Acceptable	Acceptable	34.1-110%	27.8%	19.2%
8270C SIM	Chrysene	70506	Acceptable	Acceptable	31.3-112%	26.3%	19%
8270C SIM	Indeno(1,2,3- cd)pyrene	70506	Acceptable	Acceptable	24.7-152%	30.4%	21.3%
8270C SIM	1,4-Dioxane	70536	Acceptable	Acceptable	15-60.5%	55.1%	29.7%
8270C SIM	Naphthalene	70536	Acceptable	Acceptable	15-78.3%	38.6%	31.7%
8270C SIM	1-Methylnaphthalene	70536	Acceptable	Acceptable	15-79.6%	35.9%	31.4%
8270C SIM	2-Methylnaphthalene	70536	Acceptable	Acceptable	15-78.6%	31.9%	30.5%
8270C SIM	Acenaphthene	70536	Acceptable	Acceptable	15-92%	43.3%	30.5%
8270C SIM	Fluorene	70536	Acceptable	Acceptable	15-96%	29.4%	25.1%

Detections of total cobalt, dissolved zinc, and total selenium in the associated samples were qualified as J+ due to evidence of potential high bias. Non-detection of these analytes in the associated samples did not require qualification.

Dissolved beryllium was not detected in the associated samples and the results were assigned UJ qualifiers due to evidence of potential low bias,



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	V	ALIDATION	CRITERIA CHECKLIST	-			
The identified analytes with LCS/LCSD RPD values that exceeded the defined QC limits were not detected in the associated samples. These results were qualified as UJ due to evidence of poor precision.							
17. Were surrogate r	ecoveries within labora	tory QC limi	ts?		No		
Comments: Surrogat	e recoveries were withi	in laboratory	QC limits, with the follow	ving exceptions.			
Qualification of sample data was not required based on surrogate non-conformances in QC samples as the environmental samples were evaluated based on their specific surrogate recoveries.							
18. Were the number of trip blank, field blank, and/or equipment blank samples       Yes         collected equal to at least 10% of the total number of samples or as required by the project guidelines, QAPP, SAP, or permit?       Yes							
Comments: The num One trip blank sample were collected as par	ber of trip, field, and ec e, Trip Blank, one field b t of this sample set.	quipment bla olank sample	anks collected was equal e, FB 9-28-22, and one e	to at least 10% of the equipment blank sam	e number of samples. ble, EB-09-28-22,		
19. Were target analy equipment blank	ytes reported as not de samples?	tected in the	e trip blank, field blank, a	nd/or	No		
Comments: Target an exceptions.	nalytes were not detect	ed in the trip	o blank, field blank, and e	equipment blank sam	ples with the following		
	Blank Sample ID	<u>Method</u>	<u>Analyte</u>	<u>Concentration</u>			
	Trip Blank	8260B	Acetone	3.4 µg/L			
	FB 9-28-22	8260B	2-Butanone	16 µg/L			
	FB 9-28-22	8260B	Acetone	4.8 µg/L	-		
	EB-9-28-22	8260B	Acetone	12 µg/L			
	EB-9-28-22	8015D	TPH DRO	0.019 mg/L			
	EB-9-28-22	200.7	Dissolved Zinc	0.0048 mg/L			
Detections of acetone in the associated samples that were less than the applicable reporting limits were assigned U qualifiers. Detections of acetone and dissolved zinc in the associated samples that were greater than the reporting limits but less than 10 times the blank results were assigned JB qualifiers. Non-detections of these analytes in the associated samples and results greater than 10 times the blank detection did not require qualification. The TPH DRO results for the samples in batch 70492 were previously qualified due to a laboratory blank detection; therefore, additional qualification due to the equipment blank contamination was not required.							
20. Was the number of field duplicates collected equal to at least 10% of the total Yes number of samples or as required by the project guidelines, QAPP, SAP, or permit?							
Comments: The num	ber of field duplicates of	collected wa	s equal to at least 10% o	f the number of samp	oles.		
Sample DUP-9-28-22	was collected as a fiel	d duplicate o	of sample BW-1C.				
21. Were field duplica 0-30%, or air 0-2	ate RPD values within ( 5%)?	data validati	on QC limits (soil 0-50%	water	Yes		
Comments: As indica within data validation	ated in the Field Duplica	ate Summar water sampl	y Table at the end of this les.	report, field duplicate	e RPD values were		



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VALIDATION CRITERIA CHECKLIST									
22. For laborato validation o	22. For laboratory duplicates prepared from project samples, were RPDs within data N/A validation or laboratory QC limits?								
Comments: Laboratory duplicates were prepared for the analysis of cyanide in batch WG1935876 from sample EB-09-28-22 and a sample not associated with this data set.									
The sample EB- calculated.	09-28-22 and the lab	oratory duplicate were both n	on-detect for cyanid	e, and an RPD could	not be				
The RPD value to but data were no	The RPD value for the laboratory duplicate sample pair prepared from a non-project sample was evaluated and considered, but data were not qualified based on that result since matrix similarity to project samples could not be guaranteed.								
23. Were the fo	llowing data relations	hips realistic?							
• Target EPH/82	• Target analytes were reported by more than one method (e.g., 8260/8270, N/A EPH/8270)?								
Comments: Tar	get analytes were no	t reported by more than one r	method.						
Both to	tal and dissolved me	tals analyses were performed	l, and the total metal	s I	No				
results	were greater than or	equal to the dissolved metals	s results?						
Comments: The following table contains the exceptions in which the dissolved metals results exceeded the total metals results.									
Sample ID         Analyte         Total Result (mg/L)         Dissolved Result (mg/L)									
	BW-3C Antimony ND 0.00057								
	BW-3B	Antimony	ND	0.0013					
	DUP-9-28-22	Antimony	ND	0.00055					
	BW-1C Arsenic 0.00015 0.00017								

The EPA has not provided guidance or requirements for the evaluation, validation, and qualification of dissolved metals results that exceed the corresponding total metals results. Therefore, qualification of results was not performed based on these data.

ND

ND

ND

ND

ND

ND

ND

ND

ND

0.00015

0.0077

0.00067

0.0048

0.024

0.018

0.028

0.30

0.026

Arsenic

Nickel

Selenium

Zinc

Zinc

Zinc

Zinc

Zinc

Zinc



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DUP-9-28-22

BW-1C

BW-3C

EB-09-28-22

BW-1C

BW-2C

BW-3C

BW-3B

DUP-9-28-22

Client Sample ID: BW-1C Field Duplicate Sample ID: DUP 9-28-22								
Analyte	Duplicate Result	Relative Percent Difference (RPD)						
Barium, Dissolved	E 200.7	0.017 mg/L	0.017 mg/L	0.0%				
Barium, Total	E 200.7	0.018 mg/L	0.018 mg/L	0.0%				
Chromium, Total	E 200.7	ND (0.0060 mg/L)	0.0024 mg/L	DL				
Nickel, Dissolved	E 200.7	0.0077 mg/L	ND (0.010 mg/L)	DL				
Zinc, Dissolved	E 200.7	0.024 mg/L	0.026 mg/L	8.0%				
Antimony, Dissolved	E200.8	ND (0.0010 mg/L)	0.00055 mg/L	DL				
Arsenic, Dissolved	E200.8	0.00017 mg/L	0.00015 mg/L	12.5% +/-RL				
Arsenic, Total	E200.8	0.00015 mg/L	ND (0.0010 mg/L)	DL				
TPH DRO	SW8015	0.025 mg/L	0.018 mg/L	32.6% +/-RL				
Acetone	SW8260B	7.1 μg/L	11 µg/L	43.1% +/-RL				

## FIELD DUPLICATE SUMMARY

Field duplicate RPD control limits are not to exceed 30% for water as established by USEPA Region I - New England Environmental Data Review Supplement for Region 1 Data Review Elements and Superfund Specific Guidance/Procedures, EQADR-Supplement2, September 2020.

DL – Indicates that the analyte was detected in one of the duplicate samples and was undetected in the other sample, and therefore an RPD could not be calculated. Data were not qualified since the detection was within two times the reporting limit. Non-detected results are indicated above with the applicable reporting limit as ND (RL).

+/-RL – Indicates that the detections in both of the samples were within two times the reporting limit. Qualification of data was not required.



## DATA QUALIFICATION SUMMARY

Abbreviation	Reason
EBD	Equipment blank detection
ERPD-LCS	The LCS/LCSD RPD exceeded the upper acceptable limit indicating poor precision.
ERPD-MS	The MS/MSD RPD exceeded the upper acceptable limit indicating poor precision.
HR-LCS	The LCS and/or LCSD percent recovery was greater than the upper acceptable limit indicating a possible high bias.
LR-LCS	The LCS and/or LCSD percent recovery was less than the lower acceptable limit indicating a possible low bias.
MBD	Method blank detection
MDLRL	Flagged by the laboratory: The result was greater than the MDL but less than the RL.
TBD	Trip blank detection

Analyte	Method	Field Sample ID	Lab Sample ID	Result	Limit	Units	Reviewer Qualifier	DV Flag Reasons
1,4-Dioxane	SW8270C	EB-09-28-22	2209f93-001c	ND	1.0	µg/L	UJ	ERPD-LCS
1,4-Dioxane	SW8270C	BW-1C	2209f93-002c	ND	1.0	µg/L	UJ	ERPD-LCS
1,4-Dioxane	SW8270C	BW-2C	2209f93-003c	ND	1.0	µg/L	UJ	ERPD-LCS
1,4-Dioxane	SW8270C	BW-2B	2209f93-004c	ND	1.0	µg/L	UJ	ERPD-LCS
1,4-Dioxane	SW8270C	BW-3C	2209f93-005c	ND	1.0	µg/L	UJ	ERPD-LCS
1,4-Dioxane	SW8270C	BW-3B	2209f93-006c	ND	1.0	µg/L	UJ	ERPD-LCS
1,4-Dioxane	SW8270C	DUP-9-28-22	2209f93-007c	ND	1.0	µg/L	UJ	ERPD-LCS
1-Methylnaphthalene	SW8270C	EB-09-28-22	2209f93-001c	ND	0.30	µg/L	UJ	ERPD-LCS
1-Methylnaphthalene	SW8270C	BW-1C	2209f93-002c	ND	0.30	µg/L	UJ	ERPD-LCS
1-Methylnaphthalene	SW8270C	BW-2C	2209f93-003c	ND	0.30	µg/L	UJ	ERPD-LCS
1-Methylnaphthalene	SW8270C	BW-2B	2209f93-004c	ND	0.30	µg/L	UJ	ERPD-LCS
1-Methylnaphthalene	SW8270C	BW-3C	2209f93-005c	ND	0.30	µg/L	UJ	ERPD-LCS
1-Methylnaphthalene	SW8270C	BW-3B	2209f93-006c	ND	0.30	µg/L	UJ	ERPD-LCS
1-Methylnaphthalene	SW8270C	DUP-9-28-22	2209f93-007c	ND	0.30	µg/L	UJ	ERPD-LCS



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Analyte	Method	Field Sample ID	Lab Sample ID	Result	Limit	Units	Reviewer Qualifier	DV Flag Reasons
2-Methylnaphthalene	SW8270C	EB-09-28-22	2209f93-001c	ND	0.30	µg/L	UJ	ERPD-LCS
2-Methylnaphthalene	SW8270C	BW-1C	2209f93-002c	ND	0.30	µg/L	UJ	ERPD-LCS
2-Methylnaphthalene	SW8270C	BW-2C	2209f93-003c	ND	0.30	µg/L	UJ	ERPD-LCS
2-Methylnaphthalene	SW8270C	BW-2B	2209f93-004c	ND	0.30	µg/L	UJ	ERPD-LCS
2-Methylnaphthalene	SW8270C	BW-3C	2209f93-005c	ND	0.30	µg/L	UJ	ERPD-LCS
2-Methylnaphthalene	SW8270C	BW-3B	2209f93-006c	ND	0.30	µg/L	UJ	ERPD-LCS
2-Methylnaphthalene	SW8270C	DUP-9-28-22	2209f93-007c	ND	0.30	µg/L	UJ	ERPD-LCS
Acenaphthene	SW8270C	EB-09-28-22	2209f93-001c	ND	0.30	µg/L	UJ	ERPD-LCS
Acenaphthene	SW8270C	BW-1C	2209f93-002c	ND	0.30	µg/L	UJ	ERPD-LCS
Acenaphthene	SW8270C	BW-2C	2209f93-003c	ND	0.30	µg/L	UJ	ERPD-LCS
Acenaphthene	SW8270C	BW-2B	2209f93-004c	ND	0.30	µg/L	UJ	ERPD-LCS
Acenaphthene	SW8270C	BW-3C	2209f93-005c	ND	0.30	µg/L	UJ	ERPD-LCS
Acenaphthene	SW8270C	BW-3B	2209f93-006c	ND	0.30	µg/L	UJ	ERPD-LCS
Acenaphthene	SW8270C	DUP-9-28-22	2209f93-007c	ND	0.30	µg/L	UJ	ERPD-LCS
Acetone	SW8260B	EB-09-28-22	2209F93-001a	12	10	µg/L	JB	TBD
Acetone	SW8260B	DUP-9-28-22	2209F93-007a	11	10	µg/L	JB	TBD
Acetone	SW8260B	Trip Blank	2209F93-009a	3.4	10	µg/L	J	MDLRL
Acetone	SW8260B	BW-1C	2209F93-002a	7.1	10	µg/L	U	MDLRL, TBD
Acetone	SW8260B	BW-2B	2209F93-004a	3.8	10	µg/L	U	MDLRL, TBD
Acetone	SW8260B	FB 9-28-22	2209F93-008a	4.8	10	µg/L	U	MDLRL, TBD
Anthracene	SW8270C	EB-09-28-22	2209f93-001c	ND	0.30	µg/L	UJ	ERPD-LCS
Antimony, Dissolved	E200.8	BW-3C	2209F93-005E	0.00057	0.0010	mg/L	J	MDLRL
Antimony, Dissolved	E200.8	DUP-9-28-22	2209F93-007E	0.00055	0.0010	mg/L	J	MDLRL
Arsenic, Dissolved	E200.8	BW-1C	2209F93-002E	0.00017	0.0010	mg/L	J	MDLRL
Arsenic, Dissolved	E200.8	BW-2C	2209F93-003E	0.00080	0.0010	mg/L	J	MDLRL
Arsenic, Dissolved	E200.8	BW-2B	2209F93-004E	0.00053	0.0010	mg/L	J	MDLRL
Arsenic, Dissolved	E200.8	BW-3C	2209F93-005E	0.00078	0.0010	mg/L	J	MDLRL



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Analyte	Method	Field Sample ID	Lab Sample ID	Result	Limit	Units	Reviewer Qualifier	DV Flag Reasons
Arsenic, Dissolved	E200.8	DUP-9-28-22	2209F93-007E	0.00015	0.0010	mg/L	J	MDLRL
Arsenic, Total	E200.8	BW-1C	2209F93-002D	0.00015	0.0010	mg/L	J	MDLRL
Arsenic, Total	E200.8	BW-2B	2209F93-004D	0.00064	0.0010	mg/L	J	MDLRL
Arsenic, Total	E200.8	BW-3C	2209F93-005D	0.00085	0.0010	mg/L	J	MDLRL
Benzene	SW8260B	FB 9-28-22	2209F93-008a	ND	1.0	µg/L	UJ	ERPD-MS
Benzene	SW8260B	Trip Blank	2209F93-009a	ND	1.0	µg/L	UJ	ERPD-MS
Beryllium, Dissolved	E 200.7	EB-09-28-22	2209F93-001E	ND	0.0020	mg/L	UJ	LR-LCS
Beryllium, Dissolved	E 200.7	BW-1C	2209F93-002E	ND	0.0020	mg/L	UJ	LR-LCS
Beryllium, Dissolved	E 200.7	BW-2C	2209F93-003E	ND	0.0020	mg/L	UJ	LR-LCS
Beryllium, Dissolved	E 200.7	BW-2B	2209F93-004E	ND	0.0020	mg/L	UJ	LR-LCS
Beryllium, Dissolved	E 200.7	BW-3C	2209F93-005E	ND	0.0020	mg/L	UJ	LR-LCS
Beryllium, Dissolved	E 200.7	BW-3B	2209F93-006E	ND	0.0020	mg/L	UJ	LR-LCS
Beryllium, Dissolved	E 200.7	DUP-9-28-22	2209F93-007E	ND	0.0020	mg/L	UJ	LR-LCS
Chromium, Total	E 200.7	BW-2B	2209F93-004D	0.0029	0.0060	mg/L	J	MDLRL
Chromium, Total	E 200.7	BW-3C	2209F93-005D	0.004	0.0060	mg/L	J	MDLRL
Chromium, Total	E 200.7	DUP-9-28-22	2209F93-007D	0.0024	0.0060	mg/L	J	MDLRL
Chrysene	SW8270C	EB-09-28-22	2209f93-001c	ND	0.30	µg/L	UJ	ERPD-LCS
Cobalt, Dissolved	E 200.7	BW-3B	2209F93-006E	0.0025	0.0060	mg/L	J	MDLRL
Cobalt, Total	E 200.7	BW-2B	2209F93-004D	0.0063	0.0060	mg/L	J+	HR-LCS
Cobalt, Total	E 200.7	BW-3B	2209F93-006D	0.0042	0.0060	mg/L	J+	HR-LCS, MDLRL
Fluoranthene	SW8270C	EB-09-28-22	2209f93-001c	ND	0.30	µg/L	UJ	ERPD-LCS
Fluorene	SW8270C	BW-1C	2209f93-002c	ND	0.30	µg/L	UJ	ERPD-LCS
Fluorene	SW8270C	BW-2C	2209f93-003c	ND	0.30	µg/L	UJ	ERPD-LCS
Fluorene	SW8270C	BW-2B	2209f93-004c	ND	0.30	µg/L	UJ	ERPD-LCS
Fluorene	SW8270C	BW-3C	2209f93-005c	ND	0.30	µg/L	UJ	ERPD-LCS
Fluorene	SW8270C	BW-3B	2209f93-006c	ND	0.30	µg/L	UJ	ERPD-LCS
Fluorene	SW8270C	DUP-9-28-22	2209f93-007c	ND	0.30	µg/L	UJ	ERPD-LCS



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Analyte	Method	Field Sample ID	Lab Sample ID	Result	Limit	Units	Reviewer Qualifier	DV Flag Reasons
Indeno(1,2,3-cd)pyrene	SW8270C	EB-09-28-22	2209f93-001c	ND	0.30	µg/L	UJ	ERPD-LCS
Lead, Dissolved	E200.8	BW-3C	2209F93-005E	0.000088	0.00050	mg/L	J	MDLRL
Lead, Dissolved	E200.8	BW-3B	2209F93-006E	0.000070	0.00050	mg/L	J	MDLRL
Lead, Total	E200.8	BW-3C	2209F93-005D	0.00037	0.00050	mg/L	J	MDLRL
Naphthalene	SW8270C	EB-09-28-22	2209f93-001c	ND	0.30	µg/L	UJ	ERPD-LCS
Naphthalene	SW8270C	BW-1C	2209f93-002c	ND	0.30	µg/L	UJ	ERPD-LCS
Naphthalene	SW8270C	BW-2C	2209f93-003c	ND	0.30	µg/L	UJ	ERPD-LCS
Naphthalene	SW8270C	BW-2B	2209f93-004c	ND	0.30	µg/L	UJ	ERPD-LCS
Naphthalene	SW8270C	BW-3C	2209f93-005c	ND	0.30	µg/L	UJ	ERPD-LCS
Naphthalene	SW8270C	BW-3B	2209f93-006c	ND	0.30	µg/L	UJ	ERPD-LCS
Naphthalene	SW8270C	DUP-9-28-22	2209f93-007c	ND	0.30	µg/L	UJ	ERPD-LCS
Nickel, Dissolved	E 200.7	BW-1C	2209F93-002E	0.0077	0.010	mg/L	J	MDLRL
Phenanthrene	SW8270C	EB-09-28-22	2209f93-001c	ND	0.30	µg/L	UJ	ERPD-LCS
Pyrene	SW8270C	EB-09-28-22	2209f93-001c	ND	1.0	µg/L	UJ	ERPD-LCS
Selenium, Dissolved	E200.8	BW-3C	2209F93-005E	0.00067	0.0010	mg/L	J	MDLRL
TPH DRO	SW8015	EB-09-28-22	2209F93-001C	0.019	0.064	mg/L	U	MBD, MDLRL
TPH DRO	SW8015	BW-1C	2209F93-002C	0.025	0.064	mg/L	U	MBD, MDLRL
TPH DRO	SW8015	BW-2B	2209F93-004C	0.049	0.064	mg/L	U	MBD, MDLRL
TPH DRO	SW8015	BW-3B	2209F93-006C	0.021	0.064	mg/L	U	MBD, MDLRL
TPH DRO	SW8015	DUP-9-28-22	2209F93-007C	0.018	0.064	mg/L	U	MBD, MDLRL
Vanadium, Total	E 200.7	BW-2C	2209F93-003D	0.0056	0.050	mg/L	J	MDLRL
Vanadium, Total	E 200.7	BW-3B	2209F93-006D	0.0046	0.050	mg/L	J	MDLRL
Zinc, Dissolved	E 200.7	BW-3B	2209F93-006E	0.30	0.010	mg/L	J+	HR-LCS
Zinc, Dissolved	E 200.7	BW-1C	2209F93-002E	0.024	0.010	mg/L	JB	EBD
Zinc, Dissolved	E 200.7	BW-2C	2209F93-003E	0.018	0.010	mg/L	JB	EBD
Zinc, Dissolved	E 200.7	BW-2B	2209F93-004E	0.043	0.010	mg/L	JB	EBD
Zinc, Dissolved	E 200.7	BW-3C	2209F93-005E	0.028	0.010	mg/L	JB	EBD, HR-LCS



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Analyte	Method	Field Sample ID	Lab Sample ID	Result	Limit	Units	Reviewer Qualifier	DV Flag Reasons
Zinc, Dissolved	E 200.7	DUP-9-28-22	2209F93-007E	0.026	0.010	mg/L	JB	EBD, HR-LCS
Zinc, Dissolved	E 200.7	EB-09-28-22	2209F93-001E	0.0048	0.010	mg/L	J	MDLRL



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Client: Marathon Oil	Laboratory: Hall Environmental Analysis Laboratory					
Project Name: Western Refining Southwest, Quarterly GW	Sample Matrix: Groundwater					
Project Number: 697-080-002 Task: 0006	Sample Start Date: 09/29/2022					
Date Validated: 01/23/2023	Sample End Date: 09/29/2022					
Parameters Included:						
<ul> <li>Volatile Organic Compounds (VOC) by Environmental Protection Agency (EPA) Test Methods for Evaluating Solid Waste (SW-846) Method 8260B</li> </ul>						
<ul> <li>1,2-Dibromoethane (EDB) by EPA Method 504.1</li> </ul>						
<ul> <li>Semivolatile Organic Compounds (SVOC) by SW-846 Me Monitoring (SIM)</li> </ul>	thod 8270C and Method 8270C with Selected Ion					
<ul> <li>Total Petroleum Hydrocarbons (TPH) Gasoline Range Org</li> </ul>	ganics (GRO) by SW-846 Method 8015D					
<ul> <li>TPH Diesel Range Organics (DRO) and Motor Oil Range</li> </ul>	Organics (MRO) by SW-846 Method 8015D Modified					
<ul> <li>Total and Dissolved Metals by EPA Method 200.7 and Method</li> </ul>	ethod 200.8					
<ul> <li>Total and Dissolved Mercury by EPA Method 245.1</li> </ul>						
<ul> <li>Cyanide by Standard Methods for the Examination of Wat</li> </ul>	ter and Wastewater (SM) Method 4500 CN E					
Laboratory Project ID: 2209H02						
Data Validator: Daran O'Hollearn, Lead Project Scientist						
Reviewer: Mike Phillips, Senior Chemist						

## DATA EVALUATION CRITERIA SUMMARY

A Tier II Data Validation was performed by Trihydro Corporation's Chemical Data Evaluation Services Group on the analytical data report packages generated by Hall Environmental Analysis Laboratory of Albuquerque, New Mexico, with additional data from Pace Analytical National of Mount Juliet, Tennessee evaluating samples from the Marathon Oil site, located in Gallup, New Mexico.

Precision, accuracy, method compliance, and completeness of this data package were assessed during this data review. Precision was determined by evaluating the calculated relative percent difference (RPD) values from:

- Field duplicate pairs
- Laboratory duplicate pairs
- Matrix spike (MS) and matrix spike duplicate (MSD) pairs
- Laboratory control sample (LCS) and laboratory control sample duplicate (LCSD) pairs

Laboratory accuracy was established by reviewing the demonstrated percent recoveries (%R) of the following items to verify that data are not biased.

- MS/MSD samples
- LCS/LCSD samples
- Organic system monitoring compounds (surrogates)



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Field accuracy was established by collecting and analyzing the following samples to monitor for possible ambient or cross contamination during sampling and transportation.

- Trip blanks
- Field blanks
- Equipment blanks

Method compliance was established by reviewing sample integrity, holding times, detection limits, surrogate recoveries, laboratory blanks, initial and continuing calibrations (where applicable), and the LCS/LCSD percent recoveries against method-specific requirements.

Completeness was evaluated by determining the overall ratio of the number of samples and analyses planned versus the number of samples with valid analyses. Determination of completeness included a review of the chain-of-custody (CoC), laboratory analytical methods, and other laboratory and field documents associated with this analytical data set.

Client Sample ID	Laboratory Sample Number
EB-09-29-22	2209H02-001
MW-1	2209H02-002
SMW-4	2209H02-003
MW-2	2209H02-004
MW-5	2209H02-005
DUP-9-29-22	2209H02-006
FB 9-29-22	2209H02-007
Trip Blank	2209H02-008

#### SAMPLE NUMBERS TABLE





The laboratory data were reviewed to evaluate compliance with the methods and the quality of the reported data. Assessment of CoC completeness is included in Item 3 of the Data Validation Checklist. A check mark ( $\checkmark$ ) indicates that the referenced validation criteria were deemed acceptable, whereas a crossed circle ( $\otimes$ ) indicates validation criteria for which the data have been qualified by the data validator. An empty circle (O) indicates that the specified criterion does not apply to the reviewed data. Details are noted in the tables below.

#### Validation Criteria

- ✓ Data Completeness
- ✓ CoC Documentation (Item 3)
- ✓ Holding Times and Preservation (Items 6 and 7)
- O Initial and Continuing Calibrations (Items 9 and 10)
- ⊗ Laboratory Blanks (Items 11 and 12)
- ⊗ MS/MSD (Items 13 and 14)
- ⊗ LCS/LCSD (Items 15 and 16)
- ✓ System Monitoring Compounds (i.e., Surrogates) (Item 17)
- 8 Field, Equipment, and Trip Blanks (Items 18 and 19)
- ⊗ Field Duplicates (Items 20 and 21)
- ✓ Laboratory Duplicates (Item 22)

#### **Guidance References**

Chemical data validation was conducted in accordance with the United States Environmental Protection Agency (USEPA) Contract Laboratory Program (CLP) National Functional Guidelines for the analyses listed below, or by the appropriate method if not covered in the National Functional Guidelines.

- Data for organic analyses were evaluated according to validation criteria set forth in the USEPA CLP National Functional Guidelines for Organic Superfund Methods Data Review, document number EPA-540-R-20-005, November 2020 with additional reference to the USEPA CLP National Functional Guidelines for Organic Data Review, document number EPA 540/R-99/008, October 1999.
- Data for inorganic analyses were evaluated according to validation criteria set forth in the USEPA CLP National Functional Guidelines for Inorganic Superfund Methods Data Review, document number EPA-540-R-20-006, November 2020 with additional reference to the USEPA CLP National Functional Guidelines for Inorganic Data Review, document number EPA 540-R-04-004, October 2004.
- Review of field duplicates was conducted according to the USEPA Region I New England Environmental Data Review Supplement for Region 1 Data Review Elements and Superfund Specific Guidance/Procedures, EQADR-Supplement2, September 2020.
- Trihydro Data Validation Variance Documentation, April 2022.



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#### **OVERALL DATA PACKAGE ASSESSMENT**

Based on a data validation review, the data are acceptable as delivered. Data qualified by the laboratory are discussed in Item 2 of the Validation Criteria Checklist.

The purpose of validating data and assigning qualifiers is to assist in proper data interpretation. Data that are not qualified meet the site data quality objectives. If values are assigned qualifiers other than an R (rejected, data not usable), the data may be used for site evaluation; however, consideration should be given to the reasons for qualification when interpreting sample concentrations. Data points that are assigned an R qualifier should not be used for site evaluation purposes.

If applicable, text was identified in **bold font** in the Validation Criteria Checklist to indicate that further action and/or qualification of the data were required. Data may have been qualified with J data flags by the laboratory if the result was greater than or equal to the method detection limit (MDL) but less than the reporting limit (RL). These laboratory-applied J flags were preserved, if present, and included in the Data Qualification Summary table at the end of this report. If applicable, data validation qualifiers were added for the items noted with crossed circles in the Validation Criteria section above. Please see the Data Qualification Summary table at the end of this report.

If data would be qualified with more than one flag, one qualifier was assigned based on the severity; however, all reasons for qualification were retained. Data that would be qualified with both J+ and J- flags were evaluated based on validation criteria and assigned the appropriate flag. The hierarchy of qualifiers from the most to least severe is as follows:

Data qualifiers used during this validation are included in the following table.

<u>Qualifier</u>	Definition
J	Estimated concentration
J+	The result is an estimated concentration, but may be biased high
UJ	Estimated reporting limit
U	Evaluated to be undetected at the reporting limit
JB	Estimated concentration due to blank contamination

#### **Data Completeness**

The analyses were performed as requested on the CoC records. The associated samples were received by the laboratory and analyzed properly unless otherwise noted in the Criteria Checklist below. The complete data package consisted of 450 data points. The data completeness calculation does not include any submitted blank sample results. Data points were not rejected. The data completeness measure for this data package is calculated to be 100% and is acceptable.



	v	ALIDATION CR	ITERIA CHECKLIST			
1. Was the report free of non-conformances identified by the laboratory? Yes						
Comments: The laboratory did not report non-conformances related to the analytical data for this sample set.						
2. Were the data free of da If no, define.	No					
Comments: The laboratory	used the followi	ng data qualificat	tion flags with this data	a set.		
J – Analyte detected below c	uantitation limit	ts.	-			
J6 – The sample matrix inter	fered with the a	bility to make an	y accurate determinati	ion; spike va	lue is low.	
R – % RPD outside of range						
S – % Recovery outside of ra	ange due to dilu	ition or matrix inte	erference.			
3. Were sample CoC form:	s and custody p	procedures comp	ete?		Yes	
Comments: The CoC records from field to laboratory were complete, and custody was maintained as evidenced by field and laboratory personnel signatures, dates, and times of receipt. Custody seals were not present because the samples were transferred to a laboratory field courier service for transport from the field to the laboratory, and custody was maintained at all times						
4. Were detection limits in permit, or method, or inc	accordance wit licated as acce	h the quality assu ptable?	urance project plan (Q	APP),	Yes	
Comments: The detection li	nits appeared t	o be acceptable.	The following dilution	ıs were appli	ed.	
	Method	Sample(s)	Analyte(s)	Dilution		
	200.7	 MW-5	Dissolved Metals	Factor 5		
	245.1	SMW-4	Total Mercury	5		
_			- -		I	
5. Were the reported analy QAPP, permit, or CoC?	tical methods a	nd constituents i	n compliance with the		No	
Comments: The reported an constituents in accordance w	alytical method /ith the CoC, wi	ls were in complia th the following e	ance with the CoC, an exceptions.	d the laborat	ory reported the requested	
The CoC requested total and using both Method 200.7 and accuracy, and precision goal	l dissolved meta d Method 200.8 s and, therefore	als using only Me . This substitute e, was an accept	ethod 200.7; however, d analytical method, N able replacement.	the laborato lethod 200.8	ry analyzed the samples , met similar sensitivity,	
The CoC requested cyanide This substituted analytical m replacement.	using Method 3 ethod met simil	335.4; however, t ar sensitivity, acc	he laboratory analyzed curacy, and precision g	d the sample goals and, th	s using Method 4500 CN E. erefore, was an acceptable	
6. Were samples received in good condition within method-specified requirements? No						
Comments: Samples were r temperature range of $4^{\circ}C \pm 2$ transferred to Pace National 3.0°C as noted on the CoC.	eceived on ice, 2°C at 0.6°C, 1. were received i	in good condition 0°C, and 1.7°C a in good condition	n, and with the cooler as noted on the CoC a with the cooler tempe	temperatures nd Sample L erature within	s outside the recommended og-in Check List. Samples the recommended range at	
3.0°C as noted on the CoC. The cooler temperatures below 2.0°C were judged as acceptable since the laboratory did not report the sample containers						



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VALIDATION CRITERIA CHECKLIST								
7. Were samples technical hold	7. Were samples extracted/digested and analyzed within method-specified or Yes technical holding times?							
Comments: The samples were extracted/digested and analyzed within method-specific holding times.								
8. Were reported method(s)? S	<ol> <li>Were reported units appropriate for the sample matrix/matrices and analytical Yes method(s)? Specify if wet or dry units were used for soil.</li> </ol>							
Comments: The results were reported in concentration units of micrograms per liter ( $\mu$ g/L) and milligrams per liter (mg/L), which were acceptable for the sample matrix and the analyses requested.								
9. Did the labora	tory provide a	iny specific	initial and/or con	tinuing cali	bration res	ults?		No
Comments: Initial	and continuir	a calibratio	on data were not i	included as	part of this	s data set.		
10. If initial and/or acceptable lim	continuing ca	alibration re	esults were provid	led, were th	ie results v	vithin		N/A
Comments: Initial	and continuir	g calibratio	on data were not i	included as	part of this	s data set.		
11. Was the total the total numb	number of lab er of samples	oratory bla s or analyze	nk samples prepared as required by	ared equal	to at least 1?	5% of		Yes
Comments: The to samples.	otal number o	f laboratory	/ blank samples p	prepared wa	as equal to	at least 5%	of the total r	number of
12. Were target a	nalytes report	ed as not o	letected in the lat	poratory bla	nks?			No
Comments: Targe	t analytes we	re reported	l as not detected	in the labor	atory blanl	ks, with the	following exc	ceptions.
U U	,				,	,	0	
	ſ	Method	Analyte	Batch	Conce	entration		
	-	200.7	Total Zinc	70537	0.005	5 mg/L		
		8015D	TPH DRO	70521	0.01	∋ mg/L		
Detections of the than the applicab associated sample did not require qua	identified ar le reporting s and detection lification.	alytes in t limits were	he associated s assigned U qua ere above the rep	amples tha alifiers. No orting limit	<b>at were les</b> on-detectio and greate	s than the ns of the id r than ten ti	blank result entified analy mes the blan	t <b>s and/or less</b> /tes in the k concentration
13. Was the total number of san	number of MS nples or analy	samples   /zed as rec	prepared equal to juired by the meth	o at least 5% hod?	6 of the tot	al		Yes
Comments: The to although MS samp analytical batch in	otal number o les were not this sample s	f matrix spi prepared/re et has bee	ke samples prepa eported for all ana n indicated below	ared was e alyses and/ ⁄.	qual to at le or batches	east 5% of t . The matri	the total num x spike samp	ber of samples, le source for each
	Method		<u>Analytes</u>		Batch	MS Sam	ple Source	
	200.7	1	Total Metals		70537	Not P	repared	
	200.7	D	issolved Metals	(	91551	Not P	repared	
	200.8		Total Metals		70537	Not P	repared	
	200.8	D	issolved Metals		91522	Not P	repared	
	245.1	Total a	nd Dissolved Mer	rcury	70627	SM	1W-4	
	504.1		EDB		70550	Not P	repared	
	4500CN E		Cyanide	WO	61937600	Not As	sociated	
	8015D	TP	H DRO and MRC	)	70521	Not P	repared	
👦 Trihydr	0							

		VALIDA	TION CRITERI	A CHECKLIST						
	Method	Anal	<u>ytes</u>	<b>Batch</b>	MS Sample S	Source				
	8015D	TPH	GRO	GW91584	MW-1					
	8260B	VO	Cs	R91600	MW-1					
	8270C SIM	SVC	)Cs	70536	Not Prepa	ired				
	8270C	SVC	)Cs	70536	Not Prepa	ired				
Not Associated	– The MS sample source wa	as not associ	ated with this proj	ect.						
Not Prepared –	Matrix spikes were not prep	ared/reported	d for this batch.							
14. For MS/M within dat	14. For MS/MSDs prepared from project samples, were percent recoveries and RPDs No within data validation or laboratory quality control (QC) limits?									
Comments: T limits. with the	he MS/MSD percent reco following exception.	overies and	RPDs for project	ct samples were	within data val	idation and lab	oratory QC			
The reported	MS and MSD percent re	ecoveries f	or mercury in I	Method 245.1 b	atch 70627 we	re outside the	OC limits			
of 75-125% at	t 126%, 72.1%, and 74.7	%. The res	sults for all of t	he associated s	samples in the	batch would	typically			
be qualified b	based on the MS/MSD re	esults. Ho	wever, since co	onflicting result	s (low and hig	h recoveries)	were			
reported for t	his batch, the determin	ation of wh	nich qualifier to	be applied wo	uld be arbitra	ry. Therefore,	only the			
non-detected	dissolved mercury and	i total mero	cury results for	the parent san	npie SMW-4 w	ere qualified L	JJ due to			
The percent re	coveries and RPD value	s for MS/M	SDs prepared fr	om non-project :	samples were e	waluated and d	considered			
but data were	not qualified based on th	ose results	since matrix sin	nilarity to project	samples were a	l not be guaran	iteed.			
15 Was the t	otal number of LCSs and	lyzed equa	l to at least 5% (	of the total numb	ver of	Ves				
samples of	or analyzed as required b	y the metho	od?			163				
Comments: T	be total number of LCS s	amples and	alvzed was equa	al to at least 5%	of the total nun	ober of sample	e			
			Comments: The total number of LCS samples analyzed was equal to at least 5% of the total number of samples.							
16 Word 100										
laboratory	S/LCSD percent recoverie	es and LCS	/LCSD RPDs wi	thin data validat	ion or	No				
laboratory	S/LCSD percent recoverie y QC limits?	es and LCS	/LCSD RPDs wi	thin data validat	ion or	No	reter v OC			
laboratory Comments: T limits, with the	S/LCSD percent recoverie y QC limits? he LCS and LCSD perce	es and LCS ent recoverie	/LCSD RPDs wi	thin data validat	ion or <i>r</i> ithin data valid	No ation and labor	ratory QC			
Comments: T limits, with the	S/LCSD percent recoverie y QC limits? he LCS and LCSD perce following exceptions. <u>Analyte</u>	es and LCS ent recoverie <u>Batch</u>	/LCSD RPDs wi	thin data validat D RPDs were v LCSD	ion or vithin data valid LCS/LCSD	No lation and labout LCS/LCSD	ratory QC			
Comments: T limits, with the <u>Method</u> 200 7	S/LCSD percent recoverie y QC limits? he LCS and LCSD perce following exceptions. <u>Analyte</u> Total Chromium	es and LCS ent recoverie <u>Batch</u> 70537	/LCSD RPDs wi es and LCS/LCS LCS Recovery 152%	thin data validat D RPDs were w LCSD Recovery	ion or /ithin data valid LCS/LCSD QC Limits 70-130%	No ation and labor LCS/LCSD RPD	ratory QC <u>RPD QC Limits</u>			
Comments: T limits, with the <u>Method</u> 200.7	S/LCSD percent recoverie y QC limits? he LCS and LCSD perce following exceptions. <u>Analyte</u> Total Chromium Dissolved Bervilium	es and LCS ent recoverie <u>Batch</u> 70537 C91551	/LCSD RPDs wi es and LCS/LCS <u>LCS</u> <u>Recovery</u> 152% 67 2%	thin data validat D RPDs were w LCSD <u>Recovery</u> 	ion or /ithin data valid LCS/LCSD QC Limits 70-130% 70-130%	No lation and labor LCS/LCSD RPD 	ratory QC RPD QC Limits			
Comments: T limits, with the <u>Method</u> 200.7 200.7 200.7	S/LCSD percent recoverie y QC limits? he LCS and LCSD perce following exceptions. <u>Analyte</u> Total Chromium Dissolved Beryllium Dissolved Zinc	es and LCS ent recoverie <u>Batch</u> 70537 C91551 C91551	/LCSD RPDs wi es and LCS/LCS <u>LCS</u> <u>Recovery</u> 152% 67.2% 137%	thin data validat D RPDs were w <u>LCSD</u> <u>Recovery</u> 	ion or /ithin data valid <u>LCS/LCSD</u> <u>QC Limits</u> 70-130% 70-130%	No ation and labor LCS/LCSD RPD 	ratory QC <u>RPD QC Limits</u>			
Comments: T limits, with the <u>Method</u> 200.7 200.7 8270C SIM	S/LCSD percent recoverie y QC limits? he LCS and LCSD perce following exceptions. <u>Analyte</u> Total Chromium Dissolved Beryllium Dissolved Zinc 1 4-Dioxane	es and LCS nt recoverie <u>Batch</u> 70537 C91551 C91551 70536	/LCSD RPDs wi es and LCS/LCS <u>LCS</u> <u>Recovery</u> 152% 67.2% 137% Acceptable	thin data validat D RPDs were w <u>LCSD</u> <u>Recovery</u>   Acceptable	ion or /ithin data valid <u>LCS/LCSD</u> <u>QC Limits</u> 70-130% 70-130% 15-60 5%	No ation and labor <u>LCS/LCSD</u> <u>RPD</u>   55 1%	ratory QC <u> RPD QC Limits </u> 29 7%			
Comments: T limits, with the <u>Method</u> 200.7 200.7 8270C SIM 8270C SIM	S/LCSD percent recoverie y QC limits? The LCS and LCSD perce following exceptions. <u>Analyte</u> Total Chromium Dissolved Beryllium Dissolved Zinc 1,4-Dioxane Naphthalene	es and LCS Int recoverie <u>Batch</u> 70537 C91551 C91551 70536 70536	/LCSD RPDs wi es and LCS/LCS <u>Recovery</u> 152% 67.2% 137% Acceptable Acceptable	thin data validat D RPDs were w <u>LCSD</u> <u>Recovery</u>   Acceptable Acceptable	ion or /ithin data valid <u>LCS/LCSD QC Limits</u> 70-130% 70-130% 15-60.5% 15-78.3%	No ation and labor <u>LCS/LCSD</u> <u>RPD</u>   55.1% 38.6%	ratory QC <u> <u> RPD QC</u> <u> Limits</u>   29.7% 31.7%</u>			
Mere Los           laboratory           Comments: T           limits, with the <u>Method</u> 200.7           200.7           200.7           8270C SIM           8270C SIM           8270C SIM	S/LCSD percent recoverie y QC limits? he LCS and LCSD perce following exceptions. <u>Analyte</u> Total Chromium Dissolved Beryllium Dissolved Beryllium Dissolved Zinc 1,4-Dioxane Naphthalene	es and LCS nt recoverie <u>Batch</u> 70537 C91551 C91551 70536 70536 70536	/LCSD RPDs wi es and LCS/LCS <u>LCS</u> <u>Recovery</u> 152% 67.2% 137% Acceptable Acceptable Acceptable	thin data validat	ion or /ithin data valid <u>LCS/LCSD</u> <u>QC Limits</u> 70-130% 70-130% 15-60.5% 15-78.3% 15-79.6%	No ation and labor <u>LCS/LCSD</u> <u>RPD</u>  55.1% 38.6% 35.9%	ratory QC <u>RPD QC</u> <u>Limits</u>   29.7% 31.7% 31.4%			
Mere Los           laboratory           Comments: T           limits, with the <u>Method</u> 200.7           200.7           200.7           8270C SIM           8270C SIM           8270C SIM           8270C SIM	S/LCSD percent recoverie y QC limits? The LCS and LCSD percent following exceptions. <u>Analyte</u> Total Chromium Dissolved Beryllium Dissolved Beryllium Dissolved Zinc 1,4-Dioxane Naphthalene 1-Methynaphthalene	es and LCS ent recoverie <u>Batch</u> 70537 C91551 C91551 70536 70536 70536 70536	/LCSD RPDs wi es and LCS/LCS <u>LCS</u> <u>Recovery</u> 152% 67.2% 137% Acceptable Acceptable Acceptable Acceptable	thin data validat D RPDs were w <u>LCSD</u> <u>Recovery</u>  Acceptable Acceptable Acceptable Acceptable	ion or /ithin data valid <u>LCS/LCSD</u> <u>QC Limits</u> 70-130% 70-130% 15-60.5% 15-78.3% 15-78.6%	No ation and labor <u>LCS/LCSD</u> <u>RPD</u>  55.1% 38.6% 35.9% 31.9%	ratory QC <u>RPD QC</u> <u>Limits</u>  29.7% 31.7% 31.4% 30.5%			
Meter Los           laboratory           Comments: T           limits, with the <u>Method</u> 200.7           200.7           200.7           8270C SIM           8270C SIM           8270C SIM           8270C SIM           8270C SIM           8270C SIM	S/LCSD percent recoverie y QC limits? he LCS and LCSD perce following exceptions. <u>Analyte</u> Total Chromium Dissolved Beryllium Dissolved Beryllium Dissolved Zinc 1,4-Dioxane Naphthalene 1-Methynaphthalene Acenaphthene	es and LCS nt recoverie <u>Batch</u> 70537 C91551 C91551 70536 70536 70536 70536 70536	/LCSD RPDs wi es and LCS/LCS <u>LCS</u> <u>Recovery</u> 152% 67.2% 137% Acceptable Acceptable Acceptable Acceptable	thin data validat	ion or /ithin data valid <u>LCS/LCSD</u> <u>QC Limits</u> 70-130% 70-130% 15-60.5% 15-78.3% 15-79.6% 15-78.6% 15-92%	No ation and labor LCS/LCSD <u>RPD</u>  55.1% 38.6% 35.9% 31.9% 43.3%	ratory QC <u>RPD QC</u> <u>Limits</u>  29.7% 31.7% 31.4% 30.5% 30.5%			
Mere Loc           laboratory           Comments: T           limits, with the <u>Method</u> 200.7           200.7           200.7           8270C SIM	S/LCSD percent recoverie y QC limits? The LCS and LCSD percent following exceptions. Analyte Total Chromium Dissolved Beryllium Dissolved Beryllium Dissolved Zinc 1,4-Dioxane Naphthalene 1-Methynaphthalene 2-Methynaphthalene Acenaphthene Fluorene	es and LCS Int recoveria <u>Batch</u> 70537 C91551 C91551 70536 70536 70536 70536 70536 70536 70536	/LCSD RPDs wi es and LCS/LCS <u>Recovery</u> 152% 67.2% 137% Acceptable Acceptable Acceptable Acceptable Acceptable	thin data validat	ion or /ithin data valid <u>LCS/LCSD QC Limits</u> 70-130% 70-130% 15-60.5% 15-78.3% 15-78.6% 15-78.6% 15-92% 15-96%	No ation and labor <u>LCS/LCSD</u> <u>RPD</u>  55.1% 38.6% 35.9% 31.9% 43.3% 29.4%	ratory QC <u>RPD QC</u> <u>Limits</u>  29.7% 31.7% 31.4% 30.5% 30.5% 25.1%			
Mere Loc           laboratory           Comments: T           limits, with the <u>Method</u> 200.7           200.7           200.7           8270C SIM	S/LCSD percent recoverie y QC limits? The LCS and LCSD percent following exceptions. <u>Analyte</u> Total Chromium Dissolved Beryllium Dissolved Beryllium Dissolved Zinc 1,4-Dioxane Naphthalene 1-Methynaphthalene 2-Methynaphthalene Fluorene	es and LCS nt recoverie <u>Batch</u> 70537 C91551 C91551 70536 70536 70536 70536 70536 70536	/LCSD RPDs wi es and LCS/LCS <u>Recovery</u> 152% 67.2% 137% Acceptable Acceptable Acceptable Acceptable Acceptable	thin data validat	ion or /ithin data valid <u>LCS/LCSD</u> <u>QC Limits</u> 70-130% 70-130% 70-130% 15-60.5% 15-78.3% 15-79.6% 15-92% 15-92%	No ation and labor LCS/LCSD <u>RPD</u>  55.1% 38.6% 35.9% 31.9% 43.3% 29.4%	ratory QC <u>RPD QC</u> <u>Limits</u> 29.7% 31.4% 30.5% 30.5% 25.1%			
Comments: T limits, with the <u>Method</u> 200.7 200.7 200.7 8270C SIM 8270C SIM 8270C SIM 8270C SIM 8270C SIM 8270C SIM 8270C SIM 8270C SIM	S/LCSD percent recoverie y QC limits? The LCS and LCSD percent following exceptions. Analyte Total Chromium Dissolved Beryllium Dissolved Beryllium Dissolved Zinc 1,4-Dioxane Naphthalene 1-Methynaphthalene 2-Methynaphthalene Acenaphthene Fluorene	es and LCS ent recoverie <u>Batch</u> 70537 C91551 C91551 70536 70536 70536 70536 70536 50536 70556 70557 7057 70577 70577 70577 70577 70577 70577	/LCSD RPDs wi es and LCS/LCS <u>LCS</u> <u>Recovery</u> 152% 67.2% 137% Acceptable Acceptable Acceptable Acceptable Acceptable Acceptable	thin data validat D RPDs were w <u>LCSD</u> <u>Recovery</u>  Acceptable Acceptable Acceptable Acceptable Acceptable Acceptable acceptable	ion or /ithin data valid <u>LCS/LCSD</u> <u>QC Limits</u> 70-130% 70-130% 15-60.5% 15-78.3% 15-79.6% 15-78.6% 15-92% 15-96% the evidence of	No ation and labor <u>LCS/LCSD</u> <u>RPD</u>  55.1% 38.6% 35.9% 31.9% 43.3% 29.4% of potential his	ratory QC <u>RPD QC</u> <u>Limits</u>  29.7% 31.7% 31.4% 30.5% 30.5% 25.1% gh bias.			
Comments: T limits, with the <u>Method</u> 200.7 200.7 200.7 8270C SIM 8270C SIM 8270C SIM 8270C SIM 8270C SIM 8270C SIM 8270C SIM 8270C SIM 8270C SIM 8270C SIM	S/LCSD percent recoverie y QC limits? The LCS and LCSD percent following exceptions. <u>Analyte</u> Total Chromium Dissolved Beryllium Dissolved Beryllium Dissolved Zinc 1,4-Dioxane Naphthalene 1-Methynaphthalene 2-Methynaphthalene Acenaphthene Fluorene f total chromium and discussion of total chromium in	es and LCS Int recoverie <u>Batch</u> 70537 C91551 C91551 70536 70536 70536 70536 70536 70536 ssolved zir sample MV d in the ze	/LCSD RPDs wi es and LCS/LCS <u>Recovery</u> 152% 67.2% 137% Acceptable Acceptable Acceptable Acceptable Acceptable Acceptable Acceptable Covertable Acceptable	thin data validat D RPDs were w <u>LCSD</u> <u>Recovery</u>  Acceptable Acceptable Acceptable Acceptable Acceptable Acceptable das J+ due to re qualification.	ion or /ithin data valid <u>LCS/LCSD</u> <u>QC Limits</u> 70-130% 70-130% 15-60.5% 15-79.6% 15-79.6% 15-92% 15-92% 15-96% the evidence of the second secon	No ation and labor LCS/LCSD <u>RPD</u>  55.1% 38.6% 35.9% 31.9% 43.3% 29.4% of potential his	ratory QC <u>RPD QC</u> <u>Limits</u> 29.7% 31.7% 31.4% 30.5% 30.5% 25.1% gh bias.			
Comments: T limits, with the <u>Method</u> 200.7 200.7 200.7 8270C SIM 8270C SIM	S/LCSD percent recoverie y QC limits? The LCS and LCSD percent following exceptions. Analyte Total Chromium Dissolved Beryllium Dissolved Beryllium Dissolved Zinc 1,4-Dioxane 1.4-Dioxane 1-Methynaphthalene 2-Methynaphthalene Acenaphthene Fluorene f total chromium and distingtion of total chromium in the sector of tot	es and LCS Int recoverie <u>Batch</u> 70537 C91551 C91551 70536 70536 70536 70536 70536 5050 70536 70536 5050	/LCSD RPDs wi es and LCS/LCS <u>Recovery</u> 152% 67.2% 137% Acceptable Acceptable Acceptable Acceptable Acceptable Acceptable Acceptable Acceptable Acceptable	thin data validat D RPDs were w <u>Recovery</u>  Acceptable Acceptable Acceptable Acceptable Acceptable Acceptable acceptable acceptable acceptable acceptable acceptable acceptable	ion or /ithin data valid <u>LCS/LCSD</u> <u>QC Limits</u> 70-130% 70-130% 15-60.5% 15-78.3% 15-79.6% 15-79.6% 15-92% 15-96% the evidence of results were q	No ation and labor LCS/LCSD <u>RPD</u>  55.1% 38.6% 35.9% 31.9% 43.3% 29.4% of potential his ualified as UJ	ratory QC <u>RPD QC</u> <u>Limits</u>  29.7% 31.7% 31.4% 30.5% 30.5% 25.1% gh bias. due to the			
Comments: T limits, with the <u>Method</u> 200.7 200.7 200.7 8270C SIM 8270C SIM	S/LCSD percent recoveries y QC limits? The LCS and LCSD percent following exceptions. Analyte Total Chromium Dissolved Beryllium Dissolved Beryllium Dissolved Zinc 1,4-Dioxane Naphthalene 1-Methynaphthalene 2-Methynaphthalene Acenaphthene Fluorene f total chromium and distiction of total chromium in ryllium was not detected potential low bias.	es and LCS Int recoveria <u>Batch</u> 70537 C91551 C91551 70536 70536 70536 70536 70536 50536 70536 50556 50556	/LCSD RPDs wi es and LCS/LCS <u>LCS</u> <u>Recovery</u> 152% 67.2% 137% Acceptable Acceptable Acceptable Acceptable Acceptable Acceptable Acceptable Acceptable Sociated samp	thin data validat D RPDs were w <u>LCSD</u> <u>Recovery</u>  Acceptable Acceptable Acceptable Acceptable Acceptable Acceptable Acceptable Acceptable Acceptable Acceptable Acceptable Acceptable Acceptable Acceptable Acceptable Acceptable	ion or /ithin data valid <u>LCS/LCSD</u> <u>QC Limits</u> 70-130% 70-130% 70-130% 15-60.5% 15-78.3% 15-78.6% 15-78.6% 15-96% the evidence of results were q mit were not of	No ation and labor LCS/LCSD RPD  55.1% 38.6% 35.9% 31.9% 43.3% 29.4% of potential his ualified as UJ	ratory QC <u>RPD QC</u> <u>Limits</u>  29.7% 31.7% 31.4% 30.5% 25.1% gh bias. due to the			
Comments: T limits, with the <u>Method</u> 200.7 200.7 200.7 200.7 8270C SIM 8270C SIM	S/LCSD percent recoverie y QC limits? The LCS and LCSD percent following exceptions. Analyte Total Chromium Dissolved Beryllium Dissolved Beryllium Dissolved Zinc 1,4-Dioxane Naphthalene 1-Methynaphthalene 2-Methynaphthalene Acenaphthene Fluorene f total chromium and dist ction of total chromium in ryllium was not detected potential low bias.	es and LCS ent recoverie <u>Batch</u> 70537 C91551 C91551 70536 70536 70536 70536 70536 70536 70536 50536 7057 705	/LCSD RPDs wi es and LCS/LCS <u>LCS</u> <u>Recovery</u> 152% 67.2% 137% Acceptable Acceptable Acceptable Acceptable Acceptable Acceptable Acceptable acceptable Acceptable Acceptable acceptable acceptable acceptable acceptable	thin data validat D RPDs were w <u>LCSD</u> <u>Recovery</u>  Acceptable Acceptable Acceptable Acceptable Acceptable Acceptable Acceptable acceptable Acceptable Acceptable Acceptable Acceptable Acceptable Acceptable Acceptable Acceptable Acceptable Acceptable Acceptable	ion or /ithin data valid <u>LCS/LCSD</u> <u>QC Limits</u> 70-130% 70-130% 15-60.5% 15-78.3% 15-79.6% 15-79.6% 15-92% 15-96% the evidence of results were q mit were not of precision	No ation and labor LCS/LCSD <u>RPD</u>  555.1% 38.6% 35.9% 31.9% 43.3% 29.4% of potential hi ualified as UJ detected in the	ratory QC <u>RPD QC</u> <u>Limits</u>  29.7% 31.7% 31.4% 30.5% 30.5% 25.1% gh bias. due to the			
Comments: T limits, with the <u>Method</u> 200.7 200.7 200.7 8270C SIM 8270C SIM	S/LCSD percent recoverie y QC limits? The LCS and LCSD percent following exceptions. Analyte Total Chromium Dissolved Beryllium Dissolved Beryllium Dissolved Zinc 1,4-Dioxane 1-Methynaphthalene 2-Methynaphthalene 2-Methynaphthalene fluorene f total chromium and distiction of total chromium in ryllium was not detected potential low bias.	es and LCS Int recoveria Batch 70537 C91551 C91551 70536 70536 70536 70536 70536 70536 70536 Solved zir sample MV d in the as SD RPD va were qualif	/LCSD RPDs wi es and LCS/LCS <u>LCS</u> <u>Recovery</u> 152% 67.2% 137% Acceptable Acceptable Acceptable Acceptable Acceptable Acceptable Acceptable acceptable Acceptable Acceptable Acceptable acceptable Acceptable Acceptable Acceptable Acceptable	thin data validat D RPDs were v <u>LCSD</u> <u>Recovery</u>  Acceptable Acceptable Acceptable Acceptable Acceptable Acceptable acceptable Acceptable Acceptable Acceptable Acceptable Acceptable Acceptable Acceptable Acceptable Acceptable Acceptable Acceptable Acceptable	ion or //ithin data valid <u>LCS/LCSD</u> <u>QC Limits</u> 70-130% 70-130% 15-60.5% 15-78.3% 15-78.6% 15-78.6% 15-96% the evidence of results were q mit were not cooor precision	No ation and labor LCS/LCSD RPD  55.1% 38.6% 35.9% 31.9% 43.3% 29.4% of potential his ualified as UJ detected in the a.	ratory QC <u>RPD QC</u> <u>Limits</u>  29.7% 31.7% 31.4% 30.5% 25.1% gh bias. due to the			
Comments: T limits, with the <u>Method</u> 200.7 200.7 200.7 8270C SIM 8270C SIM 8270C SIM 8270C SIM 8270C SIM 8270C SIM 8270C SIM 8270C SIM 7he non-detector Dissolved be evidence of p The identified associated sa	S/LCSD percent recoverie y QC limits? The LCS and LCSD percent following exceptions. Analyte Total Chromium Dissolved Beryllium Dissolved Beryllium Dissolved Zinc 1,4-Dioxane Naphthalene 1-Methynaphthalene 2-Methynaphthalene Acenaphthene Fluorene f total chromium and dist ction of total chromium in ryllium was not detected potential low bias.	es and LCS Int recoverie Batch 70537 C91551 C91551 70536 70536 70536 70536 70536 70536 70536 500ved zir sample MV d in the as SD RPD va were qualif	/LCSD RPDs wi es and LCS/LCS <u>Recovery</u> 152% 67.2% 137% Acceptable Acceptable Acceptable Acceptable Acceptable Acceptable Acceptable acceptable Acceptable acceptable acceptable acceptable acceptable acceptable acceptable acceptable acceptable acceptable acceptable acceptable acceptable acceptable acceptable acceptable acceptable	thin data validat D RPDs were w <u>LCSD</u> <u>Recovery</u>  Acceptable Acceptable Acceptable Acceptable Acceptable Acceptable das J+ due to re qualification. les, and these re above the QC lits to evidence of p	ion or /ithin data valid <u>LCS/LCSD</u> <u>QC Limits</u> 70-130% 70-130% 15-60.5% 15-78.3% 15-79.6% 15-79.6% 15-92% 15-96% the evidence of results were q mit were not cooor precision	No ation and labor LCS/LCSD <u>RPD</u>  55.1% 38.6% 35.9% 31.9% 43.3% 29.4% of potential his ualified as UJ detected in the b.	ratory QC <u>RPD QC</u> <u>Limits</u>  29.7% 31.7% 31.4% 30.5% 30.5% 25.1% gh bias. due to the			

			RITERIA CHECKLIST				
17. Were surrogate	recoveries within labor	atory QC limits	?		No		
Comments: Surrogate recoveries were within laboratory QC limits, with the following exceptions,							
Qualification of samples were evaluation	ple data was not requin ated based on their spe	ed based on su ecific surrogate	rrogate non-conformance recoveries.	es in QC samples as	the environmental		
18. Were the number of trip blank, field blank, and/or equipment blank samples Yes collected equal to at least 10% of the total number of samples or as required by the project guidelines, QAPP, SAP, or permit?							
Comments: The nur One trip blank samp were collected as pa	mber of trip, field, and e le, Trip Blank, one field art of this sample set.	equipment blanl I blank sample,	ks collected was equal to FB 9-29-22, and one equ	at least 10% of the r upment blank sample	umber of samples. e, EB-09-29-22,		
19. Were target ana equipment blan	alytes reported as not d k samples?	etected in the t	rip blank, field blank, and	/or	No		
Comments: Target a exceptions.	analytes were not dete	cted in the trip t	blank, field blank, and eq	uipment blank sample	es with the following		
	Blank Sample ID	Method	Analyte	Concentration			
	Trip Blank	8260B	Acetone	3.2 μg/L			
	EB-09-29-22	8260B	Acetone	5.4 µg/L			
	EB-09-29-22	8260B	Total Xylenes	0.46 µg/L			
	EB-09-29-22	8015D	TPH DRO	0.045 mg/L			
	EB-09-29-22	200.7	Total Chromium	0.0025 mg/L			
	EB-09-29-22	200.7	Dissolved Zinc	0.0072 mg/L			
Detections of aceto applicable reportin were greater than t qualifiers. Non-deto reporting limit and gr The TPH DRO resul therefore, additional	one, total chromium, a g limits were assigne he reporting limits bu ections of the identified reater than ten times th ts for the samples in ba qualification due to the	and dissolved d U qualifiers. It less than or analytes in the e blank concen atch 70521 were e equipment bla	zinc in the associated s Detections of dissolve equal to 10 times the bl associated samples and tration did not require qu e previously qualified due nk contamination was no	amples that were lead zinc in the associ ank results were as I detections that were alification. e to a laboratory blank t required.	ess than the ated samples that signed JB above the detection;		
20. Was the numbe number of same	r of field duplicates col bles or as required by t	lected equal to he project guide	at least 10% of the total elines, QAPP, SAP, or pe	rmit?	Yes		
Comments: The nur	mber of field duplicates	collected was	equal to at least 10% of t	he number of sample	S.		
Sample DUP-9-29-2	2 was collected as a fie	eld duplicate of	sample MW-1.				
		·	·				



	VA	ALIDATION CRITI		ST	
21. Were field duplicate 0-30%, or air 0-25%	e RPD values within d	lata validation QC	limits (soil 0-509	%, water	No
Comments: As indicate within data validation Q0	d in the Field Duplica C limits of 0-30% for v	te Summary Table water samples, wit	e at the end of th th the following e	is report, field duplic exception.	ate RPD values were
The RPD value for diss for dissolved zinc were results for dissolved z	solved zinc greatly e assigned J qualific inc in the associate	exceeded the dat ers for the parent d samples due to	a validation lim t and field dupli o evidence of ex	it of 30% at 107.2% icate samples, and ktremely poor preci	. The reported results J qualifiers for the ision (RPD > 100%).
An RPD value could no the analyte was detect parent sample was gre sample MW-1 and UJ f	ot be calculated for ed in the parent san eater than two times or the duplicate san	dissolved nickel nple and was und the reporting lin nple DUP-9-29-22	for the field du detected in the nit, dissolved ni 2.	plicate pair MW-1 a duplicate sample. ickel was qualified	nd DUP-9-29-22 since As the detection in the as J for the parent
22. For laboratory dupli validation or laborat	cates prepared from ory QC limits?	project samples, v	vere RPDs withi	n data	N/A
Comments: Laboratory associated with this data	duplicates were prep a set.	ared for the analy	sis of cyanide in	batch WG1937600	from samples not
The RPD values for the but data were not qualifi	laboratory duplicate s ed based on these re	samples prepared esults since matrix	from non-projec similarity to proj	t samples were eval ect samples could n	uated and considered, ot be guaranteed.
23. Were the following	data relationships rea	alistic?			
<ul> <li>Target analytes EPH/8270)?</li> </ul>	s were reported by m	ore than one meth	nod (e.g., 8260/8	270,	N/A
Comments: Target anal	ytes were not reporte	ed by more than o	ne method.		
Both total and or results were groups and the second	dissolved metals ana eater than or equal to	lyses were perforr the dissolved me	ned, and the tota tals results?	al metals	No
Comments: The followin results. The EPA has no metals results that excee based on these data.	ng table contains the ot provided guidance ed the corresponding	exceptions in white or requirements for total metals resul	ch the dissolved or the evaluation ts. Therefore, q	metals results excent n, validation, and qua ualification of results	eded the total metals alification of dissolved s was not performed
	Sample ID	Analyta	Total Result	Dissolved Result	]

Sample ID	<u>Analyte</u>	<u>Total Result</u> (mg/L)	<u>Dissolved Result</u> (mg/L)
MW-1	Arsenic	0.0013	0.0014
MW-1	Nickel	ND	0.022
EB-09-29-22	Zinc	ND	0.0072
MW-1	Zinc	0.0047	0.096
SMW-4	Zinc	ND	0.055
MW-2	Zinc	ND	0.037
MW-5	Zinc	ND	0.029
DUP-9-29-22	Zinc	ND	0.029



Client Sample ID: MW-1							
Field Duplicate Sample ID: DUP-9-29-22							
Analyte	Method	Laboratory Result	Duplicate Result	Relative Percent Difference (RPD)			
Barium, Dissolved	E 200.7	0.013 mg/L	0.013 mg/L	0.0%			
Barium, Total	E 200.7	0.013 mg/L	0.013 mg/L	0.0%			
Chromium, Total	E 200.7	0.0029 mg/L	0.0033 mg/L	12.9% +/-RL			
Nickel, Dissolved	E 200.7	0.022 mg/L	ND (0.010 mg/L)	DL			
Zinc, Dissolved	E 200.7	0.096 mg/L	0.029 mg/L	107.2%			
Zinc, Total	E 200.7	0.0047 mg/L	ND (0.010 mg/L)	DL			
Arsenic, Dissolved	E200.8	0.0014 mg/L	0.0013 mg/L	7.4% +/-RL			
Arsenic, Total	E200.8	0.0013 mg/L	0.0015 mg/L	14.3% +/-RL			
Lead, Dissolved	E200.8	0.00013 mg/L	0.00012 mg/L	8.0% +/-RL			
Lead, Total	E200.8	0.00073 mg/L	0.00066 mg/L	10.1% +/-RL			
TPH DRO	SW8015	0.017 mg/L	0.030 mg/L	55.3% +/-RL			
Acetone	SW8260B	3.3 µg/L	ND (10 μg/L)	DL			

#### FIELD DUPLICATE SUMMARY

Field duplicate RPD control limits are not to exceed 30% for water as established by USEPA Region I - New England Environmental Data Review Supplement for Region 1 Data Review Elements and Superfund Specific Guidance/Procedures, EQADR-Supplement2, September 2020.

DL – Indicates that the analyte was detected in one of the duplicate samples and was undetected in the other sample, and therefore an RPD could not be calculated. Data were not qualified since the detection was within two times the reporting limit. Non-detected results are indicated above with the applicable reporting limit as ND (RL).

+/-RL – Indicates that the detections in both of the samples were within two times the reporting limit. Qualification of data was not required.

The RPD value for dissolved zinc greatly exceeded the data validation limit of 30% at 107.2%. The reported results for dissolved zinc were assigned J qualifiers for the parent and field duplicate samples, and J qualifiers for the results for dissolved zinc in the associated samples due to evidence of extremely poor precision (RPD > 100%).

An RPD value could not be calculated for dissolved nickel for the field duplicate pair MW-1 and DUP-9-29-22 since the analyte was detected in the parent sample and was undetected in the duplicate sample. As the detection in the parent sample was greater than two times the reporting limit, dissolved nickel was qualified as J for the parent sample MW-1 and UJ for the duplicate sample DUP-9-29-22.



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## DATA QUALIFICATION SUMMARY

Abbreviation	Reason
EBD	Equipment blank detection
ERPD-FD	High field duplicate RPD.
ERPD-LCS	The LCS/LCSD RPD exceeded the upper acceptable limit indicating poor precision.
HR-LCS	The LCS and/or LCSD percent recovery was greater than the upper acceptable limit indicating a possible high bias.
LR-LCS	The LCS and/or LCSD percent recovery was less than the lower acceptable limit indicating a possible low bias.
LR-MS	The MS and/or MSD percent recovery was less than the lower acceptable limit indicating possible matrix interference.
MBD	Method blank detection
MDLRL	Flagged by the laboratory: The result was greater than the MDL but less than the RL.
TBD	Trip blank detection

Analyte	Method	Field Sample ID	Lab Sample ID	Result	Limit	Units	Reviewer Qualifier	DV Flag Reasons
1,4-Dioxane	SW8270C	EB-09-29-22	2209h02-001c	ND	1.0	µg/L	UJ	ERPD-LCS
1,4-Dioxane	SW8270C	MW-1	2209h02-002c	ND	1.0	µg/L	UJ	ERPD-LCS
1,4-Dioxane	SW8270C	SMW-4	2209h02-003c	ND	1.0	µg/L	UJ	ERPD-LCS
1,4-Dioxane	SW8270C	MW-2	2209h02-004c	ND	1.0	µg/L	UJ	ERPD-LCS
1,4-Dioxane	SW8270C	MW-5	2209h02-005c	ND	1.0	µg/L	UJ	ERPD-LCS
1,4-Dioxane	SW8270C	DUP-9-29-22	2209h02-006c	ND	1.0	µg/L	UJ	ERPD-LCS
1-Methylnaphthalene	SW8270C	EB-09-29-22	2209h02-001c	ND	0.30	µg/L	UJ	ERPD-LCS
1-Methylnaphthalene	SW8270C	MW-1	2209h02-002c	ND	0.30	µg/L	UJ	ERPD-LCS
1-Methylnaphthalene	SW8270C	SMW-4	2209h02-003c	ND	0.30	µg/L	UJ	ERPD-LCS
1-Methylnaphthalene	SW8270C	MW-2	2209h02-004c	ND	0.30	µg/L	UJ	ERPD-LCS
1-Methylnaphthalene	SW8270C	MW-5	2209h02-005c	ND	0.30	µg/L	UJ	ERPD-LCS
1-Methylnaphthalene	SW8270C	DUP-9-29-22	2209h02-006c	ND	0.30	µg/L	UJ	ERPD-LCS
2-Methylnaphthalene	SW8270C	EB-09-29-22	2209h02-001c	ND	0.30	µg/L	UJ	ERPD-LCS



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Analyte	Method	Field Sample ID	Lab Sample ID	Result	Limit	Units	Reviewer Qualifier	DV Flag Reasons
2-Methylnaphthalene	SW8270C	MW-1	2209h02-002c	ND	0.30	µg/L	UJ	ERPD-LCS
2-Methylnaphthalene	SW8270C	SMW-4	2209h02-003c	ND	0.30	µg/L	UJ	ERPD-LCS
2-Methylnaphthalene	SW8270C	MW-2	2209h02-004c	ND	0.30	µg/L	UJ	ERPD-LCS
2-Methylnaphthalene	SW8270C	MW-5	2209h02-005c	ND	0.30	µg/L	UJ	ERPD-LCS
2-Methylnaphthalene	SW8270C	DUP-9-29-22	2209h02-006c	ND	0.30	µg/L	UJ	ERPD-LCS
Acenaphthene	SW8270C	EB-09-29-22	2209h02-001c	ND	0.30	µg/L	UJ	ERPD-LCS
Acenaphthene	SW8270C	MW-1	2209h02-002c	ND	0.30	µg/L	UJ	ERPD-LCS
Acenaphthene	SW8270C	SMW-4	2209h02-003c	ND	0.30	µg/L	UJ	ERPD-LCS
Acenaphthene	SW8270C	MW-2	2209h02-004c	ND	0.30	µg/L	UJ	ERPD-LCS
Acenaphthene	SW8270C	MW-5	2209h02-005c	ND	0.30	µg/L	UJ	ERPD-LCS
Acenaphthene	SW8270C	DUP-9-29-22	2209h02-006c	ND	0.30	µg/L	UJ	ERPD-LCS
Acetone	SW8260B	Trip Blank	2209H02-008a	3.2	10	µg/L	J	MDLRL
Acetone	SW8260B	EB-09-29-22	2209H02-001a	5.4	10	µg/L	U	MDLRL, TBD
Acetone	SW8260B	MW-1	2209H02-002a	3.3	10	µg/L	U	MDLRL, TBD
Acetone	SW8260B	SMW-4	2209H02-003a	3.7	10	µg/L	U	MDLRL, TBD
Arsenic, Dissolved	E200.8	MW-5	2209H02-005E	0.00086	0.0010	mg/L	J	MDLRL
Arsenic, Total	E200.8	MW-5	2209H02-005D	0.00097	0.0010	mg/L	J	MDLRL
Beryllium, Dissolved	E 200.7	EB-09-29-22	2209H02-001E	ND	0.0020	mg/L	UJ	LR-LCS
Beryllium, Dissolved	E 200.7	MW-1	2209H02-002E	ND	0.0020	mg/L	UJ	LR-LCS
Beryllium, Dissolved	E 200.7	SMW-4	2209H02-003E	ND	0.0020	mg/L	UJ	LR-LCS
Beryllium, Dissolved	E 200.7	MW-2	2209H02-004E	ND	0.0020	mg/L	UJ	LR-LCS
Beryllium, Dissolved	E 200.7	MW-5	2209H02-005E	ND	0.010	mg/L	UJ	LR-LCS
Beryllium, Dissolved	E 200.7	DUP-9-29-22	2209H02-006E	ND	0.0020	mg/L	UJ	LR-LCS
Chromium, Total	E 200.7	EB-09-29-22	2209H02-001D	0.0025	0.0060	mg/L	J+	HR-LCS, MDLRL
Chromium, Total	E 200.7	MW-1	2209H02-002D	0.0029	0.0060	mg/L	U	EBD, HR-LCS, MDLRL
Chromium, Total	E 200.7	SMW-4	2209H02-003D	0.0040	0.0060	mg/L	U	EBD, HR-LCS, MDLRL
Chromium, Total	E 200.7	MW-2	2209H02-004D	0.0050	0.0060	mg/L	U	EBD, HR-LCS, MDLRL



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Analyte	Method	Field Sample ID	Lab Sample ID	Result	Limit	Units	Reviewer Qualifier	DV Flag Reasons
Chromium, Total	E 200.7	DUP-9-29-22	2209H02-006D	0.0033	0.0060	mg/L	U	EBD, HR-LCS, MDLRL
Fluorene	SW8270C	EB-09-29-22	2209h02-001c	ND	0.30	µg/L	UJ	ERPD-LCS
Fluorene	SW8270C	MW-1	2209h02-002c	ND	0.30	µg/L	UJ	ERPD-LCS
Fluorene	SW8270C	SMW-4	2209h02-003c	ND	0.30	µg/L	UJ	ERPD-LCS
Fluorene	SW8270C	MW-2	2209h02-004c	ND	0.30	µg/L	UJ	ERPD-LCS
Fluorene	SW8270C	MW-5	2209h02-005c	ND	0.30	µg/L	UJ	ERPD-LCS
Fluorene	SW8270C	DUP-9-29-22	2209h02-006c	ND	0.30	µg/L	UJ	ERPD-LCS
Lead, Dissolved	E200.8	MW-1	2209H02-002E	0.00013	0.00050	mg/L	J	MDLRL
Lead, Dissolved	E200.8	DUP-9-29-22	2209H02-006E	0.00012	0.00050	mg/L	J	MDLRL
Lead, Total	E200.8	SMW-4	2209H02-003D	0.00036	0.00050	mg/L	J	MDLRL
Mercury, Dissolved	E245.1	SMW-4	2209H02-003E	ND	0.00020	mg/L	UJ	LR-MS
Mercury, Total	E245.1	SMW-4	2209H02-003D	ND	0.0010	mg/L	UJ	LR-MS
Nickel, Dissolved	200.7	DUP-9-29-22	2209H02-006E	ND	0.010	mg/L	UJ	ERPD-FD
Nickel, Dissolved	200.7	MW-1	2209H02-002E	0.022	0.010	mg/L	J	ERPD-FD
Naphthalene	SW8270C	EB-09-29-22	2209h02-001c	ND	0.30	µg/L	UJ	ERPD-LCS
Naphthalene	SW8270C	MW-1	2209h02-002c	ND	0.30	µg/L	UJ	ERPD-LCS
Naphthalene	SW8270C	SMW-4	2209h02-003c	ND	0.30	µg/L	UJ	ERPD-LCS
Naphthalene	SW8270C	MW-2	2209h02-004c	ND	0.30	µg/L	UJ	ERPD-LCS
Naphthalene	SW8270C	MW-5	2209h02-005c	ND	0.30	µg/L	UJ	ERPD-LCS
Naphthalene	SW8270C	DUP-9-29-22	2209h02-006c	ND	0.30	µg/L	UJ	ERPD-LCS
TPH DRO	SW8015	EB-09-29-22	2209H02-001C	0.045	0.064	mg/L	U	MBD, MDLRL
TPH DRO	SW8015	MW-1	2209H02-002C	0.017	0.064	mg/L	U	MBD, MDLRL
TPH DRO	SW8015	SMW-4	2209H02-003C	0.022	0.064	mg/L	U	MBD, MDLRL
TPH DRO	SW8015	MW-2	2209H02-004C	0.038	0.064	mg/L	U	MBD, MDLRL
TPH DRO	SW8015	DUP-9-29-22	2209H02-006C	0.030	0.064	mg/L	U	MBD, MDLRL
Vanadium, Dissolved	E 200.7	SMW-4	2209H02-003E	0.046	0.050	mg/L	J	MDLRL
Xylenes, Total	SW8260B	EB-09-29-22	2209H02-001a	0.46	1.5	µg/L	J	MDLRL



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Analyte	Method	Field Sample ID	Lab Sample ID	Result	Limit	Units	Reviewer Qualifier	DV Flag Reasons
Zinc, Dissolved	E 200.7	MW-1	2209H02-002E	0.096	0.010	mg/L	J+	ERPD-FD, HR-LCS
Zinc, Dissolved	E 200.7	EB-09-29-22	2209H02-001E	0.0072	0.010	mg/L	J+	ERPD-FD, HR-LCS, MDLRL
Zinc, Dissolved	E 200.7	SMW-4	2209H02-003E	0.055	0.010	mg/L	JB	EBD, ERPD-FD, HR-LCS
Zinc, Dissolved	E 200.7	MW-2	2209H02-004E	0.037	0.010	mg/L	JB	EBD, ERPD-FD, HR-LCS
Zinc, Dissolved	E 200.7	DUP-9-29-22	2209H02-006E	0.029	0.010	mg/L	JB	EBD, ERPD-FD, HR-LCS
Zinc, Dissolved	E 200.7	MW-5	2209H02-005E	0.029	0.050	mg/L	U	EBD, ERPD-FD, HR-LCS, MDLRL
Zinc, Total	E 200.7	MW-1	2209H02-002D	0.0047	0.010	mg/L	U	MBD, MDLRL



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Client: Marathon Oil	Laboratory: Hall Environmental Analysis Laboratory				
Project Name: Western Refining Southwest, Quarterly GW	Sample Matrix: Groundwater				
Project Number: 697-080-002 Task: 0004	Sample Start Date: 09/30/2022				
Date Validated: 01/31/2023	Sample End Date: 09/30/2022				
Parameters Included:					
<ul> <li>Volatile Organic Compounds (VOC) by Environmental Protection Agency (EPA) Test Methods for Evaluating Solid Waste (SW-846) Method 8260B</li> </ul>					
<ul> <li>1,2-Dibromoethane (EDB) by EPA Method 504.1</li> </ul>					
<ul> <li>Semivolatile Organic Compounds (SVOC) by SW-846 Me Monitoring (SIM)</li> </ul>	thod 8270C and Method 8270C with Selected Ion				
<ul> <li>Total Petroleum Hydrocarbons (TPH) Gasoline Range Org</li> </ul>	ganics (GRO) by SW-846 Method 8015D				
<ul> <li>TPH Diesel Range Organics (DRO) and Motor Oil Range</li> </ul>	Organics (MRO) by SW-846 Method 8015D Modified				
<ul> <li>Total and Dissolved Metals by EPA Method 200.7 and Method</li> </ul>	ethod 200.8				
<ul> <li>Total and Dissolved Mercury by EPA Method 245.1</li> </ul>					
<ul> <li>Cyanide by Standard Methods for the Examination of Wat</li> </ul>	er and Wastewater (SM) Method 4500 CN E				
Laboratory Project ID: 2209H72					
Data Validator: Daran O'Hollearn, Lead Project Scientist					
Reviewer: Mike Phillips, Senior Chemist					

## DATA EVALUATION CRITERIA SUMMARY

A Tier II Data Validation was performed by Trihydro Corporation's Chemical Data Evaluation Services Group on the analytical data report packages generated by Hall Environmental Analysis Laboratory of Albuquerque, New Mexico, with additional data from Pace Analytical National of Mount Juliet, Tennessee evaluating samples from the Marathon Oil site, located in Gallup, New Mexico.

Precision, accuracy, method compliance, and completeness of this data package were assessed during this data review. Precision was determined by evaluating the calculated relative percent difference (RPD) values from:

- Field duplicate pairs
- Laboratory duplicate pairs
- Matrix spike (MS) and matrix spike duplicate (MSD) pairs
- Laboratory control sample (LCS) and laboratory control sample duplicate (LCSD) pairs

Laboratory accuracy was established by reviewing the demonstrated percent recoveries (%R) of the following items to verify that data are not biased.

- MS/MSD samples
- LCS/LCSD samples
- Organic system monitoring compounds (surrogates)



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Field accuracy was established by collecting and analyzing the following samples to monitor for possible ambient or cross contamination during sampling and transportation.

- Trip blanks
- Field blanks
- Equipment blanks

Method compliance was established by reviewing sample integrity, holding times, detection limits, surrogate recoveries, laboratory blanks, initial and continuing calibrations (where applicable), and the LCS/LCSD percent recoveries against method-specific requirements.

Completeness was evaluated by determining the overall ratio of the number of samples and analyses planned versus the number of samples with valid analyses. Determination of completeness included a review of the chain-of-custody (CoC), laboratory analytical methods, and other laboratory and field documents associated with this analytical data set.

Client Sample ID	Laboratory Sample Number
EB-9-30-22	2209H72-001
MW-4	2209H72-002
SMW-2	2209H72-003
OW-59	2209H72-004
OW-14	2209H72-005
OW-30	2209H72-006
DUP-9-30-22	2209H72-007
FB-9-30-22	2209H72-008
Trip Blank	2209H72-009

#### SAMPLE NUMBERS TABLE





The laboratory data were reviewed to evaluate compliance with the methods and the quality of the reported data. Assessment of CoC completeness is included in Item 3 of the Data Validation Checklist. A check mark ( $\checkmark$ ) indicates that the referenced validation criteria were deemed acceptable, whereas a crossed circle ( $\otimes$ ) indicates validation criteria for which the data have been qualified by the data validator. An empty circle (O) indicates that the specified criterion does not apply to the reviewed data. Details are noted in the tables below.

#### Validation Criteria

- ✓ Data Completeness
- ✓ CoC Documentation (Item 3)
- ✓ Holding Times and Preservation (Items 6 and 7)
- O Initial and Continuing Calibrations (Items 9 and 10)
- ⊗ Laboratory Blanks (Items 11 and 12)
- ✓ MS/MSD (Items 13 and 14)
- ⊗ LCS/LCSD (Items 15 and 16)
- System Monitoring Compounds (i.e., Surrogates) (Item 17)
- 8 Field, Equipment, and Trip Blanks (Items 18 and 19)
- ⊗ Field Duplicates (Items 20 and 21)
- ✓ Laboratory Duplicates (Item 22)

## **Guidance References**

Chemical data validation was conducted in accordance with the United States Environmental Protection Agency (USEPA) Contract Laboratory Program (CLP) National Functional Guidelines for the analyses listed below, or by the appropriate method if not covered in the National Functional Guidelines.

- Data for organic analyses were evaluated according to validation criteria set forth in the USEPA CLP National Functional Guidelines for Organic Superfund Methods Data Review, document number EPA-540-R-20-005, November 2020 with additional reference to the USEPA CLP National Functional Guidelines for Organic Data Review, document number EPA 540/R-99/008, October 1999.
- Data for inorganic analyses were evaluated according to validation criteria set forth in the USEPA CLP National Functional Guidelines for Inorganic Superfund Methods Data Review, document number EPA-540-R-20-006, November 2020 with additional reference to the USEPA CLP National Functional Guidelines for Inorganic Data Review, document number EPA 540-R-04-004, October 2004.
- Review of field duplicates was conducted according to the USEPA Region I New England Environmental Data Review Supplement for Region 1 Data Review Elements and Superfund Specific Guidance/Procedures, EQADR-Supplement2, September 2020.
- Trihydro Data Validation Variance Documentation, April 2022.



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#### **OVERALL DATA PACKAGE ASSESSMENT**

Based on a data validation review, the data are acceptable as delivered. Data qualified by the laboratory are discussed in Item 2 of the Validation Criteria Checklist.

The purpose of validating data and assigning qualifiers is to assist in proper data interpretation. Data that are not qualified meet the site data quality objectives. If values are assigned qualifiers other than an R (rejected, data not usable), the data may be used for site evaluation; however, consideration should be given to the reasons for qualification when interpreting sample concentrations. Data points that are assigned an R qualifier should not be used for site evaluation purposes.

If applicable, text was identified in **bold font** in the Validation Criteria Checklist to indicate that further action and/or qualification of the data were required. Data may have been qualified with J data flags by the laboratory if the result was greater than or equal to the method detection limit (MDL) but less than the reporting limit (RL). These laboratory-applied J flags were preserved, if present, and included in the Data Qualification Summary table at the end of this report. If applicable, data validation qualifiers were added for the items noted with crossed circles in the Validation Criteria section above. Please see the Data Qualification Summary table at the end of this report.

If data would be qualified with more than one flag, one qualifier was assigned based on the severity; however, all reasons for qualification were retained. Data that would be qualified with both J+ and J- flags were evaluated based on validation criteria and assigned the appropriate flag. The hierarchy of qualifiers from the most to least severe is as follows:

Data qualifiers used during this validation are included in the following table.

<u>Qualifier</u>	Definition			
J	Estimated concentration			
J+	The result is an estimated concentration, but may be biased high			
UJ	Estimated reporting limit			
U	Evaluated to be undetected at the reporting limit			
JB	Estimated concentration due to blank contamination			

#### **Data Completeness**

The analyses were performed as requested on the CoC records. The associated samples were received by the laboratory and analyzed properly unless otherwise noted in the Criteria Checklist below. The complete data package consisted of 540 data points. The data completeness calculation does not include any submitted blank sample results. Data points were not rejected. The data completeness measure for this data package is calculated to be 100% and is acceptable.



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		VALIDATIO	ON CRITERIA CHECKLIST				
1. Was the repo	ort free of non-	conformances identifie	ed by the laboratory?		No		
Comments: The laboratory noted the following analytical non-conformances related to this data set							
Methods 8270C a	and 8270C SI	I · 1-Methylnanhthaler	e was reported by EPA Method 8	270C instead of F	PA Method 8270C		
SIM because of th	neir elevated o	concentrations for sam	ple OW-14.				
The LCSD had el	evated recove	ries for the "S" flagged	compounds.				
Method 8015D DI	<u>RO/MRO</u> : The	e LCS had elevated re	covery. The LCSD had elevated	recovery due to sa	mple carryover.		
2. Were the dat If no, define.	<ol> <li>Were the data free of data qualification flags and/or notes used by the laboratory? No If no, define.</li> </ol>						
Comments: The	laboratory use	ed the following data qu	alification flags with this data set				
J – Analyte detec	ted below qua	ntitation limits.					
J6 – The sample	matrix interfer	ed with the ability to m	ake any accurate determination;	spike value is low.			
R – % RPD outsid	le of range.						
S – % Recovery of	outside of rang	ge due to dilution or ma	atrix interference.				
* – Value exceeds	s maximum co	ontaminant level.					
3. Were sample	CoC forms a	nd custody procedures	complete?		No		
Comments: The CoC records from field to laboratory were complete, and custody was maintained as evidenced by field and laboratory personnel signatures, dates, and times of receipt. Custody seals were not present because the samples were transferred to a laboratory field courier service for transport from the field to the laboratory, and custody was maintained at all times. The trip blank sample was received but was not included on the CoC. The laboratory logged in the sample and performed							
		cordance with the qual	s not required.	)	Ves		
permit, or me	thod, or indica	ated as acceptable?		/,	103		
Comments: The	detection limit	s appeared to be acce	ptable. The following dilutions we	ere applied.			
	Method	Sample(s)	Analyte(s)	Dilution Factor			
	200.7	OW-14	Dissolved and Total Barium	5			
	8015D	OW-30	TPH DRO and MRO	10			
	8015D	OW-14	TPH GRO	50			
	8260B	OW-14	Select VOCs	50			
	8260B	OW-30	MTBE	50			
	8260B	OW-14	Benzene	500			
<ol> <li>Were the rep QAPP, permi</li> <li>Comments: The constituents in ac</li> <li>The CoC requests</li> <li>using both Metho accuracy, and press</li> <li>The CoC requests</li> </ol>	orted analytica t, or CoC? reported analy cordance with ed total and di d 200.7 and M ecision goals a ed cyanide us	al methods and constit ytical methods were in the CoC, with the follo issolved metals using o lethod 200.8. This sub and, therefore, was an ing Method 335.4; how	uents in compliance with the compliance with the CoC, and the owing exceptions. only Method 200.7; however, the ostituted analytical method, Metho acceptable replacement. rever, the laboratory analyzed the	e laboratory reporte laboratory analyzed od 200.8, met simila e samples using Me	No ed the requested d the samples ar sensitivity, ethod 4500 CN E.		
This substituted a replacement.	nalytical meth	od met similar sensitiv	ity, accuracy, and precision goals	and, therefore, wa	as an acceptable		



VALIDATION CRITERIA CHECKLIST						
6. Were samples rec	6. Were samples received in good condition within method-specified requirements? No					
Comments: Samples of 4 temperature range of 4 transferred to Pace Na at 1.6°C as noted on th	Comments: Samples were received on ice, in good condition, and with the cooler temperatures outside the recommended temperature range of $4^{\circ}C \pm 2^{\circ}C$ between 5.6°C and 9.1°C as noted on the CoC and Sample Log-in Check List. Samples transferred to Pace National were received in good condition with the cooler temperature outside the recommended range at 1.6°C as noted on the CoC.					
The cooler temperature the same day (within 2	es above 6°C w 4 hours) of the	rere evaluated to be accept last sample collection time,	able since the and tempera	e samples were receive ture equilibrium had no	ed at the laboratory on t been established.	
The cooler temperature broken or frozen.	e below 2.0°C v	vas judged as acceptable s	ince the labor	atory did not report the	sample containers as	
<ol> <li>Were samples ext technical holding t</li> </ol>	racted/digested imes?	and analyzed within metho	od-specified o	r	Yes	
Comments: The samp	les were extrac	ted/digested and analyzed	within method	d-specific holding times	S.	
8. Were reported uni method(s)? Speci	ts appropriate f ify if wet or dry	or the sample matrix/matric units were used for soil.	es and analyt	ical	Yes	
Comments: The result which were acceptable	s were reported for the sample	d in concentration units of n matrix and the analyses re	nicrograms pe quested.	r liter (μg/L) and milligr	rams per liter (mg/L),	
9. Did the laboratory	provide any sp	ecific initial and/or continuir	ng calibration	results?	No	
Comments: Initial and	continuing calil	pration data were not includ	led as part of	this data set.		
10. If initial and/or con acceptable limits?	tinuing calibrati	on results were provided, w	vere the result	ts within	N/A	
Comments: Initial and	continuing calil	pration data were not includ	led as part of	this data set.		
11. Was the total num the total number o	ber of laborator f samples or ar	y blank samples prepared on alyzed as required by the r	equal to at lea nethod?	ast 5% of	Yes	
Comments: The total r samples.	number of laboi	atory blank samples prepa	red was equa	l to at least 5% of the to	otal number of	
12. Were target analyt	tes reported as	not detected in the laborate	ory blanks?		No	
Comments: Target and	alytes were rep	orted as not detected in the	aboratory bl	anks, with the following	g exceptions.	
	<u>Method</u>	<u>Analyte</u>	<u>Batch</u>	<b>Concentration</b>	]	
	200.7	Total Zinc	70537	0.0055 mg/L		
8015D TPH DRO 70553 0.045 mg/L						
Detections of the identified analytes in the associated samples that were less than the blank results and/or less than the applicable reporting limits were assigned U qualifiers. Detections of TPH DRO in the associated samples that were greater than the reporting limits but less than or equal to 10 times the blank results were assigned JB qualifiers. Non-detections of the identified analytes in the associated samples and detections that were above the reporting limit and greater than ten times the blank concentration did not require qualification.						



## VALIDATION CRITERIA CHECKLIST

13. Was the total number of MS samples prepared equal to at least 5% of the total number of samples or analyzed as required by the method?

Yes

Comments: The total number of matrix spike samples prepared was equal to at least 5% of the total number of samples, although MS samples were not prepared/reported for all analyses and/or batches. The matrix spike sample source for each analytical batch in this sample set has been indicated below.

<u>Method</u>	<u>Analytes</u>	<u>Batch</u>	MS Sample Source
200.7	Total Metals	70537	Not Prepared
200.7	Dissolved Metals	A91612	Not Prepared
200.7	Dissolved Metals	C91551	EB-9-30-22
200.8	Total Metals	70537	Not Prepared
200.8	Dissolved Metals	A91522	OW-30, DUP-9-30-22
245.1	Total and Dissolved Mercury	70628	OW-14
504.1	EDB	70550	MW-4
504.1	EDB	70551	Not Prepared
4500CN E	Cyanide	WG1937600	Not Associated, EB-9-30-22
4500CN E	Cyanide	WG1937792	Not Associated
8015D	TPH DRO and MRO	70553	Not Prepared
8015D	TPH GRO	R91497	MW-4
8260B	VOCs	R91600	Not Prepared
8270C SIM	SVOCs	70583	Not Prepared
8270C	SVOCs	70583	Not Prepared

Not Associated – The MS sample source was not associated with this project.

Not Prepared – Matrix spikes were not prepared/reported for this batch.

14. For MS/MSDs prepared from project samples, were percent recoveries and RPDs within data validation or laboratory quality control (QC) limits?

Yes

Yes

Comments: The percent recoveries and RPDs for MS/MSDs prepared from project samples were within data validation and laboratory QC limits.

The percent recoveries and RPD values for MS/MSDs prepared from non-project samples were evaluated and considered, but data were not qualified based on those results since matrix similarity to project samples could not be guaranteed.

15. Was the total number of LCSs analyzed equal to at least 5% of the total number of samples or analyzed as required by the method?

Comments: The total number of LCS samples analyzed was equal to at least 5% of the total number of samples.



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## VALIDATION CRITERIA CHECKLIST

16. Were LCS/LCSD percent recoveries and LCS/LCSD RPDs within data validation or laboratory QC limits?

Comments: The LCS and LCSD percent recoveries and LCS/LCSD RPDs were within data validation and laboratory QC limits, with the following exceptions.

<u>Method</u>	<u>Analyte</u>	<u>Batch</u>	<u>LCS</u> <u>Recovery</u>	<u>LCSD</u> <u>Recovery</u>	LCS/LCSD QC Limits	LCS/LCSD <u>RPD</u>	<u>RPD</u> <u>QC</u> Limits
200.7	Total Chromium	70537	152%		70-130%		
200.7	Dissolved Beryllium	C91551	67.2%		70-130%		
200.7	Dissolved Zinc	C91551	137%		70-130%		
8015D	TPH DRO	70553	88.5%	537%	31.7-75.4%	143%	20%
8270C SIM	Naphthalene	70583	Acceptable	84.0%	15-78.3%	Acceptable	31.7%
8270C SIM	1-Methylnaphthalene	70583	Acceptable	85.0%	15-79.6%	Acceptable	31.4%
8270C SIM	2-Methylnaphthalene	70583	Acceptable	85.0%	15-78.6%	Acceptable	30.5%
8270C SIM	Fluorene	70583	Acceptable	96.0%	15-96%	Acceptable	25.1%
8270C SIM	Anthracene	70583	Acceptable	Acceptable	21.1-106%	18.0%	14.4%
8270C SIM	Fluoranthene	70583	Acceptable	Acceptable	32.8-119%	18.7%	14.8%
8270C SIM	Pyrene	70583	Acceptable	Acceptable	34.1-110%	19.2%	19.2%
8270C SIM	Indeno(1,2,3- cd)pyrene	70583	Acceptable	Acceptable	24.7-152%	22.4%	21.3%

Target analytes with LCS and/or LCSD recoveries greater than the data validation and/or laboratory QC limits were qualified as J+ if detected in the associated samples due to evidence of potential high bias. Non-detection of these analytes in the associated samples did not require qualification.

Dissolved beryllium was not detected in the associated samples and the results were qualified as UJ due to evidence of potential low bias,

The analytes with LCS/LCSD RPD values that were greater than the QC limit were qualified as J for detections and UJ for non-detections for the associated samples due to evidence of poor precision.

17. Were surrogate recoveries within laboratory QC limits?

No

No

Comments: Surrogate recoveries were within laboratory QC limits, with the following exceptions.

<u>Method</u>	<u>Surrogate</u>	<u>Sample</u>	<u>Surrogate</u> <u>Recovery</u>	QC Limits
8015D	BFB	SMW-2	1,020%	70-130%
8015D	BFB	OW-59	6,210%	70-130%

# TPH GRO was detected in the Method 8015D analyses of samples SMW-2 and OW-59, and these results were assigned J+ qualifiers to indicate potential high bias.

Since Method 8270C surrogate associations were not available from the laboratory, qualification was assigned to all of the target analytes in a given fraction (acid or base/neutral) when two or more surrogates from the same fraction (acid or base/neutral) were outside the acceptance range. This condition did not exist for the Method 8270C analysis of samples SMW-2 and OW-30, and qualification of sample data was not required.

The TPH DRO and TPH MRO results for sample OW-30 were not qualified based on the surrogate non-conformances in the Method 8015D analysis since the applied dilution of 10 times resulted in surrogate concentrations below routinely calibrated levels, and those results were deemed unreliable and possibly inaccurate.

Qualification of sample data was not required based on surrogate non-conformances in QC samples as the environmental samples were evaluated based on their specific surrogate recoveries.



Yes

No

No

18. Were the number of trip blank, field blank, and/or equipment blank samples collected equal to at least 10% of the total number of samples or as required by the project guidelines, QAPP, SAP, or permit?

Comments: The number of trip, field, and equipment blanks collected was equal to at least 10% of the number of samples. One trip blank sample, Trip Blank, one field blank sample, FB-9-30-22, and one equipment blank sample, EB-9-30-22, were collected as part of this sample set.

19. Were target analytes reported as not detected in the trip blank, field blank, and/or equipment blank samples?

Comments: Target analytes were not detected in the trip blank, field blank, and equipment blank samples with the following exceptions.

Blank Sample ID	<u>Method</u>	<u>Analyte</u>	<u>Concentration</u>
Trip Blank	8260B	Total Xylenes	0.47 μg/L
FB-9-30-22	8260B	Total Xylenes	0.47 µg/L
EB-9-30-22	8260B	Acetone	7.0 μg/L
EB-9-30-22	8260B	Total Xylenes	0.43 µg/L
EB-9-30-22	200.7	Dissolved Zinc	0.0062 mg/L

Detections of the identified analytes in the associated samples that were less than the blank results and/or less than the applicable reporting limits were assigned U qualifiers. Detections of dissolved zinc in the associated samples that were greater than the reporting limits but less than 10 times the blank results were assigned JB qualifiers. Non-detections of these analytes in the associated samples detection did not require qualification.

20. Was the number of field duplicates collected equal to at least 10% of the total Yes number of samples or as required by the project guidelines, QAPP, SAP, or permit?

Comments: The number of field duplicates collected was equal to at least 10% of the number of samples.

Sample DUP-9-30-22 was collected as a field duplicate of sample MW-4.

 Were field duplicate RPD values within data validation QC limits (soil 0-50%, water 0-30%, or air 0-25%)?

Comments: As indicated in the Field Duplicate Summary Table at the end of this report, field duplicate RPD values were within data validation QC limits of 0-30% for water samples, with the following exception.

The RPD value for dissolved zinc exceeded the data validation limit of 30% at 73.2%. The dissolved zinc results for samples MW-4 and DUP-9-30-22 were assigned J qualifiers due to evidence of poor precision.

22. For laboratory duplicates prepared from project samples, were RPDs within data N/A validation or laboratory QC limits?

Comments: Laboratory duplicates were prepared for the analysis of cyanide in batches WG1937600 and WG1937792 from samples not associated with this data set.

The RPD values for the laboratory duplicate samples prepared from non-project samples were evaluated and considered, but data were not qualified based on these results since matrix similarity to project samples could not be guaranteed.



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VALIDATION CRITERIA CHECKLIST								
23. Were the following data relationships realistic?								
• Target analytes were reported by more than one method (e.g., 8260/8270, EPH/8270)?	N/A							
Comments: Target analytes were not reported by more than one method.								
<ul> <li>Both total and dissolved metals analyses were performed, and the total metals results were greater than or equal to the dissolved metals results?</li> </ul>	No							

Comments: The following table contains the exceptions in which the dissolved metals results exceeded the total metals results.

Sample ID	<u>Analyte</u>	<u>Total Result</u> (mg/L)	Dissolved Result (mg/L)
MW-4	Mercury	ND	0.000098
MW-4	Arsenic	0.00068	0.00072
SMW-2	Arsenic	0.0019	0.0021
OW-59	Nickel	0.031	0.040
OW-14	Nickel	0.067	0.078
OW-30	Nickel	0.075	0.081
SMW-2	Silver	0.0057	0.0078
OW-59	Silver	0.0023	0.0048
OW-14	Silver	ND	0.0014
EB-9-30-22	Zinc	ND	0.0062
MW-4	Zinc	ND	0.026
SMW-2	Zinc	ND	0.020
OW-59	Zinc	0.0091	0.014
OW-14	Zinc	ND	0.0092
OW-30	Zinc	ND	0.016
DUP-9-30-22	Zinc	ND	0.056

The EPA has not provided guidance or requirements for the evaluation, validation, and qualification of dissolved metals results that exceed the corresponding total metals results. Therefore, qualification of results was not performed based on these data.



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Client Sample ID: MW-4 Field Duplicate Sample ID: DUP-9-30-22									
Analyte	Relative Percent Difference (RPD)								
Barium, Dissolved	E 200.7	0.021 mg/L	0.018 mg/L	15.4%					
Barium, Total	E 200.7	0.021 mg/L	0.021 mg/L	0.0%					
Chromium, Total	E 200.7	0.0036 mg/L	ND (0.0060 mg/L)	DL					
Zinc, Dissolved	E 200.7	0.026 mg/L	0.056 mg/L	73.2%					
Arsenic, Dissolved	E200.8	0.00072 mg/L	0.00073 mg/L	1.4% +/-RL					
Arsenic, Total	E200.8	0.00068 mg/L	0.00078 mg/L	13.7% +/-RL					
Mercury, Dissolved	E245.1	0.000098 mg/L	ND (0.00020 mg/L)	DL					
TPH DRO	SW8015	0.020 mg/L	0.022 mg/L	9.5% +/-RL					

#### FIELD DUPLICATE SUMMARY

Field duplicate RPD control limits are not to exceed 30% for water as established by USEPA Region I - New England Environmental Data Review Supplement for Region 1 Data Review Elements and Superfund Specific Guidance/Procedures, EQADR-Supplement2, September 2020.

DL – Indicates that the analyte was detected in one of the duplicate samples and was undetected in the other sample, and therefore an RPD could not be calculated. Data were not qualified since the detection was within two times the reporting limit. Non-detected results are indicated above with the applicable reporting limit as ND (RL).

+/-RL – Indicates that the detections in both of the samples were within two times the reporting limit. Qualification of data was not required.

RPD value for dissolved zinc exceeded the data validation limit of 30% at 73.2%, which was evidence of poor precision. The dissolved zinc results were qualified as J for samples MW-4 and DUP-9-30-22.



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## DATA QUALIFICATION SUMMARY

Abbreviation	Reason
EBD	Equipment blank detection
ERPD-FD	High field duplicate RPD.
ERPD-LCS	The LCS/LCSD RPD exceeded the upper acceptable limit indicating poor precision.
HR-LCS	The LCS and/or LCSD percent recovery was greater than the upper acceptable limit indicating a possible high bias.
HR-SUR	The surrogate percent recovery was greater than the upper acceptable limit indicating a possible high bias.
LR-LCS	The LCS and/or LCSD percent recovery was less than the lower acceptable limit indicating a possible low bias.
MBD	Method blank detection
MDLRL	Flagged by the laboratory: The result was greater than the MDL but less than the RL.
TBD	Trip blank detection

Analyte	Method	Field Sample ID	Lab Sample ID	Result	Limit	Units	Reviewer Qualifier	DV Flag Reasons
1,2,4-Trimethylbenzene	SW8260B	SMW-2	2209H72-003a	0.21	1.0	µg/L	J	MDLRL
1,2,4-Trimethylbenzene	SW8260B	OW-59	2209H72-004a	0.27	1.0	µg/L	J	MDLRL
1,2,4-Trimethylbenzene	SW8260B	OW-30	2209H72-006a	0.23	1.0	µg/L	J	MDLRL
1,4-Dioxane	SW8270C	OW-30	2209h72-006c	0.72	1.0	µg/L	J	MDLRL
1-Methylnaphthalene	SW8270C	OW-14	2209H72-005C	20	5.0	µg/L	J+	HR-LCS
Acetone	SW8260B	OW-30	2209H72-006a	3.2	10	µg/L	U	EBD, MDLRL
Acetone	SW8260B	EB-9-30-22	2209H72-001a	7.0	10	µg/L	J	MDLRL
Anthracene	SW8270C	OW-14	2209h72-005c	0.68	0.30	µg/L	J	ERPD-LCS
Anthracene	SW8270C	EB-9-30-22	2209h72-001c	ND	0.30	µg/L	UJ	ERPD-LCS
Anthracene	SW8270C	MW-4	2209h72-002c	ND	0.30	µg/L	UJ	ERPD-LCS
Anthracene	SW8270C	SMW-2	2209h72-003c	ND	0.30	µg/L	UJ	ERPD-LCS
Anthracene	SW8270C	OW-59	2209h72-004c	ND	0.30	µg/L	UJ	ERPD-LCS
Anthracene	SW8270C	DUP-9-30-22	2209h72-007c	ND	0.30	µg/L	UJ	ERPD-LCS



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Analyte	Method	Field Sample ID	Lab Sample ID	Result	Limit	Units	Reviewer Qualifier	DV Flag Reasons
Anthracene	SW8270C	OW-30	2209h72-006c	0.22	0.30	µg/L	J	ERPD-LCS, MDLRL
Arsenic, Dissolved	E200.8	MW-4	2209H72-002E	0.00072	0.0010	mg/L	J	MDLRL
Arsenic, Dissolved	E200.8	OW-30	2209H72-006E	0.00076	0.0010	mg/L	J	MDLRL
Arsenic, Dissolved	E200.8	DUP-9-30-22	2209H72-007E	0.00073	0.0010	mg/L	J	MDLRL
Arsenic, Total	E200.8	MW-4	2209H72-002D	0.00068	0.0010	mg/L	J	MDLRL
Arsenic, Total	E200.8	OW-30	2209H72-006D	0.00092	0.0010	mg/L	J	MDLRL
Arsenic, Total	E200.8	DUP-9-30-22	2209H72-007D	0.00078	0.0010	mg/L	J	MDLRL
Beryllium, Dissolved	E 200.7	EB-9-30-22	2209H72-001E	ND	0.0020	mg/L	UJ	LR-LCS
Beryllium, Dissolved	E 200.7	MW-4	2209H72-002E	ND	0.0020	mg/L	UJ	LR-LCS
Beryllium, Dissolved	E 200.7	SMW-2	2209H72-003E	ND	0.0020	mg/L	UJ	LR-LCS
Beryllium, Dissolved	E 200.7	OW-59	2209H72-004E	ND	0.0020	mg/L	UJ	LR-LCS
Beryllium, Dissolved	E 200.7	OW-14	2209H72-005E	ND	0.0020	mg/L	UJ	LR-LCS
Beryllium, Dissolved	E 200.7	OW-30	2209H72-006E	ND	0.0020	mg/L	UJ	LR-LCS
Bis(2-ethylhexyl)phthalate	SW8270C	OW-30	2209H72-006C	8.6	10	µg/L	J	MDLRL
Chromium, Total	E 200.7	SMW-2	2209H72-003D	0.022	0.0060	mg/L	J+	HR-LCS
Chromium, Total	E 200.7	MW-4	2209H72-002D	0.0036	0.0060	mg/L	J+	HR-LCS, MDLRL
Cobalt, Dissolved	E 200.7	OW-30	2209H72-006E	0.0025	0.0060	mg/L	J	MDLRL
Cobalt, Total	E 200.7	OW-30	2209H72-006D	0.0057	0.0060	mg/L	J	MDLRL
Fluoranthene	SW8270C	EB-9-30-22	2209h72-001c	ND	0.30	µg/L	UJ	ERPD-LCS
Fluoranthene	SW8270C	MW-4	2209h72-002c	ND	0.30	µg/L	UJ	ERPD-LCS
Fluoranthene	SW8270C	SMW-2	2209h72-003c	ND	0.30	µg/L	UJ	ERPD-LCS
Fluoranthene	SW8270C	OW-59	2209h72-004c	ND	0.30	µg/L	UJ	ERPD-LCS
Fluoranthene	SW8270C	OW-14	2209h72-005c	ND	0.30	µg/L	UJ	ERPD-LCS
Fluoranthene	SW8270C	OW-30	2209h72-006c	ND	0.30	µg/L	UJ	ERPD-LCS
Fluoranthene	SW8270C	DUP-9-30-22	2209h72-007c	ND	0.30	µg/L	UJ	ERPD-LCS
Fluorene	SW8270C	OW-14	2209h72-005c	0.78	0.30	µg/L	J+	HR-LCS
Indeno(1,2,3-cd)pyrene	SW8270C	EB-9-30-22	2209h72-001c	ND	0.30	µg/L	UJ	ERPD-LCS



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Analyte	Method	Field Sample ID	Lab Sample ID	Result	Limit	Units	Reviewer Qualifier	DV Flag Reasons
Indeno(1,2,3-cd)pyrene	SW8270C	MW-4	2209h72-002c	ND	0.30	µg/L	UJ	ERPD-LCS
Indeno(1,2,3-cd)pyrene	SW8270C	SMW-2	2209h72-003c	ND	0.30	µg/L	UJ	ERPD-LCS
Indeno(1,2,3-cd)pyrene	SW8270C	OW-59	2209h72-004c	ND	0.30	µg/L	UJ	ERPD-LCS
Indeno(1,2,3-cd)pyrene	SW8270C	OW-14	2209h72-005c	ND	0.30	µg/L	UJ	ERPD-LCS
Indeno(1,2,3-cd)pyrene	SW8270C	OW-30	2209h72-006c	ND	0.30	µg/L	UJ	ERPD-LCS
Indeno(1,2,3-cd)pyrene	SW8270C	DUP-9-30-22	2209h72-007c	ND	0.30	µg/L	UJ	ERPD-LCS
Isopropylbenzene	SW8260B	SMW-2	2209H72-003a	0.27	1.0	µg/L	J	MDLRL
Isopropylbenzene	SW8260B	OW-14	2209H72-005a	26	50	µg/L	J	MDLRL
Lead, Dissolved	E200.8	SMW-2	2209H72-003E	0.000058	0.00050	mg/L	J	MDLRL
Lead, Dissolved	E200.8	OW-30	2209H72-006E	0.00044	0.00050	mg/L	J	MDLRL
Mercury, Dissolved	E245.1	MW-4	2209H72-002E	0.000098	0.00020	mg/L	J	MDLRL
Naphthalene	SW8270C	OW-14	2209h72-005c	15	0.30	µg/L	J+	HR-LCS
n-Butylbenzene	SW8260B	OW-14	2209H72-005a	16	150	µg/L	J	MDLRL
Pyrene	SW8270C	EB-9-30-22	2209h72-001c	ND	1.0	µg/L	UJ	ERPD-LCS
Pyrene	SW8270C	MW-4	2209h72-002c	ND	1.0	µg/L	UJ	ERPD-LCS
Pyrene	SW8270C	SMW-2	2209h72-003c	ND	1.0	µg/L	UJ	ERPD-LCS
Pyrene	SW8270C	OW-59	2209h72-004c	ND	1.0	µg/L	UJ	ERPD-LCS
Pyrene	SW8270C	OW-14	2209h72-005c	ND	1.0	µg/L	UJ	ERPD-LCS
Pyrene	SW8270C	OW-30	2209h72-006c	ND	1.0	µg/L	UJ	ERPD-LCS
Pyrene	SW8270C	DUP-9-30-22	2209h72-007c	ND	1.0	µg/L	UJ	ERPD-LCS
sec-Butylbenzene	SW8260B	SMW-2	2209H72-003a	0.2	1.0	µg/L	J	MDLRL
sec-Butylbenzene	SW8260B	OW-59	2209H72-004a	0.23	1.0	µg/L	J	MDLRL
sec-Butylbenzene	SW8260B	OW-14	2209H72-005a	11	50	µg/L	J	MDLRL
sec-Butylbenzene	SW8260B	OW-30	2209H72-006a	0.21	1.0	µg/L	J	MDLRL
Silver, Dissolved	E 200.7	OW-59	2209H72-004E	0.0048	0.0050	mg/L	J	MDLRL
Silver, Dissolved	E 200.7	OW-14	2209H72-005E	0.0014	0.0050	mg/L	J	MDLRL
Silver, Total	E 200.7	OW-59	2209H72-004D	0.0023	0.0050	mg/L	J	MDLRL



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Analyte	Method	Field Sample ID	Lab Sample ID	Result	Limit	Units	Reviewer Qualifier	DV Flag Reasons
TPH DRO	SW8015	EB-9-30-22	2209H72-001C	ND	0.064	mg/L	UJ	ERPD-LCS
TPH DRO	SW8015	OW-14	2209H72-005C	3.1	0.064	mg/L	J+	ERPD-LCS, HR-LCS
TPH DRO	SW8015	OW-30	2209H72-006C	7.9	0.64	mg/L	J+	ERPD-LCS, HR-LCS
TPH DRO	SW8015	SMW-2	2209H72-003C	0.34	0.064	mg/L	JB	ERPD-LCS, HR-LCS, MBD
TPH DRO	SW8015	OW-59	2209H72-004C	0.39	0.064	mg/L	JB	ERPD-LCS, HR-LCS, MBD
TPH DRO	SW8015	MW-4	2209H72-002C	0.020	0.064	mg/L	U	ERPD-LCS, HR-LCS, MBD, MDLRL
TPH DRO	SW8015	DUP-9-30-22	2209H72-007C	0.022	0.064	mg/L	U	ERPD-LCS, HR-LCS, MBD, MDLRL
TPH GRO	SW8015	SMW-2	2209h72-003a	0.11	0.050	mg/L	J+	HR-SUR
TPH GRO	SW8015	OW-59	2209h72-004a	0.28	0.050	mg/L	J+	HR-SUR
Vanadium, Dissolved	E 200.7	OW-59	2209H72-004E	0.0029	0.050	mg/L	J	MDLRL
Vanadium, Total	E 200.7	OW-59	2209H72-004D	0.014	0.050	mg/L	J	MDLRL
Vanadium, Total	E 200.7	OW-30	2209H72-006D	0.0048	0.050	mg/L	J	MDLRL
Xylenes, Total	SW8260B	Trip Blank	2209H72-009a	0.47	1.5	µg/L	J	MDLRL
Xylenes, Total	SW8260B	EB-9-30-22	2209H72-001a	0.43	1.5	µg/L	U	MDLRL, TBD
Xylenes, Total	SW8260B	FB-9-30-22	2209H72-008a	0.47	1.5	µg/L	U	MDLRL, TBD
Zinc, Dissolved	E 200.7	SMW-2	2209H72-003E	0.020	0.010	mg/L	JB	EBD, HR-LCS
Zinc, Dissolved	E 200.7	OW-59	2209H72-004E	0.014	0.010	mg/L	JB	EBD, HR-LCS
Zinc, Dissolved	E 200.7	OW-30	2209H72-006E	0.016	0.010	mg/L	JB	EBD, HR-LCS
Zinc, Dissolved	E 200.7	EB-9-30-22	2209H72-001E	0.0062	0.010	mg/L	U	EBD, HR-LCS, MDLRL
Zinc, Dissolved	E 200.7	OW-14	2209H72-005E	0.0092	0.010	mg/L	U	EBD, HR-LCS, MDLRL
Zinc, Dissolved	E 200.7	MW-4	2209H72-002E	0.026	0.010	mg/L	JB	EBD, ERPD-FD, HR-LCS
Zinc, Dissolved	E 200.7	DUP-9-30-22	2209H72-007E	0.056	0.010	mg/L	JB	EBD, ERPD-FD
Zinc, Total	E 200.7	OW-59	2209H72-004D	0.0091	0.010	mg/L	U	MBD, MDLRL



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Client: Marathon Oil	Laboratory: Hall Environmental Analysis Laboratory	
Project Name: Western Refining Southwest, Quarterly GW	Sample Matrix: Groundwater	
Project Number: 697-080-002 Task: 0006	Sample Start Date: 09/07/2022	
Date Validated: 01/17/2023	Sample End Date: 09/07/2022	
Parameters Included:		
<ul> <li>Volatile Organic Compounds (VOC) by Environmental Protection Agency (EPA) Test Methods for Evaluating Solid Waste (SW-846) Method 8260B</li> </ul>		
<ul> <li>1,2-Dibromoethane (EDB) by EPA Method 504.1</li> </ul>		
<ul> <li>Semivolatile Organic Compounds (SVOC) by SW-846 Method 8270C and Method 8270C with Selected Ion Monitoring (SIM)</li> </ul>		
<ul> <li>Total Petroleum Hydrocarbons (TPH) Gasoline Range Organics (GRO) by SW-846 Method 8015D</li> </ul>		
<ul> <li>TPH Diesel Range Organics (DRO) and Motor Oil Range Organics (MRO) by SW-846 Method 8015D Modified</li> </ul>		
<ul> <li>Total and Dissolved Metals by EPA Method 200.7 and Method 200.8</li> </ul>		
<ul> <li>Total and Dissolved Mercury by EPA Method 245.1</li> </ul>		
<ul> <li>Cyanide by Standard Methods for the Examination of Water and Wastewater (SM) Method 4500 CN E</li> </ul>		
Laboratory Project ID: 2209349		
Data Validator: Daran O'Hollearn, Lead Project Scientist		
Reviewer: Charles Ballek, Senior Chemist		

## DATA EVALUATION CRITERIA SUMMARY

A Tier II Data Validation was performed by Trihydro Corporation's Chemical Data Evaluation Services Group on the analytical data report packages generated by Hall Environmental Analysis Laboratory of Albuquerque, New Mexico, with additional data from Pace Analytical National of Mount Juliet, Tennessee evaluating samples from the Marathon Oil site, located in Gallup, New Mexico.

Precision, accuracy, method compliance, and completeness of this data package were assessed during this data review. Precision was determined by evaluating the calculated relative percent difference (RPD) values from:

- Field duplicate pairs
- Laboratory duplicate pairs
- Matrix spike (MS) and matrix spike duplicate (MSD) pairs
- Laboratory control sample (LCS) and laboratory control sample duplicate (LCSD) pairs

Laboratory accuracy was established by reviewing the demonstrated percent recoveries (%R) of the following items to verify that data are not biased.

- MS/MSD samples
- LCS/LCSD samples
- Organic system monitoring compounds (surrogates)



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Field accuracy was established by collecting and analyzing the following samples to monitor for possible ambient or cross contamination during sampling and transportation.

- Trip blanks
- Field blanks
- Equipment blanks

Method compliance was established by reviewing sample integrity, holding times, detection limits, surrogate recoveries, laboratory blanks, initial and continuing calibrations (where applicable), and the LCS/LCSD percent recoveries against method-specific requirements.

Completeness was evaluated by determining the overall ratio of the number of samples and analyses planned versus the number of samples with valid analyses. Determination of completeness included a review of the chain-of-custody (CoC), laboratory analytical methods, and other laboratory and field documents associated with this analytical data set.

Client Sample ID	Laboratory Sample Number
EB-9-7-22	2209349-001
OW-50	2209349-002
OW-52	2209349-003
OW-29	2209349-004
OW-54	2209349-005
OW-66	2209349-006
OW-55	2209349-007
OW-13	2209349-008
OW-56	2209349-009
FB-9-7-22	2209349-010
DUP-9-7-22	2209349-011
Trip Blank	2209349-012

## SAMPLE NUMBERS TABLE





The laboratory data were reviewed to evaluate compliance with the methods and the quality of the reported data. Assessment of CoC completeness is included in Item 3 of the Data Validation Checklist. A check mark ( $\checkmark$ ) indicates that the referenced validation criteria were deemed acceptable, whereas a crossed circle ( $\otimes$ ) indicates validation criteria for which the data have been qualified by the data validator. An empty circle (O) indicates that the specified criterion does not apply to the reviewed data. Details are noted in the tables below.

#### Validation Criteria

- ✓ Data Completeness
- ✓ CoC Documentation (Item 3)
- ✓ Holding Times and Preservation (Items 6 and 7)
- O Initial and Continuing Calibrations (Items 9 and 10)
- ⊗ Laboratory Blanks (Items 11 and 12)
- ✓ MS/MSD (Items 13 and 14)
- ⊗ LCS/LCSD (Items 15 and 16)
- System Monitoring Compounds (i.e., Surrogates) (Item 17)
- 8 Field, Equipment, and Trip Blanks (Items 18 and 19)
- ⊗ Field Duplicates (Items 20 and 21)
- ✓ Laboratory Duplicates (Item 22)

## **Guidance References**

Chemical data validation was conducted in accordance with the United States Environmental Protection Agency (USEPA) Contract Laboratory Program (CLP) National Functional Guidelines for the analyses listed below, or by the appropriate method if not covered in the National Functional Guidelines.

- Data for organic analyses were evaluated according to validation criteria set forth in the USEPA CLP National Functional Guidelines for Organic Superfund Methods Data Review, document number EPA-540-R-20-005, November 2020 with additional reference to the USEPA CLP National Functional Guidelines for Organic Data Review, document number EPA 540/R-99/008, October 1999.
- Data for inorganic analyses were evaluated according to validation criteria set forth in the USEPA CLP National Functional Guidelines for Inorganic Superfund Methods Data Review, document number EPA-540-R-20-006, November 2020 with additional reference to the USEPA CLP National Functional Guidelines for Inorganic Data Review, document number EPA 540-R-04-004, October 2004.
- Review of field duplicates was conducted according to the USEPA Region I New England Environmental Data Review Supplement for Region 1 Data Review Elements and Superfund Specific Guidance/Procedures, EQADR-Supplement2, September 2020.
- Trihydro Data Validation Variance Documentation, April 2022.



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#### **OVERALL DATA PACKAGE ASSESSMENT**

Based on a data validation review, the data are acceptable as delivered. Data qualified by the laboratory are discussed in Item 2 of the Validation Criteria Checklist.

The purpose of validating data and assigning qualifiers is to assist in proper data interpretation. Data that are not qualified meet the site data quality objectives. If values are assigned qualifiers other than an R (rejected, data not usable), the data may be used for site evaluation; however, consideration should be given to the reasons for qualification when interpreting sample concentrations. Data points that are assigned an R qualifier should not be used for site evaluation purposes.

If applicable, text was identified in **bold font** in the Validation Criteria Checklist to indicate that further action and/or qualification of the data were required. Data may have been qualified with J data flags by the laboratory if the result was greater than or equal to the method detection limit (MDL) but less than the reporting limit (RL). These laboratory-applied J flags were preserved, if present, and included in the Data Qualification Summary table at the end of this report. If applicable, data validation qualifiers were added for the items noted with crossed circles in the Validation Criteria section above. Please see the Data Qualification Summary table at the end of this report.

If data would be qualified with more than one flag, one qualifier was assigned based on the severity; however, all reasons for qualification were retained. Data that would be qualified with both J+ and J- flags were evaluated based on validation criteria and assigned the appropriate flag. The hierarchy of qualifiers from the most to least severe is as follows:

Data qualifiers used during this validation are included in the following table.

<u>Qualifier</u>	Definition
J	Estimated concentration
J+	The result is an estimated concentration, but may be biased high
UJ	Estimated reporting limit
U	Evaluated to be undetected at the reporting limit
JB	Estimated concentration due to blank contamination

#### **Data Completeness**

The analyses were performed as requested on the CoC records. The associated samples were received by the laboratory and analyzed properly unless otherwise noted in the Criteria Checklist below. The complete data package consisted of 808 data points. The data completeness calculation does not include any submitted blank sample results. Data points were not rejected. The data completeness measure for this data package is calculated to be 100% and is acceptable.



**Released to Imaging: 4/21/2023 9:45:24 AM**
VALIDATION CRITERIA CHECKLIST										
1. Was the re	1. Was the report free of non-conformances identified by the laboratory? No									
Comments: Th	Comments: The laboratory noted the following analytical non-conformances related to this data set.									
Method 8270C and Method 8270C SIM: 1-methylnaphthalene was reported by EPA Method 8270 instead of EPA Method 8270 SIMs because of its elevated concentration for sample OW-55.										
Naphthalene a their elevated of	Naphthalene and 2-methylnaphthalene were reported by EPA Method 8270 instead of EPA Method 8270 SIM because of their elevated concentrations for sample OW-66.									
Method 8015D DRO: The LCS/LCSD had slightly elevated recoveries.										
2. Were the of If no, defir	<ol> <li>Were the data free of data qualification flags and/or notes used by the laboratory? No If no, define.</li> </ol>									
Comments: Th	ne laboratory	used the following data qualified	cation flags with this data set.							
D – Sample dil	uted due to r	matrix.								
J – Analyte det	ected below	quantitation limits.								
J – The identifi	cation of the	analyte is acceptable; the repo	rted value is an estimate.							
J6 – The samp	le matrix inte	erfered with the ability to make a	any accurate determination; spik	e value is low.						
P1 – RPD valu	e not applica	able for sample concentrations I	ess than 5 times the reporting lir	nit.						
R – % RPD ou	tside of rang	e.								
S – % Recovery outside of range due to dilution or matrix interference.										
* – Value exce	eds maximu	m contaminant level.								
3. Were sam	ple CoC forr	ns and custody procedures con	nplete?	Yes	3					
Comments: Th and laboratory sealed, and cu	ne CoC reco personnel si stody seals v	rds from field to laboratory were ignatures, dates, and times of re were present and intact on the s	e complete, and custody was ma eceipt. The laboratory noted tha shipping containers.	intained as evidend t the shipping cont	ced by field ainers were					
4. Were dete permit, or	ction limits ir method, or ir	n accordance with the quality as ndicated as acceptable?	ssurance project plan (QAPP),	Yes	3					
Comments: Th	ne detection	limits appeared to be acceptabl	le. The following dilutions were a	applied.						
	Method	Sample(s)	Analyte(s)	Dilution Factor						
	200.7	OW-66	Total and Dissolved Barium	5						
	200.8	OW-54, OW-66	Total Lead	5						
	8015D	OW-66, OW-55	TPH DRO and MRO	5						
	8260B	OW-54	Select VOCs	5						
	8015D	OW-66, OW-55	TPH GRO	50						
	8260B	OW-54	MTBE	50						
	8260B	OW-66, OW-55	Select VOCs	50						
	8260B	OW-29	MTBE	100						
	8260B	OW-66	Benzene, Toluene	500						
	8260B	OW-55	Benzene	500						

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VALIDATION CRITERIA CHECKLIST								
5. Were the reported analytical methods and constituents in compliance with the No QAPP, permit, or CoC?								
Comments: The reported analytical methods were in compliance with the CoC, and the laboratory reported the requested constituents in accordance with the CoC, with the following exceptions.								
The CoC requested total ar using both Method 200.7 a accuracy, and precision go	The CoC requested total and dissolved metals using only Method 200.7; however, the laboratory analyzed the samples using both Method 200.7 and Method 200.8. This substituted analytical method, Method 200.8, met similar sensitivity, accuracy, and precision goals and, therefore, was an acceptable replacement							
The CoC requested cyanide using Method 335.4; however, the laboratory analyzed the samples using Method 4500 CN E. This substituted analytical method met similar sensitivity, accuracy, and precision goals and, therefore, was an acceptable replacement.								
6. Were samples receive	d in good condi	ition within method-spec	ified requi	rements?	No			
Comments: Samples were received on ice, in good condition, and with the cooler temperatures both within and outside the recommended temperature range of $4^{\circ}C \pm 2^{\circ}C$ between $0.3^{\circ}C$ and $2.9^{\circ}C$ as noted on the Sample Log-in Check List. Samples transferred to Pace National were received in good condition with the cooler temperature within the recommended range at 2.9°C as noted on the CoC.								
I he cooler temperature bel broken or frozen.	low 2.0°C was j	udged as acceptable sir	ice the lab	oratory did not repor	t the sample containers as			
7. Were samples extracte technical holding times	ed/digested and s?	analyzed within metho	d-specified	lor	Yes			
Comments: The samples v	were extracted/	digested and analyzed v	vithin meth	nod-specific holding t	imes.			
8. Were reported units ap method(s)? Specify if	propriate for th wet or dry units	e sample matrix/matrice were used for soil.	es and ana	lytical	Yes			
Comments: The results we which were acceptable for	ere reported in o the sample mat	concentration units of mi trix and the analyses rec	crograms juested.	per liter (µg/L) and m	hilligrams per liter (mg/L),			
9. Did the laboratory prov	vide any specifi	c initial and/or continuino	g calibratio	n results?	No			
Comments: Initial and cont	tinuing calibrati	on data were not include	ed as part	of this data set.				
10. If initial and/or continui acceptable limits?	ng calibration r	esults were provided, we	ere the res	ults within	N/A			
Comments: Initial and cont	tinuing calibrati	on data were not include	ed as part	of this data set.				
11. Was the total number of the total number of sar	of laboratory bla nples or analyz	ank samples prepared e ed as required by the m	qual to at l ethod?	east 5% of	Yes			
Comments: The number of	f laboratory bla	nk samples prepared wa	as equal to	at least 5% of the to	tal number of samples.			
12. Were target analytes r	eported as not	detected in the laborato	y blanks?		No			
Comments: Target analyte	es were reporte	d as not detected in the	laboratory	blanks, with the follo	wing exceptions.			
ů j	Method	Analyte	Batch	Concentration				
	200.7	Total Zinc	70055	0.0040 mg/L				
	8015D	TPH DRO	70050	0.031 mg/L	]			
Detections of the identifie	ed analytes in	the associated sample	s that we	re less than the bla	nk results and/or less			
than the applicable repor	ting limits wer	e assigned U qualifier	s. Detecti	ons of the identified	d analytes in the			
were assigned JB qualifie	were greater ti ers. Non-detec	tions of the identified an	alytes in th	ne associated sample	es and detections that			
were above the reporting li	mit and greater	than ten times the blan	concentra	ations did not require	e qualification.			
🕏 Trihydro								

13. Was the total number of MS samples prepared equal to at least 5% of the total number of samples or analyzed as required by the method?

Yes

Comments: The total number of matrix spike samples prepared was equal to at least 5% of the total number of samples, although MS samples were not prepared/reported for all analyses and/or batches. The matrix spike sample source for each analytical batch in this sample set has been indicated below.

<u>Method</u>	<u>Analytes</u>	<u>Batch</u>	MS Sample Source
200.7	Total Metals	70055	EB-9-7-22
200.7	Dissolved Metals	B91088	OW-50
200.8	Total Metals	70055	Not Prepared
200.8	Dissolved Metals	A91030	EB-9-7-22, OW-50
245.1	Total and Dissolved Mercury	70231	DUP-9-7-22
504.1	EDB	70123	Not Prepared
4500CN E	Cyanide	WG1925221	Not Associated, OW-50
4500CN E	Cyanide	WG1925290	DUP-9-7-22, Not Associated
8015D	TPH DRO and MRO	70050	Not Prepared
8015D	TPH GRO	R90998	Not Prepared
8260B	VOCs	R91002	OW-50
8260B	VOCs	R91045	Not Prepared
8270C SIM	SVOCs	70053	Not Prepared
8270C	SVOCs	70053	Not Prepared

Not Associated – The MS sample source was not associated with this project. Not Prepared – Matrix spikes were not prepared/reported for this batch.

14. For MS/MSDs prepared from project samples, were percent recoveries and RPDs within data validation or laboratory quality control (QC) limits?

No

Comments: The MS/MSD percent recoveries and RPDs for project samples were within data validation and laboratory QC limits, with the following exceptions.

The MS and MSD recoveries for cyanide in Method 4500CN E batch WG1925221 were outside the laboratory QC limits of 90.0-110% at 78.6% and 79.7%, respectively. However, the recoveries were within data validation limits of 75-125%. Validation action was not required.

The percent recoveries and RPD values for MS/MSDs prepared from non-project samples were evaluated and considered, but data were not qualified based on those results since matrix similarity to project samples could not be guaranteed.

15. Was the total number of LCSs analyzed equal to at least 5% of the total number of Yes samples or analyzed as required by the method?

Comments: The total number of LCS samples analyzed was equal to at least 5% of the total number of samples.

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16. Were LCS/LCSD percent recoveries and LCS/LCSD RPDs within data validation or laboratory QC limits?

Comments: The LCS and LCSD percent recoveries and LCS/LCSD RPDs were within data validation and laboratory QC limits, with the following exceptions.

<u>Method</u>	<u>Analyte</u>	<u>Batch</u>	<u>LCS</u> <u>Recovery</u>	<u>LCSD</u> <u>Recovery</u>	LCS/LCSD QC Limits	LCS/LCSD RPD	<u>RPD</u> <u>QC</u> Limits
200.7	Total Barium	70055	51.0%		70-130%		
200.7	Total Nickel	70055	142%		70-130%		
200.7	Total Zinc	70055	140%		70-130%		
200.8	Total Selenium	70055	135%		70-130%		
8015D	TPH DRO	70050	91.6%	84.5%	31.7-75.4%	Acceptable	20%
8270C	Pyrene	70053	Acceptable	Acceptable	61-123%	15.7%	11.8%
8270C SIM	Naphthalene	70053	Acceptable	Acceptable	21.3-79.9%	63.4%	25.6%
8270C SIM	1-Methylnaphthalene	70053	Acceptable	Acceptable	22.2-80.3%	64.9%	25%
8270C SIM	2-Methylnaphthalene	70053	Acceptable	Acceptable	20.6-80.1%	68.4%	25%
8270C SIM	Acenaphthene	70053	Acceptable	Acceptable	29.8-82.7%	51.7%	27.8%
8270C SIM	Fluorene	70053	Acceptable	Acceptable	33.3-86%	32.7%	26.4%

Total barium was detected in associated samples in Method 200.7 batch 70055 and the results were assigned Jqualifiers due to evidence of potential low bias. Total barium was not detected in associated sample EB-9-7-22 and the result was assigned a UJ qualifier.

The target analytes total nickel, total selenium, total zinc, and TPH DRO were detected in associated samples, and the results were qualified as J+ based on the evidence of potential high bias. Non-detections of these analytes in the associated samples did not require qualification based on the evidence of potential high bias.

The analytes with LCS/LCSD RPD values that were above the QC limit were qualified as J for detections and UJ for non-detections for the associated samples due to evidence of poor precision.

17. Were surrogate recoveries within laboratory QC limits?

No

No

Comments: Surrogate recoveries were within laboratory QC limits, with the following exceptions.

The recovery of the Method 8015D surrogate BFB for sample OW-56 was outside the laboratory acceptance range of 70-130% at 951%. TPH GRO was detected in the analysis of sample OW-56, and this result was qualified as J+ to indicate a potential high bias.

Since Method 8270C and 8270C SIM surrogate associations were not available from the laboratory, qualification was assigned to all of the target analytes in a given fraction (acid or base/neutral) when two or more surrogates from the same fraction (acid or base/neutral) were outside the acceptance range. This condition did not exist for the Method 8270C SIM analysis of samples OW-29, OW-54, OW-66, OW-55, OW-13, OW-56, and DUP-9-7-22 and for the Method 8270C analysis of sample OW-66, and qualification of sample data was not required.

Qualification of sample data was not required based on surrogate non-conformances in QC samples as the environmental samples were evaluated based on their specific surrogate recoveries.

Were the number of trip blank, field blank, and/or equipment blank samples
 Yes collected equal to at least 10% of the total number of samples or as required by the project guidelines, QAPP, SAP, or permit?

Comments: The number of trip, field, and equipment blanks collected was equal to at least 10% of the number of samples. One trip blank sample, Trip Blank, one field blank sample, FB-9-7-22, and one equipment blank sample, EB-9-7-22, were collected as part of this sample set.



19. Were target analytes reported as not detected in the trip blank, field blank, and/or equipment blank samples?

No

Comments: Target analytes were not detected in the trip blank, field blank, and equipment blank samples with the following exceptions.

Blank Sample ID	<u>Method</u>	Analyte	<u>Concentration</u>
FB-9-7-22	8260B	2-Butanone	6.8 µg/L
EB-9-7-22	8260B	2-Butanone	22 µg/L
EB-9-7-22	8260B	Acetone	18 µg/L
EB-9-7-22	8015D	TPH DRO	0.64 mg/L
EB-9-7-22	8015D	TPH MRO	0.91 mg/L
EB-9-7-22	200.7	Dissolved Chromium	0.0025 mg/L
EB-9-7-22	200.7	Dissolved Zinc	0.0046 mg/L
EB-9-7-22	200.7	Total Zinc	0.0062 mg/L
EB-9-7-22	245.1	Dissolved Mercury	0.00019 mg/L
EB-9-7-22	245.1	Total Mercury	0.00018 mg/L

Detections of TPH DRO, TPH MRO, dissolved mercury, and total mercury in the associated samples that were less than the blank results and/or less than the applicable reporting limits were assigned U qualifiers. Detections of 2-butanone, dissolved zinc, and total mercury in the associated samples that were greater than the reporting limits but less than 10 times the blank results were assigned JB qualifiers. Non-detections of the identified analytes in the associated samples did not require qualification.

The total zinc results in Method 200.7 batch 70055 were previously qualified due to a laboratory blank detection; therefore, additional qualification due to the equipment blank contamination was not required.

20. Was the number of field duplicates collected equal to at least 10% of the total number of samples or as required by the project guidelines, QAPP, SAP, or permit?

Comments: The number of field duplicates collected was equal to at least 10% of the number of samples.

Sample DUP-9-7-22 was collected as a field duplicate of sample OW-52.

21. Were field duplicate RPD values within data validation QC limits (soil 0-50%, water 0-30%, or air 0-25%)?

No

Yes

Comments: As indicated in the Field Duplicate Summary Table at the end of this report, field duplicate RPD values were within data validation QC limits of 0-30% for water samples, with the following exception.

The RPD value for dissolved zinc exceeded the data validation limit of 30% at 70.3%. The dissolved zinc results for samples OW-52 and DUP-9-7-22 were assigned J qualifiers due to evidence of poor precision.



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VALIDATION CRITERIA CHECKLIST												
22. For laboratory duplicates prepared from project samples, were RPDs within data validation or laboratory QC limits?												
Comments: Laboratory duplicates were prepared for these analyses and the laboratory duplicate sample sources are summarized in the following table.												
	Method Analytes Batch Campio Source											
	4500CN E Cvanide WG1925221 Not Associated, FB-9-7-22											
	4500CN E Cyanide WG1925200 Not Associated											
Not Associated – Th	Not Associated – The laboratory duplicate sample source was not associated with this project											
The RPD for the I measurements we The RPD values f but data were not	The RPD for the laboratory duplicate prepared from a project sample was not applicable since the result for both measurements were non-detections for cyanide and an RPD could not be calculated. The RPD values for the laboratory duplicate samples prepared from non-project samples were evaluated and considered, but data were not qualified based on these results since matrix similarity to project samples could not be quaranteed.											
23. Were the follo	owing data relat	ionships realistic?										
• Target a EPH/827	nalytes were rep 70)?	borted by more than	one method (e.g.	, 8260/8270,		N/A						
Comments: Targ	et analytes were	e not reported by mo	re than one meth	od in this data s	et.							
results w Comments: The r results.	vere greater than following table c	n or equal to the diss ontains the exceptio	olved metals res	ults? issolved metals	results exceeded th	e total metals						
	<u>Sample ID</u>	Analyt	<u>e</u> -	<u>fotal Result</u> (mg/L)	Dissolved Result							
	DUP-9-7-22	Mercu	ry	0.00015	0.00017	-						
-	EB-9-7-22	Mercu	ry	0.00018	0.00019	-						
-	OW-29	Mercu	ry	0.00016	0.00017	-						
	OW-50	Bariur	n	0.047	0.052							
	OW-29	Bariur	n	0.075	0.078							
	OW-13	Bariur	n	0.019	0.021							
	EB-9-7-22	Chromi	um	ND	0.0025							
[	OW-29	Nicke	1	0.023	0.027	1						
ļ Ī	OW-54	Nicke	1	0.21	0.23	]						
Í Í	OW-66	Nicke	l	0.30	0.33	]						
[ Γ	OW-55	Nicke	1	0.22	0.23							
[ Γ	OW-56	Nicke	1	0.064	0.065							
	OW-29	Silve	r	ND	0.0016							
[ Γ	OW-54	Silve	r	ND	0.0019							
	OW-55	Silve	r	ND	0.0019							
[	OW-29	Vanadi	um	ND	0.0017							
	OW-13	Vanadi	um	ND	0.0031							



VALIDATION CRITERIA CHECKLIST												
	Sample ID	Analyte	<u>Total Result</u> (mg/L)	Dissolved Result (mg/L)								
	DUP-9-7-22	Zinc	ND	0.025								
	OW-50	Zinc	ND	0.044								
	OW-52	Zinc	ND	0.012								
	OW-29	Zinc	ND	0.030								
	OW-66	Zinc	0.0078	0.010								
	OW-13	Zinc	ND	0.031								
	OW-56	Zinc	0.0093	0.012								

The EPA has not provided guidance or requirements for the evaluation, validation, and qualification of dissolved metals results that exceed the corresponding total metals results. Therefore, qualification of results was not performed based on these data.



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Client Sample ID: OW-52											
Field Duplicate Sample ID: DUP-9-7-22											
Analyte	Method	Laboratory Result	Duplicate Result	Relative Percent Difference (RPD)							
Barium, Dissolved	E 200.7	0.029 mg/L	0.032 mg/L	9.8%							
Barium, Total	E 200.7	0.038 mg/L	0.036 mg/L	5.4%							
Chromium, Total	E 200.7	0.0020 mg/L	0.0033 mg/L	49.1% +/-RL							
Zinc, Dissolved	E 200.7	0.012 mg/L	0.025 mg/L	70.3%							
Arsenic, Dissolved	E200.8	0.00061 mg/L	0.00051 mg/L	17.9% +/-RL							
Arsenic, Total	E200.8	0.00078 mg/L	0.00064 mg/L	19.7% +/-RL							
Lead, Dissolved	E200.8	ND (0.00050 mg/L)	0.00013 mg/L	DL							
Lead, Total	E200.8	0.00045 mg/L	0.00032 mg/L	33.8% +/-RL							
Mercury, Dissolved	E245.1	0.00019 mg/L	0.00017 mg/L	11.1% +/-RL							
Mercury, Total	E245.1	0.00019 mg/L	0.00015 mg/L	23.5% +/-RL							
TPH DRO	SW8015	0.029 mg/L	0.031 mg/L	6.7% +/-RL							
MTBE	SW8260B	4.1 µg/L	4.2 µg/L	2.4%							

### FIELD DUPLICATE SUMMARY

Field duplicate RPD control limits are not to exceed 30% for water as established by USEPA Region I - New England Environmental Data Review Supplement for Region 1 Data Review Elements and Superfund Specific Guidance/Procedures, EQADR-Supplement2, September 2020.

DL – Indicates that the analyte was detected in one of the duplicate samples and was undetected in the other sample, and therefore an RPD could not be calculated. Data were not qualified since the detection was within two times the reporting limit. Non-detected results are indicated above with the applicable reporting limit as ND (RL).

+/-RL – Indicates that the detections in both of the samples were within two times the reporting limit. Qualification of data was not required.

RPD value for dissolved zinc exceeded the data validation limit of 30% at 70.3%, which was evidence of poor precision. The dissolved zinc results were qualified as J for samples OW-52 and DUP-9-7-22.



## DATA QUALIFICATION SUMMARY

Abbreviation	Reason
EBD	Equipment blank detection
ERPD-FD	High field duplicate RPD.
ERPD-LCS	The LCS/LCSD RPD exceeded the upper acceptable limit indicating poor precision.
FBD	Field blank detection
HR-LCS	The LCS and/or LCSD percent recovery was greater than the upper acceptable limit indicating a possible high bias.
HR-SUR	The surrogate percent recovery was greater than the upper acceptable limit indicating a possible high bias.
LR-SUR	The surrogate percent recovery was less than the lower acceptable limit indicating a possible low bias.
MBD	Method blank detection
MDLRL	Flagged by the laboratory: The result was greater than the MDL but less than the RL.

Analyte	Method	Field Sample ID	Lab Sample ID	Result	Limit	Units	Reviewer Qualifier	DV Flag Reasons
1,2,4-Trimethylbenzene	SW8260B	OW-54	2209349-005a	2.7	5.0	µg/L	J	MDLRL
1,2-Dichloroethane	SW8260B	OW-29	2209349-004a	0.56	1.0	µg/L	J	MDLRL
1,2-Dichloroethane	SW8260B	OW-13	2209349-008a	0.83	1.0	µg/L	J	MDLRL
1,3,5-Trimethylbenzene	SW8260B	OW-55	2209349-007a	41	50	µg/L	J	MDLRL
1,4-Dioxane	SW8270C	OW-29	2209349-004c	0.82	1.0	µg/L	J	MDLRL
1,4-Dioxane	SW8270C	OW-54	2209349-005c	0.68	1.0	µg/L	J	MDLRL
1,4-Dioxane	SW8270C	OW-56	2209349-009c	0.68	1.0	µg/L	J	MDLRL
1-Methylnaphthalene	SW8270C	OW-66	2209349-006c	19	0.30	µg/L	J	ERPD-LCS
1-Methylnaphthalene	SW8270C	OW-55	2209349-007c	25	5.0	µg/L	J	ERPD-LCS
1-Methylnaphthalene	SW8270C	EB-9-7-22	2209349-001c	ND	0.30	µg/L	UJ	ERPD-LCS
1-Methylnaphthalene	SW8270C	OW-50	2209349-002c	ND	0.30	µg/L	UJ	ERPD-LCS
1-Methylnaphthalene	SW8270C	OW-52	2209349-003c	ND	0.30	µg/L	UJ	ERPD-LCS
1-Methylnaphthalene	SW8270C	OW-29	2209349-004c	ND	0.30	µg/L	UJ	ERPD-LCS



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Analyte	Method	Field Sample ID	Lab Sample ID	Result	Limit	Units	Reviewer Qualifier	DV Flag Reasons
1-Methylnaphthalene	SW8270C	OW-54	2209349-005c	ND	0.30	µg/L	UJ	ERPD-LCS
1-Methylnaphthalene	SW8270C	OW-13	2209349-008c	ND	0.30	µg/L	UJ	ERPD-LCS
1-Methylnaphthalene	SW8270C	OW-56	2209349-009c	ND	0.30	µg/L	UJ	ERPD-LCS
1-Methylnaphthalene	SW8270C	DUP-9-7-22	2209349-011c	ND	0.30	µg/L	UJ	ERPD-LCS
2-Butanone	SW8260B	EB-9-7-22	2209349-001a	22	10	µg/L	JB	FBD
2-Butanone	SW8260B	FB-9-7-22	2209349-010a	6.8	10	µg/L	J	MDLRL
2-Methylnaphthalene	SW8270C	OW-66	2209349-006c	40	5.0	µg/L	J	ERPD-LCS
2-Methylnaphthalene	SW8270C	OW-55	2209349-007c	10	0.30	µg/L	J	ERPD-LCS
2-Methylnaphthalene	SW8270C	EB-9-7-22	2209349-001c	ND	0.30	µg/L	UJ	ERPD-LCS
2-Methylnaphthalene	SW8270C	OW-50	2209349-002c	ND	0.30	µg/L	UJ	ERPD-LCS
2-Methylnaphthalene	SW8270C	OW-52	2209349-003c	ND	0.30	µg/L	UJ	ERPD-LCS
2-Methylnaphthalene	SW8270C	OW-29	2209349-004c	ND	0.30	µg/L	UJ	ERPD-LCS
2-Methylnaphthalene	SW8270C	OW-54	2209349-005c	ND	0.30	µg/L	UJ	ERPD-LCS
2-Methylnaphthalene	SW8270C	OW-13	2209349-008c	ND	0.30	µg/L	UJ	ERPD-LCS
2-Methylnaphthalene	SW8270C	OW-56	2209349-009c	ND	0.30	µg/L	UJ	ERPD-LCS
2-Methylnaphthalene	SW8270C	DUP-9-7-22	2209349-011c	ND	0.30	µg/L	UJ	ERPD-LCS
Acenaphthene	SW8270C	OW-55	2209349-007c	0.56	0.30	µg/L	J	ERPD-LCS
Acenaphthene	SW8270C	EB-9-7-22	2209349-001c	ND	0.30	µg/L	UJ	ERPD-LCS
Acenaphthene	SW8270C	OW-50	2209349-002c	ND	0.30	µg/L	UJ	ERPD-LCS
Acenaphthene	SW8270C	OW-52	2209349-003c	ND	0.30	µg/L	UJ	ERPD-LCS
Acenaphthene	SW8270C	OW-29	2209349-004c	ND	0.30	µg/L	UJ	ERPD-LCS
Acenaphthene	SW8270C	OW-54	2209349-005c	ND	0.30	µg/L	UJ	ERPD-LCS
Acenaphthene	SW8270C	OW-13	2209349-008c	ND	0.30	µg/L	UJ	ERPD-LCS
Acenaphthene	SW8270C	OW-56	2209349-009c	ND	0.30	µg/L	UJ	ERPD-LCS
Acenaphthene	SW8270C	DUP-9-7-22	2209349-011c	ND	0.30	µg/L	UJ	ERPD-LCS
Acenaphthene	SW8270C	OW-66	2209349-006c	0.24	0.30	µg/L	J	ERPD-LCS, MDLRL
Anthracene	SW8270C	OW-66	2209349-006c	0.20	0.30	µg/L	J	MDLRL



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Analyte	Method	Field Sample ID	Lab Sample ID	Result	Limit	Units	Reviewer Qualifier	DV Flag Reasons
Arsenic, Dissolved	E200.8	OW-52	2209349-003E	0.00061	0.0010	mg/L	J	MDLRL
Arsenic, Dissolved	E200.8	OW-29	2209349-004E	0.00055	0.0010	mg/L	J	MDLRL
Arsenic, Dissolved	E200.8	OW-13	2209349-008E	0.00057	0.0010	mg/L	J	MDLRL
Arsenic, Dissolved	E200.8	DUP-9-7-22	2209349-011E	0.00051	0.0010	mg/L	J	MDLRL
Arsenic, Total	E200.8	OW-52	2209349-003D	0.00078	0.0010	mg/L	J	MDLRL
Arsenic, Total	E200.8	OW-29	2209349-004D	0.00055	0.0010	mg/L	J	MDLRL
Arsenic, Total	E200.8	OW-13	2209349-008D	0.00063	0.0010	mg/L	J	MDLRL
Arsenic, Total	E200.8	DUP-9-7-22	2209349-011D	0.00064	0.0010	mg/L	J	MDLRL
Barium, Total	E 200.7	OW-50	2209349-002D	0.047	0.0030	mg/L	J-	LR-SUR
Barium, Total	E 200.7	OW-52	2209349-003D	0.038	0.0030	mg/L	J-	LR-SUR
Barium, Total	E 200.7	OW-29	2209349-004D	0.075	0.0030	mg/L	J-	LR-SUR
Barium, Total	E 200.7	OW-54	2209349-005D	0.47	0.0030	mg/L	J-	LR-SUR
Barium, Total	E 200.7	OW-66	2209349-006D	2.5	0.0150	mg/L	J-	LR-SUR
Barium, Total	E 200.7	OW-55	2209349-007D	0.69	0.0030	mg/L	J-	LR-SUR
Barium, Total	E 200.7	OW-13	2209349-008D	0.019	0.0030	mg/L	J-	LR-SUR
Barium, Total	E 200.7	OW-56	2209349-009D	0.41	0.0030	mg/L	J-	LR-SUR
Barium, Total	E 200.7	DUP-9-7-22	2209349-011D	0.036	0.0030	mg/L	J-	LR-SUR
Barium, Total	E 200.7	EB-9-7-22	2209349-001D	ND	0.0030	mg/L	UJ	LR-SUR
Benzene	SW8260B	OW-56	2209349-009a	0.88	1.0	µg/L	J	MDLRL
Chromium, Dissolved	E 200.7	EB-9-7-22	2209349-001E	0.0025	0.0060	mg/L	J	MDLRL
Chromium, Total	E 200.7	OW-52	2209349-003D	0.0020	0.0060	mg/L	J	MDLRL
Chromium, Total	E 200.7	OW-56	2209349-009D	0.0049	0.0060	mg/L	J	MDLRL
Chromium, Total	E 200.7	DUP-9-7-22	2209349-011D	0.0033	0.0060	mg/L	J	MDLRL
Cyanide, Total	E335.4	OW-50	2209349-002F	2.3	5.0	µg/L	J	MDLRL
Cyanide, Total	E335.4	OW-29	2209349-004F	4.74	5.0	µg/L	J	MDLRL
Cyanide, Total	E335.4	OW-56	2209349-009F	3.73	5.0	µg/L	J	MDLRL
Fluorene	SW8270C	OW-66	2209349-006c	0.74	0.30	µg/L	J	ERPD-LCS



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Analyte	Method	Field Sample ID	Lab Sample ID	Result	Limit	Units	Reviewer Qualifier	DV Flag Reasons
Fluorene	SW8270C	OW-55	2209349-007c	1.6	0.30	µg/L	J	ERPD-LCS
Fluorene	SW8270C	EB-9-7-22	2209349-001c	ND	0.30	µg/L	UJ	ERPD-LCS
Fluorene	SW8270C	OW-50	2209349-002c	ND	0.30	µg/L	UJ	ERPD-LCS
Fluorene	SW8270C	OW-52	2209349-003c	ND	0.30	µg/L	UJ	ERPD-LCS
Fluorene	SW8270C	OW-29	2209349-004c	ND	0.30	µg/L	UJ	ERPD-LCS
Fluorene	SW8270C	OW-54	2209349-005c	ND	0.30	µg/L	UJ	ERPD-LCS
Fluorene	SW8270C	OW-13	2209349-008c	ND	0.30	µg/L	UJ	ERPD-LCS
Fluorene	SW8270C	OW-56	2209349-009c	ND	0.30	µg/L	UJ	ERPD-LCS
Fluorene	SW8270C	DUP-9-7-22	2209349-011c	ND	0.30	µg/L	UJ	ERPD-LCS
Isopropylbenzene	SW8260B	OW-55	2209349-007a	19	50	µg/L	J	MDLRL
Lead, Dissolved	E200.8	OW-66	2209349-006E	0.00045	0.00050	mg/L	J	MDLRL
Lead, Dissolved	E200.8	OW-56	2209349-009E	0.00041	0.00050	mg/L	J	MDLRL
Lead, Dissolved	E200.8	DUP-9-7-22	2209349-011E	0.00013	0.00050	mg/L	J	MDLRL
Lead, Total	E200.8	OW-50	2209349-002D	0.000078	0.00050	mg/L	J	MDLRL
Lead, Total	E200.8	OW-52	2209349-003D	0.00045	0.00050	mg/L	J	MDLRL
Lead, Total	E200.8	DUP-9-7-22	2209349-011D	0.00032	0.00050	mg/L	J	MDLRL
Mercury, Dissolved	E245.1	OW-50	2209349-002E	0.00018	0.00020	mg/L	U	EBD, MDLRL
Mercury, Dissolved	E245.1	OW-52	2209349-003E	0.00019	0.00020	mg/L	U	EBD, MDLRL
Mercury, Dissolved	E245.1	OW-29	2209349-004E	0.00017	0.00020	mg/L	U	EBD, MDLRL
Mercury, Dissolved	E245.1	OW-54	2209349-005E	0.00016	0.00020	mg/L	U	EBD, MDLRL
Mercury, Dissolved	E245.1	OW-66	2209349-006E	0.00017	0.00020	mg/L	U	EBD, MDLRL
Mercury, Dissolved	E245.1	OW-55	2209349-007E	0.00016	0.00020	mg/L	U	EBD, MDLRL
Mercury, Dissolved	E245.1	OW-13	2209349-008E	0.00016	0.00020	mg/L	U	EBD, MDLRL
Mercury, Dissolved	E245.1	OW-56	2209349-009E	0.00015	0.00020	mg/L	U	EBD, MDLRL
Mercury, Dissolved	E245.1	DUP-9-7-22	2209349-011E	0.00017	0.00020	mg/L	U	EBD, MDLRL
Mercury, Dissolved	E245.1	EB-9-7-22	2209349-001E	0.00019	0.00020	mg/L	J	MDLRL
Mercury, Total	E245.1	OW-54	2209349-005D	0.00022	0.00020	mg/L	JB	EBD



Analyte	Method	Field Sample ID	Lab Sample ID	Result	Limit	Units	Reviewer Qualifier	DV Flag Reasons
Mercury, Total	E245.1	OW-50	2209349-002D	0.00019	0.00020	mg/L	U	EBD, MDLRL
Mercury, Total	E245.1	OW-52	2209349-003D	0.00019	0.00020	mg/L	U	EBD, MDLRL
Mercury, Total	E245.1	OW-29	2209349-004D	0.00016	0.00020	mg/L	U	EBD, MDLRL
Mercury, Total	E245.1	OW-66	2209349-006D	0.00019	0.00020	mg/L	U	EBD, MDLRL
Mercury, Total	E245.1	OW-55	2209349-007D	0.00017	0.00020	mg/L	U	EBD, MDLRL
Mercury, Total	E245.1	OW-13	2209349-008D	0.00017	0.00020	mg/L	U	EBD, MDLRL
Mercury, Total	E245.1	OW-56	2209349-009D	0.00016	0.00020	mg/L	U	EBD, MDLRL
Mercury, Total	E245.1	DUP-9-7-22	2209349-011D	0.00015	0.00020	mg/L	U	EBD, MDLRL
Mercury, Total	E245.1	EB-9-7-22	2209349-001D	0.00018	0.00020	mg/L	J	MDLRL
Naphthalene	SW8270C	OW-66	2209349-006c	160	5.0	µg/L	J	ERPD-LCS
Naphthalene	SW8270C	OW-55	2209349-007c	19	0.30	µg/L	J	ERPD-LCS
Naphthalene	SW8270C	EB-9-7-22	2209349-001c	ND	0.30	µg/L	UJ	ERPD-LCS
Naphthalene	SW8270C	OW-50	2209349-002c	ND	0.30	µg/L	UJ	ERPD-LCS
Naphthalene	SW8270C	OW-52	2209349-003c	ND	0.30	µg/L	UJ	ERPD-LCS
Naphthalene	SW8270C	OW-29	2209349-004c	ND	0.30	µg/L	UJ	ERPD-LCS
Naphthalene	SW8270C	OW-54	2209349-005c	ND	0.30	µg/L	UJ	ERPD-LCS
Naphthalene	SW8270C	OW-13	2209349-008c	ND	0.30	µg/L	UJ	ERPD-LCS
Naphthalene	SW8270C	OW-56	2209349-009c	ND	0.30	µg/L	UJ	ERPD-LCS
Naphthalene	SW8270C	DUP-9-7-22	2209349-011c	ND	0.30	µg/L	UJ	ERPD-LCS
Nickel, Total	E 200.7	OW-29	2209349-004D	0.023	0.010	mg/L	J+	HR-LCS
Nickel, Total	E 200.7	OW-54	2209349-005D	0.21	0.010	mg/L	J+	HR-LCS
Nickel, Total	E 200.7	OW-66	2209349-006D	0.30	0.010	mg/L	J+	HR-LCS
Nickel, Total	E 200.7	OW-55	2209349-007D	0.22	0.010	mg/L	J+	HR-LCS
Nickel, Total	E 200.7	OW-56	2209349-009D	0.064	0.010	mg/L	J+	HR-LCS
n-Propylbenzene	SW8260B	OW-55	2209349-007a	41	50	µg/L	J	MDLRL
Pyrene	SW8270C	EB-9-7-22	2209349-001c	ND	1.0	µg/L	UJ	ERPD-LCS
Pyrene	SW8270C	OW-50	2209349-002c	ND	1.0	µg/L	UJ	ERPD-LCS



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Analyte	Method	Field Sample ID	Lab Sample ID	Result	Limit	Units	Reviewer Qualifier	DV Flag Reasons
Pyrene	SW8270C	OW-52	2209349-003c	ND	1.0	µg/L	UJ	ERPD-LCS
Pyrene	SW8270C	OW-29	2209349-004c	ND	1.0	µg/L	UJ	ERPD-LCS
Pyrene	SW8270C	OW-54	2209349-005c	ND	1.0	µg/L	UJ	ERPD-LCS
Pyrene	SW8270C	OW-66	2209349-006c	ND	1.0	µg/L	UJ	ERPD-LCS
Pyrene	SW8270C	OW-55	2209349-007c	ND	1.0	µg/L	UJ	ERPD-LCS
Pyrene	SW8270C	OW-13	2209349-008c	ND	1.0	µg/L	UJ	ERPD-LCS
Pyrene	SW8270C	OW-56	2209349-009c	ND	1.0	µg/L	UJ	ERPD-LCS
Pyrene	SW8270C	DUP-9-7-22	2209349-011c	ND	1.0	µg/L	UJ	ERPD-LCS
Selenium, Dissolved	E200.8	OW-66	2209349-006E	0.00045	0.0010	mg/L	J	MDLRL
Selenium, Total	E200.8	OW-54	2209349-005D	0.0017	0.0010	mg/L	J+	HR-LCS
Selenium, Total	E200.8	OW-66	2209349-006D	0.0023	0.0010	mg/L	J+	HR-LCS
Selenium, Total	E200.8	OW-55	2209349-007D	0.0015	0.0010	mg/L	J+	HR-LCS
Selenium, Total	E200.8	OW-56	2209349-009D	0.0005	0.0010	mg/L	J+	HR-LCS, MDLRL
Silver, Dissolved	E 200.7	OW-29	2209349-004E	0.0016	0.0050	mg/L	J	MDLRL
Silver, Dissolved	E 200.7	OW-54	2209349-005E	0.0019	0.0050	mg/L	J	MDLRL
Silver, Dissolved	E 200.7	OW-55	2209349-007E	0.0019	0.0050	mg/L	J	MDLRL
TPH DRO	SW8015	EB-9-7-22	2209349-001C	0.64	0.064	mg/L	J+	HR-LCS
TPH DRO	SW8015	OW-66	2209349-006C	7.1	0.32	mg/L	J+	HR-LCS
TPH DRO	SW8015	OW-54	2209349-005C	2.0	0.064	mg/L	JB	EBD, HR-LCS
TPH DRO	SW8015	OW-55	2209349-007C	4.5	0.32	mg/L	JB	EBD, HR-LCS
TPH DRO	SW8015	OW-29	2209349-004C	0.44	0.064	mg/L	U	EBD, HR-LCS
TPH DRO	SW8015	OW-50	2209349-002C	0.065	0.064	mg/L	U	EBD, HR-LCS, MBD
TPH DRO	SW8015	OW-13	2209349-008C	0.076	0.064	mg/L	U	EBD, HR-LCS, MBD
TPH DRO	SW8015	OW-52	2209349-003C	0.029	0.064	mg/L	U	EBD, HR-LCS, MBD, MDLRL
TPH DRO	SW8015	DUP-9-7-22	2209349-011C	0.031	0.064	mg/L	U	EBD, HR-LCS, MBD, MDLRL
TPH GRO	SW8015	OW-56	2209349-009a	0.27	0.050	mg/L	J+	HR-SUR
TPH ORO	SW8015	OW-54	2209349-005C	0.12	0.080	mg/L	U	EBD



Analyte	Method	Field Sample ID	Lab Sample ID	Result	Limit	Units	Reviewer Qualifier	DV Flag Reasons
TPH ORO	SW8015	OW-29	2209349-004C	0.068	0.080	mg/L	U	EBD, MDLRL
Vanadium, Dissolved	E 200.7	OW-29	2209349-004E	0.0017	0.050	mg/L	J	MDLRL
Vanadium, Dissolved	E 200.7	OW-54	2209349-005E	0.0034	0.050	mg/L	J	MDLRL
Vanadium, Dissolved	E 200.7	OW-66	2209349-006E	0.0041	0.050	mg/L	J	MDLRL
Vanadium, Dissolved	E 200.7	OW-55	2209349-007E	0.0052	0.050	mg/L	J	MDLRL
Vanadium, Dissolved	E 200.7	OW-13	2209349-008E	0.0031	0.050	mg/L	J	MDLRL
Vanadium, Dissolved	E 200.7	OW-56	2209349-009E	0.0067	0.050	mg/L	J	MDLRL
Vanadium, Total	E 200.7	OW-54	2209349-005D	0.025	0.050	mg/L	J	MDLRL
Vanadium, Total	E 200.7	OW-66	2209349-006D	0.036	0.050	mg/L	J	MDLRL
Vanadium, Total	E 200.7	OW-55	2209349-007D	0.027	0.050	mg/L	J	MDLRL
Vanadium, Total	E 200.7	OW-56	2209349-009D	0.014	0.050	mg/L	J	MDLRL
Zinc, Dissolved	E 200.7	OW-50	2209349-002E	0.044	0.010	mg/L	JB	EBD
Zinc, Dissolved	E 200.7	OW-29	2209349-004E	0.030	0.010	mg/L	JB	EBD
Zinc, Dissolved	E 200.7	OW-54	2209349-005E	0.017	0.010	mg/L	JB	EBD
Zinc, Dissolved	E 200.7	OW-66	2209349-006E	0.010	0.010	mg/L	JB	EBD
Zinc, Dissolved	E 200.7	OW-55	2209349-007E	0.014	0.010	mg/L	JB	EBD
Zinc, Dissolved	E 200.7	OW-13	2209349-008E	0.031	0.010	mg/L	JB	EBD
Zinc, Dissolved	E 200.7	OW-56	2209349-009E	0.012	0.010	mg/L	JB	EBD
Zinc, Dissolved	E 200.7	OW-52	2209349-003E	0.012	0.010	mg/L	JB	EBD, ERPD-FD
Zinc, Dissolved	E 200.7	DUP-9-7-22	2209349-011E	0.025	0.010	mg/L	JB	EBD, ERPD-FD
Zinc, Dissolved	E 200.7	EB-9-7-22	2209349-001E	0.0046	0.010	mg/L	J	MDLRL
Zinc, Total	E 200.7	OW-54	2209349-005D	0.020	0.010	mg/L	JB	HR-SUR, MBD
Zinc, Total	E 200.7	OW-55	2209349-007D	0.026	0.010	mg/L	JB	HR-SUR, MBD
Zinc, Total	E 200.7	EB-9-7-22	2209349-001D	0.0062	0.010	mg/L	U	HR-SUR, MBD, MDLRL
Zinc, Total	E 200.7	OW-66	2209349-006D	0.0078	0.010	mg/L	U	HR-SUR, MBD, MDLRL
Zinc, Total	E 200.7	OW-56	2209349-009D	0.0093	0.010	mg/L	U	HR-SUR, MBD, MDLRL



.



Client: Marathon Oil	Laboratory: Hall Environmental Analysis Laboratory
Project Name: Western Refining Southwest, Quarterly GW	Sample Matrix: Groundwater
Project Number: 697-080-002 Task: 0006	Sample Start Date: 09/08/2022
Date Validated: 01/17/2023	Sample End Date: 09/08/2022
Parameters Included:	
<ul> <li>Volatile Organic Compounds (VOC) by Environmental Pro Waste (SW-846) Method 8260B</li> </ul>	otection Agency (EPA) Test Methods for Evaluating Solid
<ul> <li>1,2-Dibromoethane (EDB) by EPA Method 504.1</li> </ul>	
<ul> <li>Semivolatile Organic Compounds (SVOC) by SW-846 Me Monitoring (SIM)</li> </ul>	thod 8270C and Method 8270C with Selected Ion
<ul> <li>Total Petroleum Hydrocarbons (TPH) Gasoline Range Or</li> </ul>	ganics (GRO) by SW-846 Method 8015D
<ul> <li>TPH Diesel Range Organics (DRO) and Motor Oil Range</li> </ul>	Organics (MRO) by SW-846 Method 8015D Modified
<ul> <li>Total and Dissolved Metals by EPA Method 200.7 and Method</li> </ul>	ethod 200.8
<ul> <li>Total and Dissolved Mercury by EPA Method 245.1</li> </ul>	
<ul> <li>Cyanide by Standard Methods for the Examination of Wat</li> </ul>	ter and Wastewater (SM) Method 4500 CN E
Laboratory Project ID: 2209441	
Data Validator: Daran O'Hollearn, Lead Project Scientist	
Reviewer: Charles Ballek, Senior Chemist	

## DATA EVALUATION CRITERIA SUMMARY

A Tier II Data Validation was performed by Trihydro Corporation's Chemical Data Evaluation Services Group on the analytical data report packages generated by Hall Environmental Analysis Laboratory of Albuquerque, New Mexico, with additional data from Pace Analytical National of Mount Juliet, Tennessee evaluating samples from the Marathon Oil site, located in Gallup, New Mexico.

Precision, accuracy, method compliance, and completeness of this data package were assessed during this data review. Precision was determined by evaluating the calculated relative percent difference (RPD) values from:

- Field duplicate pairs
- Laboratory duplicate pairs
- Matrix spike (MS) and matrix spike duplicate (MSD) pairs
- Laboratory control sample (LCS) and laboratory control sample duplicate (LCSD) pairs

Laboratory accuracy was established by reviewing the demonstrated percent recoveries (%R) of the following items to verify that data are not biased.

- MS/MSD samples
- LCS/LCSD samples
- Organic system monitoring compounds (surrogates)



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Field accuracy was established by collecting and analyzing the following samples to monitor for possible ambient or cross contamination during sampling and transportation.

- Trip blanks
- Field blanks
- Equipment blanks

Method compliance was established by reviewing sample integrity, holding times, detection limits, surrogate recoveries, laboratory blanks, initial and continuing calibrations (where applicable), and the LCS/LCSD percent recoveries against method-specific requirements.

Completeness was evaluated by determining the overall ratio of the number of samples and analyses planned versus the number of samples with valid analyses. Determination of completeness included a review of the chain-of-custody (CoC), laboratory analytical methods, and other laboratory and field documents associated with this analytical data set.

Client Sample ID	Laboratory Sample Number
EB-09-08-22	2209441-001
PW-3	2209441-002
PW-4	2209441-003
EAST LDU	2209441-004
WEST LDU	2209441-005
DUP 9-8-22	2209441-006
FB 9-8-22	2209441-007
TRIP BLANK	2209441-008

### SAMPLE NUMBERS TABLE





The laboratory data were reviewed to evaluate compliance with the methods and the quality of the reported data. Assessment of CoC completeness is included in Item 3 of the Data Validation Checklist. A check mark ( $\checkmark$ ) indicates that the referenced validation criteria were deemed acceptable, whereas a crossed circle ( $\otimes$ ) indicates validation criteria for which the data have been qualified by the data validator. An empty circle (O) indicates that the specified criterion does not apply to the reviewed data. Details are noted in the tables below.

### Validation Criteria

- ✓ Data Completeness
- ⊗ Chromatography (Item 2)
- ✓ CoC Documentation (Item 3)
- ✓ Holding Times and Preservation (Items 6 and 7)
- O Initial and Continuing Calibrations (Items 9 and 10)
- ⊗ Laboratory Blanks (Items 11 and 12)
- ✓ MS/MSD (Items 13 and 14)
- ⊗ LCS/LCSD (Items 15 and 16)
- System Monitoring Compounds (i.e., Surrogates) (Item 17)
- ⊗ Field, Equipment, and Trip Blanks (Items 18 and 19)
- ✓ Field Duplicates (Items 20 and 21)
- ✓ Laboratory Duplicates (Item 22)

### **Guidance References**

Chemical data validation was conducted in accordance with the United States Environmental Protection Agency (USEPA) Contract Laboratory Program (CLP) National Functional Guidelines for the analyses listed below, or by the appropriate method if not covered in the National Functional Guidelines.

- Data for organic analyses were evaluated according to validation criteria set forth in the USEPA CLP National Functional Guidelines for Organic Superfund Methods Data Review, document number EPA-540-R-20-005, November 2020 with additional reference to the USEPA CLP National Functional Guidelines for Organic Data Review, document number EPA 540/R-99/008, October 1999.
- Data for inorganic analyses were evaluated according to validation criteria set forth in the USEPA CLP National Functional Guidelines for Inorganic Superfund Methods Data Review, document number EPA-540-R-20-006, November 2020 with additional reference to the USEPA CLP National Functional Guidelines for Inorganic Data Review, document number EPA 540-R-04-004, October 2004.
- Review of field duplicates was conducted according to the USEPA Region I New England Environmental Data Review Supplement for Region 1 Data Review Elements and Superfund Specific Guidance/Procedures, EQADR-Supplement2, September 2020.
- Trihydro Data Validation Variance Documentation, April 2022.



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## **OVERALL DATA PACKAGE ASSESSMENT**

Based on a data validation review, the data are acceptable as delivered. Data qualified by the laboratory are discussed in Item 2 of the Validation Criteria Checklist.

The purpose of validating data and assigning qualifiers is to assist in proper data interpretation. Data that are not qualified meet the site data quality objectives. If values are assigned qualifiers other than an R (rejected, data not usable), the data may be used for site evaluation; however, consideration should be given to the reasons for qualification when interpreting sample concentrations. Data points that are assigned an R qualifier should not be used for site evaluation purposes.

If applicable, text was identified in **bold font** in the Validation Criteria Checklist to indicate that further action and/or qualification of the data were required. Data may have been qualified with J data flags by the laboratory if the result was greater than or equal to the method detection limit (MDL) but less than the reporting limit (RL). These laboratory-applied J flags were preserved, if present, and included in the Data Qualification Summary table at the end of this report. If applicable, data validation qualifiers were added for the items noted with crossed circles in the Validation Criteria section above. Please see the Data Qualification Summary table at the end of this report.

If data would be qualified with more than one flag, one qualifier was assigned based on the severity; however, all reasons for qualification were retained. Data that would be qualified with both J+ and J- flags were evaluated based on validation criteria and assigned the appropriate flag. The hierarchy of qualifiers from the most to least severe is as follows:

Data qualifiers used during this validation are included in the following table.

<u>Qualifier</u>	Definition
J	Estimated concentration
J+	The result is an estimated concentration, but may be biased high
J-	The result is an estimated concentration, but may be biased low
UJ	Estimated reporting limit
U	Evaluated to be undetected at the reporting limit
JB	Estimated concentration due to blank contamination
R	Rejected, data not usable

## **Data Completeness**

The analyses were performed as requested on the CoC records. The associated samples were received by the laboratory and analyzed properly unless otherwise noted in the Criteria Checklist below. The complete data package consisted of 450 data points. The data completeness calculation does not include any submitted blank sample results. Fourteen data points were rejected. The data completeness measure for this data package is calculated to be 96.89% and is acceptable.



		VALID	ATION CRITERIA CHECKLIST		
1. Was the report f	ree of non-co	onformances ide	ntified by the laboratory?		No
Comments: The lab	oratory noted	l the following ar	nalytical non-conformances related	to this data set.	
<u>Method 8270C and N</u> in both the 8270 SIM	<u>/lethod 8270</u> method and	<u>C SIM</u> : The reco the standard 82	overy for chrysene was low in the Li ?70 method and is non-detect.	CS/LCSD. This co	mpound is reported
The recovery for 1,4-	dioxane was	low in the LCS	Э.		
The "S" flagged surro	ogates for sa	mples "East LDl	J" and "West LDU" were low due to	the emulsive natu	re of the sample.
Method 8015D DRO	The LCS/L	CSD had elevate	ed recoveries.		
2. Were the data fr If no, define.	ee of data qu	alification flags	and/or notes used by the laboratory	ı?	No
Comments: The lab	oratory used	the following dat	ta qualification flags with this data s	et.	
E – Estimated value. J qualifiers if detec application of this lat J – Analyte detected	Multiple an ted, and nor poratory flag to below quant	alytes were flag -detections we to QC sample re itation limits.	gged by the laboratory with the E re assigned UJ due to this lab id sults in the laboratory report did no	Ilag. These resu entified non-conf t require qualificati	Ilts were assigned ormance. The on.
R – % RPD outside o	of range.				
S – % Recovery outs	ide of range	due to dilution o	r matrix interference.		
<sup>r</sup> – Value exceeds m	aximum cont	aminant level.			
3. Were sample Co	oC forms and	custody proced	ures complete?		Yes
Comments: The Co and laboratory perso sealed, and custody	C records fro nnel signatur seals were p	m field to labora es, dates, and ti resent and intac	tory were complete, and custody wain imes of receipt. The laboratory note t on the shipping containers.	as maintained as e ed that the shipping	evidenced by field g containers were
4. Were detection permit, or metho	imits in acco d, or indicate	rdance with the ed as acceptable	quality assurance project plan (QAF ??	PP),	Yes
Comments: The det	ection limits a	appeared to be a	acceptable. The following dilutions	were applied.	
	<u>Method</u>	<u>Sample(s)</u>	<u>Analyte(s)</u>	Dilution Factor	
	200.7	East LDU	Total and Dissolved Chromium	5	
	200.7	East LDU	Total and Dissolved Nickel	5	
	200.7	West LDU	Dissolved Nickel	5	
5. Were the report QAPP, permit, c	ed analytical r CoC?	methods and co	nstituents in compliance with the		No
Comments: The rep constituents in accor	orted analytic dance with th	cal methods wer ne CoC, with the	e in compliance with the CoC, and following exceptions.	the laboratory repo	orted the requested
The CoC requested to using both Method 2 accuracy, and precise	otal and diss 00.7 and Met ion goals and	olved metals us hod 200.8. This d, therefore, was	ing only Method 200.7; however, th s substituted analytical method, Met s an acceptable replacement.	e laboratory analy: hod 200.8, met sir	zed the samples nilar sensitivity,
The CoC requested This substituted anal replacement.	cyanide using ytical methoo	g Method 335.4; d met similar ser	however, the laboratory analyzed t sitivity, accuracy, and precision go	he samples using als and, therefore,	Method 4500 CN E. was an acceptable



VALIDATION CRITERIA CHECKLIST								
6. Were samples receiv	6. Were samples received in good condition within method-specified requirements? No							
Comments: Samples were received on ice, in good condition, and with the cooler temperatures within the recommended temperature range of $4^{\circ}C \pm 2^{\circ}C$ at 2.4°C and 3.8°C as noted on the CoC and Sample Log-in Check List. Samples transferred to Pace National were received in good condition with the cooler temperature outside the recommended range at 0.4°C as noted on the CoC. The cooler temperatures below 2.0°C were judged as acceptable since the laboratory did not report the sample containers								
<ol> <li>Were samples extract technical holding tim</li> </ol>	cted/digested an	nd analyzed within metho	d-specified c	r	Yes			
Comments: The samples	s were extracted	d/digested and analyzed v	vithin metho	d-specific holding tin	nes.			
8. Were reported units method(s)? Specify	appropriate for if wet or dry un	the sample matrix/matrice its were used for soil.	es and analy	tical	Yes			
Comments: The results which were acceptable for	were reported ir or the sample m	n concentration units of m atrix and the analyses rec	icrograms pe juested.	er liter (μg/L) and mil	ligrams per liter (mg/L),			
9. Did the laboratory pr	ovide any speci	ific initial and/or continuing	g calibration	results?	No			
Comments: Initial and co	ontinuing calibra	tion data were not include	ed as part of	this data set.				
10. If initial and/or contin acceptable limits?	uing calibration	results were provided, w	ere the resul	ts within	N/A			
Comments: Initial and co	ontinuing calibra	tion data were not include	ed as part of	this data set.				
11. Was the total numbe the total number of s	r of laboratory l amples or anal	blank samples prepared e yzed as required by the m	qual to at lea ethod?	ast 5% of	Yes			
Comments: The total nur samples.	mber of laborate	ory blank samples prepare	ed was equa	I to at least 5% of th	e total number of			
12. Were target analytes	reported as no	t detected in the laborato	ry blanks?		No			
Comments: Target analy	tes were report	ed as not detected in the	laboratory b	anks, with the follow	ving exceptions.			
	<u>Method</u>	<u>Analyte</u>	<u>Batch</u>	Concentration				
	200.7	Total Barium	70092	0.0018 mg/L				
	200.8	Total Antimony	70092	0.00063 mg/L				
	200.8	Total Lead	70092	0.00040 mg/L				
	8015D	TPH DRO	70105	0.052 mg/L				
Detections of total lead and TPH DRO in the associated samples that were less than the blank results and/or less than the applicable reporting limits were assigned U qualifiers. Detections of total barium and total lead in the associated samples that were greater than the reporting limits but less than or equal to 10 times the blank results were assigned JB qualifiers. Non-detections of the identified analytes in the associated samples and detections that were above the reporting limit and greater than ten times the blank concentration did not require qualification.								



VALIDATION	CRITERIA	CHECKLIST
VALIDATION		ONLONLIOT

13. Was the total number of MS samples prepared equal to at least 5% of the total number of samples or analyzed as required by the method?

Yes

Comments: The total number of matrix spike samples prepared was equal to at least 5% of the total number of samples, although MS samples were not prepared/reported for all analyses and/or batches. The matrix spike sample source for each analytical batch in this sample set has been indicated below.

<u>Method</u>	<u>Analytes</u>	<u>Batch</u>	MS Sample Source
200.7	Total Metals	70092	DUP 9-8-22
200.7	Dissolved Metals	B91088	Not Prepared
200.8	Total Metals	70092	Not Prepared
200.8	Dissolved Metals	A91030	Not Prepared
200.8	Dissolved Selenium	A91078	Not Prepared
200.8	Dissolved Metals	B91030	DUP 9-8-22
245.1	Total and Dissolved Mercury	70232	Not Prepared
504.1	EDB	70123	PW-3
504.1	EDB	70173	Not Prepared
4500CN E	Cyanide	WG1925290	Not Associated, PW-3
8015D	TPH DRO and MRO	70105	Not Prepared
8015D	TPH GRO	R90998	Not Prepared
8260B	VOCs	R90977	PW-3
8270C SIM	SVOCs	70094	Not Prepared
8270C	SVOCs	70094	Not Prepared

Not Associated – The MS sample source was not associated with this project. Not Prepared – Matrix spikes were not prepared/reported for this batch.

14. For MS/MSDs prepared from project samples, were percent recoveries and RPDs within data validation or laboratory quality control (QC) limits?

Yes

Comments: The MS/MSD percent recoveries and RPDs for project samples were within data validation and laboratory QC limits.

The percent recoveries and RPD values for MS/MSDs prepared from non-project samples were evaluated and considered, but data were not qualified based on those results since matrix similarity to project samples could not be guaranteed.

15. Was the total number of LCSs analyzed equal to at least 5% of the total number of<br/>samples or analyzed as required by the method?Yes

Comments: The total number of LCS samples analyzed was equal to at least 5% of the total number of samples.



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16. Were LCS/LCSD percent recoveries and LCS/LCSD RPDs within data validation or laboratory QC limits?

Comments: The LCS and LCSD percent recoveries and LCS/LCSD RPDs were within data validation and laboratory QC limits, with the following exceptions.

<u>Method</u>	Analyte	<u>Batch</u>	<u>LCS</u> <u>Recovery</u>	LCSD Recovery	LCS/LCSD QC Limits	LCS/LCSD RPD	<u>RPD</u> <u>QC</u> Limits
200.8	Total Antimony	70092	144%		70-130%		
8015D	TPH DRO	70105	81.4%	120%	31.7-75.4%	38.5%	20%
8270C	Pyrene	70094	Acceptable	Acceptable	61-123%	32.8%	11.8%
8270C SIM	1,4-Dioxane	70094	Acceptable	20.0%	20.2-48.4%	Acceptable	30.1%
8270C SIM	Chrysene	70094	51.0%	48.0%	55.3-115%	Acceptable	20%

Total antimony was not detected in the associated samples in Method 200.8 batch 70092 and qualification of the results was not required based on the evidence of potential high bias.

The target analyte TPH DRO was detected in associated samples, and the results were qualified as J+ based on the evidence of potential high bias.

The analytes with LCS/LCSD RPD values that exceeded the QC limit were qualified as J for detections and UJ for non-detections for the associated samples due to evidence of poor precision.

Non-detections of 1,4-dioxane and chrysene were qualified as UJ, and the detections of 1,4-dioxane in samples East LDU and West LDU were qualified as J-, due to evidence of low bias.

17. Were surrogate recoveries within laboratory QC limits?

No

No

Comments: Surrogate recoveries were within laboratory QC limits, with the following exceptions.

•	-	•		
Method	Surrogate	<u>Sample</u>	Surrogate Recovery	QC Limits
8015D	BFB	East LDU	166%	70-130%
8270C	2-Fluorophenol	East LDU	0.745%	15-84.5%
8270C	Phenol-d₅	East LDU	2.53%	15-67%
8270C	2,4,6-Tribromophenol	East LDU	4.59%	15-108%
8270C	2-Fluorophenol	West LDU	1.54%	15-84.5%
8270C	Phenol-d₅	West LDU	0.0%	15-67%
8270C	2,4,6-Tribromophenol	West LDU	5.29%	15-108%
8270C-SIM	4-Terphenyl-d <sub>14</sub>	EB-09-08-22	62.3%	72-147%
8270C-SIM	4-Terphenyl-d <sub>14</sub>	PW-3	63.6%	72-147%
8270C-SIM	4-Terphenyl-d <sub>14</sub>	PW-4	65.7%	72-147%
8270C-SIM	4-Terphenyl-d <sub>14</sub>	EAST LDU	53.5%	72-147%
8270C-SIM	4-Terphenyl-d <sub>14</sub>	WEST LDU	55.8%	72-147%
8270C-SIM	4-Terphenyl-d <sub>14</sub>	DUP 9-8-22	45.9%	72-147%

TPH GRO was detected in the Method 8015D analysis of sample East LDU, and this result was qualified as J+ to indicate a potential high bias.

The associated analytes in the acid fraction of samples East LDU and West LDU were not detected. Since these surrogates recovered at less than 10%, these associated results were qualified as R indicating rejected results, data not usable due to evidence of extreme low bias.

Since Method 8270C and 8270C SIM surrogate associations were not available from the laboratory, qualification was assigned to all of the target analytes in a given fraction (acid or base/neutral) when two or more surrogates from the same



fraction (acid or base/neutral) were outside the acceptance range. This condition did not exist for the Method 8270C SIM analysis of samples EB-09-08-22, PW-3, PW-4, East LDU, West LDU, and DUP 9-8-22, and qualification of sample data was not required.

Qualification of sample data was not required based on surrogate non-conformances in QC samples as the environmental samples were evaluated based on their specific surrogate recoveries.

18. Were the number of trip blank, field blank, and/or equipment blank samples collected equal to at least 10% of the total number of samples or as required by the project guidelines, QAPP, SAP, or permit?

Comments: The number of trip, field, and equipment blanks collected was equal to at least 10% of the number of samples. One trip blank sample, TRIP BLANK, one field blank sample, FB 9-8-22, and one equipment blank sample, EB-9-8-22, were collected as part of this sample set.

19. Were target analytes reported as not detected in the trip blank, field blank, and/or equipment blank samples?

No

Yes

Comments: Target analytes were not detected in the trip blank, field blank, and equipment blank samples with the following exceptions.

Blank Sample ID	<u>Method</u>	Analyte	Concentration
TRIP BLANK	8260B	Methylene Chloride	4.8 µg/L
FB 9-8-22	8260B	2-Butanone	29 µg/L
FB 9-8-22	8260B	Acetone	20 µg/L
EB-9-8-22	8260B	Dissolved Zinc	0.0067 mg/L
EB-9-8-22	245.1	Dissolved Mercury	0.00012 mg/L
EB-9-8-22	245.1	Total Mercury	0.00017 mg/L
EB-9-8-22	8015D	TPH DRO	0.058 mg/L
EB-9-8-22	8260B	Acetone	8.3 µg/L

Detections of the identified analytes in the associated samples that were less than the blank results and/or less than the applicable reporting limits were assigned U qualifiers. Detections of the identified analytes in the associated samples that were greater than the reporting limits but less than 10 times the blank results were assigned JB qualifiers. Non-detections of these analytes in the associated samples and results greater than 10 times the blank detection did not require qualification.

The TPH DRO results for the samples in batch 70105 were previously qualified due to a laboratory blank detection; therefore, additional qualification due to the equipment blank contamination was not required.

20. Was the number of field duplicates collected equal to at least 10% of the total number of samples or as required by the project guidelines, QAPP, SAP, or permit?	Yes					
Comments: The number of field duplicates collected was equal to at least 10% of the number of samples	i.					
Sample DUP 9-8-22 was collected as a field duplicate of sample PW-3.						
<ol> <li>Were field duplicate RPD values within data validation QC limits (soil 0-50%, water 0-30%, or air 0-25%)?</li> </ol>	Yes					
Comments: As indicated in the Field Duplicate Summary Table at the end of this report, field duplicate RPD values were within data validation QC limits of 0-30% for water samples.						



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VALIDATION CRITERIA CHECKLIST										
22. For laborat validation o	22. For laboratory duplicates prepared from project samples, were RPDs within data N/A validation or laboratory QC limits?									
Comments: La associated with	Comments: Laboratory duplicates were prepared for the analysis of cyanide in batch WG1925290 from samples not associated with this data set.									
The RPD values for the laboratory duplicate samples prepared from non-project samples were evaluated and considered, but data were not qualified based on these results since matrix similarity to project samples could not be guaranteed.										
23. Were the f	ollowing data relationships i	realistic?								
• Targe EPH/8	t analytes were reported by 3270)?	more than one method	(e.g., 8260/8270,	Ye	es					
Comments: Th reported as not	Comments: The target analyte chrysene was reported by both Method 8270C and Method 8270C SIM. This analyte was reported as not detected by both methods.									
Both to     results	otal and dissolved metals a s were greater than or equa	nalyses were performed I to the dissolved metals	l, and the total metals results?	N	0					
Comments: Th results.	e following table contains th	ne exceptions in which t	he dissolved metals r	esults exceeded the	total metals					
	Sample ID	<u>Analyte</u>	<u>Total Result</u> (mg/L)	Dissolved Result (mg/L)						
	DUP 9-8-22	Mercury	0.00015	0.00018						
	East LDU	Arsenic	ND	0.00079						
	PW-3	Barium	0.010	0.011						
	East LDU	Beryllium	0.0014	0.0020						
	West LDU	Beryllium	ND	0.0013						
	East LDU	Cobalt	0.027	0.028	]					
	East LDU	Nickel	2.4	2.5						
	West LDU Nickel 0.99 1.1									

East LDU	Cobalt	0.027	0.028
East LDU	Nickel	2.4	2.5
West LDU	Nickel	0.99	1.1
PW-3	Selenium	0.00077	0.0010
East LDU	Selenium	ND	0.00045
West LDU	Selenium	ND	0.00070
PW-3	Silver	0.0019	0.0058
PW-4	Silver	ND	0.0037
DUP 9-8-22	Silver	ND	0.0056
PW-3	Vanadium	ND	0.0024
PW-4	Vanadium	ND	0.0024
DUP 9-8-22	Vanadium	ND	0.0026
EB-09-08-22	Zinc	ND	0.0067
PW-3	Zinc	0.0087	0.021
PW-4	Zinc	ND	0.042
DUP 9-8-22	Zinc	ND	0.016

The EPA has not provided guidance or requirements for the evaluation, validation, and qualification of dissolved metals results that exceed the corresponding total metals results. Therefore, qualification of results was not performed based on these data.



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Client Sample ID: PW-3 Field Duplicate Sample ID: DUP 9-8-22								
Analyte	Analyte Method Laboratory Result D		Duplicate Result	Relative Percent Difference (RPD)				
Barium, Dissolved	E 200.7	0.011 mg/L	0.01 mg/L	9.5%				
Barium, Total	E 200.7	0.010 mg/L	0.011 mg/L	9.5%				
Cobalt, Total	E 200.7	0.013 mg/L	0.013 mg/L	0.0%				
Silver, Dissolved	E 200.7	0.0058 mg/L	0.0056 mg/L	3.5% +/-RL				
Silver, Total	E 200.7	0.0019 mg/L	ND (0.0050 mg/L)	DL				
Vanadium, Dissolved	E 200.7	0.0024 mg/L	0.0026 mg/L	8.0% +/-RL				
Zinc, Dissolved	E 200.7	0.021 mg/L	0.016 mg/L	27.0%				
Zinc, Total	E 200.7	0.0087 mg/L	ND (0.010 mg/L)	DL				
Arsenic, Dissolved	E200.8	0.00013 mg/L	0.00024 mg/L	59.5% +/-RL				
Arsenic, Total	E200.8	0.0038 mg/L	0.0041 mg/L	7.6%				
Lead, Total	E200.8	0.00007 mg/L	0.00013 mg/L	60.0% +/-RL				
Selenium, Dissolved	E200.8	0.0010 mg/L	0.00071 mg/L	33.9% +/-RL				
Selenium, Total	E200.8	0.00077 mg/L	0.0012 mg/L	43.7% +/-RL				
Mercury, Dissolved	E245.1	0.00017 mg/L	0.00018 mg/L	5.7% +/-RL				
Mercury, Total	E245.1	0.00018 mg/L	0.00015 mg/L	18.2% +/-RL				
TPH DRO	SW8015	0.058 mg/L	0.047 mg/L	21.0% +/-RL				
Acetone	SW8260B	7.9 μg/L	7.1 μg/L	10.7% +/-RL				
Methylene Chloride	SW8260B	ND (3.0 μg/L)	2.6 µg/L	DL				

### FIELD DUPLICATE SUMMARY

Field duplicate RPD control limits are not to exceed 30% for water as established by USEPA Region I - New England Environmental Data Review Supplement for Region 1 Data Review Elements and Superfund Specific Guidance/Procedures, EQADR-Supplement2, September 2020.

DL – Indicates that the analyte was detected in one of the duplicate samples and was undetected in the other sample, and therefore an RPD could not be calculated. Data were not qualified since the detection was within two times the reporting limit. Non-detected results are indicated above with the applicable reporting limit as ND (RL).

+/-RL – Indicates that the detections in both of the samples were within two times the reporting limit. Qualification of data was not required.



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Abbreviation	Reason
EBL	Flagged as estimated by the laboratory.
MBD	Method blank detection
HR-LCS	The LCS and/or LCSD percent recovery was greater than the upper acceptable limit indicating a possible high bias.
LR-LCS	The LCS and/or LCSD percent recovery was less than the lower acceptable limit indicating a possible low bias.
ERPD-LCS	The LCS/LCSD RPD exceeded the upper acceptable limit indicating poor precision.
HR-SUR	The surrogate percent recovery was greater than the upper acceptable limit indicating a possible high bias.
LR-SUR	The surrogate percent recovery was less than the lower acceptable limit indicating a possible low bias.
FBD	Field blank detection
EBD	Equipment blank detection
TBD	Trip blank detection
MDLRL	Flagged by the laboratory: The result was greater than the MDL but less than the RL.

Analyte	Method	Field Sample ID	Lab Sample ID	Result	Limit	Units	Reviewer Qualifier	DV Flag Reasons
1,3,5-Trimethylbenzene	SW8260B	WEST LDU	2209441-005a	0.61	1.0	µg/L	J	MDLRL
1,4-Dioxane	SW8270C	WEST LDU	2209441-005c	7.1	1.0	µg/L	J-	EBL, LR-LCS
1,4-Dioxane	SW8270C	EB-09-08-22	2209441-001c	ND	1.0	µg/L	UJ	EBL, LR-LCS
1,4-Dioxane	SW8270C	PW-3	2209441-002c	ND	1.0	µg/L	UJ	EBL, LR-LCS
1,4-Dioxane	SW8270C	PW-4	2209441-003c	ND	1.0	µg/L	UJ	EBL, LR-LCS
1,4-Dioxane	SW8270C	DUP 9-8-22	2209441-006c	ND	1.0	µg/L	UJ	EBL, LR-LCS
1,4-Dioxane	SW8270C	EAST LDU	2209441-004c	0.34	1.0	µg/L	J-	EBL, LR-LCS, MDLRL
2,4,6-Trichlorophenol	SW8270C	EAST LDU	2209441-004C	ND	10	µg/L	R	LR-SUR
2,4,6-Trichlorophenol	SW8270C	WEST LDU	2209441-005C	ND	10	µg/L	R	LR-SUR
2,4-Dimethylphenol	SW8270C	EAST LDU	2209441-004C	ND	10	µg/L	R	LR-SUR
2,4-Dimethylphenol	SW8270C	WEST LDU	2209441-005C	ND	10	µg/L	R	LR-SUR



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Analyte	Method	Field Sample ID	Lab Sample ID	Result	Limit	Units	Reviewer Qualifier	DV Flag Reasons
2,4-Dinitrophenol	SW8270C	EAST LDU	2209441-004C	ND	20	µg/L	R	LR-SUR
2,4-Dinitrophenol	SW8270C	WEST LDU	2209441-005C	ND	20	µg/L	R	LR-SUR
2-Butanone	SW8260B	EAST LDU	2209441-004a	8.2	10	µg/L	U	FBD, MDLRL
2-Methylphenol	SW8270C	EAST LDU	2209441-004C	ND	10	µg/L	R	LR-SUR
2-Methylphenol	SW8270C	WEST LDU	2209441-005C	ND	10	µg/L	R	LR-SUR
3,4-Methylphenol	SW8270C	EAST LDU	2209441-004C	ND	10	µg/L	R	LR-SUR
3,4-Methylphenol	SW8270C	WEST LDU	2209441-005C	ND	10	µg/L	R	LR-SUR
Acetone	SW8260B	EAST LDU	2209441-004a	56	10	µg/L	JB	FBD
Acetone	SW8260B	WEST LDU	2209441-005a	10	10	µg/L	U	FBD
Acetone	SW8260B	EB-09-08-22	2209441-001a	8.3	10	µg/L	U	FBD, MDLRL
Acetone	SW8260B	PW-3	2209441-002a	7.9	10	µg/L	U	FBD, MDLRL
Acetone	SW8260B	PW-4	2209441-003a	9.9	10	µg/L	U	FBD, MDLRL
Acetone	SW8260B	DUP 9-8-22	2209441-006a	7.1	10	µg/L	U	FBD, MDLRL
Arsenic, Dissolved	E200.8	PW-3	2209441-002E	0.00013	0.0010	mg/L	J	MDLRL
Arsenic, Dissolved	E200.8	EAST LDU	2209441-004E	0.00079	0.0010	mg/L	J	MDLRL
Arsenic, Dissolved	E200.8	WEST LDU	2209441-005E	0.00059	0.0010	mg/L	J	MDLRL
Arsenic, Dissolved	E200.8	DUP 9-8-22	2209441-006E	0.00024	0.0010	mg/L	J	MDLRL
Arsenic, Total	E200.8	WEST LDU	2209441-005D	0.00074	0.0010	mg/L	J	MDLRL
Barium, Total	E 200.7	PW-3	2209441-002D	0.010	0.0030	mg/L	JB	MBD
Barium, Total	E 200.7	PW-4	2209441-003D	0.013	0.0030	mg/L	JB	MBD
Barium, Total	E 200.7	DUP 9-8-22	2209441-006D	0.011	0.0030	mg/L	JB	MBD
Benzene	SW8260B	WEST LDU	2209441-005a	0.93	1.0	µg/L	J	MDLRL
Benzoic Acid	SW8270C	EAST LDU	2209441-004C	ND	20	µg/L	R	LR-SUR
Benzoic Acid	SW8270C	WEST LDU	2209441-005C	ND	20	µg/L	R	LR-SUR
Beryllium, Dissolved	E 200.7	EAST LDU	2209441-004E	0.0020	0.0020	mg/L	J	MDLRL
Beryllium, Dissolved	E 200.7	WEST LDU	2209441-005E	0.0013	0.0020	mg/L	J	MDLRL
Beryllium, Total	E 200.7	EAST LDU	2209441-004D	0.0014	0.0020	mg/L	J	MDLRL



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Analyte	Method	Field Sample ID	Lab Sample ID	Result	Limit	Units	Reviewer Qualifier	DV Flag Reasons
Chrysene	SW8270C	EB-09-08-22	2209441-001c	ND	0.30	µg/L	UJ	EBL, LR-LCS
Chrysene	SW8270C	PW-3	2209441-002c	ND	0.30	µg/L	UJ	EBL, LR-LCS
Chrysene	SW8270C	PW-4	2209441-003c	ND	0.30	µg/L	UJ	EBL, LR-LCS
Chrysene	SW8270C	EAST LDU	2209441-004c	ND	0.30	µg/L	UJ	EBL, LR-LCS
Chrysene	SW8270C	WEST LDU	2209441-005c	ND	0.30	µg/L	UJ	EBL, LR-LCS
Chrysene	SW8270C	DUP 9-8-22	2209441-006c	ND	0.30	µg/L	UJ	EBL, LR-LCS
Cobalt, Dissolved	E 200.7	WEST LDU	2209441-005E	0.0031	0.0060	mg/L	J	MDLRL
Ethylbenzene	SW8260B	WEST LDU	2209441-005a	0.69	1.0	µg/L	J	MDLRL
Fluorene	SW8270C	WEST LDU	2209441-005c	0.20	0.30	µg/L	J	MDLRL
Lead, Dissolved	E200.8	WEST LDU	2209441-005E	0.00011	0.00050	mg/L	J	MDLRL
Lead, Total	E200.8	WEST LDU	2209441-005D	0.00054	0.00050	mg/L	JB	MBD
Lead, Total	E200.8	PW-3	2209441-002D	0.00007	0.00050	mg/L	U	MBD, MDLRL
Lead, Total	E200.8	DUP 9-8-22	2209441-006D	0.00013	0.00050	mg/L	U	MBD, MDLRL
Mercury, Dissolved	E245.1	PW-3	2209441-002E	0.00017	0.00020	mg/L	U	EBD, MDLRL
Mercury, Dissolved	E245.1	PW-4	2209441-003E	0.00018	0.00020	mg/L	U	EBD, MDLRL
Mercury, Dissolved	E245.1	EAST LDU	2209441-004E	0.00019	0.00020	mg/L	U	EBD, MDLRL
Mercury, Dissolved	E245.1	WEST LDU	2209441-005E	0.00019	0.00020	mg/L	U	EBD, MDLRL
Mercury, Dissolved	E245.1	DUP 9-8-22	2209441-006E	0.00018	0.00020	mg/L	U	EBD, MDLRL
Mercury, Dissolved	E245.1	EB-09-08-22	2209441-001E	0.00012	0.00020	mg/L	J	MDLRL
Mercury, Total	E245.1	EAST LDU	2209441-004D	0.00023	0.00020	mg/L	JB	EBD
Mercury, Total	E245.1	PW-3	2209441-002D	0.00018	0.00020	mg/L	U	EBD, MDLRL
Mercury, Total	E245.1	PW-4	2209441-003D	0.00018	0.00020	mg/L	U	EBD, MDLRL
Mercury, Total	E245.1	WEST LDU	2209441-005D	0.00019	0.00020	mg/L	U	EBD, MDLRL
Mercury, Total	E245.1	DUP 9-8-22	2209441-006D	0.00015	0.00020	mg/L	U	EBD, MDLRL
Mercury, Total	E245.1	EB-09-08-22	2209441-001D	0.00017	0.00020	mg/L	J	MDLRL
Methylene Chloride	SW8260B	DUP 9-8-22	2209441-006a	2.6	3.0	µg/L	U	MDLRL, TBD
MTBE	SW8260B	EAST LDU	2209441-004a	0.94	1.0	µg/L	J	MDLRL



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Analyte	Method	Field Sample ID	Lab Sample ID	Result	Limit	Units	Reviewer Qualifier	DV Flag Reasons
Naphthalene	SW8270C	EAST LDU	2209441-004c	0.24	0.3	µg/L	J	MDLRL
n-Butylbenzene	SW8260B	EAST LDU	2209441-004a	0.89	3.0	µg/L	J	MDLRL
Phenol	SW8270C	EAST LDU	2209441-004C	ND	20	µg/L	R	LR-SUR
Phenol	SW8270C	WEST LDU	2209441-005C	ND	20	µg/L	R	LR-SUR
Pyrene	SW8270C	EB-09-08-22	2209441-001c	ND	1.0	µg/L	UJ	ERPD-LCS
Pyrene	SW8270C	PW-3	2209441-002c	ND	1.0	µg/L	UJ	ERPD-LCS
Pyrene	SW8270C	PW-4	2209441-003c	ND	1.0	µg/L	UJ	ERPD-LCS
Pyrene	SW8270C	WEST LDU	2209441-005c	ND	1.0	µg/L	UJ	ERPD-LCS
Pyrene	SW8270C	DUP 9-8-22	2209441-006c	ND	1.0	µg/L	UJ	ERPD-LCS
Pyrene	SW8270C	EAST LDU	2209441-004c	0.36	1.0	µg/L	J	ERPD-LCS, MDLRL
sec-Butylbenzene	SW8260B	EAST LDU	2209441-004a	0.89	1.0	µg/L	J	MDLRL
Selenium, Dissolved	E200.8	EAST LDU	2209441-004E	0.00045	0.0010	mg/L	J	MDLRL
Selenium, Dissolved	E200.8	WEST LDU	2209441-005E	0.00070	0.0010	mg/L	J	MDLRL
Selenium, Dissolved	E200.8	DUP 9-8-22	2209441-006E	0.00071	0.0010	mg/L	J	MDLRL
Selenium, Total	E200.8	PW-3	2209441-002D	0.00077	0.0010	mg/L	J	MDLRL
Silver, Dissolved	E 200.7	PW-4	2209441-003E	0.0037	0.0050	mg/L	J	MDLRL
Silver, Total	E 200.7	PW-3	2209441-002D	0.0019	0.0050	mg/L	J	MDLRL
TPH DRO	SW8015	EAST LDU	2209441-004C	3.3	0.064	mg/L	J+	EBL, ERPD-LCS, HR-LCS
TPH DRO	SW8015	WEST LDU	2209441-005C	3.0	0.064	mg/L	J+	EBL, ERPD-LCS, HR-LCS
TPH DRO	SW8015	EB-09-08-22	2209441-001C	0.058	0.064	mg/L	U	EBL, ERPD-LCS, HR-LCS, MBD, MDLRL
TPH DRO	SW8015	PW-3	2209441-002C	0.058	0.064	mg/L	U	EBL, ERPD-LCS, HR-LCS, MBD, MDLRL
TPH DRO	SW8015	PW-4	2209441-003C	0.049	0.064	mg/L	U	EBL, ERPD-LCS, HR-LCS, MBD, MDLRL
TPH DRO	SW8015	DUP 9-8-22	2209441-006C	0.047	0.064	mg/L	U	EBL, ERPD-LCS, HR-LCS, MBD, MDLRL
TPH GRO	SW8015	EAST LDU	2209441-004a	0.35	0.050	mg/L	J+	HR-SUR
TPH ORO	SW8015	EAST LDU	2209441-004C	0.21	0.080	mg/L	J	EBL



Analyte	Method	Field Sample ID	Lab Sample ID	Result	Limit	Units	Reviewer Qualifier	DV Flag Reasons
TPH ORO	SW8015	EB-09-08-22	2209441-001C	ND	0.080	mg/L	UJ	EBL
TPH ORO	SW8015	PW-3	2209441-002C	ND	0.080	mg/L	UJ	EBL
TPH ORO	SW8015	PW-4	2209441-003C	ND	0.080	mg/L	UJ	EBL
TPH ORO	SW8015	DUP 9-8-22	2209441-006C	ND	0.080	mg/L	UJ	EBL
TPH ORO	SW8015	WEST LDU	2209441-005C	0.073	0.080	mg/L	J	EBL, MDLRL
Vanadium, Dissolved	E 200.7	PW-3	2209441-002E	0.0024	0.050	mg/L	J	MDLRL
Vanadium, Dissolved	E 200.7	PW-4	2209441-003E	0.0024	0.050	mg/L	J	MDLRL
Vanadium, Dissolved	E 200.7	EAST LDU	2209441-004E	0.011	0.050	mg/L	J	MDLRL
Vanadium, Dissolved	E 200.7	WEST LDU	2209441-005E	0.0052	0.050	mg/L	J	MDLRL
Vanadium, Dissolved	E 200.7	DUP 9-8-22	2209441-006E	0.0026	0.050	mg/L	J	MDLRL
Vanadium, Total	E 200.7	WEST LDU	2209441-005D	0.032	0.050	mg/L	J	MDLRL
Zinc, Dissolved	E 200.7	PW-3	2209441-002E	0.021	0.010	mg/L	JB	EBD
Zinc, Dissolved	E 200.7	PW-4	2209441-003E	0.042	0.010	mg/L	JB	EBD
Zinc, Dissolved	E 200.7	DUP 9-8-22	2209441-006E	0.016	0.010	mg/L	JB	EBD
Zinc, Dissolved	E 200.7	EB-09-08-22	2209441-001E	0.0067	0.010	mg/L	J	MDLRL
Zinc, Total	E 200.7	PW-3	2209441-002D	0.0087	0.010	mg/L	J	MDLRL





Client: Marathon Oil	Laboratory: Hall Environmental Analysis Laboratory				
Project Name: Western Refining Southwest, Quarterly GW	Sample Matrix: Groundwater				
Project Number: 697-080-002 Task: 0006	Sample Start Date: 09/09/2022				
Date Validated: 01/18/2023	Sample End Date: 09/09/2022				
Parameters Included:					
<ul> <li>Volatile Organic Compounds (VOC) by Environmental Protection Agency (EPA) Test Methods for Evaluating Solid Waste (SW-846) Method 8260B</li> </ul>					
<ul> <li>1,2-Dibromoethane (EDB) by EPA Method 504.1</li> </ul>					
<ul> <li>Semivolatile Organic Compounds (SVOC) by SW-846 Method 8270C and Method 8270C with Selected Ion Monitoring (SIM)</li> </ul>					
<ul> <li>Total Petroleum Hydrocarbons (TPH) Gasoline Range Organics (GRO) by SW-846 Method 8015D</li> </ul>					
<ul> <li>TPH Diesel Range Organics (DRO) and Motor Oil Range Organics (MRO) by SW-846 Method 8015D Modified</li> </ul>					
<ul> <li>Total and Dissolved Metals by EPA Method 200.7 and Method 200.8</li> </ul>					
<ul> <li>Total and Dissolved Mercury by EPA Method 245.1</li> </ul>					
<ul> <li>Chemical Oxygen Demand (COD) by EPA Method 410.4</li> </ul>					
<ul> <li>Cyanide by Standard Methods for the Examination of Water and Wastewater (SM) Method 4500 CN E</li> </ul>					
<ul> <li>Biochemical Oxygen Demand (BOD) by SM Method 5210B</li> </ul>					
<ul> <li>E. Coli by SM Method 9223B</li> </ul>					
Laboratory Project ID: 2209478					
Data Validator: Daran O'Hollearn, Lead Project Scientist					
Reviewer: Mike Phillips, Senior Chemist					

## DATA EVALUATION CRITERIA SUMMARY

A Tier II Data Validation was performed by Trihydro Corporation's Chemical Data Evaluation Services Group on the analytical data report packages generated by Hall Environmental Analysis Laboratory of Albuquerque, New Mexico, with additional data from Pace Analytical National of Mount Juliet, Tennessee evaluating samples from the Marathon Oil site, located in Gallup, New Mexico.

Precision, accuracy, method compliance, and completeness of this data package were assessed during this data review. Precision was determined by evaluating the calculated relative percent difference (RPD) values from:

- Field duplicate pairs
- Laboratory duplicate pairs
- Matrix spike (MS) and matrix spike duplicate (MSD) pairs
- Laboratory control sample (LCS) and laboratory control sample duplicate (LCSD) pairs

Laboratory accuracy was established by reviewing the demonstrated percent recoveries (%R) of the following items to verify that data are not biased.

- MS/MSD samples
- LCS/LCSD samples
- Organic system monitoring compounds (surrogates)

Field accuracy was established by collecting and analyzing the following samples to monitor for possible ambient or cross contamination during sampling and transportation.



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- Trip blanks
- Field blanks
- Equipment blanks

Method compliance was established by reviewing sample integrity, holding times, detection limits, surrogate recoveries, laboratory blanks, initial and continuing calibrations (where applicable), and the LCS/LCSD percent recoveries against method-specific requirements.

Completeness was evaluated by determining the overall ratio of the number of samples and analyses planned versus the number of samples with valid analyses. Determination of completeness included a review of the chain-of-custody (CoC), laboratory analytical methods, and other laboratory and field documents associated with this analytical data set.

Client Sample ID	Laboratory Sample Number
EB-9-9-22	2209478-001
STP-1 to EP-2	2209478-002
EP-2	2209478-003
FB-9-9-22	2209478-004
DUP 9-9-22	2209478-005
Trip Blank	2209478-006

### SAMPLE NUMBERS TABLE





The laboratory data were reviewed to evaluate compliance with the methods and the quality of the reported data. Assessment of CoC completeness is included in Item 3 of the Data Validation Checklist. A check mark ( $\checkmark$ ) indicates that the referenced validation criteria were deemed acceptable, whereas a crossed circle ( $\otimes$ ) indicates validation criteria for which the data have been qualified by the data validator. An empty circle (O) indicates that the specified criterion does not apply to the reviewed data. Details are noted in the tables below.

### Validation Criteria

- ✓ Data Completeness
- ⊗ Laboratory Qualifiers (Item 2)
- ✓ CoC Documentation (Item 3)
- ✓ Holding Times and Preservation (Items 6 and 7)
- O Initial and Continuing Calibrations (Items 9 and 10)
- ⊗ Laboratory Blanks (Items 11 and 12)
- ✓ MS/MSD (Items 13 and 14)
- ⊗ LCS/LCSD (Items 15 and 16)
- ✓ System Monitoring Compounds (i.e., Surrogates) (Item 17)
- ⊗ Field, Equipment, and Trip Blanks (Items 18 and 19)
- ⊗ Field Duplicates (Items 20 and 21)
- ✓ Laboratory Duplicates (Item 22)

### **Guidance References**

Chemical data validation was conducted in accordance with the United States Environmental Protection Agency (USEPA) Contract Laboratory Program (CLP) National Functional Guidelines for the analyses listed below, or by the appropriate method if not covered in the National Functional Guidelines.

- Data for organic analyses were evaluated according to validation criteria set forth in the USEPA CLP National Functional Guidelines for Organic Superfund Methods Data Review, document number EPA-540-R-20-005, November 2020 with additional reference to the USEPA CLP National Functional Guidelines for Organic Data Review, document number EPA 540/R-99/008, October 1999.
- Data for inorganic analyses were evaluated according to validation criteria set forth in the USEPA CLP National Functional Guidelines for Inorganic Superfund Methods Data Review, document number EPA-540-R-20-006, November 2020 with additional reference to the USEPA CLP National Functional Guidelines for Inorganic Data Review, document number EPA 540-R-04-004, October 2004.
- Review of field duplicates was conducted according to the USEPA Region I New England Environmental Data Review Supplement for Region 1 Data Review Elements and Superfund Specific Guidance/Procedures, EQADR-Supplement2, September 2020.
- Trihydro Data Validation Variance Documentation, April 2022.



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## **OVERALL DATA PACKAGE ASSESSMENT**

Based on a data validation review, the data are acceptable as delivered. Data qualified by the laboratory are discussed in Item 2 of the Validation Criteria Checklist.

The purpose of validating data and assigning qualifiers is to assist in proper data interpretation. Data that are not qualified meet the site data quality objectives. If values are assigned qualifiers other than an R (rejected, data not usable), the data may be used for site evaluation; however, consideration should be given to the reasons for qualification when interpreting sample concentrations. Data points that are assigned an R qualifier should not be used for site evaluation purposes.

If applicable, text was identified in **bold font** in the Validation Criteria Checklist to indicate that further action and/or qualification of the data were required. Data may have been qualified with J data flags by the laboratory if the result was greater than or equal to the method detection limit (MDL) but less than the reporting limit (RL). These laboratory-applied J flags were preserved, if present, and included in the Data Qualification Summary table at the end of this report. If applicable, data validation qualifiers were added for the items noted with crossed circles in the Validation Criteria section above. Please see the Data Qualification Summary table at the end of this report.

If data would be qualified with more than one flag, one qualifier was assigned based on the severity; however, all reasons for qualification were retained. Data that would be qualified with both J+ and J- flags were evaluated based on validation criteria and assigned the appropriate flag. The hierarchy of qualifiers from the most to least severe is as follows:

Data qualifiers used during this validation are included in the following table.

<u>Qualifier</u>	Definition			
J	Estimated concentration			
J+	The result is an estimated concentration, but may be biased high			
J-	The result is an estimated concentration, but may be biased low			
UJ	Estimated reporting limit			
U	Evaluated to be undetected at the reporting limit			
JB	Estimated concentration due to blank contamination			

### **Data Completeness**

The analyses were performed as requested on the CoC records. The associated samples were received by the laboratory and analyzed properly unless otherwise noted in the Criteria Checklist below. The complete data package consisted of 279 data points. The data completeness calculation does not include any submitted blank sample results. Data points were not rejected. The data completeness measure for this data package is calculated to be 100% and is acceptable.



VALIDATION CRITERIA CHECKLIST						
1. Was the report free of non-conformances identified by the laboratory? No						
Comments: The laboratory noted the following analytical non-conformances related to this data set.						
<u>Method 8270C an</u> in both the 8270 S	d Method 82700 IM method and	<u>C SIM</u> : The recovery for chrysene was the standard 8270 method and is non-	low in the LCS detect.	/LCSD. This com	pound is reported	
The recovery for 1,4-dioxane was low in the LCSD.						
Method 8015D DF	RO: The LCS/L	CSD had elevated recoveries.				
Method 5210B: Fo	or sample EP-2,	the RPD between bottles was greater	han 30%.			
2. Were the data free of data qualification flags and/or notes used by the laboratory? No lf no, define.						
Comments: The la	aboratory used	the following data qualification flags wit	h this data set.			
D – Sample dilute	d due to matrix.					
to EP-2, EP-2, and DUP 9-9-22. These results were assigned J qualifiers if detected and non-detections were assigned UJ due to this non-conformance. Note that the BOD result for sample STP-1 to EP-2 was reported as >67.56 mg/L in the laboratory report; however, the result could not be reported as >67.56 mg/L in Project Direct due to limitations of the data management system.						
H – Holding times	for preparation	or analysis exceeded				
J – Analyte detected below quantitation limits.						
J6 – The sample r	natrix interfered	with the ability to make any accurate d	etermination; s	spike value is low.		
P1 – RPD value n	ot applicable for	sample concentrations less than 5 time	es the reporting	g limit.		
R – % RPD outsid	e of range.					
R – RPD between assigned a J qua	bottles >30%. lifier to indicat	This laboratory flag was applied to t e an estimated result due to evidenc	he BOD result e of poor pred	t for sample EP-2 cision.	. This result was	
S – % Recovery o	utside of range	due to dilution or matrix interference.				
* - Value exceeds	maximum cont	aminant level.				
3. Were sample CoC forms and custody procedures complete? Yes						
Comments: The C and laboratory per sealed, and custor	CoC records from rsonnel signatur dy seals were p	m field to laboratory were complete, and es, dates, and times of receipt. The lat resent and intact on the shipping contai	d custody was poratory noted ners.	maintained as evident that the shipping of the	denced by field containers were	
4. Were detection permit, or met	on limits in acco thod, or indicate	rdance with the quality assurance proje d as acceptable?	ct plan (QAPP	),	Yes	
Comments: The detection limits appeared to be acceptable. The following dilutions were applied.						
	Method	Sample(s)	Analyte(s)	Dilution Factor		
	8270C	STP-1 to EP-2, EP-2, DUP 9-9-22	SVOC	10		
	8270C SIM	STP-1 to EP-2, EP-2, DUP 9-9-22	SVOC	10		
	9223B	STP-1 to EP-2, EP-2, DUP 9-9-22	E. Coli	10		



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VALIDATION CRITERIA CHECKLIST							
5. Were the reported analytical methods and constituents in compliance with the No QAPP, permit, or CoC?							
Comments: The reported analytical methods were in compliance with the CoC, and the laboratory reported the requested constituents in accordance with the CoC, with the following exceptions.							
The CoC requested total and dissolved metals using only Method 200.7; however, the laboratory analyzed the susing both Method 200.7 and Method 200.8. This substituted analytical method, Method 200.8, met similar sen accuracy, and precision goals and, therefore, was an acceptable replacement.	samples isitivity,						
The CoC requested cyanide using Method 335.4; however, the laboratory analyzed the samples using Method 4 This substituted analytical method met similar sensitivity, accuracy, and precision goals and, therefore, was an replacement.	4500 CN E. acceptable						
6. Were samples received in good condition within method-specified requirements? No							
Comments: Samples were received on ice, in good condition, and with the cooler temperatures both within and recommended temperature range of $4^{\circ}C \pm 2^{\circ}C$ between -0.5°C and 5.8°C as noted on the CoC and Sample Log List. Samples transferred to Pace National were received in good condition with the cooler temperature outside recommended range at 0.4°C as noted on the CoC.	l outside the g-in Check e the						
The cooler temperatures below 2.0°C were judged as acceptable since the laboratory did not report the sample as broken or frozen.	containers						
7. Were samples extracted/digested and analyzed within method-specified or Yes technical holding times?							
Comments: The samples were extracted/digested and analyzed within method-specific holding times.							
8. Were reported units appropriate for the sample matrix/matrices and analytical Yes method(s)? Specify if wet or dry units were used for soil.							
Comments: The results were reported in concentration units of micrograms per liter (µg/L), milligrams per liter (mg/L), and most probable number per 100 milliliters (MPN/ 100mL), which were acceptable for the sample matrix and the analyses requested.							
9. Did the laboratory provide any specific initial and/or continuing calibration results? No							
Comments: Initial and continuing calibration data were not included as part of this data set.							
10. If initial and/or continuing calibration results were provided, were the results within acceptable limits?       N/A							
Comments: Initial and continuing calibration data were not included as part of this data set.							
11. Was the total number of laboratory blank samples prepared equal to at least 5% of the total number of samples or analyzed as required by the method?Yes							
Comments: The total number of laboratory blank samples prepared was equal to at least 5% of the total number samples.	er of						



# VALIDATION CRITERIA CHECKLIST 12. Were target analytes reported as not detected in the laboratory blanks? No Comments: Target analytes were reported as not detected in the laboratory blanks, with the following exceptions.

<u>!</u>		,	,
<u>Method</u>	<u>Analyte</u>	<u>Batch</u>	Concentration
200.7	Total Barium	70092	0.0018 mg/L
200.8	Total Antimony	70092	0.00063 mg/L
200.8	Total Lead	70092	0.00040 mg/L
8015D	TPH DRO	70105	0.052 mg/L

Detections of total lead and TPH DRO in the associated samples that were less than the blank results and less than the applicable reporting limits were assigned U qualifiers. Detections of total antimony and TPH DRO in the associated samples that were greater than the reporting limits but less than or equal to 10 times the blank results were assigned JB qualifiers. Non-detections of the identified analytes in the associated samples and detections that were above the reporting limit and greater than ten times the blank concentration did not require qualification.

13. Was the total number of MS samples prepared equal to at least 5% of the total number of samples or analyzed as required by the method?

Comments: The total number of matrix spike samples prepared was equal to at least 5% of the total number of samples, although MS samples were not prepared/reported for all analyses and/or batches. The matrix spike sample source for each analytical batch in this sample set has been indicated below.

Method	<u>Analytes</u>	<u>Batch</u>	MS Sample Source
200.7	Total Metals	70092	Not Prepared
200.7	Dissolved Metals	B91139	EB-9-9-22
200.8	Total Metals	70092	DUP 9-9-22
200.8	Dissolved Metals	B91030	Not Prepared
245.1	Total and Dissolved Mercury	70232	EP-2
410.4	COD	WG1931912	Not Associated
504.1	EDB	70173	Not Prepared
4500CN E	Cyanide	WG1925290	Not Associated
4500CN E	Cyanide	WG1928505	Not Associated
5210B	BOD	70067	Not Prepared
8015D	TPH DRO and MRO	70105	Not Prepared
8015D	TPH GRO	A91113	Not Prepared
8015D	TPH GRO	B91113	DUP 9-9-22
8260B	VOCs	R90977	Not Prepared
8270C SIM	SVOCs	70094	Not Prepared
8270C	SVOCs	70094	Not Prepared
9223B	E.Coli	70088	Not Prepared

Not Associated – The MS sample source was not associated with this project.

Not Prepared – Matrix spikes were not prepared/reported for this batch.



Yes

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#### VALIDATION CRITERIA CHECKLIST

14. For MS/MSDs prepared from project samples, were percent recoveries and RPDs within data validation or laboratory guality control (QC) limits?

Comments: The MS/MSD percent recoveries and RPDs for project samples were within data validation and laboratory QC limits.

The percent recoveries and RPD values for MS/MSDs prepared from non-project samples were evaluated and considered, but data were not qualified based on those results since matrix similarity to project samples could not be guaranteed.

15. Was the total number of LCSs analyzed equal to at least 5% of the total number of samples or analyzed as required by the method?

Comments: The total number of LCS samples analyzed was equal to at least 5% of the total number of samples.

16. Were LCS/LCSD percent recoveries and LCS/LCSD RPDs within data validation or laboratory QC limits?

Comments: The LCS and LCSD percent recoveries and LCS/LCSD RPDs were within data validation and laboratory QC limits, with the following exceptions.

<u>Method</u>	Analyte	<u>Batch</u>	<u>LCS</u> <u>Recovery</u>	LCSD Recovery	LCS/LCSD QC Limits	LCS/LCSD RPD	<u>RPD</u> <u>QC</u> <u>Limits</u>
200.7	<b>Dissolved Barium</b>	B91139	135%		70-130%		
200.8	Total Antimony	70092	144%		70-130%		
8015D	TPH DRO	70105	81.4%	120%	31.7-75.4%	38.5%	20%
8270C	Pyrene	70094	Acceptable	Acceptable	61-123%	32.8%	11.8%
8270C SIM	1,4-Dioxane	70094	Acceptable	20.0%	20.2-48.4%	Acceptable	30.1%
8270C SIM	Chrysene	70094	51.0%	48.0%	55.3-115%	Acceptable	20.0%
5210B	BOD	70067	84.3%		84.6-115.4%		

The target analytes dissolved barium and total antimony were detected in associated samples, and the results were qualified as J+ based on the evidence of potential high bias. Non-detections of these analytes in the associated samples did not require qualification based on the evidence of potential high bias.

The analytes with LCS/LCSD RPD values that exceeded the QC limit were assigned J qualifiers for detections and UJ for non-detections for the associated samples due to evidence of poor precision.

The target analytes 1,4-dioxane, chrysene, and BOD were not detected in associated samples, and the results were qualified as UJ based on the evidence of potential low bias. Detections of BOD in the associated samples EP-2 and DUP 9-9-22 were qualified as J- due to the evidence of potential low bias.

17. Were surrogate recoveries within laboratory QC limits?

No

Yes

Yes

No

Comments: Surrogate recoveries were within laboratory QC limits, with the following exceptions.

Since Method 8270C and 8270C SIM surrogate associations were not available from the laboratory, qualification was assigned to all of the target analytes in a given fraction (acid or base/neutral) when two or more surrogates from the same fraction (acid or base/neutral) were outside the acceptance range. This condition did not exist for the Method 8270C SIM analysis of sample EB-9-9-22, and qualification of sample data was not required.

The SVOC results for samples STP-1 to EP-2, EP-2, and DUP 9-9-22 were not qualified based on the surrogate nonconformances in the Method 8270C and Method 8270C SIM analyses since the applied dilution of 10 times resulted in surrogate concentrations below routinely calibrated levels, and those results were deemed unreliable and possibly inaccurate.

Qualification of sample data was not required based on surrogate non-conformances in QC samples as the environmental samples were evaluated based on their specific surrogate recoveries.



Yes

Yes

No

#### VALIDATION CRITERIA CHECKLIST

18. Were the number of trip blank, field blank, and/or equipment blank samples collected equal to at least 10% of the total number of samples or as required by the project guidelines, QAPP, SAP, or permit?

Comments: The number of trip, field, and equipment blanks collected was equal to at least 10% of the number of samples. One trip blank sample, Trip Blank, one field blank sample, FB-9-9-22, and one equipment blank sample, EB-9-9-22, were collected as part of this sample set.

19.	Were target analytes reported as not detected in the trip blank, field blank, and/or	No
	equipment blank samples?	

Comments: Target analytes were not detected in the trip blank, field blank, and equipment blank samples with the following exceptions.

Blank Sample ID	<u>Method</u>	Analyte	<u>Concentration</u>
Trip Blank	8260B	Acetone	6.9 µg/L
EB-9-9-22	200.7	Dissolved Vanadium	0.0019 mg/L
EB-9-9-22	200.7	Dissolved Zinc	0.0065 mg/L
EB-9-9-22	245.1	Dissolved Mercury	0.00018 mg/L
EB-9-9-22	245.1	Total Mercury	0.00019 mg/L
EB-9-9-22	410.4	COD	44.7 mg/L
EB-9-9-22	8015D	TPH DRO	0.043 mg/L
EB-9-9-22	8260B	Acetone	8.70 µa/L

Detections of the identified analytes in the associated samples that were less than the blank results and/or less than the applicable reporting limits were assigned U qualifiers. Detections of the identified analytes in the associated samples that were greater than the reporting limits but less than 10 times the blank results were assigned JB qualifiers. Non-detections of the identified analytes in the associated samples did not require qualification.

The TPH DRO results for the samples in batch 70105 were previously qualified due to a laboratory blank detection; therefore, additional qualification due to the equipment blank contamination was not required.

20. Was the number of field duplicates collected equal to at least 10% of the total number of samples or as required by the project guidelines, QAPP, SAP, or permit?

Comments: The number of field duplicates collected was equal to at least 10% of the number of samples.

Sample DUP 9-9-22 was collected as a field duplicate of sample STP-1 to EP-2.

21. Were field duplicate RPD values within data validation QC limits (soil 0-50%, water 0-30%, or air 0-25%)?

Comments: As indicated in the Field Duplicate Summary Table at the end of this report, field duplicate RPD values were within data validation QC limits of 0-30% for water samples, with the following exceptions.

The RPD value for dissolved zinc exceeded the data validation limit of 30% at 51.0%. The dissolved zinc results for samples STP-1 to EP-2 and DUP 9-9-22 were assigned J qualifiers due to evidence of poor precision.

An RPD value could not be calculated for BOD for the field duplicate pair STP-1 to EP-2 and DUP 9-9-22 since the analyte was detected in the duplicate sample and the concentration was uncertain in the parent sample. As the detection in the duplicate sample was greater than two times the reporting limit, BOD was qualified as J for both the duplicate and parent samples.



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22. For laborate validation o		TALIBATION		CALISI			
	ory duplicates prepar r laboratory QC limits	ed from project sam	ples, were RPDs	s within data		Yes	
Comments: Lat summarized in t	boratory duplicates w the following table.	ere prepared for the	ese analyses, and	d the laborate	ory duplicate sample	e sources are	
	Method         Analytes         Batch         Laboratory Duplicate           Sample Source         Sample Source						
410.4 COD WG1931912 EB 9-9-22, Not Associated							
	4500CN E Cyanide WG1925290 Not Associated						
	4500CN E	Cyanide	WG1928505	EP-2,	Not Associated		
Not Associated –	The laboratory duplicate	e sample source was i	not associated with	this project.			
The RPDs for la	aboratory duplicates r	prepared from project	ct samples were	within labora	tory acceptance limi	ts or were not	
applicable since	the results for one of	r both measuremen	its were within 5	times the rep	orting limit.		
The RPD value:	s for the laboratory d	inlicate samples pre	epared from non-	proiect samn	les were evaluated	and considered	
out data were n	ot qualified based on	these results since	matrix similarity	to project sar	nples could not be c	juaranteed.	
23 Wore the fr		shine realistic?				·	
				000/0070		X	
• Larget	analytes were report	ed by more than on	e method (e.g., b	3260/8270,		Yes	
	210):						
				070C and M	thad 00700 CIM T	bic analyto was	
Comments: The	e target analyte chrys	sene was reported b	by both Method 8			The analyte was	
Comments: The reported as not	e target analyte chrys detected by both me	sene was reported b thods.	by both Method 8			This analyte was	
Comments: The reported as not	e target analyte chrys detected by both me	thods.	by both Method 8.			nis analyte was	
Comments: The reported as not • Both to results Comments: The	e target analyte chrys detected by both me otal and dissolved me were greater than or e following table cont	thods. tals analyses were equal to the dissolv ains the exceptions	performed, and t ved metals result in which the diss	he total meta s?	ils results exceeded th	No ne total metals	
Comments: The reported as not • Both to results Comments: The results.	e target analyte chrys detected by both me otal and dissolved me were greater than or e following table cont	thods. etals analyses were equal to the dissolv ains the exceptions	performed, and t ved metals result in which the diss	he total meta s? solved metals	ils results exceeded th	No ne total metals	
Comments: The reported as not • Both to results Comments: The results.	e target analyte chrys detected by both me otal and dissolved me were greater than or e following table cont Sample ID	thods. tals analyses were equal to the dissolv ains the exceptions	performed, and t ved metals result in which the diss	he total meta s? solved metals	Is results exceeded th	No ne total metals	
Comments: The reported as not • Both to results Comments: The results.	e target analyte chrys detected by both me btal and dissolved me were greater than or e following table cont <u>Sample ID</u>	thods. etals analyses were equal to the dissolv ains the exceptions <u>Analyt</u>	performed, and t ved metals result in which the diss	he total meta s? colved metals <u>ttal Result</u> (mg/L)	errou 6270C SIM. T	No ne total metals	
Comments: The reported as not • Both to results Comments: The results.	e target analyte chrys detected by both me otal and dissolved me were greater than or e following table cont <u>Sample ID</u> STP-1 to EP-2	thods. tals analyses were equal to the dissolv ains the exceptions <u>Analyt</u>	performed, and t ved metals result in which the diss <u>te</u> <u><u>Tc</u></u>	he total meta s? solved metals <u>ital Result</u> (mg/L) ND	Is Dissolved Result (mg/L) 0.00058	No ne total metals	
Comments: The reported as not • Both to results Comments: The results.	e target analyte chrys detected by both me otal and dissolved me were greater than or e following table cont <u>Sample ID</u> STP-1 to EP-2 DUP 9-9-22 EP-2	ene was reported b thods. etals analyses were equal to the dissolv ains the exceptions <u>Analyt</u> Antimo Nicke	performed, and t ved metals result in which the diss te <u>Tc</u> ny <u>ny</u>	he total meta s? tolved metals tal Result (mg/L) ND 0.037	Is           Dissolved Result           (mg/L)           0.00058           0.038	No ne total metals	
Comments: The reported as not • Both to results Comments: The results.	e target analyte chrys detected by both me btal and dissolved me were greater than or e following table cont <u>Sample ID</u> STP-1 to EP-2 DUP 9-9-22 EP-2 EP-2	thods. tals analyses were equal to the dissolv ains the exceptions <u>Analyte Antimo Antimo Seleniu Seleniu</u>	performed, and t ved metals result in which the diss <u>re</u> <u><u>Tc</u> ny<u><u>Tc</u> ny<u></u></u></u>	he total meta s? tal Result (mg/L) ND 0.037 0.0011	Is is results exceeded th Dissolved Result (mg/L) 0.00065 0.00058 0.038 0.0016	No ne total metals	
Comments: The reported as not • Both to results Comments: The results.	e target analyte chrys detected by both me otal and dissolved me were greater than or e following table cont <u>Sample ID</u> STP-1 to EP-2 DUP 9-9-22 EP-2 EP-2 STP-1 to EP-2	ene was reported b thods. etals analyses were equal to the dissolv ains the exceptions <u>Analyt</u> Antimo Antimo Seleniu Silve	performed, and t ved metals result in which the diss <u>ie Tc</u> ny <u></u> ny in	he total meta s? solved metals <u>ital Result</u> (mg/L) ND 0.037 0.0011 0.0022	Is a results exceeded th Dissolved Result (mg/L) 0.00065 0.00058 0.038 0.0016 0.0051	No ne total metals	
Comments: The reported as not • Both to results Comments: The results.	e target analyte chrys detected by both me btal and dissolved me were greater than or e following table cont <u>Sample ID</u> STP-1 to EP-2 EP-2 EP-2 STP-1 to EP-2 EP-2 EP-2 EP-2	ene was reported b thods. etals analyses were equal to the dissolv ains the exceptions <u>Analyti</u> Antimo Antimo Seleniu Silver	performed, and t ved metals result in which the diss in which the	he total meta s? colved metals <u>tal Result (mg/L)</u> ND 0.037 0.0011 0.0022 0.0042	Is is results exceeded th Dissolved Result (mg/L) 0.00065 0.00058 0.0016 0.0051 0.010	No ne total metals	
Comments: The reported as not • Both to results Comments: The results.	e target analyte chrys detected by both me btal and dissolved me were greater than or e following table cont <u>Sample ID</u> STP-1 to EP-2 EP-2 EP-2 STP-1 to EP-2 EP-2 DUP 9-9-22	ene was reported b thods. etals analyses were equal to the dissolv ains the exceptions <u>Analyt</u> <u>Antimo</u> Antimo <u>Antimo</u> Seleniu Silver Silver	performed, and t ved metals result in which the diss te	he total meta s? colved metals <u>ital Result (mg/L)</u> <u>ND</u> 0.037 0.0011 0.0022 0.0042 0.0020	Is results exceeded th Dissolved Result (mg/L) 0.00065 0.00058 0.0038 0.0016 0.0051 0.010 0.0055	No ne total metals	
Comments: The reported as not • Both to results Comments: The results.	e target analyte chrys detected by both me btal and dissolved me were greater than or e following table cont <u>Sample ID</u> STP-1 to EP-2 DUP 9-9-22 EP-2 STP-1 to EP-2 DUP 9-9-22 EP-2 DUP 9-9-22 EB-9-9-22	thods. tals analyses were equal to the dissolv ains the exceptions <u>Analyte</u> Antimo Antimo Silver Silver Silver Vanadite Vanadite	performed, and t ved metals result in which the diss in which the diss <u>re</u> <u>r</u> r um r um	he total meta s? solved metals <u>ital Result (mg/L)</u> ND 0.037 0.0011 0.0022 0.0042 0.0020 ND	Is results exceeded th Dissolved Result (mg/L) 0.00065 0.00058 0.0016 0.0051 0.0010 0.0055 0.0019	No ne total metals	
Comments: The reported as not • Both to results Comments: The results.	e target analyte chrys detected by both me btal and dissolved me were greater than or e following table cont <u>Sample ID</u> STP-1 to EP-2 EP-2 EP-2 EP-2 STP-1 to EP-2 EP-2 DUP 9-9-22 EB-9-9-22 STP-1 to EP-2	etals analyses were equal to the dissolv ains the exceptions <u>Analyte</u> <u>Antimo</u> <u>Antimo</u> <u>Seleniu</u> Silver <u>Silver</u> Vanadir	performed, and t ved metals result in which the diss in which the	he total meta s? solved metals <u>stal Result</u> ( <u>mg/L)</u> ND 0.037 0.0011 0.0022 0.0042 0.0020 ND ND	ls b results exceeded th <u>Dissolved Result</u> (mg/L) 0.00065 0.00058 0.0016 0.0051 0.0019 0.0043	No ne total metals	
Comments: The reported as not • Both to results Comments: The results.	e target analyte chrys detected by both me btal and dissolved me were greater than or e following table cont <u>Sample ID</u> STP-1 to EP-2 DUP 9-9-22 EP-2 EP-2 STP-1 to EP-2 DUP 9-9-22 EP-2 DUP 9-9-22 EP-2 STP-1 to EP-2 DUP 9-9-22 EB-9-9-22 STP-1 to EP-2	thods. tals analyses were equal to the dissolv ains the exceptions <u>Analyte</u> <u>Antimo</u> <u>Antimo</u> <u>Silver</u> <u>Silver</u> <u>Silver</u> <u>Vanadir</u> <u>Xanadir</u> <u>Xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx</u>	performed, and t ved metals result in which the diss in which the	he total meta s? colved metals <u>tal Result (mg/L)</u> ND 0.0011 0.0022 0.0042 0.0020 ND ND ND ND	Is results exceeded th Dissolved Result (mg/L) 0.00065 0.00058 0.0016 0.0051 0.0010 0.0055 0.0019 0.0043 0.0068	No ne total metals	
Comments: The reported as not • Both to results Comments: The results.	e target analyte chrys detected by both me btal and dissolved me were greater than or e following table cont <u>STP-1 to EP-2</u> DUP 9-9-22 EP-2 EP-2 STP-1 to EP-2 EP-2 DUP 9-9-22 EB-9-9-22 STP-1 to EP-2 DUP 9-9-22 EP-2 DUP 9-9-22 EP-2 DUP 9-9-22	thods. thods. tals analyses were equal to the dissolv ains the exceptions Analyt Antimo Antimo Antimo Seleniu Silvei Silvei Silvei Vanadii Vanadii Vanadii Vanadii Vanadii Vanadii Vanadii	performed, and t ved metals result in which the diss regime	he total meta s? solved metals <u>tal Result (mg/L)</u> ND 0.037 0.0011 0.0022 0.0042 0.0020 ND ND ND ND ND	Is results exceeded th Dissolved Result (mg/L) 0.00065 0.00058 0.0038 0.0016 0.0051 0.0010 0.0055 0.0019 0.0043 0.0068 0.0037	No ne total metals	
Comments: The reported as not • Both to results Comments: The results.	e target analyte chrys detected by both me otal and dissolved me were greater than or e following table cont <u>Sample ID</u> STP-1 to EP-2 DUP 9-9-22 EP-2 STP-1 to EP-2 EP-2 DUP 9-9-22 EB-9-9-22 EP-2 STP-1 to EP-2 EP-2 DUP 9-9-22 EB-9-9-22 EB-9-9-22 EB-9-9-22	ere was reported b thods. etals analyses were equal to the dissolv ains the exceptions <u>Analyt</u> <u>Analyt</u> <u>Antimo</u> <u>Antimo</u> <u>Antimo</u> <u>Antimo</u> Seleniu Silver Silver Silver Vanadir Vanadir Vanadir Vanadir	performed, and t ved metals result in which the diss in which the	he total meta s? solved metals <u>ital Result</u> (mg/L) ND 0.037 0.0011 0.0022 0.0042 0.0020 ND ND ND ND ND ND	Is results exceeded th Dissolved Result (mg/L) 0.00065 0.00058 0.0016 0.0051 0.0010 0.0019 0.0043 0.0068 0.0037 0.0065	No ne total metals	
Comments: The reported as not • Both to results Comments: The results.	e target analyte chrys detected by both me bal and dissolved me were greater than or e following table cont <u>Sample ID</u> STP-1 to EP-2 DUP 9-9-22 EP-2 DUP 9-9-22 EP-2 DUP 9-9-22 EB-9-9-22 STP-1 to EP-2 DUP 9-9-22 EB-9-9-22 EB-9-9-22 EB-9-9-22 STP-1 to EP-2	thods. tals analyses were equal to the dissolv ains the exceptions Analyt Antimo Antimo Antimo Antimo Seleniu Silvei Silvei Vanadii Vanadii Vanadii Vanadii Zinc	performed, and t ved metals result in which the diss in which the	he total meta s? colved metals <u>tal Result (mg/L)</u> ND 0.0011 0.0022 0.0042 0.0020 ND ND ND ND ND ND ND ND ND ND	Is presults exceeded th <u>Dissolved Result</u> (mg/L) 0.00065 0.00058 0.0016 0.0051 0.0010 0.0019 0.0043 0.0065 0.0037 0.0065 0.032	No ne total metals	
Comments: The reported as not • Both to results Comments: The results.	e target analyte chrys detected by both me btal and dissolved me were greater than or e following table cont <u>Sample ID</u> STP-1 to EP-2 DUP 9-9-22 EP-2 EP-2 STP-1 to EP-2 EP-2 DUP 9-9-22 EB-9-9-22 STP-1 to EP-2 DUP 9-9-22 EB-9-9-22	thods. tals analyses were equal to the dissolv ains the exceptions Analyt Antimo Antimo Antimo Antimo Silvei Silvei Silvei Vanadii Vanadii Vanadii Vanadii Vanadii Vanadii Zinc Zinc	performed, and t ved metals result in which the diss in which the	he total meta s? colved metals <u>tal Result (mg/L)</u> ND 0.0011 0.0022 0.0042 0.0020 ND ND ND ND ND ND ND ND ND ND ND ND ND	Is presults exceeded th Dissolved Result (mg/L) 0.00065 0.00058 0.0016 0.0051 0.0010 0.0019 0.0043 0.0065 0.0037 0.0065 0.0032 0.0059	No ne total metals	



Client Sample ID: STP-1 to EP-2 Field Duplicate Sample ID: DUP 9-9-22								
Analyte	Method	Laboratory Result	Duplicate Result	Relative Percent Difference (RPD)				
Barium, Dissolved	E 200.7	0.024 mg/L	0.025 mg/L	4.1%				
Barium, Total	E 200.7	0.032 mg/L	0.03 mg/L	6.5%				
Cobalt, Total	E 200.7	0.013 mg/L	0.012 mg/L	8.0%				
Silver, Dissolved	E 200.7	0.0051 mg/L	0.0055 mg/L	7.5% +/-RL				
Silver, Total	E 200.7	0.0022 mg/L	0.0020 mg/L	9.5% +/-RL				
Vanadium, Dissolved	E 200.7	0.0043 mg/L	0.0037 mg/L	15.0% +/-RL				
Zinc, Dissolved	E 200.7	0.032 mg/L	0.019 mg/L	51.0%				
Zinc, Total	E 200.7	0.022 mg/L	0.025 mg/L	12.8%				
Antimony, Dissolved	E200.8	0.00065 mg/L	0.00058 mg/L	11.4% +/-RL				
Arsenic, Dissolved	E200.8	0.0021 mg/L	0.0023 mg/L	9.1%				
Arsenic, Total	E200.8	0.0025 mg/L	0.0025 mg/L	0.0%				
Lead, Total	E200.8	0.00015 mg/L	0.00016 mg/L	6.5% +/-RL				
Selenium, Dissolved	E200.8	0.0011 mg/L	0.0013 mg/L	16.7% +/-RL				
Selenium, Total	E200.8	0.0011 mg/L	0.0018 mg/L	48.3% +/-RL				
Mercury, Dissolved	E245.1	0.00018 mg/L	0.00018 mg/L	0.0% +/-RL				
Mercury, Total	E245.1	0.00022 mg/L	0.00024 mg/L	8.7% +/-RL				
COD	410.4	190 mg/L	181 mg/L	4.9%				
BOD	SM 5210 B	>67.56 (2.0 mg/L)	47 mg/L	DL				
TPH DRO	SW8015	0.18 mg/L	0.20 mg/L	10.5%				
TPH ORO	SW8015	0.11 mg/L	0.13 mg/L	16.7% +/-RL				
Acetone	SW8260B	8.7 μg/L	7.0 μg/L	21.7% +/-RL				

#### FIELD DUPLICATE SUMMARY

Field duplicate RPD control limits are not to exceed 30% for water as established by USEPA Region I - New England Environmental Data Review Supplement for Region 1 Data Review Elements and Superfund Specific Guidance/Procedures, EQADR-Supplement2, September 2020.

DL – Indicates that the analyte was detected in one of the duplicate samples and was undetected in the other sample, and therefore an RPD could not be calculated. Data were not qualified since the detection was within two times the reporting limit. Non-detected results are indicated above with the applicable reporting limit as ND (RL).

+/-RL – Indicates that the detections in both of the samples were within two times the reporting limit. Qualification of data was not required.

The RPD value for dissolved zinc exceeded the data validation limit of 30% at 51.0%, which was evidence of poor precision. The dissolved zinc results were qualified as J for samples STP-1 to EP-2 and DUP 9-9-22.

An RPD value could not be calculated for BOD for the field duplicate pair STP-1 to EP-2 and DUP 9-9-22 since the analyte was detected in the duplicate sample and the concentration was uncertain in the parent sample. As the detection in the duplicate sample was greater than two times the reporting limit, BOD was qualified as J for both the duplicate and parent samples.



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#### DATA QUALIFICATION SUMMARY

Abbreviation	Reason
EBD	Equipment blank detection
EBL	Flagged as estimated by the laboratory.
ERPD-FD	High field duplicate RPD.
ERPD-LCS	The LCS/LCSD RPD exceeded the upper acceptable limit indicating poor precision.
HR-LCS	The LCS and/or LCSD percent recovery was greater than the upper acceptable limit indicating a possible high bias.
LR-LCS	The LCS and/or LCSD percent recovery was less than the lower acceptable limit indicating a possible low bias.
MBD	Method blank detection
MDLRL	Flagged by the laboratory: The result was greater than the MDL but less than the RL.
OTHER	Other
TBD	Trip blank detection

Analyte	Method	Field Sample ID	Lab Sample ID	Result	Limit	Units	Reviewer Qualifier	DV Flag Reasons
1,4-Dioxane	SW8270C	EB-9-9-22	2209478-001c	ND	1.0	µg/L	UJ	EBL, LR-LCS
1,4-Dioxane	SW8270C	STP-1 to EP-2	2209478-002c	ND	10	µg/L	UJ	EBL, LR-LCS
1,4-Dioxane	SW8270C	EP-2	2209478-003c	ND	10	µg/L	UJ	EBL, LR-LCS
1,4-Dioxane	SW8270C	DUP 9-9-22	2209478-005c	ND	10	µg/L	UJ	EBL, LR-LCS
Acetone	SW8260B	EP-2	2209478-003a	15	10	µg/L	JB	TBD
Acetone	SW8260B	Trip Blank	2209478-006a	6.9	10	µg/L	J	MDLRL
Acetone	SW8260B	EB-9-9-22	2209478-001a	8.7	10	µg/L	U	MDLRL, TBD
Acetone	SW8260B	STP-1 to EP-2	2209478-002a	8.7	10	µg/L	U	MDLRL, TBD
Acetone	SW8260B	DUP 9-9-22	2209478-005a	7.0	10	µg/L	U	MDLRL, TBD
Antimony, Dissolved	E200.8	STP-1 to EP-2	2209478-002E	0.00065	0.0010	mg/L	J	MDLRL
Antimony, Dissolved	E200.8	DUP 9-9-22	2209478-005E	0.00058	0.0010	mg/L	J	MDLRL



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Analyte	Method	Field Sample ID	Lab Sample ID	Result	Limit	Units	Reviewer Qualifier	DV Flag Reasons
Antimony, Total	E200.8	EP-2	2209478-003D	0.0018	0.0010	mg/L	JB	HR-LCS, MBD
Barium, Dissolved	E 200.7	STP-1 to EP-2	2209478-002E	0.024	0.0020	mg/L	J+	HR-LCS
Barium, Dissolved	E 200.7	EP-2	2209478-003E	0.14	0.0020	mg/L	J+	HR-LCS
Barium, Dissolved	E 200.7	DUP 9-9-22	2209478-005E	0.025	0.0020	mg/L	J+	HR-LCS
BOD	5210 B	EB-9-9-22	2209478-001H	ND	2.0	mg/L	UJ	LR-LCS
BOD	5210 B	EP-2	2209478-003H	46	2.0	mg/L	J-	OTHER, LR-LCS
BOD	5210 B	DUP 9-9-22	2209478-005H	47	2.0	mg/L	J-	ERPD-FD, LR-LCS
BOD	5210 B	STP-1 to EP-2	2209478-002H	>67.56	2.0	mg/L	J-	EBL, ERPD-FD, LR-LCS
Carbon Disulfide	SW8260B	EP-2	2209478-003a	2.2	10	µg/L	J	MDLRL
COD	410.4	STP-1 to EP-2	2209478-0021	190	20	mg/L	JB	EBD
COD	410.4	DUP 9-9-22	2209478-0051	181	20	mg/L	JB	EBD
Chrysene	SW8270C	EB-9-9-22	2209478-001c	ND	0.30	µg/L	UJ	EBL, LR-LCS
Chrysene	SW8270C	STP-1 to EP-2	2209478-002c	ND	3.0	µg/L	UJ	EBL, LR-LCS
Chrysene	SW8270C	EP-2	2209478-003c	ND	3.0	µg/L	UJ	EBL, LR-LCS
Chrysene	SW8270C	DUP 9-9-22	2209478-005c	ND	3.0	µg/L	UJ	EBL, LR-LCS
Lead, Total	E200.8	STP-1 to EP-2	2209478-002D	0.00015	0.00050	mg/L	U	MBD, MDLRL
Lead, Total	E200.8	DUP 9-9-22	2209478-005D	0.00016	0.00050	mg/L	U	MBD, MDLRL
Mercury, Dissolved	E245.1	STP-1 to EP-2	2209478-002E	0.00018	0.00020	mg/L	U	EBD, MDLRL
Mercury, Dissolved	E245.1	EP-2	2209478-003E	0.00015	0.00020	mg/L	U	EBD, MDLRL
Mercury, Dissolved	E245.1	DUP 9-9-22	2209478-005E	0.00018	0.00020	mg/L	U	EBD, MDLRL
Mercury, Dissolved	E245.1	EB-9-9-22	2209478-001E	0.00018	0.00020	mg/L	J	MDLRL
Mercury, Total	E245.1	STP-1 to EP-2	2209478-002D	0.00022	0.00020	mg/L	JB	EBD
Mercury, Total	E245.1	DUP 9-9-22	2209478-005D	0.00024	0.00020	mg/L	JB	EBD
Mercury, Total	E245.1	EP-2	2209478-003D	0.00015	0.00020	mg/L	U	EBD, MDLRL



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Analyte	Method	Field Sample ID	Lab Sample ID	Result	Limit	Units	Reviewer Qualifier	DV Flag Reasons
Mercury, Total	E245.1	EB-9-9-22	2209478-001D	0.00019	0.00020	mg/L	J	MDLRL
Pyrene	SW8270C	EB-9-9-22	2209478-001c	ND	1.0	µg/L	UJ	ERPD-LCS
Pyrene	SW8270C	STP-1 to EP-2	2209478-002c	ND	10	µg/L	UJ	ERPD-LCS
Pyrene	SW8270C	EP-2	2209478-003c	ND	10	µg/L	UJ	ERPD-LCS
Pyrene	SW8270C	DUP 9-9-22	2209478-005c	ND	10	µg/L	UJ	ERPD-LCS
Silver, Total	E 200.7	STP-1 to EP-2	2209478-002D	0.0022	0.0050	mg/L	J	MDLRL
Silver, Total	E 200.7	EP-2	2209478-003D	0.0042	0.0050	mg/L	J	MDLRL
Silver, Total	E 200.7	DUP 9-9-22	2209478-005D	0.0020	0.0050	mg/L	J	MDLRL
TPH DRO	SW8015	STP-1 to EP-2	2209478-002C	0.18	0.064	mg/L	JB	EBL, ERPD-LCS, HR-LCS, MBD
TPH DRO	SW8015	EP-2	2209478-003C	0.28	0.064	mg/L	JB	EBL, ERPD-LCS, HR-LCS, MBD
TPH DRO	SW8015	DUP 9-9-22	2209478-005C	0.20	0.064	mg/L	JB	EBL, ERPD-LCS, HR-LCS, MBD
TPH DRO	SW8015	EB-9-9-22	2209478-001C	0.043	0.064	mg/L	U	EBL, ERPD-LCS, HR-LCS, MBD, MDLRL
TPH GRO	SW8015	EP-2	2209478-003a	0.0094	0.050	mg/L	J	MDLRL
TPH ORO	SW8015	STP-1 to EP-2	2209478-002C	0.11	0.080	mg/L	J	EBL
TPH ORO	SW8015	EP-2	2209478-003C	0.11	0.080	mg/L	J	EBL
TPH ORO	SW8015	DUP 9-9-22	2209478-005C	0.13	0.080	mg/L	J	EBL
TPH ORO	SW8015	EB-9-9-22	2209478-001C	ND	0.080	mg/L	UJ	EBL
Vanadium, Dissolved	E 200.7	STP-1 to EP-2	2209478-002E	0.0043	0.050	mg/L	U	EBD, MDLRL
Vanadium, Dissolved	E 200.7	EP-2	2209478-003E	0.0068	0.050	mg/L	U	EBD, MDLRL
Vanadium, Dissolved	E 200.7	DUP 9-9-22	2209478-005E	0.0037	0.050	mg/L	U	EBD, MDLRL
Vanadium, Dissolved	E 200.7	EB-9-9-22	2209478-001E	0.0019	0.050	mg/L	J	MDLRL
Zinc, Dissolved	E 200.7	STP-1 to EP-2	2209478-002E	0.032	0.010	mg/L	JB	EBD, ERPD-FD
Zinc, Dissolved	E 200.7	DUP 9-9-22	2209478-005E	0.019	0.010	mg/L	JB	EBD, ERPD-FD
Zinc, Dissolved	E 200.7	EP-2	2209478-003E	0.0059	0.010	mg/L	U	EBD, MDLRL



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Analyte	Method	Field Sample ID	Lab Sample ID	Result	Limit	Units	Reviewer Qualifier	DV Flag Reasons
Zinc, Dissolved	E 200.7	EB-9-9-22	2209478-001E	0.0065	0.010	mg/L	J	MDLRL



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Client: Marathon Oil	Laboratory: Hall Environmental Analysis Laboratory			
Project Name: Western Refining Southwest, Quarterly GW	Sample Matrix: Groundwater			
Project Number: 697-080-002 Task: 0006	Sample Start Date: 09/13/2022			
Date Validated: 01/23/2023	Sample End Date: 09/13/2022			
Parameters Included:				
<ul> <li>Volatile Organic Compounds (VOC) by Environmental Protection Agency (EPA) Test Methods for Evaluating Solid Waste (SW-846) Method 8260B</li> </ul>				
<ul> <li>1,2-Dibromoethane (EDB) by EPA Method 504.1</li> </ul>				
<ul> <li>Semivolatile Organic Compounds (SVOC) by SW-846 Me Monitoring (SIM)</li> </ul>	thod 8270C and Method 8270C with Selected Ion			
<ul> <li>Total Petroleum Hydrocarbons (TPH) Gasoline Range Or</li> </ul>	ganics (GRO) by SW-846 Method 8015D			
<ul> <li>TPH Diesel Range Organics (DRO) and Motor Oil Range</li> </ul>	Organics (MRO) by SW-846 Method 8015D Modified			
<ul> <li>Total and Dissolved Metals by EPA Method 200.7 and Method</li> </ul>	ethod 200.8			
<ul> <li>Total and Dissolved Mercury by EPA Method 245.1</li> </ul>				
<ul> <li>Cyanide by Standard Methods for the Examination of Wat</li> </ul>	ter and Wastewater (SM) Method 4500 CN E			
Laboratory Project ID: 2209635				
Data Validator: Daran O'Hollearn, Lead Project Scientist				
Reviewer: Mike Phillips, Senior Chemist				

#### DATA EVALUATION CRITERIA SUMMARY

A Tier II Data Validation was performed by Trihydro Corporation's Chemical Data Evaluation Services Group on the analytical data report packages generated by Hall Environmental Analysis Laboratory of Albuquerque, New Mexico, with additional data from Pace Analytical National of Mount Juliet, Tennessee evaluating samples from the Marathon Oil site, located in Gallup, New Mexico.

Precision, accuracy, method compliance, and completeness of this data package were assessed during this data review. Precision was determined by evaluating the calculated relative percent difference (RPD) values from:

- Field duplicate pairs
- Laboratory duplicate pairs
- Matrix spike (MS) and matrix spike duplicate (MSD) pairs
- Laboratory control sample (LCS) and laboratory control sample duplicate (LCSD) pairs

Laboratory accuracy was established by reviewing the demonstrated percent recoveries (%R) of the following items to verify that data are not biased.

- MS/MSD samples
- LCS/LCSD samples
- Organic system monitoring compounds (surrogates)



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Field accuracy was established by collecting and analyzing the following samples to monitor for possible ambient or cross contamination during sampling and transportation.

- Trip blanks
- Field blanks
- Equipment blanks

Method compliance was established by reviewing sample integrity, holding times, detection limits, surrogate recoveries, laboratory blanks, initial and continuing calibrations (where applicable), and the LCS/LCSD percent recoveries against method-specific requirements.

Completeness was evaluated by determining the overall ratio of the number of samples and analyses planned versus the number of samples with valid analyses. Determination of completeness included a review of the chain-of-custody (CoC), laboratory analytical methods, and other laboratory and field documents associated with this analytical data set.

Client Sample ID	Laboratory Sample Number
EB-09-13-22	2209635-001
MKTF-46	2209635-002
MKTF-18R	2209635-003
MKTF-38	2209635-004
MKTF-40	2209635-005
MKTF-31	2209635-006
FB 9-13-22	2209635-007
DUP-9-13-22	2209635-008
Trip Blank	2209635-009

#### SAMPLE NUMBERS TABLE





The laboratory data were reviewed to evaluate compliance with the methods and the quality of the reported data. Assessment of CoC completeness is included in Item 3 of the Data Validation Checklist. A check mark ( $\checkmark$ ) indicates that the referenced validation criteria were deemed acceptable, whereas a crossed circle ( $\otimes$ ) indicates validation criteria for which the data have been qualified by the data validator. An empty circle ( $\bigcirc$ ) indicates that the specified criterion does not apply to the reviewed data. Details are noted in the tables below.

#### Validation Criteria

- ✓ Data Completeness
- ⊗ Laboratory Identified Issues (Item 1)
- ⊗ Laboratory Qualifiers (Item 2)
- ✓ CoC Documentation (Item 3)
- ✓ Holding Times and Preservation (Items 6 and 7)
- O Initial and Continuing Calibrations (Items 9 and 10)
- ⊗ Laboratory Blanks (Items 11 and 12)
- ✓ MS/MSD (Items 13 and 14)
- ⊗ LCS/LCSD (Items 15 and 16)
- System Monitoring Compounds (i.e., Surrogates) (Item 17)
- ⊗ Field, Equipment, and Trip Blanks (Items 18 and 19)
- ⊗ Field Duplicates (Items 20 and 21)
- ✓ Laboratory Duplicates (Item 22)

#### **Guidance References**

Chemical data validation was conducted in accordance with the United States Environmental Protection Agency (USEPA) Contract Laboratory Program (CLP) National Functional Guidelines for the analyses listed below, or by the appropriate method if not covered in the National Functional Guidelines.

- Data for organic analyses were evaluated according to validation criteria set forth in the USEPA CLP National Functional Guidelines for Organic Superfund Methods Data Review, document number EPA-540-R-20-005, November 2020 with additional reference to the USEPA CLP National Functional Guidelines for Organic Data Review, document number EPA 540/R-99/008, October 1999.
- Data for inorganic analyses were evaluated according to validation criteria set forth in the USEPA CLP National Functional Guidelines for Inorganic Superfund Methods Data Review, document number EPA-540-R-20-006, November 2020 with additional reference to the USEPA CLP National Functional Guidelines for Inorganic Data Review, document number EPA 540-R-04-004, October 2004.
- Review of field duplicates was conducted according to the USEPA Region I New England Environmental Data Review Supplement for Region 1 Data Review Elements and Superfund Specific Guidance/Procedures, EQADR-Supplement2, September 2020.
- Trihydro Data Validation Variance Documentation, April 2022.





#### **OVERALL DATA PACKAGE ASSESSMENT**

Based on a data validation review, the data are acceptable as delivered. Data qualified by the laboratory are discussed in Item 2 of the Validation Criteria Checklist.

The purpose of validating data and assigning qualifiers is to assist in proper data interpretation. Data that are not qualified meet the site data quality objectives. If values are assigned qualifiers other than an R (rejected, data not usable), the data may be used for site evaluation; however, consideration should be given to the reasons for qualification when interpreting sample concentrations. Data points that are assigned an R qualifier should not be used for site evaluation purposes.

If applicable, text was identified in **bold font** in the Validation Criteria Checklist to indicate that further action and/or qualification of the data were required. Data may have been qualified with J data flags by the laboratory if the result was greater than or equal to the method detection limit (MDL) but less than the reporting limit (RL). These laboratory-applied J flags were preserved, if present, and included in the Data Qualification Summary table at the end of this report. If applicable, data validation qualifiers were added for the items noted with crossed circles in the Validation Criteria section above. Please see the Data Qualification Summary table at the end of this report.

If data would be qualified with more than one flag, one qualifier was assigned based on the severity; however, all reasons for qualification were retained. Data that would be qualified with both J+ and J- flags were evaluated based on validation criteria and assigned the appropriate flag. The hierarchy of qualifiers from the most to least severe is as follows:

Data qualifiers used during this validation are included in the following table.

<u>Qualifier</u>	Definition
J	Estimated concentration
J+	The result is an estimated concentration, but may be biased high
J-	The result is an estimated concentration, but may be biased low
UJ	Estimated reporting limit
U	Evaluated to be undetected at the reporting limit
JB	Estimated concentration due to blank contamination

#### **Data Completeness**

The analyses were performed as requested on the CoC records. The associated samples were received by the laboratory and analyzed properly unless otherwise noted in the Criteria Checklist below. The complete data package consisted of 540 data points. The data completeness calculation does not include any submitted blank sample results. Data points were not rejected. The data completeness measure for this data package is calculated to be 100% and is acceptable.



VALIDATION CRITERIA CHECKLIST						
1. Was the report free of non-conformances identified by the laboratory? No						
Comments: The la	Comments: The laboratory noted the following analytical non-conformances related to this data set.					
Method 8270C and EPA Method 8270 i	Method 8270C nstead of EPA	<u>SIM</u> : Naphthale Method 8270 SIN	ne, 1-methylnaphthalene, and 2-m M because of its elevated concentra	ethylnaphthalene ation for sample M	were reported by KTF-18R.	
For sample MKTF-3 The target analyte a J qualifiers to in	31, the analyte <b>1,4-dioxane th</b> dicate an estin	1,4 dioxane is E nat was flagged nated concentra	flagged because the result is above by the laboratory with the E flag ition.	e the calibration ra for sample MKTF	nge of the curve. <b>-31 was assigned</b>	
Method 8015D DR	<u>)</u> : The LCS ha	d slightly elevate	d recovery. The LCSD had accepta	able recoveries.		
2. Were the data If no, define.	free of data qua	alification flags ar	nd/or notes used by the laboratory?		No	
Comments: The la	boratory used tl	ne following data	qualification flags with this data se	t.		
E – Estimated value These results wer identified non-con	e. TPH DRO an e assigned J q formance.	nd TPH MRO we ualifiers if deteo	ere flagged by the laboratory with cted, and non-detections were as	n the E flag in mu ssigned UJ due to	Itiple samples. this laboratory	
J – Analyte detecte	d below quantit	ation limits.				
J – The identificatio	n of the analyte	is acceptable; th	ne reported value is an estimate.			
R – % RPD outside	of range.					
S – % Recovery ou	tside of range o	lue to dilution or	matrix interference.			
* – Value exceeds i	naximum conta	iminant level.				
3. Were sample (	CoC forms and	custody procedu	res complete?		Yes	
Comments: The CoC records from field to laboratory were complete, and custody was maintained as evidenced by field and laboratory personnel signatures, dates, and times of receipt. Custody seals were not present because the samples were transferred to a laboratory field courier service for transport from the field to the laboratory, and custody was maintained at all times.						
4. Were detection permit, or meth	limits in accord lod, or indicated	dance with the qu d as acceptable?	uality assurance project plan (QAPF	<sup>&gt;</sup> ),	Yes	
Comments: The de	etection limits a	opeared to be ac	ceptable. The following dilutions w	ere applied.		
	<u>Method</u>	Sample(s)	<u>Analyte(s)</u>	Dilution Factor		
	8260B	MKTF-31	Select VOCs	2		
	200.7	MKTF-18R	Total and Dissolved Barium	5	]	
	8260B	MKTF-18R	Select VOCs	10		
	8015D	MKTF-18R	TPH GRO	20		
	8260B	MKTF-31	MTBE	20		
	8260B	MKTF-18R	Benzene	100		



VALIDATION CRITERIA CHECKLIST						
<ol><li>Were the reported analytical methods and constituents in compliance with the QAPP, permit, or CoC?</li></ol>	No					
Comments: The reported analytical methods were in compliance with the CoC, and the laborator constituents in accordance with the CoC, with the following exceptions.	y reported the requested					
The CoC requested total and dissolved metals using only Method 200.7; however, the laboratory using both Method 200.7 and Method 200.8. This substituted analytical method, Method 200.8, n accuracy, and precision goals and, therefore, was an acceptable replacement.	analyzed the samples net similar sensitivity,					
The CoC requested cyanide using Method 335.4; however, the laboratory analyzed the samples of This substituted analytical method met similar sensitivity, accuracy, and precision goals and, there replacement.	using Method 4500 CN E. efore, was an acceptable					
6. Were samples received in good condition within method-specified requirements?	No					
Comments: Samples were received on ice, in good condition, and with the cooler temperatures be recommended temperature range of $4^{\circ}C \pm 2^{\circ}C$ between $0.4^{\circ}C$ and $4.7^{\circ}C$ as noted on the CoC ar List. Samples transferred to Pace National were received in good condition with the cooler temper recommended range at 2.1°C as noted on the CoC.	ooth within and outside the nd Sample Log-in Check erature within the					
The cooler temperatures below 2.0°C were judged as acceptable since the laboratory did not report as broken or frozen.	ort the sample containers					
7. Were samples extracted/digested and analyzed within method-specified or technical holding times?	Yes					
Comments: The samples were extracted/digested and analyzed within method-specific holding ti	mes.					
8. Were reported units appropriate for the sample matrix/matrices and analytical method(s)? Specify if wet or dry units were used for soil.	Yes					
Comments: The results were reported in concentration units of micrograms per liter ( $\mu$ g/L) and m which were acceptable for the sample matrix and the analyses requested.	illigrams per liter (mg/L),					
9. Did the laboratory provide any specific initial and/or continuing calibration results?	No					
Comments: Initial and continuing calibration data were not included as part of this data set.						
10. If initial and/or continuing calibration results were provided, were the results within acceptable limits?	N/A					
Comments: Initial and continuing calibration data were not included as part of this data set.						
11. Was the total number of laboratory blank samples prepared equal to at least 5% of the total number of samples or analyzed as required by the method?	Yes					
Comments: The total number of laboratory blank samples prepared was equal to at least 5% of the samples.	he total number of					



#### VALIDATION CRITERIA CHECKLIST 12. Were target analytes reported as not detected in the laboratory blanks? No Comments: Target analytes were reported as not detected in the laboratory blanks, with the following exceptions. Method Batch **Concentration** Analyte 200.7 **Total Zinc** 70179 0.0056 mg/L 245.1 Total and Dissolved Mercury 70278 0.00012 mg/L 8015D **TPH DRO** 70190 0.030 mg/L Detections of the identified analytes in the associated samples that were less than the blank results and/or less than the applicable reporting limits were assigned U qualifiers. Detections of total zinc and TPH DRO in the associated samples that were greater than the reporting limits but less than or equal to 10 times the blank results were assigned JB qualifiers. Non-detections of the identified analytes in the associated samples and detections that were above the reporting limit and greater than ten times the blank concentration did not require qualification. 13. Was the total number of MS samples prepared equal to at least 5% of the total Yes number of samples or analyzed as required by the method? Comments: The total number of matrix spike samples prepared was equal to at least 5% of the total number of samples, although MS samples were not prepared/reported for all analyses and/or batches. The matrix spike sample source for each analytical batch in this sample set has been indicated below. Method Analytes Batch MS Sample Source 200.7 70179 **Total Metals** Not Prepared **Dissolved Metals** EB-09-13-22 200.7 C91139 200.8 70179 DUP-9-13-22 **Total Metals** 200.8 Dissolved Metals C91078 Not Prepared 245.1 Total and Dissolved Mercury 70278 Not Prepared 504.1 EDB 70173 EB-09-13-22 4500CN E WG1928511 Not Associated Cyanide 8015D TPH DRO and MRO 70190 Not Prepared TPH GRO MKTF-46 8015D A91113 8260B VOCs R91021 Not Prepared 8260B VOCs R91060 Not Prepared 8260B VOCs R91090 Not Prepared 70174 8270C SIM **SVOCs** Not Prepared 8270C **SVOCs** 70174 Not Prepared Not Associated – The MS sample source was not associated with this project. Not Prepared - Matrix spikes were not prepared/reported for this batch. 14. For MS/MSDs prepared from project samples, were percent recoveries and RPDs Yes within data validation or laboratory quality control (QC) limits? Comments: The MS/MSD percent recoveries and RPDs for project samples were within data validation and laboratory QC limits. The percent recoveries and RPD values for MS/MSDs prepared from non-project samples were evaluated and considered,

but data were not qualified based on those results since matrix similarity to project samples could not be guaranteed.

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VALIDATION CRITERIA CHECKLIST							
15. Was the total number of LCSs analyzed equal to at least 5% of the total number of Samples or analyzed as required by the method?							
Comments	The total number of LCS	S samples a	nalyzed was eq	ual to at least 5	% of the total n	umber of samp	les.
16. Were l labora	CS/LCSD percent recove tory QC limits?	eries and LC	S/LCSD RPDs	within data valio	lation or	No	
Comments limits, with	: The LCS and LCSD per the following exceptions.	cent recove	ries and LCS/L0	CSD RPDs were	e within data va	lidation and lab	ooratory QC
<u>Method</u>	Analyte	<u>Batch</u>	<u>LCS</u> <u>Recovery</u>	LCSD Recovery	LCS/LCSD QC Limits	LCS/LCSD RPD	<u>RPD QC</u> <u>Limits</u>
200.8	<b>Dissolved Selenium</b>	C91078	62.2%		70-130%		
8015D	TPH DRO	70190	89.3%	Acceptable	31.7-75.4%	25.3%	20%
analyte we TPH DRO precision a	re qualified as UJ due to was detected in the asso and as J+ due to the evi	o the evider ociated san dence of hi	nce of potentia nples. These ro gh bias.	il low bias. esults were qua	alified as J du	e to evidence	of poor
17. Were s	surrogate recoveries withi	n laboratory	QC limits?			No	
Comments	Surrogate recoveries we	ere within la	boratory QC lim	its, with the follo	wing exceptior	IS.	
The recove 162%. TPI J+ to indic	The recovery of the surrogate BFB for sample MKTF-38 was outside the laboratory acceptance range of 70-130% at 162%. TPH GRO was detected in the Method 8015D analysis of samples MKTF-38, and this result was qualified as						
Since Method 8270C and 8270C SIM surrogate associations were not available from the laboratory, qualification was assigned to all of the target analytes in a given fraction (acid or base/neutral) when two or more surrogates from the same fraction (acid or base/neutral) were outside the acceptance range. This condition did not exist for the Method 8270C SIM analysis of samples MKTF-46, MKTF-18R, MKTF-38, MKTF-40, MKTF-31, and DUP-9-13-22 or the Method 8270C analysis of sample MKTF-40, and qualification of sample data was not required.							
Qualificatio samples we	Qualification of sample data was not required based on surrogate non-conformances in QC samples as the environmental samples were evaluated based on their specific surrogate recoveries.						
18. Were t collect project	he number of trip blank, f ed equal to at least 10% c guidelines, QAPP, SAP,	eld blank, a of the total n or permit?	nd/or equipmen umber of sampl	t blank samples es or as require	d by the	Yes	3
Comments One trip bla were collec	: The number of trip, field ank sample, Trip Blank, or ted as part of this sample	, and equipr ne field blanl set.	ment blanks coll k sample, FB 9-	lected was equa 13-22, and one	ll to at least 109 equipment blar	% of the numbe nk sample, EB-	er of samples. 09-13-22,



#### VALIDATION CRITERIA CHECKLIST

19. Were target analytes reported as not detected in the trip blank, field blank, and/or equipment blank samples?

No

Comments: Target analytes were not detected in the trip blank, field blank, and equipment blank samples with the following exceptions.

Blank Sample ID	<u>Method</u>	<u>Analyte</u>	<u>Concentration</u>
FB 9-13-22	8260B	2-Butanone	12 µg/L
FB 9-13-22	8260B	Acetone	16 µg/L
EB-09-13-22	8260B	2-Butanone	11 µg/L
EB-09-13-22	8260B	Acetone	14 µg/L
EB-09-13-22	8270C SIM	1,4-Dioxane	0.16 µg/L
EB-09-13-22	8015D	TPH DRO	0.030 mg/L
EB-09-13-22	200.7	Dissolved Zinc	0.0064 mg/L

Detections of the identified analytes in the associated samples that were less than the blank results and/or less than the applicable reporting limits were assigned U qualifiers. Detections of acetone and dissolved zinc in the associated samples that were greater than the reporting limits but less than or equal to 10 times the blank results were assigned JB qualifiers. Non-detections of the identified analytes in the associated samples and detections that were above the reporting limit and greater than ten times the blank concentration did not require qualification.

The TPH DRO results for the samples in batch 70190 were previously qualified due to a laboratory blank detection; therefore, additional qualification due to the equipment blank contamination was not required.

20.	Was the number of field duplicates collected equal to at least 10% of the total	Yes
	number of samples or as required by the project guidelines, QAPP, SAP, or permit?	

Comments: The number of field duplicates collected was equal to at least 10% of the number of samples.

Sample DUP-9-13-22 was collected as a field duplicate of sample MKTF-46.

21. Were field duplicate RPD values within data validation QC limits (soil 0-50%, water No 0-30%, or air 0-25%)?

Comments: As indicated in the Field Duplicate Summary Table at the end of this report, field duplicate RPD values were within data validation QC limits of 0-30% for water samples, with the following exceptions.

The RPD values for 1,4-dioxane and total cobalt exceeded the data validation limit of 30% at 72.7% and 40.7%, respectively, which was evidence of poor precision. The 1,4-dioxane and total cobalt results were qualified as J for samples MKTF-46 and DUP 9-13-22.

22. For laboratory duplicates prepared from project samples, were RPDs within data validation or laboratory QC limits?

Comments: Laboratory duplicates were prepared for the analysis of cyanide in batch WG1928511 from a sample not associated with this data set.

The RPD value for the laboratory duplicate samples prepared from a non-project sample was evaluated and considered, but data were not qualified based on this result since matrix similarity to project samples could not be guaranteed.



N/A

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VALIDATION CRITERIA CHECKLIST					
23. Were the following data relationships realistic?					
<ul> <li>Target analytes were reported by more than one method (e.g., 8260/8270, EPH/8270)?</li> </ul>	N/A				
Comments: Target analytes were not reported by more than one method.					
<ul> <li>Both total and dissolved metals analyses were performed, and the total metals results were greater than or equal to the dissolved metals results?</li> </ul>	No				

Comments: The following table contains the exceptions in which the dissolved metals results exceeded the total metals results. The EPA has not provided guidance or requirements for the evaluation, validation, and qualification of dissolved metals results that exceed the corresponding total metals results. Therefore, qualification of results was not performed based on these data.

Sample ID	<u>Analyte</u>	<u>Total Result</u> (mg/L)	<u>Dissolved Result</u> (mg/L)
MKTF-18R	Arsenic	0.0072	0.0073
MKTF-46	Beryllium	ND	0.00097
MKTF-38	Nickel	ND	0.0040
MKTF-40	Nickel	0.0059	0.0088
MKTF-46	Silver	ND	0.0039
MKTF-18R	Silver	ND	0.0015
MKTF-38	Silver	ND	0.0040
MKTF-40	Silver	ND	0.0066
NKTF-31	Silver	ND	0.0020
DUP-9-13-22	Silver	ND	0.0036
Sample ID	<u>Analyte</u>	<u>Total Result</u> (mg/L)	Dissolved Result (mg/L)
MKTF-46	Vanadium	0.0043	0.0056
DUP-9-13-22	Vanadium	0.0038	0.0050
EB-09-13-22	Zinc	ND	0.0064
MKTF-46	Zinc	0.0072	0.0099
MKTF-38	Zinc	0.013	0.015
MKTF-31	Zinc	0.0071	0.010
DUP-9-13-22	Zinc	ND	0.013

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Client Sample ID: MKTF-46 Field Duplicate Sample ID: DUP-9-13-22						
Analyte	Method	Laboratory Result	Duplicate Result	Relative Percent Difference (RPD)		
Barium, Dissolved	E 200.7	0.037 mg/L	0.036 mg/L	2.70%		
Barium, Total	E 200.7	0.068 mg/L	0.075 mg/L	9.80%		
Beryllium, Dissolved	E 200.7	0.00097 mg/L	ND (0.0020 mg/L)	DL		
Cobalt, Total	E 200.7	0.013 mg/L	0.0086 mg/L	40.7%		
Silver, Dissolved	E 200.7	0.0039 mg/L	0.0036 mg/L	8.0% +/-RL		
Vanadium, Dissolved	E 200.7	0.0056 mg/L	0.0050 mg/L	11.3% +/-RL		
Vanadium, Total	E 200.7	0.0043 mg/L	0.0038 mg/L	12.3% +/-RL		
Zinc, Dissolved	E 200.7	0.0099 mg/L	0.013 mg/L	27.1% +/-RL		
Zinc, Total	E 200.7	0.0072 mg/L	ND (0.010 mg/L)	DL		
Arsenic, Dissolved	E200.8	0.00077 mg/L	0.00081 mg/L	5.1% +/-RL		
Arsenic, Total	E200.8	0.00082 mg/L	0.00081 mg/L	1.2% +/-RL		
Lead, Total	E200.8	0.00073 mg/L	0.00083 mg/L	12.8% +/-RL		
Selenium, Total	E200.8	0.00040 mg/L	0.00063 mg/L	44.7% +/-RL		
Mercury, Total	E245.1	0.00010 mg/L	0.00011 mg/L	9.5% +/-RL		
Cyanide, Total	E335.4	ND (5.0 µg/L)	3.06 µg/L	DL		
TPH DRO	SW8015	0.068 mg/L	0.058 mg/L	15.9% +/-RL		
TPH GRO	SW8015	0.025 mg/L	0.021 mg/L	17.4% +/-RL		
Acetone	SW8260B	6.4 µg/L	8.1 µg/L	23.4% +/-RL		
Chlorobenzene	SW8260B	0.29 µg/L	0.33 µg/L	12.9% +/-RL		
sec-Butylbenzene	SW8260B	0.18 µg/L	ND (1.0 μg/L)	DL		
Di-n-butylphthalate	SW8270C	15 µg/L	ND (10 μg/L)	DL		
Pyrene	SW8270C	0.40 µg/L	ND (1.0 µg/L)	DL		
1,4-Dioxane	SW8270C	0.98 µg/L	2.1 μg/L	72.7%		

#### FIELD DUPLICATE SUMMARY

Field duplicate RPD control limits are not to exceed 30% for water as established by USEPA Region I - New England Environmental Data Review Supplement for Region 1 Data Review Elements and Superfund Specific Guidance/Procedures, EQADR-Supplement2, September 2020.

DL – Indicates that the analyte was detected in one of the duplicate samples and was undetected in the other sample, and therefore an RPD could not be calculated. Data were not qualified since the detection was within two times the reporting limit. Non-detected results are indicated above with the applicable reporting limit as ND (RL).

+/-RL – Indicates that the detections in both of the samples were within two times the reporting limit. Qualification of data was not required.

The RPD values for 1,4-dioxane and total cobalt exceeded the data validation limit of 30% at 72.7% and 40.7%, respectively, which was evidence of poor precision. The 1,4-dioxane and total cobalt results were qualified as J for samples MKTF-46 and DUP 9-13-22.



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Abbreviation	Reason
EBD	Equipment blank detection
EBL	Flagged as estimated by the laboratory.
ECAL	The result exceeds the calibration range.
ERPD-FD	High field duplicate RPD.
ERPD-LCS	The LCS/LCSD RPD exceeded the upper acceptable limit indicating poor precision.
FBD	Field blank detection
HR-LCS	The LCS and/or LCSD percent recovery was greater than the upper acceptable limit indicating a possible high bias.
HR-SUR	The surrogate percent recovery was greater than the upper acceptable limit indicating a possible high bias.
LR-LCS	The LCS and/or LCSD percent recovery was less than the lower acceptable limit indicating a possible low bias.
MBD	Method blank detection
MDLRL	Flagged by the laboratory: The result was greater than the MDL but less than the RL.

Analyte	Method	Field Sample ID	Lab Sample ID	Result	Limit	Units	Reviewer Qualifier	DV Flag Reasons
1,1,1-Trichloroethane	SW8260B	MKTF-31	2209635-006a	1.7	2.0	µg/L	J	MDLRL
1,1-Dichloroethane	SW8260B	MKTF-40	2209635-005a	0.96	1.0	µg/L	J	MDLRL
1,2-Dibromoethane	E504.1	MKTF-31	2209635-006B	0.0057	0.0093	µg/L	J	MDLRL
1,4-Dioxane	SW8270C	DUP-9-13-22	2209635-008c	2.1	1.0	µg/L	J	ERPD-FD
1,4-Dioxane	SW8270C	MKTF-46	2209635-002c	0.98	1.0	µg/L	U	EBD, ERPD-FD, MDLRL
1,4-Dioxane	SW8270C	EB-09-13-22	2209635-001c	0.16	1.0	µg/L	J	MDLRL
1,4-Dioxane	SW8270C	MKTF-31	2209635-006c	75	1.0	µg/L	J	ECAL
2-Butanone	SW8260B	EB-09-13-22	2209635-001a	11	10	µg/L	U	FBD
3,4-Methylphenol	SW8270C	MKTF-18R	2209635-003C	5.9	10	µg/L	J	MDLRL
Acetone	SW8260B	MKTF-38	2209635-004a	19	10	µg/L	JB	FBD
Acetone	SW8260B	EB-09-13-22	2209635-001a	14	10	µg/L	U	FBD



Analyte	Method	Field Sample ID	Lab Sample ID	Result	Limit	Units	Reviewer Qualifier	DV Flag Reasons
Acetone	SW8260B	MKTF-46	2209635-002a	6.4	10	µg/L	U	FBD, MDLRL
Acetone	SW8260B	DUP-9-13-22	2209635-008a	8.1	10	µg/L	U	FBD, MDLRL
Arsenic, Dissolved	E200.8	MKTF-46	2209635-002E	0.00077	0.0010	mg/L	J	MDLRL
Arsenic, Dissolved	E200.8	MKTF-40	2209635-005E	0.00066	0.0010	mg/L	J	MDLRL
Arsenic, Dissolved	E200.8	MKTF-31	2209635-006E	0.00070	0.0010	mg/L	J	MDLRL
Arsenic, Dissolved	E200.8	DUP-9-13-22	2209635-008E	0.00081	0.0010	mg/L	J	MDLRL
Arsenic, Total	E200.8	MKTF-46	2209635-002D	0.00082	0.0010	mg/L	J	MDLRL
Arsenic, Total	E200.8	DUP-9-13-22	2209635-008D	0.00081	0.0010	mg/L	J	MDLRL
Benzo(a)anthracene	SW8270C	MKTF-18R	2209635-003c	0.18	0.30	µg/L	J	MDLRL
Beryllium, Dissolved	E 200.7	MKTF-46	2209635-002E	0.00097	0.0020	mg/L	J	MDLRL
Chlorobenzene	SW8260B	MKTF-46	2209635-002a	0.29	1.0	µg/L	J	MDLRL
Chlorobenzene	SW8260B	DUP-9-13-22	2209635-008a	0.33	1.0	µg/L	J	MDLRL
Chloromethane	SW8260B	MKTF-38	2209635-004a	1.8	3.0	µg/L	J	MDLRL
cis-1,2-Dichloroethene	SW8260B	MKTF-18R	2209635-003a	8.7	10	µg/L	J	MDLRL
Cobalt, Total	E 200.7	MKTF-46	2209635-002D	0.013	0.0060	mg/L	J	ERPD-FD
Cobalt, Total	E 200.7	DUP-9-13-22	2209635-008D	0.0086	0.0060	mg/L	J	ERPD-FD
Cyanide, Total	E335.4	DUP-9-13-22	2209635-008F	3.06	5.0	µg/L	J	MDLRL
Fluoranthene	SW8270C	MKTF-18R	2209635-003c	0.28	0.30	µg/L	J	MDLRL
Isopropylbenzene	SW8260B	MKTF-18R	2209635-003a	3.7	10	µg/L	J	MDLRL
Lead, Dissolved	E200.8	MKTF-38	2209635-004E	0.00021	0.00050	mg/L	J	MDLRL
Lead, Dissolved	E200.8	MKTF-31	2209635-006E	0.000082	0.00050	mg/L	J	MDLRL
Mercury, Total	E245.1	MKTF-46	2209635-002D	0.00010	0.00020	mg/L	U	MBD, MDLRL
Mercury, Total	E245.1	DUP-9-13-22	2209635-008D	0.00011	0.00020	mg/L	U	MBD, MDLRL
MTBE	SW8260B	MKTF-40	2209635-005a	0.73	1.0	µg/L	J	MDLRL
n-Butylbenzene	SW8260B	MKTF-18R	2209635-003a	3.3	30	µg/L	J	MDLRL
n-Butylbenzene	SW8260B	MKTF-38	2209635-004a	1.2	3.0	µg/L	J	MDLRL
Nickel, Dissolved	E 200.7	MKTF-18R	2209635-003E	0.0041	0.010	mg/L	J	MDLRL



Analyte	Method	Field Sample ID	Lab Sample ID	Result	Limit	Units	Reviewer Qualifier	DV Flag Reasons
Nickel, Dissolved	E 200.7	MKTF-38	2209635-004E	0.0040	0.010	mg/L	J	MDLRL
Nickel, Dissolved	E 200.7	MKTF-40	2209635-005E	0.0088	0.010	mg/L	J	MDLRL
Nickel, Dissolved	E 200.7	MKTF-31	2209635-006E	0.0039	0.010	mg/L	J	MDLRL
Nickel, Total	E 200.7	MKTF-18R	2209635-003D	0.0074	0.010	mg/L	J	MDLRL
Nickel, Total	E 200.7	MKTF-40	2209635-005D	0.0059	0.010	mg/L	J	MDLRL
Nickel, Total	E 200.7	MKTF-31	2209635-006D	0.0099	0.010	mg/L	J	MDLRL
n-Propylbenzene	SW8260B	MKTF-18R	2209635-003a	4.9	10	µg/L	J	MDLRL
Phenanthrene	SW8270C	MKTF-38	2209635-004c	0.16	0.30	µg/L	J	MDLRL
p-Isopropyltoluene	SW8260B	MKTF-18R	2209635-003a	2.3	10	µg/L	J	MDLRL
Pyrene	SW8270C	MKTF-46	2209635-002c	0.40	1.0	µg/L	J	MDLRL
Pyrene	SW8270C	MKTF-18R	2209635-003c	0.64	1.0	µg/L	J	MDLRL
sec-Butylbenzene	SW8260B	MKTF-46	2209635-002a	0.18	1.0	µg/L	J	MDLRL
sec-Butylbenzene	SW8260B	MKTF-18R	2209635-003a	2.2	10	µg/L	J	MDLRL
Selenium, Dissolved	E200.8	EB-09-13-22	2209635-001E	ND	0.0010	mg/L	UJ	LR-LCS
Selenium, Dissolved	E200.8	MKTF-46	2209635-002E	ND	0.0010	mg/L	UJ	LR-LCS
Selenium, Dissolved	E200.8	MKTF-18R	2209635-003E	ND	0.0010	mg/L	UJ	LR-LCS
Selenium, Dissolved	E200.8	DUP-9-13-22	2209635-008E	ND	0.0010	mg/L	UJ	LR-LCS
Selenium, Dissolved	E200.8	MKTF-38	2209635-004E	0.00075	0.0010	mg/L	J-	LR-LCS, MDLRL
Selenium, Dissolved	E200.8	MKTF-40	2209635-005E	0.00039	0.0010	mg/L	J-	LR-LCS, MDLRL
Selenium, Dissolved	E200.8	MKTF-31	2209635-006E	0.00051	0.0010	mg/L	J-	LR-LCS, MDLRL
Selenium, Total	E200.8	MKTF-46	2209635-002D	0.00040	0.0010	mg/L	J	MDLRL
Selenium, Total	E200.8	MKTF-18R	2209635-003D	0.00046	0.0010	mg/L	J	MDLRL
Selenium, Total	E200.8	MKTF-40	2209635-005D	0.00088	0.0010	mg/L	J	MDLRL
Selenium, Total	E200.8	DUP-9-13-22	2209635-008D	0.00063	0.0010	mg/L	J	MDLRL
Silver, Dissolved	E 200.7	MKTF-46	2209635-002E	0.0039	0.0050	mg/L	J	MDLRL
Silver, Dissolved	E 200.7	MKTF-18R	2209635-003E	0.0015	0.0050	mg/L	J	MDLRL
Silver, Dissolved	E 200.7	MKTF-38	2209635-004E	0.0040	0.0050	mg/L	J	MDLRL



Analyte	Method	Field Sample ID	Lab Sample ID	Result	Limit	Units	Reviewer Qualifier	DV Flag Reasons
Silver, Dissolved	E 200.7	MKTF-31	2209635-006E	0.0020	0.0050	mg/L	J	MDLRL
Silver, Dissolved	E 200.7	DUP-9-13-22	2209635-008E	0.0036	0.0050	mg/L	J	MDLRL
TPH DRO	SW8015	EB-09-13-22	2209635-001C	0.030	0.064	mg/L	U	EBL, ERPD-LCS, HR-LCS, MBD, MDLRL
TPH DRO	SW8015	MKTF-40	2209635-005C	0.050	0.064	mg/L	U	EBL, ERPD-LCS, HR-LCS, MBD, MDLRL
TPH DRO	SW8015	DUP-9-13-22	2209635-008C	0.058	0.064	mg/L	U	EBL, ERPD-LCS, HR-LCS, MBD, MDLRL
TPH DRO	SW8015	MKTF-18R	2209635-003C	3.1	0.064	mg/L	J+	EBL, ERPD-LCS, HR-LCS
TPH DRO	SW8015	MKTF-38	2209635-004C	0.73	0.064	mg/L	J+	EBL, ERPD-LCS, HR-LCS
TPH DRO	SW8015	MKTF-46	2209635-002C	0.068	0.064	mg/L	JB	EBL, ERPD-LCS, HR-LCS, MBD
TPH DRO	SW8015	MKTF-31	2209635-006C	0.26	0.064	mg/L	JB	EBL, ERPD-LCS, HR-LCS, MBD
TPH GRO	SW8015	MKTF-38	2209635-004a	0.35	0.050	mg/L	J+	HR-SUR
TPH GRO	SW8015	MKTF-46	2209635-002a	0.025	0.050	mg/L	J	MDLRL
TPH GRO	SW8015	DUP-9-13-22	2209635-008a	ND	0.050	mg/L	J	MDLRL
TPH ORO	SW8015	EB-09-13-22	2209635-001C	ND	0.080	mg/L	UJ	EBL
TPH ORO	SW8015	MKTF-46	2209635-002C	ND	0.080	mg/L	UJ	EBL
TPH ORO	SW8015	MKTF-18R	2209635-003C	ND	0.080	mg/L	UJ	EBL
TPH ORO	SW8015	MKTF-38	2209635-004C	ND	0.080	mg/L	UJ	EBL
TPH ORO	SW8015	MKTF-40	2209635-005C	ND	0.080	mg/L	UJ	EBL
TPH ORO	SW8015	MKTF-31	2209635-006C	ND	0.080	mg/L	UJ	EBL
TPH ORO	SW8015	DUP-9-13-22	2209635-008C	ND	0.080	mg/L	UJ	EBL
Vanadium, Dissolved	E 200.7	MKTF-46	2209635-002E	0.0056	0.050	mg/L	J	MDLRL
Vanadium, Dissolved	E 200.7	MKTF-18R	2209635-003E	0.0017	0.050	mg/L	J	MDLRL
Vanadium, Dissolved	E 200.7	MKTF-38	2209635-004E	0.0040	0.050	mg/L	J	MDLRL
Vanadium, Dissolved	E 200.7	MKTF-40	2209635-005E	0.011	0.050	mg/L	J	MDLRL
Vanadium, Dissolved	E 200.7	MKTF-31	2209635-006E	0.0063	0.050	mg/L	J	MDLRL
Vanadium, Dissolved	E 200.7	DUP-9-13-22	2209635-008E	0.0050	0.050	mg/L	J	MDLRL



Analyte	Method	Field Sample ID	Lab Sample ID	Result	Limit	Units	Reviewer Qualifier	DV Flag Reasons
Vanadium, Total	E 200.7	MKTF-46	2209635-002D	0.0043	0.050	mg/L	J	MDLRL
Vanadium, Total	E 200.7	MKTF-18R	2209635-003D	0.0089	0.050	mg/L	J	MDLRL
Vanadium, Total	E 200.7	MKTF-38	2209635-004D	0.023	0.050	mg/L	J	MDLRL
Vanadium, Total	E 200.7	MKTF-40	2209635-005D	0.023	0.050	mg/L	J	MDLRL
Vanadium, Total	E 200.7	MKTF-31	2209635-006D	0.032	0.050	mg/L	J	MDLRL
Vanadium, Total	E 200.7	DUP-9-13-22	2209635-008D	0.0038	0.050	mg/L	J	MDLRL
Zinc, Dissolved	E 200.7	MKTF-38	2209635-004E	0.015	0.010	mg/L	JB	EBD
Zinc, Dissolved	E 200.7	MKTF-31	2209635-006E	0.010	0.010	mg/L	JB	EBD
Zinc, Dissolved	E 200.7	DUP-9-13-22	2209635-008E	0.013	0.010	mg/L	JB	EBD
Zinc, Dissolved	E 200.7	MKTF-46	2209635-002E	0.0099	0.010	mg/L	U	EBD, MDLRL
Zinc, Dissolved	E 200.7	MKTF-18R	2209635-003E	0.0093	0.010	mg/L	U	EBD, MDLRL
Zinc, Dissolved	E 200.7	MKTF-40	2209635-005E	0.0077	0.010	mg/L	U	EBD, MDLRL
Zinc, Dissolved	E 200.7	EB-09-13-22	2209635-001E	0.0064	0.010	mg/L	J	MDLRL
Zinc, Total	E 200.7	MKTF-18R	2209635-003D	0.028	0.010	mg/L	JB	MBD
Zinc, Total	E 200.7	MKTF-38	2209635-004D	0.013	0.010	mg/L	JB	MBD
Zinc, Total	E 200.7	MKTF-46	2209635-002D	0.0072	0.010	mg/L	U	MBD, MDLRL
Zinc, Total	E 200.7	MKTF-40	2209635-005D	0.0096	0.010	mg/L	U	MBD, MDLRL
Zinc, Total	E 200.7	MKTF-31	2209635-006D	0.0071	0.010	mg/L	U	MBD, MDLRL





Client: Marathon Oil	Laboratory: Hall Environmental Analysis Laboratory						
Project Name: Western Refining Southwest, Quarterly GW	Sample Matrix: Groundwater						
Project Number: 697-080-002 Task: 0006	Sample Start Date: 09/14/2022						
Date Validated: 01/18/2023	Sample End Date: 09/14/2022						
Parameters Included:							
<ul> <li>Volatile Organic Compounds (VOC) by Environmental Pro Waste (SW-846) Method 8260B</li> </ul>	otection Agency (EPA) Test Methods for Evaluating Solid						
<ul> <li>1,2-Dibromoethane (EDB) by EPA Method 504.1</li> </ul>							
<ul> <li>Semivolatile Organic Compounds (SVOC) by SW-846 Me Monitoring (SIM)</li> </ul>	thod 8270C and Method 8270C with Selected Ion						
<ul> <li>Total Petroleum Hydrocarbons (TPH) Gasoline Range Or</li> </ul>	ganics (GRO) by SW-846 Method 8015D						
<ul> <li>TPH Diesel Range Organics (DRO) and Motor Oil Range</li> </ul>	Organics (MRO) by SW-846 Method 8015D Modified						
<ul> <li>Total and Dissolved Metals by EPA Method 200.7 and Method</li> </ul>	ethod 200.8						
<ul> <li>Total and Dissolved Mercury by EPA Method 245.1</li> </ul>							
<ul> <li>Cyanide by Standard Methods for the Examination of Water</li> </ul>	ter and Wastewater (SM) Method 4500 CN E						
Laboratory Project ID: 2209730	Laboratory Project ID: 2209730						
Data Validator: Daran O'Hollearn, Lead Project Scientist							
Reviewer: Mike Phillips, Senior Chemist							

#### DATA EVALUATION CRITERIA SUMMARY

A Tier II Data Validation was performed by Trihydro Corporation's Chemical Data Evaluation Services Group on the analytical data report packages generated by Hall Environmental Analysis Laboratory of Albuquerque, New Mexico, with additional data from Pace Analytical National of Mount Juliet, Tennessee evaluating samples from the Marathon Oil site, located in Gallup, New Mexico.

Precision, accuracy, method compliance, and completeness of this data package were assessed during this data review. Precision was determined by evaluating the calculated relative percent difference (RPD) values from:

- Field duplicate pairs
- Laboratory duplicate pairs
- Matrix spike (MS) and matrix spike duplicate (MSD) pairs
- Laboratory control sample (LCS) and laboratory control sample duplicate (LCSD) pairs

Laboratory accuracy was established by reviewing the demonstrated percent recoveries (%R) of the following items to verify that data are not biased.

- MS/MSD samples
- LCS/LCSD samples
- Organic system monitoring compounds (surrogates)



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Field accuracy was established by collecting and analyzing the following samples to monitor for possible ambient or cross contamination during sampling and transportation.

- Trip blanks
- Field blanks
- Equipment blanks

Method compliance was established by reviewing sample integrity, holding times, detection limits, surrogate recoveries, laboratory blanks, initial and continuing calibrations (where applicable), and the LCS/LCSD percent recoveries against method-specific requirements.

Completeness was evaluated by determining the overall ratio of the number of samples and analyses planned versus the number of samples with valid analyses. Determination of completeness included a review of the chain-of-custody (CoC), laboratory analytical methods, and other laboratory and field documents associated with this analytical data set.

Client Sample ID	Laboratory Sample Number
EB-09-14-22	2209730-001
MKTF-27	2209730-002
MKTF-28	2209730-003
MKTF-29	2209730-004
MKTF-30	2209730-005
OPIS-1	2209730-006
NAPI-2	2209730-007
NAPI-3	2209730-008
KA-3	2209730-009
DUP 9-14-22	2209730-010
FB 9-14-22	2209730-011
Trip Blank	2209730-012

#### SAMPLE NUMBERS TABLE





The laboratory data were reviewed to evaluate compliance with the methods and the quality of the reported data. Assessment of CoC completeness is included in Item 3 of the Data Validation Checklist. A check mark ( $\checkmark$ ) indicates that the referenced validation criteria were deemed acceptable, whereas a crossed circle ( $\otimes$ ) indicates validation criteria for which the data have been qualified by the data validator. An empty circle (O) indicates that the specified criterion does not apply to the reviewed data. Details are noted in the tables below.

#### Validation Criteria

- ✓ Data Completeness
- ✓ CoC Documentation (Item 3)
- ✓ Holding Times and Preservation (Items 6 and 7)
- O Initial and Continuing Calibrations (Items 9 and 10)
- ⊗ Laboratory Blanks (Items 11 and 12)
- ✓ MS/MSD (Items 13 and 14)
- ⊗ LCS/LCSD (Items 15 and 16)
- System Monitoring Compounds (i.e., Surrogates) (Item 17)
- 8 Field, Equipment, and Trip Blanks (Items 18 and 19)
- ⊗ Field Duplicates (Items 20 and 21)
- ✓ Laboratory Duplicates (Item 22)

#### **Guidance References**

Chemical data validation was conducted in accordance with the United States Environmental Protection Agency (USEPA) Contract Laboratory Program (CLP) National Functional Guidelines for the analyses listed below, or by the appropriate method if not covered in the National Functional Guidelines.

- Data for organic analyses were evaluated according to validation criteria set forth in the USEPA CLP National Functional Guidelines for Organic Superfund Methods Data Review, document number EPA-540-R-20-005, November 2020 with additional reference to the USEPA CLP National Functional Guidelines for Organic Data Review, document number EPA 540/R-99/008, October 1999.
- Data for inorganic analyses were evaluated according to validation criteria set forth in the USEPA CLP National Functional Guidelines for Inorganic Superfund Methods Data Review, document number EPA-540-R-20-006, November 2020 with additional reference to the USEPA CLP National Functional Guidelines for Inorganic Data Review, document number EPA 540-R-04-004, October 2004.
- Review of field duplicates was conducted according to the USEPA Region I New England Environmental Data Review Supplement for Region 1 Data Review Elements and Superfund Specific Guidance/Procedures, EQADR-Supplement2, September 2020.
- Trihydro Data Validation Variance Documentation, April 2022.



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#### **OVERALL DATA PACKAGE ASSESSMENT**

Based on a data validation review, the data are acceptable as delivered. Data qualified by the laboratory are discussed in Item 2 of the Validation Criteria Checklist.

The purpose of validating data and assigning qualifiers is to assist in proper data interpretation. Data that are not qualified meet the site data quality objectives. If values are assigned qualifiers other than an R (rejected, data not usable), the data may be used for site evaluation; however, consideration should be given to the reasons for qualification when interpreting sample concentrations. Data points that are assigned an R qualifier should not be used for site evaluation purposes.

If applicable, text was identified in **bold font** in the Validation Criteria Checklist to indicate that further action and/or qualification of the data were required. Data may have been qualified with J data flags by the laboratory if the result was greater than or equal to the method detection limit (MDL) but less than the reporting limit (RL). These laboratory-applied J flags were preserved, if present, and included in the Data Qualification Summary table at the end of this report. If applicable, data validation qualifiers were added for the items noted with crossed circles in the Validation Criteria section above. Please see the Data Qualification Summary table at the end of this report.

If data would be qualified with more than one flag, one qualifier was assigned based on the severity; however, all reasons for qualification were retained. Data that would be qualified with both J+ and J- flags were evaluated based on validation criteria and assigned the appropriate flag. The hierarchy of qualifiers from the most to least severe is as follows:

Data qualifiers used during this validation are included in the following table.

<u>Qualifier</u>	Definition
J	Estimated concentration
J+	The result is an estimated concentration, but may be biased high
J-	The result is an estimated concentration, but may be biased low
UJ	Estimated reporting limit
U	Evaluated to be undetected at the reporting limit
JB	Estimated concentration due to blank contamination

#### **Data Completeness**

The analyses were performed as requested on the CoC records. The associated samples were received by the laboratory and analyzed properly unless otherwise noted in the Criteria Checklist below. The complete data package consisted of 810 data points. The data completeness calculation does not include any submitted blank sample results. Data points were not rejected. The data completeness measure for this data package is calculated to be 100% and is acceptable.



1. Was the r	eport free of non-c	conformances identifie	d by the laboratory?	No	)				
Comments: The laboratory noted the following analytical non-conformances related to this data set.									
Method 82700 instead of EPA	C and Method 8270 A Method 8270 SIN	<u>)C SIM</u> : Naphthalene I because of their elev	and 1-methylnaphthalene were rep vated concentrations for sample N/	ported by EPA Meth API-2.	od 8270				
Method 8015D DRO: The LCS had slightly elevated recoveries.									
<ol> <li>Were the If no, defi</li> </ol>	data free of data c ne.	ualification flags and/o	or notes used by the laboratory?	No	)				
Comments: T	he laboratory used	d the following data qu	alification flags with this data set.						
D – Sample di	luted due to matrix	κ.							
E – The analy calibration (IC sample data w	te concentration ex AL). <i>This laborato</i> /as not required.	xceeds the upper limit ry flag was applied on	of the calibration range of the instr Iy to QC sample results in the labo	ument established I ratory report, and q	by the initial <i>Walification of</i>				
J – Analyte de	tected below quar	titation limits.							
S – % Recove	ry outside of range	e due to dilution or ma	trix interference.						
V – The sample concentration is too high to evaluate accurate spike recoveries.									
V – The samp	le concentration is	* – Value exceeds maximum contaminant level.							
V – The samp * – Value exce	e concentration is eds maximum cor	ntaminant level.							
V – The samp * – Value exce 3. Were sam Comments: T and laboratory	e concentration is eeds maximum cor pple CoC forms an the CoC records from the coc records from the coc records from the terms of terms	ntaminant level. d custody procedures om field to laboratory v	complete? were complete, and custody was m	Ye naintained as evider	s Iced by field				
<ul> <li>V – The samp</li> <li>* – Value exce</li> <li>3. Were sam</li> <li>Comments: T and laboratory</li> <li>were transferm</li> <li>maintained at</li> <li>4. Were dete</li> </ul>	e concentration is eeds maximum cor pple CoC forms an he CoC records from personnel signatu ed to a laboratory all times.	ntaminant level. d custody procedures om field to laboratory v ures, dates, and times field courier service fo ordance with the quali	complete? were complete, and custody was m of receipt. Custody seals were no r transport from the field to the labor ty assurance project plan (QAPP),	Ye naintained as eviden t present because th pratory, and custody Ye	s iced by field ne samples v was s				
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<ul> <li>V – The samp</li> <li>* – Value exce</li> <li>3. Were sam</li> <li>Comments: T</li> <li>and laboratory</li> <li>were transferred</li> <li>maintained at</li> <li>4. Were detered</li> <li>permit, or</li> <li>Comments: T</li> </ul>	e concentration is eeds maximum cor nple CoC forms an he CoC records fro personnel signatu ed to a laboratory all times. ection limits in acco method, or indication he detection limits	ataminant level. d custody procedures om field to laboratory oures, dates, and times field courier service fo ordance with the qualities appeared to be accept	complete? were complete, and custody was m of receipt. Custody seals were no r transport from the field to the labor ty assurance project plan (QAPP), ptable. The following dilutions were	Ye naintained as evider t present because to pratory, and custody Ye e applied.	s need by field ne samples r was s				
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<ul> <li>V – The samp</li> <li>* – Value exce</li> <li>3. Were sam</li> <li>Comments: T and laboratory</li> <li>were transferre maintained at</li> <li>4. Were dete permit, or</li> <li>Comments: T</li> </ul>	e concentration is eeds maximum cor pple CoC forms an the CoC records from personnel signatured to a laboratory all times. ection limits in accord method, or indicat the detection limits <u>Method</u> 8260B 200.7 8015D 8260B	ataminant level. d custody procedures om field to laboratory wares, dates, and times field courier service for ordance with the quali- ted as acceptable? appeared to be accept <u>Sample(s)</u> NAPI-2 NAPI-2 NAPI-3 OPIS-1 OPIS-1	complete? were complete, and custody was m of receipt. Custody seals were no r transport from the field to the labor ty assurance project plan (QAPP), otable. The following dilutions were <u>Analyte(s)</u> <u>Select VOCs</u> <u>Dissolved Barium</u> Total and Dissolved Barium TPH GRO, DRO, and MRO VOCs	Ye naintained as evider t present because the pratory, and custody Ye applied. Dilution Factor 2 5 5 5 5 5 5	s need by field ne samples v was				
<ul> <li>V – The samp</li> <li>* – Value exce</li> <li>3. Were sam</li> <li>Comments: T</li> <li>and laboratory</li> <li>were transferred</li> <li>maintained at</li> <li>4. Were dete</li> <li>permit, or</li> <li>Comments: T</li> </ul>	le concentration is seds maximum cor nple CoC forms an the CoC records from personnel signatu ed to a laboratory all times. The detection limits in accord method, or indicat he detection limits Method 8260B 200.7 8015D 8260B 200.7	ataminant level. d custody procedures om field to laboratory v ures, dates, and times field courier service fo ordance with the quali- ted as acceptable? appeared to be accept <u>Sample(s)</u> NAPI-2 NAPI-2 NAPI-3 OPIS-1 OPIS-1 NAPI-2	complete? were complete, and custody was m of receipt. Custody seals were no r transport from the field to the labor ty assurance project plan (QAPP), otable. The following dilutions were <u>Analyte(s)</u> Select VOCs Dissolved Barium Total and Dissolved Barium TPH GRO, DRO, and MRO VOCs Total Barium	Ye naintained as evider t present because th pratory, and custody Ye e applied. Dilution Factor 2 5 5 5 5 5 5 10	s need by field ne samples r was				
<ul> <li>V – The samp</li> <li>* – Value exce</li> <li>3. Were sam</li> <li>Comments: T and laboratory were transferrent maintained at</li> <li>4. Were dete permit, or</li> <li>Comments: T</li> </ul>	le concentration is seds maximum cor apple CoC forms an the CoC records fir personnel signatu ed to a laboratory all times. ection limits in accord method, or indicat the detection limits <u>Method</u> 8260B 200.7 8015D 8260B 200.7 8015D	ataminant level. d custody procedures om field to laboratory oures, dates, and times field courier service for ordance with the quali- ted as acceptable? appeared to be accept <u>Sample(s)</u> NAPI-2 NAPI-2 NAPI-3 OPIS-1 OPIS-1 NAPI-2 NAPI-2 NAPI-2 NAPI-2 NAPI-2 NAPI-2 NAPI-2	complete? were complete, and custody was m of receipt. Custody seals were no r transport from the field to the labor ty assurance project plan (QAPP), otable. The following dilutions were <u>Analyte(s)</u> Select VOCs Dissolved Barium Total and Dissolved Barium TPH GRO, DRO, and MRO VOCs Total Barium TPH GRO	Ye naintained as evider t present because the pratory, and custody Ye applied. Dilution Factor 2 5 5 5 5 5 10 10	s nced by field ne samples r was s				
<ul> <li>V – The samp</li> <li>* – Value exce</li> <li>3. Were sam</li> <li>Comments: T</li> <li>and laboratory</li> <li>were transferm</li> <li>maintained at</li> <li>4. Were dete</li> <li>permit, or</li> <li>Comments: T</li> </ul>	le concentration is seds maximum cor nple CoC forms an the CoC records from personnel signatu ed to a laboratory all times. The detection limits in accord method, or indicat he detection limits Method 8260B 200.7 200.7 8015D 8260B 200.7 8015D 8270C	ataminant level. d custody procedures om field to laboratory v ures, dates, and times field courier service fo ordance with the quali- ted as acceptable? appeared to be accept <u>Sample(s)</u> NAPI-2 NAPI-2 NAPI-3 OPIS-1 OPIS-1 NAPI-2 NAPI-2 OPIS-1 OPIS-1 OPIS-1	complete? were complete, and custody was m of receipt. Custody seals were no r transport from the field to the labor ty assurance project plan (QAPP), otable. The following dilutions were <u>Analyte(s)</u> Select VOCs Dissolved Barium Total and Dissolved Barium TPH GRO, DRO, and MRO VOCs Total Barium TPH GRO SVOCs	Ye naintained as evider t present because the pratory, and custody Ye e applied. Dilution Factor 2 5 5 5 5 5 5 10 10 10 10	s need by field ne samples r was				
<ul> <li>V – The samp</li> <li>* – Value exce</li> <li>3. Were sam</li> <li>Comments: T and laboratory were transferre maintained at</li> <li>4. Were dete permit, or</li> <li>Comments: T</li> </ul>	le concentration is seds maximum cor apple CoC forms an the CoC records fir personnel signatu ed to a laboratory all times. ection limits in accor method, or indicat the detection limits <u>Method</u> 8260B 200.7 8015D 8260B 200.7 8015D 8270C 8270C SIM	ataminant level. d custody procedures om field to laboratory oures, dates, and times field courier service for ordance with the quali- ted as acceptable? appeared to be accept <u>Sample(s)</u> NAPI-2 NAPI-2 NAPI-3 OPIS-1 OPIS-1 OPIS-1 OPIS-1 OPIS-1 OPIS-1 OPIS-1	complete? were complete, and custody was m of receipt. Custody seals were no r transport from the field to the labor ty assurance project plan (QAPP), otable. The following dilutions were <u>Analyte(s)</u> Select VOCs Dissolved Barium Total and Dissolved Barium TPH GRO, DRO, and MRO VOCs Total Barium TPH GRO SVOCs SVOCs	Ye naintained as evider t present because the pratory, and custody Ye applied. Dilution Factor 2 5 5 5 5 5 10 10 10 10 10	s need by field ne samples r was s				

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VALIDATION CRITERIA CHECKLIST	
<ol><li>Were the reported analytical methods and constituents in compliance with the QAPP, permit, or CoC?</li></ol>	No
Comments: The reported analytical methods were in compliance with the CoC, and the laboratory reconstituents in accordance with the CoC, with the following exceptions.	ported the requested
The CoC requested total and dissolved metals using only Method 200.7; however, the laboratory ana using both Method 200.7 and Method 200.8. This substituted analytical method, Method 200.8, met s accuracy, and precision goals and, therefore, was an acceptable replacement.	lyzed the samples similar sensitivity,
The CoC requested cyanide using Method 335.4; however, the laboratory analyzed the samples using This substituted analytical method met similar sensitivity, accuracy, and precision goals and, therefore replacement.	g Method 4500 CN E. e, was an acceptable
6. Were samples received in good condition within method-specified requirements?	No
Comments: Samples were received on ice, in good condition, and with the cooler temperatures both recommended temperature range of $4^{\circ}C \pm 2^{\circ}C$ between $0.4^{\circ}C$ and $2.4^{\circ}C$ as noted on the CoC and S List. Samples transferred to Pace National were received in good condition with the cooler temperature recommended range at 1.8°C as noted on the CoC.	within and outside the ample Log-in Check ıre outside the
The cooler temperatures below 2.0°C were judged as acceptable since the laboratory did not report the as broken or frozen.	ne sample containers
7. Were samples extracted/digested and analyzed within method-specified or technical holding times?	Yes
Comments: The samples were extracted/digested and analyzed within method-specific holding times	5.
<ol> <li>Were reported units appropriate for the sample matrix/matrices and analytical method(s)? Specify if wet or dry units were used for soil.</li> </ol>	Yes
Comments: The results were reported in concentration units of micrograms per liter ( $\mu$ g/L) and milligr which were acceptable for the sample matrix and the analyses requested.	ams per liter (mg/L),
9. Did the laboratory provide any specific initial and/or continuing calibration results?	No
Comments: Initial and continuing calibration data were not included as part of this data set.	
10. If initial and/or continuing calibration results were provided, were the results within acceptable limits?	N/A
Comments: Initial and continuing calibration data were not included as part of this data set.	
11. Was the total number of laboratory blank samples prepared equal to at least 5% of the total number of samples or analyzed as required by the method?	Yes
Comments: The total number of laboratory blank samples prepared was equal to at least 5% of the to samples.	otal number of
12. Were target analytes reported as not detected in the laboratory blanks?	No
Comments: Target analytes were reported as not detected in the laboratory blanks, with the following	g exception.
TPH DRO was detected in the laboratory blank for Method 8015D batch 70201 at a concentration Results greater than the blank detection and/or the laboratory reporting limit but less than 10 the concentration were qualified with a JB flag. Detections of this analyte in the associated samples were support to the support of the super support of the super support of the support of the support of the support of the super super support of the super support of the super super super support of the super supe	on of 0.025 mg/L. times the blank vith results greater



than ten times the blank concentration did not require qualification.

	CRITERIA	CHECKLIST
VALIDATION		CHECKEIST

13. Was the total number of MS samples prepared equal to at least 5% of the total number of samples or analyzed as required by the method?

Yes

Comments: The total number of matrix spike samples prepared was equal to at least 5% of the total number of samples, although MS samples were not prepared/reported for all analyses and/or batches. The matrix spike sample source for each analytical batch in this sample set has been indicated below.

<u>Method</u>	<u>Analytes</u>	<u>Batch</u>	MS Sample Source
200.7	Total Metals	70240	Not Prepared
200.7	Dissolved Silver	A91392	DUP 9-14-22
200.7	Dissolved Metals	B91347	Not Prepared
200.7	Dissolved Metals	C91347	Not Prepared
200.8	Total Metals	70240	KA-3, DUP 9-14-22
200.8	Dissolved Metals	C91078	KA-3, DUP 9-14-22
245.1	Total and Dissolved Mercury	70279	EB-09-14-22
504.1	EDB	70247	Not Prepared
4500CN E	Cyanide	WG1928522	Not Associated
4500CN E	Cyanide	WG1928523	Not Associated, MKTF-27
8015D	TPH DRO and MRO	70201	Not Prepared
8015D	TPH GRO	A91113	Not Prepared
8260B	VOCs	R91115	Not Prepared
8270C SIM	SVOCs	70216	Not Prepared
8270C	SVOCs	70216	Not Prepared

Not Associated – The MS sample source was not associated with this project. Not Prepared – Matrix spikes were not prepared/reported for this batch.

14. For MS/MSDs prepared from project samples, were percent recoveries and RPDs within data validation or laboratory quality control (QC) limits?

Yes

Comments: The MS/MSD percent recoveries and RPDs for project samples were within data validation and laboratory QC limits.

The percent recoveries and RPD values for MS/MSDs prepared from non-project samples were evaluated and considered, but data were not qualified based on those results since matrix similarity to project samples could not be guaranteed.

15. Was the total number of LCSs analyzed equal to at least 5% of the total number of<br/>samples or analyzed as required by the method?Yes

Comments: The total number of LCS samples analyzed was equal to at least 5% of the total number of samples.



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#### VALIDATION CRITERIA CHECKLIST

16. Were LCS/LCSD percent recoveries and LCS/LCSD RPDs within data validation or laboratory QC limits?

Comments: The LCS and LCSD percent recoveries and LCS/LCSD RPDs were within data validation and laboratory QC limits, with the following exceptions.

Met	<u>hod</u>	<u>Analyte</u>	<u>Batch</u>	<u>LCS</u> Recovery	<u>LCSD</u> Recovery	LCS/LCSD QC Limits
200	).7	Dissolved Barium	B91347	68.2%		70-130%
200	).7	Dissolved Nickel	B91347	133%		70-130%
200	).8	Dissolved Selenium	C91078	62.2%		70-130%
801	5D	TPH DRO	70201	75.5%	Acceptable	31.7-75.4%

Detections of dissolved barium and dissolved selenium were qualified as J-, and non-detections of these analytes were qualified as UJ, due to the evidence of potential low bias.

**Detections of dissolved nickel and TPH DRO were qualified as J+ due to the evidence of potential high bias.** The non-detection of dissolved nickel in sample EB-09-14-22 did not require qualification due to this non-conformance.

17. Were surrogate recoveries within laboratory QC limits?

No

No

Comments: Surrogate recoveries were within laboratory QC limits, with the following exceptions.

The recoveries of the surrogate BFB for samples NAPI-2, NAPI-3, and KA-3 were outside the laboratory acceptance range of 70-130% at 131%, 201%, and 147%, respectively. TPH GRO was detected in the Method 8015D analysis of samples NAPI-2, NAPI-3, KA-3, and these results were qualified as J+ to indicate a potential high bias.

Since Method 8270C and 8270C SIM surrogate associations were not available from the laboratory, qualification was assigned to all of the target analytes in a given fraction (acid or base/neutral) when two or more surrogates from the same fraction (acid or base/neutral) were outside the acceptance range. This condition did not exist for the Method 8270C SIM analysis of samples MKTF-27, MKTF-28, MKTF-29, MKTF-30, NAPI-2, NAPI-3, KA-3, and DUP 9-14-22, and qualification of sample data was not required.

The SVOC results for sample OPIS-1 were not qualified based on the surrogate non-conformances in the Method 8270C and Method 8270C SIM analyses since the applied dilution of 10 times resulted in surrogate concentrations below routinely calibrated levels, and those results were deemed unreliable and possibly inaccurate.

Qualification of sample data was not required based on surrogate non-conformances in QC samples as the environmental samples were evaluated based on their specific surrogate recoveries.

 18. Were the number of trip blank, field blank, and/or equipment blank samples
 Yes

 collected equal to at least 10% of the total number of samples or as required by the
 project guidelines, QAPP, SAP, or permit?

Comments: The number of trip, field, and equipment blanks collected was equal to at least 10% of the number of samples. One trip blank sample, Trip Blank, one field blank sample, FB 9-14-22, and one equipment blank sample, EB-9-14-22, were collected as part of this sample set.



	V	ALIDATION	CRITERIA CHECKLIST	Г	
19. Were target anal equipment blank	No				
Comments: Target a exceptions.	nalytes were not detec	ted in the trip	blank, field blank, and e	equipment blank samp	oles with the following
	Blank Sample ID	<u>Method</u>	<u>Analyte</u>	<u>Concentration</u>	
	FB 9-14-22	8260B	2-Butanone	12 µg/L	
	FB 9-14-22	8260B	Acetone	59 µg/L	
	EB-9-14-22	200.7	<b>Dissolved Zinc</b>	0.0069 mg/L	
	EB-9-14-22	200.7	Total Zinc	0.0052 mg/L	
	EB-9-14-22	8015D	TPH DRO	0.71 mg/L	
	EB-9-14-22	8015D	TPH MRO	0.89 mg/L	
horoforo additional	nualification due to the	oquinmont bl			TIK GELECTION,
20. Was the number	of field duplicates colle	ected equal to	ank contamination was	not required.	Yes
20. Was the number number of samp	of field duplicates colle	ected equal to e project guid	ank contamination was at least 10% of the tota lelines, QAPP, SAP, or	not required. al permit?	Yes
20. Was the number number of samp Comments: The num Sample DUP 9-14-22	of field duplicates colle les or as required by the ober of field duplicates was collected as a fiel	ected equal to e project guid collected was d duplicate o	ank contamination was at least 10% of the tota delines, QAPP, SAP, or s equal to at least 10% of f sample MKTF-27.	not required. al permit? of the number of samp	Yes
20. Was the number number of samp Comments: The num Sample DUP 9-14-22 21. Were field duplic 0-30%, or air 0-2	of field duplicates colle les or as required by the ober of field duplicates of was collected as a fiel ate RPD values within (5%)?	ected equal to e project guid collected was d duplicate o data validatio	ank contamination was o at least 10% of the tota delines, QAPP, SAP, or s equal to at least 10% o f sample MKTF-27. on QC limits (soil 0-50%	not required. al permit? of the number of samp , water	Yes oles.
20. Was the number number of samp Comments: The num Sample DUP 9-14-22 21. Were field duplic 0-30%, or air 0-2 Comments: As indica	of field duplicates colle les or as required by the other of field duplicates of was collected as a fiel ate RPD values within (5%)? ated in the Field Duplicated QC limits of 0-30% for	ected equal to e project guid collected was d duplicate o data validatio ate Summary water sample	ank contamination was b at least 10% of the tota delines, QAPP, SAP, or s equal to at least 10% of f sample MKTF-27. on QC limits (soil 0-50% or Table at the end of this es, with the following ex	not required. al permit? of the number of samp , water s report, field duplicate ception.	Yes oles. No RPD values were
<ol> <li>Was the number number of samp</li> <li>Comments: The num</li> <li>Sample DUP 9-14-22</li> <li>Were field duplic 0-30%, or air 0-2</li> <li>Comments: As indica within data validation</li> <li>The RPD value for t precision. The total</li> </ol>	of field duplicates colle les or as required by the aber of field duplicates of was collected as a fiel ate RPD values within (5%)? ated in the Field Duplica QC limits of 0-30% for otal cobalt exceeded for	ected equal to e project guid collected was d duplicate o data validatio ate Summary water sample the data vali jualified as	ank contamination was b at least 10% of the tota delines, QAPP, SAP, or s equal to at least 10% of f sample MKTF-27. on QC limits (soil 0-50% or Table at the end of this es, with the following ex dation limit of 30% at 3 J for samples MKTF-27	not required. al permit? of the number of samp , water , water s report, field duplicate ception. 30.8%, which was ev r and DUP 9-14-22.	Yes oles. No RPD values were
<ol> <li>Was the number number of samp</li> <li>Comments: The num</li> <li>Sample DUP 9-14-22</li> <li>Were field duplic 0-30%, or air 0-2</li> <li>Comments: As indica within data validation</li> <li>The RPD value for to precision. The total</li> <li>For laboratory du validation or laboratory du</li> </ol>	of field duplicates colle les or as required by the aber of field duplicates of was collected as a fiel ate RPD values within (5%)? ated in the Field Duplicates of QC limits of 0-30% for <b>otal cobalt exceeded for</b> <b>l cobalt results were of</b> uplicates prepared from oratory QC limits?	ected equal to e project guid collected was d duplicate o data validatio ate Summary water sample the data vali jualified as s	ank contamination was b at least 10% of the tota delines, QAPP, SAP, or s equal to at least 10% of f sample MKTF-27. on QC limits (soil 0-50% or Table at the end of this es, with the following ex dation limit of 30% at 3 J for samples MKTF-27 ples, were RPDs within	not required. al permit? of the number of samp , water , water s report, field duplicate ception. 30.8%, which was ev ' and DUP 9-14-22. data	Yes oles. No e RPD values were ridence of poor
<ol> <li>Was the number number of samp</li> <li>Comments: The num</li> <li>Sample DUP 9-14-22</li> <li>Were field duplic 0-30%, or air 0-2</li> <li>Comments: As indica</li> <li>within data validation</li> <li>The RPD value for t</li> <li>precision. The total</li> <li>22. For laboratory du validation or labo</li> <li>Comments: Laborator</li> <li>Samples not associat</li> </ol>	of field duplicates colle les or as required by the aber of field duplicates of was collected as a fiel ate RPD values within (5%)? ated in the Field Duplicates QC limits of 0-30% for <b>otal cobalt exceeded</b> <b>i cobalt results were of</b> uplicates prepared from pratory QC limits? ory duplicates were pre- ed with this data set.	ected equal to e project guid collected was d duplicate o data validatio ate Summary water sample the data vali jualified as project sample pared for the	ank contamination was o at least 10% of the tota delines, QAPP, SAP, or s equal to at least 10% of f sample MKTF-27. on QC limits (soil 0-50% or Table at the end of this es, with the following ex dation limit of 30% at 3 J for samples MKTF-27 ples, were RPDs within analysis of cyanide in b	not required. al permit? of the number of samp , water s report, field duplicate ception. <b>30.8%, which was ev</b> <b>7 and DUP 9-14-22.</b> data patches WG1928522 a	Yes oles. No e RPD values were ridence of poor N/A and WG1928523 fror



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		VALIDATION CRITER	IA CHECKLIST				
23. Were the follo	owing data relationships	realistic?					
• Target a		N/A					
Comments: Targ	et analytes were not rep	orted by more than one	method.				
<ul> <li>Both tota results w</li> </ul>	tals	No					
Comments: The results	following table contains	the exceptions in which	the dissolved meta	ils results exceeded t	the total metals		
roouno.	Sampla ID	Apolyto	Total Result	Dissolved Result	]		
		Analyte	<u>(mg/L)</u>	<u>(mg/L)</u>			
	MKTF-28	Antimony	ND	0.00077			
	MKTF-27	Nickel	0.029	0.032			
	MKTF-28	Nickel	ND	0.0050	_		
	MKTF-29	Nickel	0.015	0.018			
	MKTF-30	Nickel	0.014	0.018			
	KA-3	Nickel	0.020	0.022	_		
	DUP 9-14-22	Nickel	0.029	0.033			
	KA-3	Selenium	0.00080	0.0014			
	MKTF-27	Silver	ND	0.0043			
	MKTF-28	Silver	ND	0.0019			
	MKTF-29	Silver	0.0026	0.0077			
	MKTF-30	Silver	ND	0.0022			
	Sample ID	<u>Analyte</u>	<u>Total Result</u> <u>(mg/L)</u>	Dissolved Result (mg/L)			
	OPIS-1	Silver	ND	0.0025			
	NAPI-2	Silver	ND	0.0026			
	NAPI-3	Silver	ND	0.0028	-		
	DUP 9-14-22	Silver	ND	0.0040	-		
	EB-09-14-22	Zinc	0.0052	0.0069			
	MKTF-27	Zinc	0.0040	0.011			
	MKTF-28	Zinc	0.024	0.043			
	MKTF-29	Zinc	ND	0.011			
	MKTF-30	Zinc	ND	0.0090			
	OPIS-1	Zinc	0.0068	0.023			
	NAPI-2	Zinc	ND	0.0096	]		
	NAPI-3	Zinc	ND	0.012			

The EPA has not provided guidance or requirements for the evaluation, validation, and qualification of dissolved metals results that exceed the corresponding total metals results. Therefore, qualification of results was not performed based on these data.

0.0089

ND

0.032

0.010

Zinc

Zinc

🔝 Trihydro

KA-3

DUP 9-14-22
Client Sample ID: MKTF-27 Field Duplicate Sample ID: DUP 9-14-22								
Analyte	Method	Laboratory Result	Duplicate Result	Relative Percent Difference (RPD)				
Barium, Dissolved	E 200.7	0.059 mg/L	0.058 mg/L	1.7%				
Barium, Total	E 200.7	0.18 mg/L	0.17 mg/L	5.7%				
Cobalt, Total	E 200.7	0.011 mg/L	0.015 mg/L	30.8%				
Nickel, Dissolved	E 200.7	0.032 mg/L	0.033 mg/L	3.1%				
Nickel, Total	E 200.7	0.029 mg/L	0.029 mg/L	0.0%				
Silver, Dissolved	E 200.7	0.0043 mg/L	0.0040 mg/L	7.2% +/-RL				
Vanadium, Dissolved	E 200.7	0.0038 mg/L	0.0048 mg/L	23.3% +/-RL				
Vanadium, Total	E 200.7	0.015 mg/L	0.016 mg/L	6.5% +/-RL				
Zinc, Dissolved	E 200.7	0.011 mg/L	0.010 mg/L	9.5% +/-RL				
Zinc, Total	E 200.7	0.0040 mg/L	ND (0.010 mg/L)	DL				
Arsenic, Dissolved	E200.8	0.00042 mg/L	0.00049 mg/L	15.4% +/-RL				
Arsenic, Total	E200.8	0.0011 mg/L	0.0013 mg/L	16.7% +/-RL				
Lead, Dissolved	E200.8	0.000093 mg/L	0.000080 mg/L	15.0% +/-RL				
Lead, Total	E200.8	0.0032 mg/L	0.0029 mg/L	9.8%				
Selenium, Dissolved	E200.8	0.00051 mg/L	0.00094 mg/L	59.3% +/-RL				
Selenium, Total	E200.8	0.0011 mg/L	0.0014 mg/L	24.0% +/-RL				
Cyanide, Total	E335.4	0.00799 mg/L	0.00901 mg/L	12.0% +/-RL				
TPH DRO	SW8015	0.20 mg/L	0.21 mg/L	4.9%				
TPH GRO	SW8015	0.030 mg/L	0.032 mg/L	6.5% +/-RL				
TPH ORO	SW8015	0.068 mg/L	0.061 mg/L	10.9% +/-RL				
1,1-Dichloroethane	SW8260B	1.6 µg/L	1.6 µg/L	0.0% +/-RL				
МТВЕ	SW8260B	33 µg/L	33 µg/L	0.0%				
1,4-Dioxane	SW8270C	5.0 µg/L	5.7 µg/L	13.1%				

#### FIELD DUPLICATE SUMMARY

Field duplicate RPD control limits are not to exceed 30% for water as established by USEPA Region I - New England Environmental Data Review Supplement for Region 1 Data Review Elements and Superfund Specific Guidance/Procedures, EQADR-Supplement2, September 2020.

DL – Indicates that the analyte was detected in one of the duplicate samples and was undetected in the other sample, and therefore an RPD could not be calculated. Data were not qualified since the detection was within two times the reporting limit. Non-detected results are indicated above with the applicable reporting limit as ND (RL).

+/-RL – Indicates that the detections in both of the samples were within two times the reporting limit. Qualification of data was not required.

The RPD value for total cobalt exceeded the data validation limit of 30% at 30.8%, which was evidence of poor precision. The total cobalt results were qualified as J for samples MKTF-27 and DUP 9-14-22.



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Abbreviation	Reason
EBD	Equipment blank detection
ERPD-FD	High field duplicate RPD.
HR-LCS	The LCS and/or LCSD percent recovery was greater than the upper acceptable limit indicating a possible high bias.
HR-SUR	The surrogate percent recovery was greater than the upper acceptable limit indicating a possible high bias.
LR-LCS	The LCS and/or LCSD percent recovery was less than the lower acceptable limit indicating a possible low bias.
MBD	Method blank detection
MDLRL	Flagged by the laboratory: The result was greater than the MDL but less than the RL.

Analyte	Method	Field Sample ID	Lab Sample ID	Result	Limit	Units	Reviewer Qualifier	DV Flag Reasons
1,1-Dichloroethane	SW8260B	MKTF-29	2209730-004a	0.90	1.0	µg/L	J	MDLRL
1,4-Dioxane	SW8270C	MKTF-28	2209730-003c	0.36	1.0	µg/L	J	MDLRL
1,4-Dioxane	SW8270C	NAPI-3	2209730-008c	0.74	1.0	µg/L	J	MDLRL
1,4-Dioxane	SW8270C	KA-3	2209730-009c	0.48	1.0	µg/L	J	MDLRL
Anthracene	SW8270C	NAPI-3	2209730-008c	0.18	0.30	µg/L	J	MDLRL
Antimony, Dissolved	E200.8	MKTF-28	2209730-003E	0.00077	0.0010	mg/L	J	MDLRL
Arsenic, Dissolved	E200.8	MKTF-27	2209730-002E	0.00042	0.0010	mg/L	J	MDLRL
Arsenic, Dissolved	E200.8	MKTF-28	2209730-003E	0.00093	0.0010	mg/L	J	MDLRL
Arsenic, Dissolved	E200.8	MKTF-29	2209730-004E	0.00078	0.0010	mg/L	J	MDLRL
Arsenic, Dissolved	E200.8	MKTF-30	2209730-005E	0.00060	0.0010	mg/L	J	MDLRL
Arsenic, Dissolved	E200.8	KA-3	2209730-009E	0.00067	0.0010	mg/L	J	MDLRL
Arsenic, Dissolved	E200.8	DUP 9-14-22	2209730-010E	0.00049	0.0010	mg/L	J	MDLRL
Arsenic, Total	E200.8	MKTF-29	2209730-004D	0.00094	0.0010	mg/L	J	MDLRL
Arsenic, Total	E200.8	KA-3	2209730-009D	0.00071	0.0010	mg/L	J	MDLRL
Barium, Dissolved	E 200.7	MKTF-27	2209730-002E	0.059	0.0020	mg/L	J-	LR-LCS



Analyte	Method	Field Sample ID	Lab Sample ID	Result	Limit	Units	Reviewer Qualifier	DV Flag Reasons
Barium, Dissolved	E 200.7	MKTF-28	2209730-003E	0.073	0.0020	mg/L	J-	LR-LCS
Barium, Dissolved	E 200.7	MKTF-29	2209730-004E	0.20	0.0020	mg/L	J-	LR-LCS
Barium, Dissolved	E 200.7	MKTF-30	2209730-005E	0.036	0.0020	mg/L	J-	LR-LCS
Barium, Dissolved	E 200.7	OPIS-1	2209730-006E	0.82	0.0020	mg/L	J-	LR-LCS
Barium, Dissolved	E 200.7	NAPI-2	2209730-007E	4.9	0.010	mg/L	J-	LR-LCS
Barium, Dissolved	E 200.7	NAPI-3	2209730-008E	2.3	0.010	mg/L	J-	LR-LCS
Barium, Dissolved	E 200.7	KA-3	2209730-009E	0.21	0.0020	mg/L	J-	LR-LCS
Barium, Dissolved	E 200.7	EB-09-14-22	2209730-001E	ND	0.0020	mg/L	UJ	LR-LCS
Chromium, Total	E 200.7	OPIS-1	2209730-006D	0.0023	0.0060	mg/L	J	MDLRL
Cobalt, Dissolved	E 200.7	OPIS-1	2209730-006E	0.0048	0.0060	mg/L	J	MDLRL
Cobalt, Total	E 200.7	MKTF-27	2209730-002D	0.011	0.0060	mg/L	J	ERPD-FD
Cobalt, Total	E 200.7	DUP 9-14-22	2209730-010D	0.015	0.0060	mg/L	J	ERPD-FD
Ethylbenzene	SW8260B	OPIS-1	2209730-006a	4.6	5.0	µg/L	J	MDLRL
Ethylbenzene	SW8260B	KA-3	2209730-009a	0.31	1.0	µg/L	J	MDLRL
Fluorene	SW8270C	NAPI-3	2209730-008c	0.24	0.30	µg/L	J	MDLRL
Lead, Dissolved	E200.8	MKTF-27	2209730-002E	0.000093	0.00050	mg/L	J	MDLRL
Lead, Dissolved	E200.8	MKTF-28	2209730-003E	0.00014	0.00050	mg/L	J	MDLRL
Lead, Dissolved	E200.8	MKTF-30	2209730-005E	0.000098	0.00050	mg/L	J	MDLRL
Lead, Dissolved	E200.8	NAPI-2	2209730-007E	0.00032	0.00050	mg/L	J	MDLRL
Lead, Dissolved	E200.8	KA-3	2209730-009E	0.00021	0.00050	mg/L	J	MDLRL
Lead, Dissolved	E200.8	DUP 9-14-22	2209730-010E	0.00008	0.00050	mg/L	J	MDLRL
n-Butylbenzene	SW8260B	NAPI-2	2209730-007a	1.2	6.0	µg/L	J	MDLRL
Nickel, Dissolved	E 200.7	MKTF-27	2209730-002E	0.032	0.010	mg/L	J+	HR-LCS
Nickel, Dissolved	E 200.7	MKTF-29	2209730-004E	0.018	0.010	mg/L	J+	HR-LCS
Nickel, Dissolved	E 200.7	MKTF-30	2209730-005E	0.018	0.010	mg/L	J+	HR-LCS
Nickel, Dissolved	E 200.7	OPIS-1	2209730-006E	0.17	0.010	mg/L	J+	HR-LCS
Nickel, Dissolved	E 200.7	NAPI-2	2209730-007E	0.068	0.010	mg/L	J+	HR-LCS



Analyte	Method	Field Sample ID	Lab Sample ID	Result	Limit	Units	Reviewer Qualifier	DV Flag Reasons
Nickel, Dissolved	E 200.7	NAPI-3	2209730-008E	0.022	0.010	mg/L	J+	HR-LCS
Nickel, Dissolved	E 200.7	KA-3	2209730-009E	0.022	0.010	mg/L	J+	HR-LCS
Nickel, Dissolved	E 200.7	MKTF-28	2209730-003E	0.005	0.010	mg/L	J+	HR-LCS, MDLRL
sec-Butylbenzene	SW8260B	NAPI-3	2209730-008a	0.73	1.0	µg/L	J	MDLRL
Selenium, Dissolved	E200.8	OPIS-1	2209730-006E	0.0012	0.0010	mg/L	J-	LR-LCS
Selenium, Dissolved	E200.8	KA-3	2209730-009E	0.0014	0.0010	mg/L	J-	LR-LCS
Selenium, Dissolved	E200.8	EB-09-14-22	2209730-001E	ND	0.0010	mg/L	UJ	LR-LCS
Selenium, Dissolved	E200.8	MKTF-29	2209730-004E	ND	0.0010	mg/L	UJ	LR-LCS
Selenium, Dissolved	E200.8	MKTF-30	2209730-005E	ND	0.0010	mg/L	UJ	LR-LCS
Selenium, Dissolved	E200.8	NAPI-3	2209730-008E	ND	0.0010	mg/L	UJ	LR-LCS
Selenium, Dissolved	E200.8	MKTF-27	2209730-002E	0.00051	0.0010	mg/L	J-	LR-LCS, MDLRL
Selenium, Dissolved	E200.8	MKTF-28	2209730-003E	0.00044	0.0010	mg/L	J-	LR-LCS, MDLRL
Selenium, Dissolved	E200.8	NAPI-2	2209730-007E	0.00053	0.0010	mg/L	J-	LR-LCS, MDLRL
Selenium, Dissolved	E200.8	DUP 9-14-22	2209730-010E	0.00094	0.0010	mg/L	J-	LR-LCS, MDLRL
Selenium, Total	E200.8	MKTF-30	2209730-005D	0.00053	0.0010	mg/L	J	MDLRL
Selenium, Total	E200.8	NAPI-2	2209730-007D	0.00063	0.0010	mg/L	J	MDLRL
Selenium, Total	E200.8	NAPI-3	2209730-008D	0.00054	0.0010	mg/L	J	MDLRL
Selenium, Total	E200.8	KA-3	2209730-009D	0.0008	0.0010	mg/L	J	MDLRL
Silver, Dissolved	E 200.7	MKTF-27	2209730-002E	0.0043	0.0050	mg/L	J	MDLRL
Silver, Dissolved	E 200.7	MKTF-28	2209730-003E	0.0019	0.0050	mg/L	J	MDLRL
Silver, Dissolved	E 200.7	MKTF-30	2209730-005E	0.0022	0.0050	mg/L	J	MDLRL
Silver, Dissolved	E 200.7	OPIS-1	2209730-006E	0.0025	0.0050	mg/L	J	MDLRL
Silver, Dissolved	E 200.7	NAPI-2	2209730-007E	0.0026	0.0050	mg/L	J	MDLRL
Silver, Dissolved	E 200.7	NAPI-3	2209730-008E	0.0028	0.0050	mg/L	J	MDLRL
Silver, Dissolved	E 200.7	DUP 9-14-22	2209730-010E	0.0040	0.0050	mg/L	J	MDLRL
Silver, Total	E 200.7	MKTF-29	2209730-004D	0.0026	0.0050	mg/L	J	MDLRL
Toluene	SW8260B	NAPI-2	2209730-007a	0.62	2.0	µg/L	J	MDLRL



Analyte	Method	Field Sample ID	Lab Sample ID	Result	Limit	Units	Reviewer Qualifier	DV Flag Reasons
TPH DRO	SW8015	EB-09-14-22	2209730-001C	0.71	0.064	mg/L	J+	HR-LCS
TPH DRO	SW8015	MKTF-29	2209730-004C	1.2	0.064	mg/L	J+	HR-LCS
TPH DRO	SW8015	OPIS-1	2209730-006C	7.3	0.32	mg/L	J+	HR-LCS
TPH DRO	SW8015	NAPI-2	2209730-007C	2.7	0.064	mg/L	J+	HR-LCS
TPH DRO	SW8015	NAPI-3	2209730-008C	0.86	0.064	mg/L	J+	HR-LCS
TPH DRO	SW8015	KA-3	2209730-009C	0.61	0.064	mg/L	J+	HR-LCS
TPH DRO	SW8015	MKTF-27	2209730-002C	0.2	0.064	mg/L	JB	HR-LCS, MBD
TPH DRO	SW8015	MKTF-28	2209730-003C	0.16	0.064	mg/L	JB	HR-LCS, MBD
TPH DRO	SW8015	MKTF-30	2209730-005C	0.15	0.064	mg/L	JB	HR-LCS, MBD
TPH DRO	SW8015	DUP 9-14-22	2209730-010C	0.21	0.064	mg/L	JB	HR-LCS, MBD
TPH GRO	SW8015	NAPI-2	2209730-007a	4.1	0.50	mg/L	J+	HR-SUR
TPH GRO	SW8015	NAPI-3	2209730-008a	0.47	0.050	mg/L	J+	HR-SUR
TPH GRO	SW8015	KA-3	2209730-009a	0.12	0.050	mg/L	J+	HR-SUR
TPH GRO	SW8015	MKTF-27	2209730-002a	0.03	0.050	mg/L	J	MDLRL
TPH GRO	SW8015	MKTF-29	2209730-004a	0.02	0.050	mg/L	J	MDLRL
TPH GRO	SW8015	MKTF-30	2209730-005a	0.028	0.050	mg/L	J	MDLRL
TPH GRO	SW8015	DUP 9-14-22	2209730-010a	0.032	0.050	mg/L	J	MDLRL
TPH ORO	SW8015	OPIS-1	2209730-006C	1.0	0.40	mg/L	JB	EBD
TPH ORO	SW8015	MKTF-29	2209730-004C	0.84	0.080	mg/L	U	EBD
TPH ORO	SW8015	NAPI-2	2209730-007C	0.14	0.080	mg/L	U	EBD
TPH ORO	SW8015	NAPI-3	2209730-008C	0.086	0.080	mg/L	U	EBD
TPH ORO	SW8015	KA-3	2209730-009C	0.11	0.080	mg/L	U	EBD
TPH ORO	SW8015	MKTF-27	2209730-002C	0.068	0.080	mg/L	U	EBD, MDLRL
TPH ORO	SW8015	DUP 9-14-22	2209730-010C	0.061	0.080	mg/L	U	EBD, MDLRL
Vanadium, Dissolved	E 200.7	MKTF-27	2209730-002E	0.0038	0.050	mg/L	J	MDLRL
Vanadium, Dissolved	E 200.7	MKTF-28	2209730-003E	0.0064	0.050	mg/L	J	MDLRL
Vanadium, Dissolved	E 200.7	MKTF-29	2209730-004E	0.0083	0.050	mg/L	J	MDLRL



Analyte	Method	Field Sample ID	Lab Sample ID	Result	Limit	Units	Reviewer Qualifier	DV Flag Reasons
Vanadium, Dissolved	E 200.7	MKTF-30	2209730-005E	0.0046	0.050	mg/L	J	MDLRL
Vanadium, Dissolved	E 200.7	OPIS-1	2209730-006E	0.029	0.050	mg/L	J	MDLRL
Vanadium, Dissolved	E 200.7	NAPI-2	2209730-007E	0.0042	0.050	mg/L	J	MDLRL
Vanadium, Dissolved	E 200.7	NAPI-3	2209730-008E	0.0023	0.050	mg/L	J	MDLRL
Vanadium, Dissolved	E 200.7	KA-3	2209730-009E	0.015	0.050	mg/L	J	MDLRL
Vanadium, Dissolved	E 200.7	DUP 9-14-22	2209730-010E	0.0048	0.050	mg/L	J	MDLRL
Vanadium, Total	E 200.7	MKTF-27	2209730-002D	0.015	0.050	mg/L	J	MDLRL
Vanadium, Total	E 200.7	MKTF-28	2209730-003D	0.034	0.050	mg/L	J	MDLRL
Vanadium, Total	E 200.7	MKTF-29	2209730-004D	0.011	0.050	mg/L	J	MDLRL
Vanadium, Total	E 200.7	MKTF-30	2209730-005D	0.021	0.050	mg/L	J	MDLRL
Vanadium, Total	E 200.7	OPIS-1	2209730-006D	0.041	0.050	mg/L	J	MDLRL
Vanadium, Total	E 200.7	NAPI-2	2209730-007D	0.0092	0.050	mg/L	J	MDLRL
Vanadium, Total	E 200.7	NAPI-3	2209730-008D	0.0041	0.050	mg/L	J	MDLRL
Vanadium, Total	E 200.7	KA-3	2209730-009D	0.019	0.050	mg/L	J	MDLRL
Vanadium, Total	E 200.7	DUP 9-14-22	2209730-010D	0.016	0.050	mg/L	J	MDLRL
Xylenes, Total	SW8260B	NAPI-3	2209730-008a	1.2	1.5	µg/L	J	MDLRL
Zinc, Dissolved	E 200.7	MKTF-27	2209730-002E	0.011	0.010	mg/L	JB	EBD
Zinc, Dissolved	E 200.7	MKTF-28	2209730-003E	0.043	0.010	mg/L	JB	EBD
Zinc, Dissolved	E 200.7	MKTF-29	2209730-004E	0.011	0.010	mg/L	JB	EBD
Zinc, Dissolved	E 200.7	OPIS-1	2209730-006E	0.023	0.010	mg/L	JB	EBD
Zinc, Dissolved	E 200.7	NAPI-3	2209730-008E	0.012	0.010	mg/L	JB	EBD
Zinc, Dissolved	E 200.7	KA-3	2209730-009E	0.032	0.010	mg/L	JB	EBD
Zinc, Dissolved	E 200.7	DUP 9-14-22	2209730-010E	0.010	0.010	mg/L	JB	EBD
Zinc, Dissolved	E 200.7	MKTF-30	2209730-005E	0.009	0.010	mg/L	U	EBD, MDLRL
Zinc, Dissolved	E 200.7	NAPI-2	2209730-007E	0.0096	0.010	mg/L	U	EBD, MDLRL
Zinc, Dissolved	E 200.7	EB-09-14-22	2209730-001E	0.0069	0.010	mg/L	J	MDLRL
Zinc, Total	E 200.7	MKTF-28	2209730-003D	0.024	0.010	mg/L	JB	EBD



Analyte	Method	Field Sample ID	Lab Sample ID	Result	Limit	Units	Reviewer Qualifier	DV Flag Reasons
Zinc, Total	E 200.7	MKTF-27	2209730-002D	0.004	0.010	mg/L	U	EBD, MDLRL
Zinc, Total	E 200.7	OPIS-1	2209730-006D	0.0068	0.010	mg/L	U	EBD, MDLRL
Zinc, Total	E 200.7	KA-3	2209730-009D	0.0089	0.010	mg/L	U	EBD, MDLRL
Zinc, Total	E 200.7	EB-09-14-22	2209730-001D	0.0052	0.010	mg/L	J	MDLRL



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Client: Marathon Oil	Laboratory: Hall Environmental Analysis Laboratory				
Project Name: Western Refining Southwest, Quarterly GW	Sample Matrix: Groundwater				
Project Number: 697-080-002 Task: 0004	Sample Start Date: 09/15/2022				
Date Validated: 01/16/2023	Sample End Date: 09/15/2022				
Parameters Included:					
<ul> <li>Volatile Organic Compounds (VOC) by Environmental Pro Waste (SW-846) Method 8260B</li> </ul>	otection Agency (EPA) Test Methods for Evaluating Solid				
<ul> <li>1,2-Dibromoethane (EDB) by EPA Method 504.1</li> </ul>					
<ul> <li>Semivolatile Organic Compounds (SVOC) by SW-846 Me Monitoring (SIM)</li> </ul>	thod 8270C and Method 8270C with Selected Ion				
<ul> <li>Total Petroleum Hydrocarbons (TPH) Gasoline Range Organics (GRO) by SW-846 Method 8015D</li> </ul>					
<ul> <li>TPH Diesel Range Organics (DRO) and Motor Oil Range Organics (MRO) by SW-846 Method 8015D Modified</li> </ul>					
<ul> <li>Total and Dissolved Metals by EPA Method 200.7 and Method 200.8</li> </ul>					
<ul> <li>Total and Dissolved Mercury by EPA Method 245.1</li> </ul>					

- Anions by EPA Method 300.0
- · Cyanide by Standard Methods for the Examination of Water and Wastewater (SM) Method 4500 CN E

Laboratory Project ID: 2209816

Data Validator: Daran O'Hollearn, Lead Project Scientist

Reviewer: Charles Ballek, Senior Chemist

## DATA EVALUATION CRITERIA SUMMARY

A Tier II Data Validation was performed by Trihydro Corporation's Chemical Data Evaluation Services Group on the analytical data report packages generated by Hall Environmental Analysis Laboratory of Albuquerque, New Mexico, with additional data from Pace Analytical National of Mount Juliet, Tennessee evaluating samples from the Marathon Oil site, located in Gallup, New Mexico.

Precision, accuracy, method compliance, and completeness of this data package were assessed during this data review. Precision was determined by evaluating the calculated relative percent difference (RPD) values from:

- Field duplicate pairs
- Laboratory duplicate pairs
- Matrix spike (MS) and matrix spike duplicate (MSD) pairs
- Laboratory control sample (LCS) and laboratory control sample duplicate (LCSD) pairs

Laboratory accuracy was established by reviewing the demonstrated percent recoveries (%R) of the following items to verify that data are not biased.

- MS/MSD samples
- LCS/LCSD samples
- Organic system monitoring compounds (surrogates)



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Field accuracy was established by collecting and analyzing the following samples to monitor for possible ambient or cross contamination during sampling and transportation.

- Trip blanks
- Field blanks
- Equipment blanks

Method compliance was established by reviewing sample integrity, holding times, detection limits, surrogate recoveries, laboratory blanks, initial and continuing calibrations (where applicable), and the LCS/LCSD percent recoveries against method-specific requirements.

Completeness was evaluated by determining the overall ratio of the number of samples and analyses planned versus the number of samples with valid analyses. Determination of completeness included a review of the chain-of-custody (CoC), laboratory analytical methods, and other laboratory and field documents associated with this analytical data set.

Client Sample ID	Laboratory Sample Number
EB-09-15-22	2209816-001
MKTF-16	2209816-002
OW-12A	2209816-003
OW-70	2209816-004
OW-57	2209816-005
FB 9-15-22	2209816-006
DUP 9-15-22	2209816-007
Trip Blank	2209816-008

### SAMPLE NUMBERS TABLE





The laboratory data were reviewed to evaluate compliance with the methods and the quality of the reported data. Assessment of CoC completeness is included in Item 3 of the Data Validation Checklist. A check mark ( $\checkmark$ ) indicates that the referenced validation criteria were deemed acceptable, whereas a crossed circle ( $\otimes$ ) indicates validation criteria for which the data have been qualified by the data validator. An empty circle (O) indicates that the specified criterion does not apply to the reviewed data. Details are noted in the tables below.

#### Validation Criteria

- ✓ Data Completeness
- ✓ CoC Documentation (Item 3)
- ✓ Holding Times and Preservation (Items 6 and 7)
- O Initial and Continuing Calibrations (Items 9 and 10)
- ⊗ Laboratory Blanks (Items 11 and 12)
- ⊗ MS/MSD (Items 13 and 14)
- ✓ LCS/LCSD (Items 15 and 16)
- System Monitoring Compounds (i.e., Surrogates) (Item 17)
- 8 Field, Equipment, and Trip Blanks (Items 18 and 19)
- ⊗ Field Duplicates (Items 20 and 21)
- ✓ Laboratory Duplicates (Item 22)

### **Guidance References**

Chemical data validation was conducted in accordance with the United States Environmental Protection Agency (USEPA) Contract Laboratory Program (CLP) National Functional Guidelines for the analyses listed below, or by the appropriate method if not covered in the National Functional Guidelines.

- Data for organic analyses were evaluated according to validation criteria set forth in the USEPA CLP National Functional Guidelines for Organic Superfund Methods Data Review, document number EPA-540-R-20-005, November 2020 with additional reference to the USEPA CLP National Functional Guidelines for Organic Data Review, document number EPA 540/R-99/008, October 1999.
- Data for inorganic analyses were evaluated according to validation criteria set forth in the USEPA CLP National Functional Guidelines for Inorganic Superfund Methods Data Review, document number EPA-540-R-20-006, November 2020 with additional reference to the USEPA CLP National Functional Guidelines for Inorganic Data Review, document number EPA 540-R-04-004, October 2004.
- Review of field duplicates was conducted according to the USEPA Region I New England Environmental Data Review Supplement for Region 1 Data Review Elements and Superfund Specific Guidance/Procedures, EQADR-Supplement2, September 2020.
- Trihydro Data Validation Variance Documentation, April 2022.



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### **OVERALL DATA PACKAGE ASSESSMENT**

Based on a data validation review, the data are acceptable as delivered. Data qualified by the laboratory are discussed in Item 2 of the Validation Criteria Checklist.

The purpose of validating data and assigning qualifiers is to assist in proper data interpretation. Data that are not qualified meet the site data quality objectives. If values are assigned qualifiers other than an R (rejected, data not usable), the data may be used for site evaluation; however, consideration should be given to the reasons for qualification when interpreting sample concentrations. Data points that are assigned an R qualifier should not be used for site evaluation purposes.

If applicable, text was identified in **bold font** in the Validation Criteria Checklist to indicate that further action and/or qualification of the data were required. Data may have been qualified with J data flags by the laboratory if the result was greater than or equal to the method detection limit (MDL) but less than the reporting limit (RL). These laboratory-applied J flags were preserved, if present, and included in the Data Qualification Summary table at the end of this report. If applicable, data validation qualifiers were added for the items noted with crossed circles in the Validation Criteria section above. Please see the Data Qualification Summary table at the end of this report.

If data would be qualified with more than one flag, one qualifier was assigned based on the severity; however, all reasons for qualification were retained. Data that would be qualified with both J+ and J- flags were evaluated based on validation criteria and assigned the appropriate flag. The hierarchy of qualifiers from the most to least severe is as follows:

Data qualifiers used during this validation are included in the following table.

<u>Qualifier</u>	Definition
J	Estimated concentration
J+	The result is an estimated concentration, but may be biased high
UJ	Estimated reporting limit
U	Evaluated to be undetected at the reporting limit
JB	Estimated concentration due to blank contamination

#### **Data Completeness**

The analyses were performed as requested on the CoC records. The associated samples were received by the laboratory and analyzed properly unless otherwise noted in the Criteria Checklist below. The complete data package consisted of 456 data points. The data completeness calculation does not include any submitted blank sample results. Data points were not rejected. The data completeness measure for this data package is calculated to be 100% and is acceptable.



1. Was the report free of non-conformances identified by the laboratory?       No         Comments: The laboratory noted the following analytical non-conformance related to this data set.       Method 8270 SIM because of their elevated concentrations for sample OW-67.         2. Were the data free of data qualification flags and/or notes used by the laboratory?       No         2. Were the data free of data qualification flags and/or notes used by the laboratory?       No         3. Were the data free of data qualification flags and/or notes used by the laboratory?       No         3. Were the data free of data qualification flags and/or notes used by the laboratory?       No         3. Were sample diluted due to matrix.       J - Analyte detected below quantitation limits.       No         5% Recovery outside of range due to dilution or matrix interference.       No       No         Comments: The CoC feords from field to laboratory were complete, and custody was maintained as evidenced by field and laboratory personnel signatures, dates, and times of receipt. The laboratory noted that the shipping containers were sealed, and custody seals were present and intact on the shipping containers.         The container for sample MKTF-16 Method 8015 DRO/MCO was not received by the laboratory.       Yes         4. Were detection limits appeared to be acceptable. The following dilutions were applied.       Dilution Factor         60150       OW-57       TPH DRO and MRO       2         200.7       MKTF-16, OW-12A       TPH DRO and	VALIDATION CRITERIA CHECKLIST									
Comments: The laboratory noted the following analytical non-conformance related to this data set.         Method 8270C: Naphthalene, 1-methylnaphthalene, and 2-methylnaphthalene were reported by EPA Method 8270 instead of EPA Method 8270 SIM because of their elevated concentrations for sample OV-57.         2. Were the data free of data qualification flags and/or notes used by the laboratory?       No         If no, define.       No         2. Sample diluted due to matrix.       J - Analyte detected below quantitation limits.         3. A nalyte detected below quantitation limits.       S - % Recovery outside of range due to dilution or matrix interference.         * - Value exceeds maximum contaminant level.       No         3. Were sample CoC forms and custody procedures complete; and custody was maintained as evidenced by field and laboratory personnel signatures, dates, and times of receipt. The laboratory noted that the shipping containers were sealed, and custody seals were present and intact on the shipping containers.         The container for sample MKTF-16 Method 8015 DRO/MRO was not received by the laboratory.       Yes         4. Were detection limits appeared to be acceptable. The following dilutions were applied.       Dilution Factor         80150       Sample(s)       Analyte(s)       Dilution Factor         80150       MKTF-16       Total Lead       5         80150       MKTF-16       Total Lead       5         80150       MKTF-16       Total Lead and Selenium <t< td=""><td>1. W</td><td colspan="8">1. Was the report free of non-conformances identified by the laboratory?       No</td></t<>	1. W	1. Was the report free of non-conformances identified by the laboratory?       No								
Method 8270C: Naphthalene, 1-methylnaphthalene, and 2-methylnaphthalene were reported by EPA Method 8270 instead of EPA Method 8270 SIM because of their elevated concentrations for sample OW-57.         2. Were the data free of data qualification flags and/or notes used by the laboratory? In orderine.       No         Comments: The laboratory used the following data qualification flags with this data set.       D - Sample diluted due to matrix.         J - Analyte detected below quantitation limits.       S - % Recovery outside of range due to dilution or matrix interference.         * - Value exceeds maximum contaminant level.       No         3. Were sample CoC forms and custody procedures complete, and custody was maintained as evidenced by field and laboratory personnel signatures, dates, and times of receipt. The laboratory noted that the shipping containers were sealed, and custody see present and intact on the shipping containers.         The container for sample MKTF-16 Method 8015 DRO/MRO was not received by the laboratory.       Yes         comments: The detection limits in accordance with the quality assurance project plan (QAPP), Yes permit, or method, or indicated as acceptable. The following dilutons were applied.       Yes         Ver detection limits in accordance with the quality assurance project plan (QAPP), Yes permit, or method, or indicated as acceptable?       Yes         Comments: The detection limits appeared to be acceptable. The following dilutons were applied.       Yes         Ver detection limits in accordance with the quality assurance project plan (QAPP), Yes       Yes         200.7	Comm	Comments: The laboratory noted the following analytical non-conformance related to this data set.								
2. Were the data free of data qualification flags and/or notes used by the laboratory?       No         r no, define.       Comments: The laboratory used the following data qualification flags with this data set.       D - Sample diluted due to matrix.         J - Analyte detected below quanitiation limits.       S - % Recovery outside of range due to dilution or matrix interference.       *         * - Value exceeds maximum contaminant level.       No         Comments: The CoC forms and custody procedures complete, and custody was maintained as evidenced by field and laboratory personnel signatures, dates, and times of receipt. The laboratory noted that the shipping containers were sealed, and custody seals were present and intact on the shipping containers.         The container for sample MKTF-16 Method 8015 DRO/MRO was not received by the laboratory.       Yes         9. were detection limits in accordance with the quality assurance project plan (QAPP), permit, or method, or indicated as acceptable?       Yes         Comments: The detection limits appeared to be acceptable. The following dilutions were applied.       Dilution Factor         8. Method       Sample(S)       Analyte(S)       Dilution Factor         8. Motificial       Gound       Sample(S)       Analyte(S)       Dilution Factor         8. Method       Sample(S)       Analyte(S)       Dilution Factor       Sample(S)       Analyte(S)       Dilution Factor         8. Motificiti G, OW-57       Select Total and Dissolved Metals	<u>Metho</u> of EPA	Method 8270C: Naphthalene, 1-methylnaphthalene, and 2-methylnaphthalene were reported by EPA Method 8270 instead of EPA Method 8270 SIM because of their elevated concentrations for sample OW-57.								
Comments: The laboratory used the following data qualification flags with this data set.         D - Sample diluted due to matrix.         J - Analyte detected below quantitation limits.         S - % Recovery outside of range due to dilution or matrix interference.         * - Value exceeds maximum contaminant level.         3. Were sample CoC forms and custody procedures complete?       No         Comments: The CoC records from field to laboratory were complete, and custody was maintained as evidenced by field and laboratory personnel signatures, dates, and times of receipt. The laboratory noted that the shipping containers were sealed, and custody seals were present and intact on the shipping containers.         The container for sample MKTF-16 Method 8015 DRO/MRO was not received by the laboratory.         4. Were detection limits in accordance with the quality assurance project plan (QAPP), yes permit, or method, or indicated as acceptable?       Yes         Comments: The detection limits appeared to be acceptable. The following dilutions were applied.       Dilution Factor         Method       Sample(s)       Analyte(s)       Dilution Factor         8015D       OW-57       TPH DRO and MRO       2       200.7         8015D       MKTF-16, OW-12A, OW-57       Select Total and Dissolved Metals       5         8015D       MKTF-16       Total Lead       5         8015D       MKTF-16       Total Lead and Selenium       20         8	2. W If	<ol> <li>Were the data free of data qualification flags and/or notes used by the laboratory?</li> <li>No</li> <li>If no, define.</li> </ol>								
D - Sample diluted due to matrix.         J - Analyte detected below quantitation limits.         S - % Recovery outside of range due to dilution or matrix interference.         * - Value exceeds maximum contaminant level.         3. Were sample CoC forms and custody procedures complete?       No         Comments: The CoC records from field to laboratory were complete, and custody was maintained as evidenced by field and laboratory personnel signatures, dates, and times of receipt. The laboratory noted that the shipping containers were sealed, and custody seals were present and intact on the shipping containers.         The container for sample MKTF-16 Method 8015 DRO/MRO was not received by the laboratory.       Yes         4. Were detection limits in accordance with the quality assurance project plan (QAPP), permit, or method, or indicated as acceptable?       Yes         Comments: The detection limits appeared to be acceptable. The following dilutions were applied.       Dilution Factor         Method       Sample(s)       Analyte(s)       Dilution Factor         8015D       OW-57       TPH DRO and MRO       2         200.7       MKTF-16, OW-12A, OW-57       Select Total and Dissolved Metals       5         300.0       MKTF-16       Anaions       5         300.0       MKTF-16       VOCs       5         200.7       MKTF-16       Total Lead       5         300.0       MKTF-16       VOC	Comm	ents: The la	aboratory used the following data qualif	ication flags with this data set.						
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S - % Recovery outside of range due to dilution or matrix interference.         * - Value exceeds maximum contaminant level.         3. Were sample CoC forms and custody procedures complete, and custody was maintained as evidenced by field and laboratory personnel signatures, dates, and times of receipt. The laboratory noted that the shipping containers were sealed, and custody seals were present and intact on the shipping containers.         The container for sample MKTF-16 Method 8015 DRO/MRO was not received by the laboratory.         4. Were detection limits in accordance with the quality assurance project plan (QAPP), permit, or method, or indicated as acceptable?       Yes         Comments: The detection limits appeared to be acceptable. The following dilutions were applied.       Dilution Factor         8015D       OW-57       TPH DRO and MRO       2         200.7       MKTF-16, OW-12A, OW-57       Select Total and Dissolved Metals       5         300.0       MKTF-16       Total Lead       5         3015D       MKTF-16, OW-12A       TPH GRO       5         8015D       MKTF-16       VOCs       5         8015D       MKTF-16       Total Lead       5         200.7       MKTF-16       Total Barium       10         200.7       MKTF-16       Total Barium       20         200.7       OW-57       Total Barium       50         8015D       <	J – An	alyte detecte	ed below quantitation limits.							
<ul> <li>* - Value exceeds maximum contaminant level.</li> <li>Were sample CoC forms and custody procedures complete, and custody was maintained as evidenced by field and laboratory personnel signatures, dates, and times of receipt. The laboratory noted that the shipping containers were sealed, and custody seals were present and intact on the shipping containers. The container for sample MKTF-16 Method 8015 DRO/MRO was not received by the laboratory.</li> <li>Were detection limits in accordance with the quality assurance project plan (QAPP), Yes permit, or method, or indicated as acceptable. The following dilutions were applied.</li> <li>Method Sample(s) Analyte(s) Dilution Factor 80150 OW-57 TPH DRO and MRO 2</li> <li>200.7 MKTF-16, OW-12A, OW-57 Select Total and Dissolved Metals 5</li> <li>200.8 MKTF-16 Total Lead 5</li> <li>300.0 MKTF-16 OW-12A TPH GRO 5</li> <li>8015D MKTF-16, OW-12A TPH GRO 5</li> <li>8015D MKTF-16 Total Barium 10</li> <li>200.7 OW-57 Total Barium 20</li> <li>200.7 OW-57 TPH GRO 50</li> <li>8015D OW-57 TPH GRO 50</li> <li>8015D OW-57 TOtal Barium 10</li> <li>200.7 OW-57 TOtal Barium 50</li> <li>8015D OW-57 TPH GRO 50</li> <li>8015D OW-57 TPH GRO 50</li> <li>8015D OW-57 TOtal Barium 10</li> <li>200.7 OW-57 TOtal Barium 50</li> <li>8015D OW-57 TPH GRO 50</li> <li>8260B OW-12A, OW-57 Select VOCs 50</li> <li>200.7 MKTF-16 Total Lead and Selenium 20</li> <li>200.7 OW-57 TOtal Barium 50</li> <li>8015D OW-57 TOtal Barium 50</li></ul>	S – %	Recovery of	utside of range due to dilution or matrix	interference.						
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4. Were detection limits in accordance with the quality assurance project plan (QAPP), permit, or method, or indicated as acceptable?       Yes         Comments: The detection limits appeared to be acceptable. The following dilutions were applied.         Method       Sample(s)       Analyte(s)       Dilution Factor         8015D       OW-57       TPH DRO and MRO       2         200.7       MKTF-16, OW-12A, OW-57       Select Total and Dissolved Metals       5         200.8       MKTF-16       Total Lead       5         300.0       MKTF-16, OW-12A       TPH GRO       5         8015D       MKTF-16       VOCs       5         8060B       MKTF-16       Total Barium       10         200.7       OW-57       Total Lead and Selenium       20         200.7       OW-57       Total Lead and Selenium       20         200.7       OW-57       Total Barium       50         8015D       OW-57       TPH GRO       50         8015D       OW-57       TPH GRO       50         8015D       OW-57       Total Barium       50         8015D       OW-57       TPH GRO       50         8015D       OW-57       TPH GRO       50         8015D       OW-57	Comm and la sealed The co	Comments: The CoC records from field to laboratory were complete, and custody was maintained as evidenced by field and laboratory personnel signatures, dates, and times of receipt. The laboratory noted that the shipping containers were sealed, and custody seals were present and intact on the shipping containers.								
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8015D         OW-57         TPH DRO and MRO         2           200.7         MKTF-16, OW-12A, OW-57         Select Total and Dissolved Metals         5           200.8         MKTF-16         Total Lead         5           300.0         MKTF-16         Anions         5           8015D         MKTF-16, OW-12A         TPH GRO         5           8015D         MKTF-16, OW-12A         TPH GRO         5           8260B         MKTF-16         VOCs         5           200.7         MKTF-16         Total Barium         10           200.8         OW-57         Total Lead and Selenium         20           200.7         OW-57         Total Barium         50           8015D         OW-57         Total Barium         50           8015D         OW-57         Select VOCs         50           8015D         OW-57         Select VOCs         50           8260B         OW-12A, OW-57         Select VOCs         50           200.7         MKTF-16         Total Iron         100           8260B         OW-57         Benzene         500		<u>Method</u>	<u>Sample(s)</u>	<u>Analyte(s)</u>	Dilution Factor					
200.7         MKTF-16, OW-12A, OW-57         Select Total and Dissolved Metals         5           200.8         MKTF-16         Total Lead         5           300.0         MKTF-16         Anions         5           8015D         MKTF-16, OW-12A         TPH GRO         5           8260B         MKTF-16         VOCs         5           200.7         MKTF-16         Total Barium         10           200.8         OW-57         Total Lead and Selenium         20           200.7         OW-57         Total Barium         50           8015D         OW-57         Total Barium         50           8015D         OW-57         Select VOCs         50           8260B         OW-12A, OW-57         Select VOCs         50           8260B         OW-12A, OW-57         Select VOCs         50           8260B         OW-57         Benzene         500		8015D	OW-57	TPH DRO and MRO	2					
200.8         MKTF-16         Total Lead         5           300.0         MKTF-16         Anions         5           8015D         MKTF-16, OW-12A         TPH GRO         5           8260B         MKTF-16         VOCs         5           200.7         MKTF-16         VOCs         5           200.7         MKTF-16         Total Barium         10           200.8         OW-57         Total Lead and Selenium         20           200.7         OW-57         Total Barium         50           8015D         OW-57         Total Barium         50           8015D         OW-57         Select VOCs         50           8260B         OW-12A, OW-57         Select VOCs         50           200.7         MKTF-16         Total Iron         100           8260B         OW-577         Benzene         500		200.7	MKTF-16, OW-12A, OW-57	Select Total and Dissolved Metals	5					
300.0         MKTF-16         Anions         5           8015D         MKTF-16, OW-12A         TPH GRO         5           8260B         MKTF-16         VOCs         5           200.7         MKTF-16         Total Barium         10           200.8         OW-57         Total Lead and Selenium         20           200.7         OW-57         Total Barium         50           8015D         OW-57         Total Barium         50           8015D         OW-57         Select VOCs         50           8260B         OW-12A, OW-57         Select VOCs         50           200.7         MKTF-16         Total Iron         100           8260B         OW-57         Benzene         500		200.8	MKTF-16	Total Lead	5					
8015D         MKTF-16, OW-12A         TPH GRO         5           8260B         MKTF-16         VOCs         5           200.7         MKTF-16         Total Barium         10           200.8         OW-57         Total Lead and Selenium         20           200.7         OW-57         Total Barium         50           200.7         OW-57         Total Barium         50           8015D         OW-57         Total Barium         50           8015D         OW-57         Select VOCs         50           8260B         OW-12A, OW-57         Select VOCs         50           200.7         MKTF-16         Total Iron         100           8260B         OW-57         Benzene         500		300.0	MKTF-16	Anions	5					
8260B         MKTF-16         VOCs         5           200.7         MKTF-16         Total Barium         10           200.8         OW-57         Total Lead and Selenium         20           200.7         OW-57         Total Barium         50           8015D         OW-57         TPH GRO         50           8260B         OW-12A, OW-57         Select VOCs         50           200.7         MKTF-16         Total Iron         100           8260B         OW-57         Benzene         500		8015D	MKTF-16, OW-12A	TPH GRO	5					
200.7         MKTF-16         Total Barium         10           200.8         OW-57         Total Lead and Selenium         20           200.7         OW-57         Total Barium         50           8015D         OW-57         TPH GRO         50           8260B         OW-12A, OW-57         Select VOCs         50           200.7         MKTF-16         Total Iron         100           8260B         OW-57         Benzene         500		8260B	MKTF-16	VOCs	5					
200.8         OW-57         Total Lead and Selenium         20           200.7         OW-57         Total Barium         50           8015D         OW-57         TPH GRO         50           8260B         OW-12A, OW-57         Select VOCs         50           200.7         MKTF-16         Total Iron         100           8260B         OW-57         Benzene         500		200.7	MKTF-16	Total Barium	10					
200.7         OW-57         Total Barium         50           8015D         OW-57         TPH GRO         50           8260B         OW-12A, OW-57         Select VOCs         50           200.7         MKTF-16         Total Iron         100           8260B         OW-57         Benzene         500		200.8	OW-57	Total Lead and Selenium	20					
8015D         OW-57         TPH GRO         50           8260B         OW-12A, OW-57         Select VOCs         50           200.7         MKTF-16         Total Iron         100           8260B         OW-57         Benzene         500		200.7         OW-57         Total Barium         50								
8260B         OW-12A, OW-57         Select VOCs         50           200.7         MKTF-16         Total Iron         100           8260B         OW-57         Benzene         500		8015D OW-57 TPH GRO 50								
200.7         MKTF-16         Total Iron         100           8260B         OW-57         Benzene         500		8260B	OW-12A, OW-57	Select VOCs	50					
8260B OW-57 Benzene 500		200.7	MKTF-16	Total Iron	100					
		8260B	OW-57	Benzene	500					

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VALIDATION CRITERIA CHECKLIST							
5. Were the reported analytical methods and constituents in compliance with the QAPP, permit, or CoC?	No						
Comments: The reported analytical methods were in compliance with the CoC, and the laboratory reported the requested constituents in accordance with the CoC, with the following exceptions.							
The CoC requested total and dissolved metals using only Method 200.7; however, the laboratory analyzed the samples using both Method 200.7 and Method 200.8. This substituted analytical method, Method 200.8, met similar sensitivity, accuracy, and precision goals and, therefore, was an acceptable replacement.							
The CoC requested cyanide using Method 335.4; however, the laboratory analyzed the samples usi This substituted analytical method met similar sensitivity, accuracy, and precision goals and, therefor replacement.	ing Method 4500 CN E. ore, was an acceptable						
6. Were samples received in good condition within method-specified requirements?	No						
Comments: Samples were received on ice, in good condition, and with the cooler temperatures out temperature range of $4^{\circ}C \pm 2^{\circ}C$ at $0.4^{\circ}C$ , $1.3^{\circ}C$ , and $1.4^{\circ}C$ as noted on the <i>Sample Log-in Check L</i> transferred to Pace National were received in good condition with the cooler temperature within the 5.7°C as noted on the CoC.	tside the recommended <i>.ist.</i> Samples recommended range at						
The cooler temperatures below 2.0°C were judged as acceptable since the laboratory did not report as broken or frozen.	t the sample containers						
7. Were samples extracted/digested and analyzed within method-specified or technical holding times?	Yes						
Comments: The samples were extracted/digested and analyzed within method-specific holding time	es.						
<ol> <li>Were reported units appropriate for the sample matrix/matrices and analytical method(s)? Specify if wet or dry units were used for soil.</li> </ol>	Yes						
Comments: The results were reported in concentration units of micrograms per liter ( $\mu$ g/L) and milliwhich were acceptable for the sample matrix and the analyses requested.	grams per liter (mg/L),						
9. Did the laboratory provide any specific initial and/or continuing calibration results?	No						
Comments: Initial and continuing calibration data were not included as part of this data set.							
10. If initial and/or continuing calibration results were provided, were the results within acceptable limits?	N/A						
Comments: Initial and continuing calibration data were not included as part of this data set.							
11. Was the total number of laboratory blank samples prepared equal to at least 5% of the total number of samples or analyzed as required by the method?	Yes						
Comments: The total number of laboratory blank samples prepared was equal to at least 5% of the samples.	total number of						
12. Were target analytes reported as not detected in the laboratory blanks?	No						
Comments: Target analytes were reported as not detected in the laboratory blanks, with the following	ng exception.						
TPH DRO was detected in the laboratory blank for Method 8015D batch 70323 at a concentration The sample EB-09-15-22 TPH DRO result that was detected at a concentration equal to the bl less than the laboratory reporting limit was qualified with a U flag. The TPH DRO results in the samples were greater than ten times the blank concentration and did not require qualification.	tion of 0.021 mg/L. lank concentration and e remaining associated						



## VALIDATION CRITERIA CHECKLIST

13. Was the total number of MS samples prepared equal to at least 5% of the total number of samples or analyzed as required by the method?

Yes

Comments: The total number of matrix spike samples prepared was equal to at least 5% of the total number of samples, although MS samples were not prepared/reported for all analyses and/or batches. The matrix spike sample source for each analytical batch in this sample set has been indicated below.

Method	Analytes	Batch	MS Sample Source
200.7	Total Metals	70299	MKTF-16, OW-12A
200.7	Total Metals	70359	Not Prepared
200.7	Dissolved Silver	A91392	EB-09-15-22
200.7	Dissolved Metals	C91347	Not Prepared
200.8	Total Metals	70299	Not Prepared
200.8	Total Metals	70359	Not Prepared
200.8	Dissolved Metals	A91132	Not Prepared
245.1	Total and Dissolved Mercury	70307	Not Prepared
245.1	Total Mercury	70391	Not Prepared
300.0	Anions	R91119	Not Prepared
504.1	EDB	70321	Not Prepared
4500CN E	Cyanide	WG1929558	Not Associated
8015D	TPH DRO and MRO	70323	Not Prepared
8015D	TPH GRO	B91113	Not Prepared
8015D	TPH GRO	C91131	Not Prepared
8260B	VOCs	A91114	Not Prepared
8260B	VOCs	R91137	Not Prepared
8270C SIM	SVOCs	70290	Not Prepared
8270C	SVOCs	70290	Not Prepared

Not Associated – The MS sample source was not associated with this project. Not Prepared – Matrix spikes were not prepared/reported for this batch.

within data validation or laboratory quality control (QC) limits?

14. For MS/MSDs prepared from project samples, were percent recoveries and RPDs

Yes

Comments: The percent recoveries and RPDs for MS/MSDs prepared from project samples were within data validation and laboratory QC limits.

The percent recoveries and RPD values for MS/MSDs prepared from non-project samples were evaluated and considered, but data were not qualified based on those results since matrix similarity to project samples could not be guaranteed.

15. Was the total number of LCSs analyzed equal to at least 5% of the total number of Yes samples or analyzed as required by the method?

Comments: The total number of LCS samples analyzed was equal to at least 5% of the total number of samples.



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## VALIDATION CRITERIA CHECKLIST

16. Were LCS/LCSD percent recoveries and LCS/LCSD RPDs within data validation or laboratory QC limits?

No

Comments: The LCS and LCSD percent recoveries and LCS/LCSD RPDs were within data validation and laboratory QC limits, with the following exception.

The LCS recovery for total cobalt in Method 200.7 batch 70299 was outside the acceptance limits of 70-130% at 141%. Total cobalt was detected in associated samples and the results were qualified with J+ flags due to potential high bias. Total cobalt was not detected in the associated sample EB-09-15-22 and the result did not require qualification.

17. Were surrogate recoveries within laboratory QC limits?

No

Comments: Surrogate recoveries were within laboratory QC limits, with the following exceptions.

Method	Surrogate	<u>Sample</u>	<u>Surrogate</u> <u>Recovery</u>	QC Limits
8015D (GRO)	Bromofluorobenzene (BFB)	OW-12A	158%	70-130%
8015D (GRO)	BFB	OW-70	517%	70-130%
8015D (GRO)	BFB	DUP 9-15-22	493%	70-130%
8270C-SIM	4-Terphenyl-d <sub>14</sub>	EB-09-15-22	70.0%	72.2-147%
8270C-SIM	4-Terphenyl-d <sub>14</sub>	MKTF-16	53.5%	72.2-147%
8270C-SIM	4-Terphenyl-d <sub>14</sub>	OW-12A	53.9%	72.2-147%
8270C-SIM	4-Terphenyl-d <sub>14</sub>	OW-70	54.7%	72.2-147%
8270C-SIM	4-Terphenyl-d <sub>14</sub>	OW-57	51.1%	72.2-147%
8270C-SIM	4-Terphenyl-d <sub>14</sub>	DUP 9-15-22	48.5%	72.2-147%

The associated analyte TPH GRO was detected in the identified samples. These results were qualified as J+ due to evidence of potential high bias.

Since Method 8270C and 8270C-SIM surrogate associations were not available from the laboratory, qualification was assigned to all of the target analytes in a given fraction (acid or base/neutral) when two or more surrogates from the same fraction (acid or base/neutral) were outside the acceptance range. This condition did not exist for the Method 8270C-SIM analysis for samples EB-09-15-22, MKTF-16, OW-12A, OW-70, OW-57, and DUP 9-15-22 and qualification of sample data was not required.

Qualification of sample data was not required based on surrogate non-conformances in QC samples as the environmental samples were evaluated based on their specific surrogate recoveries.

18. Were the number of trip blank, field blank, and/or equipment blank samples collected equal to at least 10% of the total number of samples or as required by the project guidelines, QAPP, SAP, or permit?

Yes

Comments: The number of trip, field, and equipment blanks collected was equal to at least 10% of the number of samples. One trip blank sample, Trip Blank, one field blank sample, FB 9-15-22, and one equipment blank sample, EB-09-15-22, were collected as part of this sample set.



	V	ALIDATION	CRITERIA CHECKLIS	Г					
19. Were target anal equipment blank	ytes reported as not de samples?	etected in the	trip blank, field blank, a	nd/or	No				
Comments: Target a exceptions.	nalytes were not detect	ted in the trip	blank, field blank, and	equipment blank sam	ples with the followin				
Blank Sample ID         Method         Analyte         Concentration									
	Trip Blank	8260B	Acetone	2.7 μg/L	-				
	FB 9-15-22	8260B	2-Butanone	17 µg/L	_				
	FB 9-15-22	8260B	Acetone	11 µg/L	_				
	EB-09-15-22	8260B	Acetone	4.3 µg/L	-				
	EB-09-15-22	8015D	TPH DRO	0.021 mg/L	1				
	EB-09-15-22	200.7	Dissolved Zinc	0.0066 mg/L	1				
equire qualification. The TPH DRO results herefore, additional o	s for the samples in bat qualification due to the	ch 70323 we equipment bl	ere previously qualified or ank contamination was	lue to a laboratory bland	ank detection;				
require qualification. The TPH DRO results therefore, additional of 20. Was the number number of sample	s for the samples in bat qualification due to the of field duplicates colle	ch 70323 we equipment bl ected equal to e project quio	ere previously qualified o ank contamination was o at least 10% of the tota delines, QAPP, SAP, or	lue to a laboratory bla not required. al permit?	ank detection; Yes				
require qualification. The TPH DRO results herefore, additional of 20. Was the number number of sampl Comments: The num	s for the samples in bat qualification due to the of field duplicates colle les or as required by the ober of field duplicates o	tch 70323 we equipment bl ected equal to e project guio collected was	ere previously qualified of ank contamination was o at least 10% of the tota delines, QAPP, SAP, or s equal to at least 10% of	lue to a laboratory bla not required. al permit? of the number of sam	ank detection; Yes				
require qualification. The TPH DRO results herefore, additional of 20. Was the number number of sample Comments: The num Sample DUP-9-15-22	s for the samples in bat qualification due to the of field duplicates colle les or as required by the ober of field duplicates of was collected as a field	ich 70323 we equipment bl ected equal to e project guio collected was ld duplicate c	ere previously qualified of ank contamination was o at least 10% of the tota delines, QAPP, SAP, or s equal to at least 10% of f sample OW-70.	lue to a laboratory bla not required. al permit? of the number of sam	ank detection; Yes ples.				
require qualification. The TPH DRO results herefore, additional of 20. Was the number number of sampl Comments: The num Sample DUP-9-15-22 21. Were field duplic 0-30%, or air 0-2	s for the samples in bat qualification due to the of field duplicates colle les or as required by the other of field duplicates of 2 was collected as a fiel ate RPD values within (5%)?	tch 70323 we equipment bl ected equal to e project guio collected was ld duplicate c data validatio	ere previously qualified of ank contamination was to at least 10% of the tota delines, QAPP, SAP, or s equal to at least 10% of sample OW-70.	due to a laboratory bla not required. al permit? of the number of sam , water	ank detection; Yes ples.				
require qualification. The TPH DRO results herefore, additional of 20. Was the number number of sampl Comments: The num Sample DUP-9-15-22 21. Were field duplic 0-30%, or air 0-2 Comments: As indica within data validation	s for the samples in bat qualification due to the of field duplicates colle les or as required by the other of field duplicates of was collected as a fiel ate RPD values within (5%)? ated in the Field Duplication QC limits of 0-30% for	ich 70323 we equipment bl ected equal to e project guio collected was ld duplicate o data validatio ate Summary water sample	ere previously qualified of ank contamination was to at least 10% of the tota delines, QAPP, SAP, or s equal to at least 10% of sample OW-70. on QC limits (soil 0-50% or Table at the end of this es, with the following ex	due to a laboratory bla not required. al permit? of the number of sam , water , water s report, field duplicat ceptions.	ank detection; Yes ples. No e RPD values were				
require qualification. The TPH DRO results therefore, additional of 20. Was the number number of sampl Comments: The num Sample DUP-9-15-22 21. Were field duplic 0-30%, or air 0-2 Comments: As indica within data validation <b>The RPD value for to</b> <b>DW-70 and DUP-9-1</b>	s for the samples in bat qualification due to the of field duplicates colle les or as required by the other of field duplicates of was collected as a fiel ate RPD values within 5%)? ated in the Field Duplication QC limits of 0-30% for otal lead exceeded the 5-22 were assigned J	ich 70323 we equipment bl ected equal to e project guid collected was d duplicate o data validatio ate Summary water sample e data valida qualifiers d	ere previously qualified of ank contamination was of at least 10% of the tota delines, QAPP, SAP, or a equal to at least 10% of f sample OW-70. on QC limits (soil 0-50% of Table at the end of this es, with the following ex <b>ation limit of 30% at 35</b> <b>ue to evidence of poor</b>	lue to a laboratory bla not required. al permit? of the number of sam , water , water s report, field duplicat ceptions. .9%. The MTBE res r precision.	ank detection; Yes ples. No e RPD values were ults for samples				



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VALIDATION CRITERIA CHECKLIST									
22. For laboratory validation or lal	22. For laboratory duplicates prepared from project samples, were RPDs within data N/A validation or laboratory QC limits?								
Comments: Labora 22 and from a same	Comments: Laboratory duplicates were prepared for the analysis of cyanide in batch WG1929558 from sample EB-09-15- 22 and from a sample not associated with this data set.								
The sample EB-09-	15-22 and the labora	atory duplicate were both	non-detect for cya	nide and a RPD coul	d not be calculated.				
The RPD values for but data were not q	The RPD values for the laboratory duplicate samples prepared from non-project samples were evaluated and considered, but data were not qualified based on these results since matrix similarity to project samples could not be guaranteed.								
23. Were the follow	ving data relationship	os realistic?							
• Target ana EPH/8270	alytes were reported )?	by more than one metho	od (e.g., 8260/8270,		N/A				
Comments: Target	analytes were not re	eported by more than one	e method in this dat	a set.					
Both total a results we	and dissolved metals re greater than or eq	s analyses were perform ual to the dissolved meta	ed, and the total me als results?	etals	No				
Comments: The following table contains the exceptions in which the dissolved metals results exceeded the total metals results.									
Sample ID         Analyte         Total Result (mg/L)         Dissolved Result (mg/L)									
MKTF-16 Antimony 0.00049 0.00060									
OW-70 Cadmium ND 0.0010									
	OW-12A	Silver	ND	0.0020					
	OW-57	Silver	ND	0.0019					

DUP 9-15-22ZincND0.013The EPA has not provided guidance or requirements for the evaluation, validation, and qualification of dissolved metals<br/>results that exceed the corresponding total metals results. Therefore, qualification of results was not performed based on<br/>these data.

ND

0.0083

0.0047

0.0066

0.013

0.011

Zinc

Zinc

Zinc

EB-09-15-22

**OW-12A** 

OW-70



Client Sample ID: OW-70 Field Duplicate Sample ID: DLIP 9-15-22								
Analyte	Method	Laboratory Result	Duplicate Result	Relative Percent Difference (RPD)				
Barium, Dissolved	E 200.7	0.53 mg/L	0.55 mg/L	3.7%				
Barium, Total	E 200.7	0.79 mg/L	0.70 mg/L	12.1%				
Cadmium, Dissolved	E 200.7	0.0010 mg/L	ND (0.0020 mg/L)	DL				
Chromium, Total	E 200.7	0.0070 mg/L	0.0031 mg/L	77.2% +/-RL				
Cobalt, Dissolved	E 200.7	0.0042 mg/L	0.0046 mg/L	9.1% +/-RL				
Cobalt, Total	E 200.7	0.0094 mg/L	0.012 mg/L	24.3% +/-RL				
Nickel, Dissolved	E 200.7	0.044 mg/L	0.043 mg/L	2.3%				
Nickel, Total	E 200.7	0.046 mg/L	0.044 mg/L	4.4%				
Vanadium, Dissolved	E 200.7	0.0031 mg/L	0.0025 mg/L	21.4% +/-RL				
Vanadium, Total	E 200.7	0.014 mg/L	0.0083 mg/L	51.1% +/-RL				
Zinc, Dissolved	E 200.7	0.011 mg/L	0.013 mg/L	16.7% +/-RL				
Zinc, Total	E 200.7	0.0047 mg/L	ND (0.010 mg/L)	DL				
Arsenic, Dissolved	E200.8	0.0012 mg/L	0.0012 mg/L	0.0% +/-RL				
Arsenic, Total	E200.8	0.0028 mg/L	0.0025 mg/L	11.3%				
Lead, Dissolved	E200.8	0.00012 mg/L	0.00013 mg/L	8.0% +/-RL				
Lead, Total	E200.8	0.0023 mg/L	0.0016 mg/L	35.9%				
Selenium, Total	E200.8	0.00069 mg/L	ND (0.0010) mg/L	DL				
TPH DRO	SW8015	0.94 mg/L	0.96 mg/L	2.1%				
TPH GRO	SW8015	0.39 mg/L	0.35 mg/L	10.8%				
1,1-Dichloroethane	SW8260B	0.49 µg/L	0.47 µg/L	4.2% +/-RL				
1,2,4-Trimethylbenzene	SW8260B	0.13 µg/L	0.15 µg/L	14.3% +/-RL				
1,2-Dichloroethane	SW8260B	6.8 µg/L	5.9 µg/L	14.2%				
Benzene	SW8260B	1.0 μg/L	0.99 µg/L	1.0% +/-RL				
lsopropylbenzene	SW8260B	30 µg/L	28 µg/L	6.9%				
MTBE	SW8260B	60 µg/L	55 µg/L	8.7%				
n-Butylbenzene	SW8260B	1.5 μg/L	1.4 µg/L	6.9% +/-RL				
n-Propylbenzene	SW8260B	1.1 μg/L	1.0 µg/L	9.5% +/-RL				
sec-Butylbenzene	SW8260B	6.5 µg/L	6.4 µg/L	1.6%				
1,4-Dioxane	SW8270C	0.70 μg/L	0.66 µg/L	5.9% +/-RL				
1-Methylnaphthalene	SW8270C	1.0 µg/L	ND (0.30 μg/L)	DL				
2-Methylnaphthalene	SW8270C	0.74 μg/L	ND (0.30 μg/L)	DL				
Acenaphthene	SW8270C	0.18 µg/L	0.14 µg/L	25.0% +/-RL				
Anthracene	SW8270C	0.18 µg/L	0.20 µg/L	10.5% +/-RL				
Di-n-butylphthalate	SW8270C	ND (10 μg/L)	20 µg/L	DL				
Fluoranthene	SW8270C	ND (0.30 µg/L)	0.20 µg/L	DL				

### FIELD DUPLICATE SUMMARY

🐨 Trihydro

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Analyte Meth		Laboratory Result	Duplicate Result	Relative Percent Difference (RPD)	
Naphthalene	SW8270C	1.3 µg/L	ND (0.30 μg/L)	DL	
Phenanthrene	SW8270C	0.40 µg/L	0.34 µg/L	16.2% +/-RL	
Phenol	SW8270C	29 µg/L	ND (20 μg/L)	DL	
Pyrene	SW8270C	ND (1.0 µg/L)	0.44 µg/L	DL	

Field duplicate RPD control limits are not to exceed 30% for water as established by USEPA Region I - New England Environmental Data Review Supplement for Region 1 Data Review Elements and Superfund Specific Guidance/Procedures, EQADR-Supplement2, September 2020.

DL – Indicates that the analyte was detected in one of the duplicate samples and was undetected in the other sample, and therefore an RPD could not be calculated. Data were not qualified since the detection was within two times the reporting limit. Non-detected results are indicated above with the applicable reporting limit as ND (RL).

+/-RL – Indicates that the detections in both of the samples were within two times the reporting limit. Qualification of data was not required.

The RPD value for total lead exceeded the data validation limit of 30% at 35.9%, which was evidence of poor precision. The MTBE results were qualified as J for samples OW-70 and DUP 9-15-22.

An RPD value could not be calculated for 1-methylnaphthalene, 2-methylnaphthalene, and naphthalene for the field duplicate pair OW-70 and DUP 9-15-22 since the analyte was detected in the parent sample and was undetected in the duplicate sample. As the detections in the parent sample were greater than two times the reporting limit, 1-methylnaphthalene, 2-methylnaphthalene, and naphthalene were qualified as J and UJ for the parent and duplicate samples, respectively.



## DATA QUALIFICATION SUMMARY

Abbreviation	Reason
MBD	Method blank detection
HR-MS	The MS and/or MSD percent recovery was greater than the upper acceptable limit indicating possible matrix interference.
HR-SUR	The surrogate percent recovery was greater than the upper acceptable limit indicating a possible high bias.
EBD	Equipment blank detection
TBD	Trip blank detection
ERPD-FD	High field duplicate RPD.
MDLRL	Flagged by the laboratory: The result was greater than the MDL but less than the RL.

Analyte	Method	Field Sample ID	Lab Sample ID	Result	Limit	Units	Reviewer Qualifier	DV Flag Reasons
1,1-Dichloroethane	SW8260B	OW-70	2209816-004a	0.49	1.0	µg/L	J	MDLRL
1,1-Dichloroethane	SW8260B	DUP 9-15-22	2209816-007a	0.47	1.0	µg/L	J	MDLRL
1,1-Dichloroethene	SW8260B	OW-12A	2209816-003a	0.34	1.0	µg/L	J	MDLRL
1,2,4-Trimethylbenzene	SW8260B	OW-70	2209816-004a	0.13	1.0	µg/L	J	MDLRL
1,2,4-Trimethylbenzene	SW8260B	DUP 9-15-22	2209816-007a	0.15	1.0	µg/L	J	MDLRL
1,3,5-Trimethylbenzene	SW8260B	OW-12A	2209816-003a	0.44	1.0	µg/L	J	MDLRL
1,4-Dioxane	SW8270C	OW-70	2209816-004c	0.70	1.0	µg/L	J	MDLRL
1,4-Dioxane	SW8270C	OW-57	2209816-005c	0.80	1.0	µg/L	J	MDLRL
1,4-Dioxane	SW8270C	DUP 9-15-22	2209816-007c	0.66	1.0	µg/L	J	MDLRL
1-Methylnaphthalene	SW8270C	OW-70	2209816-004c	1.0	0.30	µg/L	J	ERPD-FD
1-Methylnaphthalene	SW8270C	DUP 9-15-22	2209816-007c	ND	0.30	µg/L	UJ	ERPD-FD
2-Methylnaphthalene	SW8270C	OW-70	2209816-004c	0.74	0.30	µg/L	J	ERPD-FD
2-Methylnaphthalene	SW8270C	DUP 9-15-22	2209816-007c	ND	0.30	µg/L	UJ	ERPD-FD
2-Methylnaphthalene	SW8270C	MKTF-16	2209816-002c	0.16	0.30	µg/L	J	MDLRL
2-Methylnaphthalene	SW8270C	OW-12A	2209816-003c	0.16	0.30	µg/L	J	MDLRL



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Analyte	Method	Field Sample ID	Lab Sample ID	Result	Limit	Units	Reviewer Qualifier	DV Flag Reasons
Acenaphthene	SW8270C	OW-70	2209816-004c	0.18	0.30	µg/L	J	MDLRL
Acenaphthene	SW8270C	DUP 9-15-22	2209816-007c	0.14	0.30	µg/L	J	MDLRL
Acetone	SW8260B	FB 9-15-22	2209816-006a	11	10	µg/L	JB	TBD
Acetone	SW8260B	Trip Blank	2209816-008a	2.7	10	µg/L	J	MDLRL
Acetone	SW8260B	EB-09-15-22	2209816-001a	4.3	10	µg/L	U	MDLRL, TBD
Anthracene	SW8270C	OW-70	2209816-004c	0.18	0.30	µg/L	J	MDLRL
Anthracene	SW8270C	OW-57	2209816-005c	0.20	0.30	µg/L	J	MDLRL
Anthracene	SW8270C	DUP 9-15-22	2209816-007c	0.20	0.30	µg/L	J	MDLRL
Antimony, Dissolved	E200.8	MKTF-16	2209816-002E	0.0006	0.0010	mg/L	J	MDLRL
Antimony, Total	E200.8	MKTF-16	2209816-002D	0.00049	0.0010	mg/L	J	MDLRL
Benzene	SW8260B	DUP 9-15-22	2209816-007a	0.99	1.0	µg/L	J	MDLRL
Cadmium, Dissolved	E 200.7	OW-70	2209816-004E	0.0010	0.0020	mg/L	J	MDLRL
Chromium, Total	E 200.7	DUP 9-15-22	2209816-007D	0.0031	0.0060	mg/L	J	MDLRL
Cobalt, Dissolved	E 200.7	OW-70	2209816-004E	0.0042	0.0060	mg/L	J	MDLRL
Cobalt, Dissolved	E 200.7	DUP 9-15-22	2209816-007E	0.0046	0.0060	mg/L	J	MDLRL
Cobalt, Total	E 200.7	MKTF-16	2209816-002D	0.012	0.0060	mg/L	J+	HR-MS
Cobalt, Total	E 200.7	OW-12A	2209816-003D	0.011	0.0060	mg/L	J+	HR-MS
Cobalt, Total	E 200.7	OW-70	2209816-004D	0.0094	0.0060	mg/L	J+	HR-MS
Cobalt, Total	E 200.7	DUP 9-15-22	2209816-007D	0.012	0.0060	mg/L	J+	HR-MS
Fluoranthene	SW8270C	DUP 9-15-22	2209816-007c	0.20	0.30	µg/L	J	MDLRL
Isopropylbenzene	SW8260B	MKTF-16	2209816-002a	1.7	5.0	µg/L	J	MDLRL
Isopropylbenzene	SW8260B	OW-57	2209816-005a	16	50	µg/L	J	MDLRL
Lead, Dissolved	E200.8	OW-70	2209816-004E	0.00012	0.00050	mg/L	J	MDLRL
Lead, Dissolved	E200.8	DUP 9-15-22	2209816-007E	0.00013	0.00050	mg/L	J	MDLRL
Lead, Total	E200.8	OW-70	2209816-004D	0.0023	0.00050	mg/L	J	ERPD-FD
Lead, Total	E200.8	DUP 9-15-22	2209816-007D	0.0016	0.00050	mg/L	J	ERPD-FD
MTBE	SW8260B	OW-57	2209816-005a	41	50	µg/L	J	MDLRL



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Analyte	Method	Field Sample ID	Lab Sample ID	Result	Limit	Units	Reviewer Qualifier	DV Flag Reasons
Naphthalene	SW8270C	OW-70	2209816-004c	1.3	0.30	µg/L	J	ERPD-FD
Naphthalene	SW8270C	DUP 9-15-22	2209816-007c	ND	0.30	µg/L	UJ	ERPD-FD
n-Butylbenzene	SW8260B	OW-12A	2209816-003a	0.89	3.0	µg/L	J	MDLRL
n-Butylbenzene	SW8260B	OW-70	2209816-004a	1.5	3.0	µg/L	J	MDLRL
n-Butylbenzene	SW8260B	DUP 9-15-22	2209816-007a	1.4	3.0	µg/L	J	MDLRL
Nickel, Dissolved	E 200.7	MKTF-16	2209816-002E	0.0075	0.010	mg/L	J	MDLRL
Nickel, Dissolved	E 200.7	OW-12A	2209816-003E	0.0076	0.010	mg/L	J	MDLRL
n-Propylbenzene	SW8260B	MKTF-16	2209816-002a	1.4	5.0	µg/L	J	MDLRL
n-Propylbenzene	SW8260B	OW-57	2209816-005a	42	50	µg/L	J	MDLRL
Pyrene	SW8270C	DUP 9-15-22	2209816-007c	0.44	1.0	µg/L	J	MDLRL
Selenium, Total	E200.8	OW-70	2209816-004D	0.00069	0.0010	mg/L	J	MDLRL
Silver, Dissolved	E 200.7	OW-12A	2209816-003E	0.0020	0.0050	mg/L	J	MDLRL
Silver, Dissolved	E 200.7	OW-57	2209816-005E	0.0019	0.0050	mg/L	J	MDLRL
Toluene	SW8260B	MKTF-16	2209816-002a	1.4	5.0	µg/L	J	MDLRL
Toluene	SW8260B	OW-57	2209816-005a	27	50	µg/L	J	MDLRL
TPH DRO	SW8015	EB-09-15-22	2209816-001C	0.021	0.064	mg/L	U	MBD, MDLRL
TPH GRO	SW8015	OW-12A	2209816-003a	3.6	0.25	mg/L	J+	HR-SUR
TPH GRO	SW8015	OW-70	2209816-004a	0.39	0.050	mg/L	J+	HR-SUR
TPH GRO	SW8015	DUP 9-15-22	2209816-007a	0.35	0.050	mg/L	J+	HR-SUR
Vanadium, Dissolved	E 200.7	MKTF-16	2209816-002E	0.0042	0.050	mg/L	J	MDLRL
Vanadium, Dissolved	E 200.7	OW-12A	2209816-003E	0.0044	0.050	mg/L	J	MDLRL
Vanadium, Dissolved	E 200.7	OW-70	2209816-004E	0.0031	0.050	mg/L	J	MDLRL
Vanadium, Dissolved	E 200.7	OW-57	2209816-005E	0.0039	0.050	mg/L	J	MDLRL
Vanadium, Dissolved	E 200.7	DUP 9-15-22	2209816-007E	0.0025	0.050	mg/L	J	MDLRL
Vanadium, Total	E 200.7	OW-12A	2209816-003D	0.027	0.050	mg/L	J	MDLRL
Vanadium, Total	E 200.7	OW-70	2209816-004D	0.014	0.050	mg/L	J	MDLRL
Vanadium, Total	E 200.7	DUP 9-15-22	2209816-007D	0.0083	0.050	mg/L	J	MDLRL



Analyte	Method	Field Sample ID	Lab Sample ID	Result	Limit	Units	Reviewer Qualifier	DV Flag Reasons
Vinyl Chloride	SW8260B	MKTF-16	2209816-002a	2.0	5.0	µg/L	J	MDLRL
Xylenes, Total	SW8260B	MKTF-16	2209816-002a	5.6	7.5	µg/L	J	MDLRL
Zinc, Dissolved	E 200.7	OW-57	2209816-005E	0.0098	0.010	mg/L	U	MBD, MDLRL
Zinc, Dissolved	E 200.7	MKTF-16	2209816-002E	0.017	0.010	mg/L	JB	EBD
Zinc, Dissolved	E 200.7	OW-12A	2209816-003E	0.013	0.010	mg/L	JB	EBD
Zinc, Dissolved	E 200.7	OW-70	2209816-004E	0.011	0.010	mg/L	JB	EBD
Zinc, Dissolved	E 200.7	DUP 9-15-22	2209816-007E	0.013	0.010	mg/L	JB	EBD
Zinc, Dissolved	E 200.7	EB-09-15-22	2209816-001E	0.0066	0.010	mg/L	J	MDLRL
Zinc, Total	E 200.7	OW-12A	2209816-003D	0.0083	0.010	mg/L	J	MDLRL
Zinc, Total	E 200.7	OW-70	2209816-004D	0.0047	0.010	mg/L	J	MDLRL



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Western Refining Southwest LLC D/B/A Marathon Gallup Refinery 2022 Annual Groundwater Monitoring Report

Appendix D-4. 4<sup>th</sup> Quarter Data Validation Reports



Client: Marathon Oil	Laboratory: Hall Environmental Analysis Laboratory			
Project Name: Western Refining Southwest, Quarterly GW	Sample Matrix: Groundwater			
Project Number: 697-080-002 Task: 0006	Sample Start Date: 12/15/2022			
Date Validated: 01/31/2023	Sample End Date: 12/15/2022			
Parameters Included:				
<ul> <li>Volatile Organic Compounds (VOC) by Environmental Protection Agency (EPA) Test Methods for Evaluating Solid Waste (SW-846) Method 8260B</li> </ul>				
<ul> <li>1,2-Dibromoethane (EDB) by EPA Method 504.1</li> </ul>				
<ul> <li>Semivolatile Organic Compounds (SVOC) by SW-846 Method 8270C and Method 8270C with Selected Ion Monitoring (SIM)</li> </ul>				
<ul> <li>Total Petroleum Hydrocarbons (TPH) Gasoline Range Or</li> </ul>	ganics (GRO) by SW-846 Method 8015D			
<ul> <li>TPH Diesel Range Organics (DRO) and Motor Oil Range</li> </ul>	Organics (MRO) by SW-846 Method 8015D Modified			
<ul> <li>Total and Dissolved Metals by EPA Method 200.7 and Method</li> </ul>	ethod 200.8			
<ul> <li>Total and Dissolved Mercury by EPA Method 245.1</li> </ul>				
<ul> <li>Cyanide by Standard Methods for the Examination of Wat</li> </ul>	ter and Wastewater (SM) Method 4500 CN E			
Laboratory Project ID: 2212A11				
Data Validator: Daran O'Hollearn, Lead Project Scientist				
Reviewer: Charles Ballek, Senior Chemist				

### DATA EVALUATION CRITERIA SUMMARY

A Tier II Data Validation was performed by Trihydro Corporation's Chemical Data Evaluation Services Group on the analytical data report packages generated by Hall Environmental Analysis Laboratory of Albuquerque, New Mexico, with additional data from Pace Analytical National of Mount Juliet, Tennessee evaluating samples from the Marathon Oil site, located in Gallup, New Mexico.

Precision, accuracy, method compliance, and completeness of this data package were assessed during this data review. Precision was determined by evaluating the calculated relative percent difference (RPD) values from:

- Field duplicate pairs
- Laboratory duplicate pairs
- Matrix spike (MS) and matrix spike duplicate (MSD) pairs
- Laboratory control sample (LCS) and laboratory control sample duplicate (LCSD) pairs

Laboratory accuracy was established by reviewing the demonstrated percent recoveries (%R) of the following items to verify that data are not biased.

- MS/MSD samples
- LCS/LCSD samples
- Organic system monitoring compounds (surrogates)



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Field accuracy was established by collecting and analyzing the following samples to monitor for possible ambient or cross contamination during sampling and transportation.

- Trip blanks
- Field blanks
- Equipment blanks

Method compliance was established by reviewing sample integrity, holding times, detection limits, surrogate recoveries, laboratory blanks, initial and continuing calibrations (where applicable), and the LCS/LCSD percent recoveries against method-specific requirements.

Completeness was evaluated by determining the overall ratio of the number of samples and analyses planned versus the number of samples with valid analyses. Determination of completeness included a review of the chain-of-custody (CoC), laboratory analytical methods, and other laboratory and field documents associated with this analytical data set.

Client Sample ID	Laboratory Sample Number
EB-12-15-22	2212a11-001
MKTF-30	2212a11-002
STP-1-NW	2212a11-003
OPIS-1	2212a11-004
FB-12-15-22	2212a11-005
Dup-12-15-22	2212a11-006
Trip Blank	2212a11-007

#### SAMPLE NUMBERS TABLE





The laboratory data were reviewed to evaluate compliance with the methods and the quality of the reported data. Assessment of CoC completeness is included in Item 3 of the Data Validation Checklist. A check mark ( $\checkmark$ ) indicates that the referenced validation criteria were deemed acceptable, whereas a crossed circle ( $\otimes$ ) indicates validation criteria for which the data have been qualified by the data validator. An empty circle (O) indicates that the specified criterion does not apply to the reviewed data. Details are noted in the tables below.

#### Validation Criteria

- ✓ Data Completeness
- ✓ CoC Documentation (Item 3)
- ✓ Holding Times and Preservation (Items 6 and 7)
- O Initial and Continuing Calibrations (Items 9 and 10)
- ⊗ Laboratory Blanks (Items 11 and 12)
- ⊗ MS/MSD (Items 13 and 14)
- ⊗ LCS/LCSD (Items 15 and 16)
- System Monitoring Compounds (i.e., Surrogates) (Item 17)
- ✓ Trip, Field, and Equipment Blanks (Items 18 and 19)
- ✓ Field Duplicates (Items 20 and 21)
- ✓ Laboratory Duplicates (Item 22)

#### **Guidance References**

Chemical data validation was conducted in accordance with the United States Environmental Protection Agency (USEPA) Contract Laboratory Program (CLP) National Functional Guidelines for the analyses listed below, or by the appropriate method if not covered in the National Functional Guidelines.

- Data for organic analyses were evaluated according to validation criteria set forth in the USEPA CLP National Functional Guidelines for Organic Superfund Methods Data Review, document number EPA-540-R-20-005, November 2020 with additional reference to the USEPA CLP National Functional Guidelines for Organic Data Review, document number EPA 540/R-99/008, October 1999.
- Data for inorganic analyses were evaluated according to validation criteria set forth in the USEPA CLP National Functional Guidelines for Inorganic Superfund Methods Data Review, document number EPA-540-R-20-006, November 2020 with additional reference to the USEPA CLP National Functional Guidelines for Inorganic Data Review, document number EPA 540-R-04-004, October 2004.
- Review of field duplicates was conducted according to the USEPA Region I New England Environmental Data Review Supplement for Region 1 Data Review Elements and Superfund Specific Guidance/Procedures, EQADR-Supplement2, September 2020.
- Trihydro Data Validation Variance Documentation, April 2022.



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### **OVERALL DATA PACKAGE ASSESSMENT**

Based on a data validation review, the data are acceptable as delivered. Data qualified by the laboratory are discussed in Item 2 of the Validation Criteria Checklist.

The purpose of validating data and assigning qualifiers is to assist in proper data interpretation. Data that are not qualified meet the site data quality objectives. If values are assigned qualifiers other than an R (rejected, data not usable), the data may be used for site evaluation; however, consideration should be given to the reasons for qualification when interpreting sample concentrations. Data points that are assigned an R qualifier should not be used for site evaluation purposes.

If applicable, text was identified in **bold font** in the Validation Criteria Checklist to indicate that further action and/or qualification of the data were required. Data may have been qualified with J data flags by the laboratory if the result was greater than or equal to the method detection limit (MDL) but less than the reporting limit (RL). These laboratory-applied J flags were preserved, if present, and included in the Data Qualification Summary table at the end of this report. If applicable, data validation qualifiers were added for the items noted with crossed circles in the Validation Criteria section above. Please see the Data Qualification Summary table at the end of this report.

If data would be qualified with more than one flag, one qualifier was assigned based on the severity; however, all reasons for qualification were retained. Data that would be qualified with both J+ and J- flags were evaluated based on validation criteria and assigned the appropriate flag. The hierarchy of qualifiers from the most to least severe is as follows:

Data qualifiers used during this validation are included in the following table.

<u>Qualifier</u>	Definition
J	Estimated concentration
J+	The result is an estimated concentration, but may be biased high
J-	The result is an estimated concentration, but may be biased low
UJ	Estimated reporting limit
U	Evaluated to be undetected at the reporting limit
JB	Estimated concentration due to blank contamination

#### **Data Completeness**

The analyses were performed as requested on the CoC records. The associated samples were received by the laboratory and analyzed properly unless otherwise noted in the Criteria Checklist below. The complete data package consisted of 360 data points. The data completeness calculation does not include any submitted blank sample results. Data points were not rejected. The data completeness measure for this data package is calculated to be 100% and is acceptable.



		VALIDATION C	RITERIA CHECKLIST			
1. Was the repor	t free of non-cor	nformances identified by	the laboratory?		No	
Comments: The la	aboratory noted t	the following analytical n	on-conformances related to this	data set.		
Method 80156D D	RO/MRO: The r	method blank had a low-	level detection for DRO. Sample	es with detect	ions are flagged	
with a "B".						
2. Were the data If no, define.	free of data qua	alification flags and/or no	otes used by the laboratory?		No	
Comments: The laboratory used the following data qualification flags with this data set.						
B – Analyte detect	ed in the associa	ated method blank.				
D – Sample diluted	d due to matrix.					
J – Analyte detecte	ed below quantit	ation limits.				
P1 – RPD value no	ot applicable for	sample concentrations l	ess than 5 times the reporting lin	nit.		
R – % PRD is out	of range.					
S – % Recovery or	utside of range d	lue to dilution or matrix i	nterference.			
* - Value exceeds	maximum conta	minant level.				
3. Were sample	CoC forms and	custody procedures com	plete?		No	
Comments: The C	CoC records from	n field to laboratory were	complete, and custody was mai	ntained as ev	videnced by field	
sealed, and custor	ly seals were pre	esent and intact on the s	shipping containers.	t the shipping	containers were	
The trip blank sam sample and perform	ple was received med the appropr	d by the laboratory but w	/as not included on the CoC. Th /alidation action was not required	e laboratory l	ogged in the	
4. Were detectio	n limits in accord	dance with the quality as	surance project plan (QAPP).		Yes	
permit, or met	hod, or indicated	as acceptable?	······································			
Comments: The d	etection limits a	opeared to be acceptabl	e. The following dilutions were a	applied.		
	<u>Method</u>	Sample(s)	Analyte(s)	<u>Dilution</u> Factor	]	
	200.8	Multiple Samples	Total and Dissolved Metals	5		
	8015D	OPIS-1	TPH DRO and MRO	5	]	
	8015D	OPIS-1	VOCs	5		
	8270C	OPIS-1	SVOCs	10		
	8270C SIM	OPIS-1	SVOCs	10		
5 Were the rend	orted analytical m	athods and constituents	s in compliance with the		No	
QAPP, permit	, or CoC?					
Comments: The reported analytical methods were in compliance with the CoC, and the laboratory reported the requested constituents in accordance with the CoC, with the following exceptions						
The CoC requested total and dissolved metals using only Method 200.7; however, the laboratory analyzed the samples						
using both Method accuracy, and pred	200.7 and Meth 200.7 goals and,	nod 200.8. This substitu , therefore, was an acce	ted analytical method, Method 2 ptable replacement.	00.8, met sim	ılar sensitivity,	
The CoC requeste	d cyanide using	Method 335.4; however	, the laboratory analyzed the sar	nples using M	1ethod 4500 CN E	
This substituted an	nalytical method	met similar sensitivity, a	ccuracy, and precision goals and	d, therefore, v	vas an acceptable	

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replacement.

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VALIDATION CRITERIA CHECKLIST							
6. Were samples received in good	condition within method-spe	ecified requirem	nents?	No			
Comments: Samples were received on ice, in good condition, and with the cooler temperatures both within and outside the recommended temperature range of $4^{\circ}C \pm 2^{\circ}C$ at $0.4^{\circ}C$ , $0.6^{\circ}C$ , and $3.1^{\circ}C$ as noted on Sample Log-in Check List. Samples transferred to Pace National were received in good condition with the cooler temperature within the recommended range at $4.0^{\circ}C$ as noted on the CoC.							
The cooler temperatures below 2.0° as broken or frozen.	The cooler temperatures below 2.0°C were judged as acceptable since the laboratory did not report the sample containers as broken or frozen.						
7. Were samples extracted/digested and analyzed within method-specified or Yes technical holding times?							
Comments: The samples were extra	acted/digested and analyzed	within method	-specific holding tir	nes.			
8. Were reported units appropriate for the sample matrix/matrices and analytical Yes method(s)? Specify if wet or dry units were used for soil.							
Comments: The results were report which were acceptable for the samp	Comments: The results were reported in concentration units of micrograms per liter (µg/L) and milligrams per liter (mg/L), which were acceptable for the sample matrix and the analyses requested.						
9. Did the laboratory provide any s	pecific initial and/or continui	ng calibration r	esults?	No			
Comments: Initial and continuing ca	libration data were not inclue	ded as part of t	his data set.				
10. If initial and/or continuing calibra acceptable limits?	ation results were provided, v	were the result	s within	N/A			
Comments: Initial and continuing ca	libration data were not inclue	ded as part of t	his data set.				
11. Was the total number of laborat the total number of samples or a	ory blank samples prepared analyzed as required by the r	equal to at leas method?	st 5% of	Yes			
Comments: The total number of lab samples.	oratory blank samples prepa	red was equal	to at least 5% of th	ne total number of			
12. Were target analytes reported a	s not detected in the laborate	ory blanks?		No			
Comments: Target analytes were re	eported as not detected in the	e laboratory bla	anks, with the follow	ving exceptions.			
Metho	<u>d</u> <u>Analyte</u>	<u>Batch</u>	Concentration				
200.7 Total Beryllium 72221 0.00082 mg/L							
8015D TPH DRO 72199 0.097 mg/L							
Detections of total beryllium and TPH DRO in the associated samples that were less than the blank results and/or less than the applicable reporting limits were assigned U qualifiers. Detections of TPH DRO in the associated samples that were greater than the reporting limits but less than or equal to 10 times the blank results were							
assigned JB qualifiers. Non-detections of the identified analytes in the associated samples and detections that were							

above the reporting limit and greater than ten times the blank concentration did not require qualification.



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## VALIDATION CRITERIA CHECKLIST

13. Was the total number of MS samples prepared equal to at least 5% of the total number of samples or analyzed as required by the method?

Yes

Comments: The total number of matrix spike samples prepared was equal to at least 5% of the total number of samples, although MS samples were not prepared/reported for all analyses and/or batches. The matrix spike sample source for each analytical batch in this sample set has been indicated below.

<u>Method</u>	Analytes	Batch	MS Sample Source
200.7	Total Metals	72221	Not Prepared
200.7	Dissolved Metals	C93558	EB-12-15-22, MKTF-30
200.8	Total Metals	72221	Not Prepared
200.8	Dissolved Metals	A93438	EB-12-15-22, MKTF-30
200.8	Dissolved Antimony	A93556	MKTF-30, STP-1-NW
245.1	Total and Dissolved Mercury	72295	Not Prepared
504.1	EDB	72313	Not Prepared
4500CN E	Cyanide	WG1977924	Not Associated
8015D	TPH DRO and MRO	72199	Not Prepared
8015D	TPH GRO	B93549	MKTF-30
8260B	VOCs	R93599	MKTF-30
8270C SIM	SVOCs	72138	Not Prepared
8270C	SVOCs	72138	Not Prepared
8270C SIM	SVOCs	72239	Not Prepared
8270C	SVOCs	72239	Not Prepared

Not Associated – The MS sample source was not associated with this project.

Not Prepared – Matrix spikes were not prepared/reported for this batch.

14. For MS/MSDs prepared from project samples, were percent recoveries and RPDs within data validation or laboratory quality control (QC) limits?

No

Comments: The MS/MSD percent recoveries and RPDs for project samples were within data validation and laboratory QC limits, with the following exceptions.

<u>Method</u>	Analyte	<u>Batch</u>	<u>MS</u> <u>Recovery</u>	<u>MSD</u> Recovery	MS/MSD QC Limits
200.7	<b>Dissolved Barium</b>	C93558	65.3%	62.2%	75-125%
200.7	Dissolved Beryllium	C93558	Acceptable	73.0%	75-125%
200.7	Dissolved Cadmium	C93558	70.1%	66.7%	75-125%
200.7	Dissolved Chromium	C93558	64.4%	60.9%	75-125%
200.7	Dissolved Cobalt	C93558	64.0%	60.9%	75-125%
200.7	<b>Dissolved Nickel</b>	C93558	64.0%	61.2%	75-125%
200.7	<b>Dissolved Silver</b>	C93558	58.1%	56.5%	75-125%
200.7	<b>Dissolved Vanadium</b>	C93558	72.2%	69.4%	75-125%
200.7	Dissolved Zinc	C93558	64.9%	61.5%	75-125%

Detections of the identified analytes in the associated samples were qualified as J- due to evidence of potential low bias. Non-detections of these analytes in the associated samples were qualified as UJ.



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VALIDATION CRITERIA CHECKLIST									
15. Was the total number of LCSs analyzed equal to at least 5% of the total number of Yes samples or analyzed as required by the method?									
Comments: TI	Comments: The total number of LCS samples analyzed was equal to at least 5% of the total number of samples.								
16. Were LCS/LCSD percent recoveries and LCS/LCSD RPDs within data validation or No laboratory QC limits?									
Comments: TI limits, with the	Comments: The LCS and LCSD percent recoveries and LCS/LCSD RPDs were within data validation and laboratory QC limits, with the following exceptions.								
<u>Method</u>	Analyte	<u>Batch</u>	<u>LCS</u> <u>Recovery</u>	LCSD Recovery	LCS/LCSD QC Limits	LCS/LCSD RPD	<u>RPD</u> <u>QC</u> <u>Limits</u>		
200.7	Total Nickel	72221	148%		70-130%				
200.7	Dissolved Nickel	C93558	137%		70-130%				
200.7	Dissolved Chromium	C93558	50.7%		70-130%				
245.1	Mercury	72295	148%		70-130%				
504.1	EDB	72313	Acceptable	Acceptable	70-130%	40.2%	20%		
8270C	Pyrene	72239	Acceptable	Acceptable	61-123%	16.6%	11.8%		
8270C SIM	1,4-Dioxane	72239	Acceptable	Acceptable	15-60.5%	32.3%	29.7%		
8270C SIM	Anthracene	72239	Acceptable	Acceptable	21.1-106%	22.5%	14.4%		
8270C SIM	Fluoranthene	72239	Acceptable	Acceptable	32.8-119%	24.9%	14.8%		
8270C SIM	Pyrene72239AcceptableAcceptable34.1-110%24.7%19.2%								

Dissolved chromium was not detected in the associated samples, and these results were qualified as UJ due to evidence of potential low bias.

**Detections of total nickel, dissolved nickel, and mercury were assigned J+ qualifiers due to evidence of potential high bias.** Non-detections of these analytes in the associated samples did not require qualification.

The analytes with LCS/LCSD RPD values that exceeded the QC limits were qualified as J for detections and UJ for non-detections for the associated samples due to evidence of poor precision.

17. Were surrogate recoveries within laboratory QC limits?

No

Yes

Comments: Surrogate recoveries were within laboratory QC limits, with the following exceptions.

The Method 8015D surrogate BFB in sample OPIS-1 was recovered outside the acceptance limits of 70-130% at 164%. TPH GRO was detected in the Method 8015D analysis of sample OPIS-1, and this result was qualified as J+ due to evidence of potential high bias.

The SVOC results for sample OPIS-1 were not qualified based on the surrogate non-conformances in the Method 8270C analyses since the applied dilution of 10 times resulted in surrogate concentrations below routinely calibrated levels and those results were deemed unreliable and possibly inaccurate.

Qualification of sample data was not required based on surrogate non-conformances in QC samples as the environmental samples were evaluated based on their specific surrogate recoveries.

18. Were the number of trip blank, field blank, and/or equipment blank samples collected equal to at least 10% of the total number of samples or as required by the project guidelines, QAPP, SAP, or permit?

Comments: The number of trip, field, and equipment blanks collected was equal to at least 10% of the number of samples. One trip blank sample, Trip Blank, one field blank sample, FB-12-15-22, and one equipment blank sample, EB-12-15-22, were collected as part of this sample set.



	VALIDATION CRITERIA CHECKLIST					
19. Were target analytes reported as not detected in the trip blank, field blank, and/or No equipment blank samples?						
Comments: Target analytes were not detected in the trip blank, field blank, and equipment blank samples with the following exceptions.						
Blank Sample ID         Method         Analyte         Concentration (mg/L)						
	EB-12-15-22	245.1	Total Mercury	0.000099	-	
	EB-12-15-22	245.1	Dissolved Mercury	0.000097		
	EB-12-15-22	8015D	TPH DRO	0.030	-	
Total mercury and dissolved mercury were not detected in the associated samples and the results did not require qualification based on the equipment blank detections. The TPH DRO results in Method 8015D batch 72199 were previously qualified due to a laboratory blank detection; therefore, additional qualification due to the equipment blank contamination was not required.						
20. Was the numbe number of sam	er of field duplicates coll bles or as required by th	ected equal ne project gu	to at least 10% of the total uidelines, QAPP, SAP, or peri	nit?	Yes	
Comments: The nu	mber of field duplicates	collected w	as equal to at least 10% of th	e number of sampl	es.	
Sample Dup-12-15-2	22 was collected as a fi	eld duplicate	e of sample STP-1-NW.			
21. Were field dupli 0-30%, or air 0-	cate RPD values within 25%)?	data valida	tion QC limits (soil 0-50%, wa	ter	Yes	
Comments: As indicated in the Field Duplicate Summary Table at the end of this report, field duplicate RPD values were within data validation QC limits of 0-30% for water samples.						
22. For laboratory duplicates prepared from project samples, were RPDs within data N/A validation or laboratory QC limits?						
Comments: Laboratory duplicates were prepared for the analysis of cyanide in batch WG1977924 from a samples not associated with this data set.						
The RPD value for t but data were not qu	he laboratory duplicate ualified based on these	samples pre results since	epared from non-project samp e matrix similarity to project sa	oles were evaluated amples could not be	d and considered, e guaranteed.	

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VALIDATION CRITERIA CHECKLIST							
23. Were the follo	- 23. Were the following data relationships realistic?						
<ul> <li>Target analytes were reported by more than one method (e.g., 8260/8270, EPH/8270)?</li> </ul>					Yes		
Comments: Targe	et analytes were not repor	rted by more than one	method.				
Both total and dissolved metals analyses were performed, and the total metals No results were greater than or equal to the dissolved metals results? Comments: The following table contains the exceptions in which the dissolved metals results exceeded the total metal results.      Sample ID Analyte Total Result (mg/L) Dissolved Result							
	OPIS-1	Antimony	ND	0.0032			
	STP-1-NW	Arsenic	0.0018	0.0022			
	DUP-12-15-22	Arsenic	0.0019	0.0023			
	DUP-12-15-22 Selenium 0.0058 0.0070						
	STP-1-NW Vanadium 0.028 0.039						
	DUP-12-15-22	Vanadium	0.028	0.029			
	OPIS-1	Zinc	0.0079	0.0097			

The EPA has not provided guidance or requirements for the evaluation, validation, and qualification of dissolved metals results that exceed the corresponding total metals results. Therefore, qualification of results was not performed based on these data.



Client Sample ID: STP-1-NW								
Analyte	Method	Laboratory Result	Duplicate Result	Relative Percent Difference (RPD)				
Barium, Dissolved	E 200.7	0.063 mg/L	0.056 mg/L	11.8%				
Barium, Total	E 200.7	0.098 mg/L	0.10 mg/L	2.0%				
Chromium, Total	E 200.7	0.0023 mg/L	0.0022 mg/L	4.4% +/-RL				
Silver, Dissolved	E 200.7	0.0016 mg/L	0.0013 mg/L	20.7% +/-RL				
Silver, Total	E 200.7	0.0022 mg/L	0.0019 mg/L	14.6% +/-RL				
Vanadium, Dissolved	E 200.7	0.039 mg/L	0.029 mg/L	29.4% +/-RL				
Vanadium, Total	E 200.7	0.028 mg/L	0.028 mg/L	0.0% +/-RL				
Arsenic, Dissolved	E200.8	0.0022 mg/L	0.0023 mg/L	4.4% +/-RL				
Arsenic, Total	E200.8	0.0018 mg/L	0.0019 mg/L	5.4% +/-RL				
Selenium, Dissolved	E200.8	0.0073 mg/L	0.0070 mg/L	4.2% +/-RL				
Selenium, Total	E200.8	0.0093 mg/L	0.0058 mg/L	46.4% +/-RL				
Cyanide, Total	E335.4	0.0538 mg/L	0.0503 mg/L	6.7%				
TPH DRO	SW8015	0.20 mg/L	0.20 mg/L	0.0%				
TPH ORO	SW8015	0.074 mg/L	ND (0.080 mg/L)	DL				
1,4-Dioxane	SW8270C	0.12 μg/L	0.12 μg/L	0.0% +/-RL				

#### FIELD DUPLICATE SUMMARY

Field duplicate RPD control limits are not to exceed 30% for water as established by USEPA Region I - New England Environmental Data Review Supplement for Region 1 Data Review Elements and Superfund Specific Guidance/Procedures, EQADR-Supplement2, September 2020.

DL – Indicates that the analyte was detected in one of the duplicate samples and was undetected in the other sample, and therefore an RPD could not be calculated. Data were not qualified since the detection was within two times the reporting limit. Non-detected results are indicated above with the applicable reporting limit as ND (RL).

+/-RL – Indicates that the detections in both of the samples were within two times the reporting limit. Qualification of data was not required.



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## DATA QUALIFICATION SUMMARY

Abbreviation	Reason
ERPD-LCS	The LCS/LCSD RPD exceeded the upper acceptable limit indicating poor precision.
HR-LCS	The LCS and/or LCSD percent recovery was greater than the upper acceptable limit indicating a possible high bias.
HR-SUR	The surrogate percent recovery was greater than the upper acceptable limit indicating a possible high bias.
LR-LCS	The LCS and/or LCSD percent recovery was less than the lower acceptable limit indicating a possible low bias.
LR-MS	The MS and/or MSD percent recovery was less than the lower acceptable limit indicating possible matrix interference.
MBD	Method blank detection
MDLRL	Flagged by the laboratory: The result was greater than the MDL but less than the RL.
ERPD-LCS	The LCS/LCSD RPD exceeded the upper acceptable limit indicating poor precision.

Analyte	Method	Field Sample ID	Lab Sample ID	Result	Limit	Units	Reviewer Qualifier	DV Flag Reasons
1,2-Dibromoethane	E504.1	EB-12-15-22	2212A11-001B	ND	0.0093	µg/L	UJ	ERPD-LCS
1,2-Dibromoethane	E504.1	MKTF-30	2212A11-002B	ND	0.0094	µg/L	UJ	ERPD-LCS
1,2-Dibromoethane	E504.1	STP-1-NW	2212A11-003B	ND	0.0094	µg/L	UJ	ERPD-LCS
1,2-Dibromoethane	E504.1	OPIS-1	2212A11-004B	ND	0.0094	µg/L	UJ	ERPD-LCS
1,2-Dibromoethane	E504.1	Dup-12-15-22	2212A11-006B	ND	0.0093	µg/L	UJ	ERPD-LCS
1,2-Dibromoethane	E504.1	Trip Blank	2212A11-007B	ND	0.0096	µg/L	UJ	ERPD-LCS
1,4-Dioxane	SW8270C	STP-1-NW	2212a11-003c	0.12	1.0	µg/L	J	MDLRL
1,4-Dioxane	SW8270C	Dup-12-15-22	2212a11-006c	0.12	1.0	µg/L	J	ERPD-LCS, MDLRL
Anthracene	SW8270C	Dup-12-15-22	2212a11-006c	ND	0.30	µg/L	UJ	ERPD-LCS
Antimony, Dissolved	E200.8	OPIS-1	2212A11-004E	0.0032	0.0050	mg/L	J	MDLRL
Arsenic, Dissolved	E200.8	STP-1-NW	2212A11-003E	0.0022	0.0050	mg/L	J	MDLRL
Arsenic, Dissolved	E200.8	OPIS-1	2212A11-004E	0.0043	0.0050	mg/L	J	MDLRL
Arsenic, Dissolved	E200.8	Dup-12-15-22	2212A11-006E	0.0023	0.0050	mg/L	J	MDLRL
Arsenic, Total	E200.8	STP-1-NW	2212A11-003D	0.0018	0.0050	mg/L	J	MDLRL



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Analyte	Method	Field Sample ID	Lab Sample ID	Result	Limit	Units	Reviewer Qualifier	DV Flag Reasons
Arsenic, Total	E200.8	OPIS-1	2212A11-004D	0.0044	0.0050	mg/L	J	MDLRL
Arsenic, Total	E200.8	Dup-12-15-22	2212A11-006D	0.0019	0.0050	mg/L	J	MDLRL
Barium, Dissolved	E 200.7	MKTF-30	2212A11-002E	0.029	0.0020	mg/L	J-	LR-MS
Barium, Dissolved	E 200.7	STP-1-NW	2212A11-003E	0.063	0.0020	mg/L	J-	LR-MS
Barium, Dissolved	E 200.7	OPIS-1	2212A11-004E	0.71	0.0020	mg/L	J-	LR-MS
Barium, Dissolved	E 200.7	Dup-12-15-22	2212A11-006E	0.056	0.0020	mg/L	J-	LR-MS
Barium, Dissolved	E 200.7	EB-12-15-22	2212A11-001E	ND	0.0020	mg/L	UJ	LR-MS
Beryllium, Total	E 200.7	MKTF-30	2212A11-002D	0.00081	0.0020	mg/L	U	MBD, MDLRL
Beryllium, Dissolved	E 200.7	EB-12-15-22	2212A11-001E	ND	0.0020	mg/L	UJ	LR-MS
Beryllium, Dissolved	E 200.7	MKTF-30	2212A11-002E	ND	0.0020	mg/L	UJ	LR-MS
Beryllium, Dissolved	E 200.7	STP-1-NW	2212A11-003E	ND	0.0020	mg/L	UJ	LR-MS
Beryllium, Dissolved	E 200.7	OPIS-1	2212A11-004E	ND	0.0020	mg/L	UJ	LR-MS
Beryllium, Dissolved	E 200.7	Dup-12-15-22	2212A11-006E	ND	0.0020	mg/L	UJ	LR-MS
Cadmium, Dissolved	E 200.7	EB-12-15-22	2212A11-001E	ND	0.0020	mg/L	UJ	LR-MS
Cadmium, Dissolved	E 200.7	MKTF-30	2212A11-002E	ND	0.0020	mg/L	UJ	LR-MS
Cadmium, Dissolved	E 200.7	STP-1-NW	2212A11-003E	ND	0.0020	mg/L	UJ	LR-MS
Cadmium, Dissolved	E 200.7	OPIS-1	2212A11-004E	ND	0.0020	mg/L	UJ	LR-MS
Cadmium, Dissolved	E 200.7	Dup-12-15-22	2212A11-006E	ND	0.0020	mg/L	UJ	LR-MS
Chromium, Dissolved	E 200.7	EB-12-15-22	2212A11-001E	ND	0.0060	mg/L	UJ	LR-LCS, LR-MS
Chromium, Dissolved	E 200.7	MKTF-30	2212A11-002E	ND	0.0060	mg/L	UJ	LR-LCS, LR-MS
Chromium, Dissolved	E 200.7	STP-1-NW	2212A11-003E	ND	0.0060	mg/L	UJ	LR-LCS, LR-MS
Chromium, Dissolved	E 200.7	OPIS-1	2212A11-004E	ND	0.0060	mg/L	UJ	LR-LCS, LR-MS
Chromium, Dissolved	E 200.7	Dup-12-15-22	2212A11-006E	ND	0.0060	mg/L	UJ	LR-LCS, LR-MS
Chromium, Total	E 200.7	MKTF-30	2212A11-002D	0.0054	0.006	mg/L	J	MDLRL
Chromium, Total	E 200.7	STP-1-NW	2212A11-003D	0.0023	0.0060	mg/L	J	MDLRL
Chromium, Total	E 200.7	Dup-12-15-22	2212A11-006D	0.0022	0.0060	mg/L	J	MDLRL
Cobalt, Dissolved	E 200.7	EB-12-15-22	2212A11-001E	ND	0.0060	mg/L	UJ	LR-MS



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Analyte	Method	Field Sample ID	Lab Sample ID	Result	Limit	Units	Reviewer Qualifier	DV Flag Reasons
Cobalt, Dissolved	E 200.7	MKTF-30	2212A11-002E	ND	0.0060	mg/L	UJ	LR-MS
Cobalt, Dissolved	E 200.7	STP-1-NW	2212A11-003E	ND	0.0060	mg/L	UJ	LR-MS
Cobalt, Dissolved	E 200.7	Dup-12-15-22	2212A11-006E	ND	0.0060	mg/L	UJ	LR-MS
Cobalt, Dissolved	E 200.7	OPIS-1	2212A11-004E	0.0041	0.0060	mg/L	J-	LR-MS, MDLRL
Cobalt, Total	E 200.7	OPIS-1	2212A11-004D	0.0048	0.0060	mg/L	J	MDLRL
Ethylbenzene	SW8260B	OPIS-1	2212a11-004a	4.6	5.0	µg/L	J	MDLRL
Fluoranthene	SW8270C	Dup-12-15-22	2212a11-006c	ND	0.30	µg/L	UJ	ERPD-LCS
Mercury, Dissolved	E245.1	EB-12-15-22	2212A11-001E	0.000097	0.0002	mg/L	J+	HR-LCS, MDLRL
Mercury, Total	E245.1	EB-12-15-22	2212A11-001D	0.000099	0.0002	mg/L	J+	HR-LCS, MDLRL
Nickel, Dissolved	E 200.7	EB-12-15-22	2212A11-001E	ND	0.010	mg/L	UJ	LR-MS
Nickel, Dissolved	E 200.7	STP-1-NW	2212A11-003E	ND	0.010	mg/L	UJ	LR-MS
Nickel, Dissolved	E 200.7	Dup-12-15-22	2212A11-006E	ND	0.010	mg/L	UJ	LR-MS
Nickel, Dissolved	E 200.7	MKTF-30	2212A11-002E	0.013	0.010	mg/L	J	HR-LCS, LR-MS
Nickel, Dissolved	E 200.7	OPIS-1	2212A11-004E	0.15	0.010	mg/L	J	HR-LCS, LR-MS
Nickel, Total	E 200.7	MKTF-30	2212A11-002D	0.024	0.010	mg/L	J+	HR-LCS
Nickel, Total	E 200.7	OPIS-1	2212A11-004D	0.18	0.010	mg/L	J+	HR-LCS
Pyrene	SW8270C	Dup-12-15-22	2212a11-006c	ND	1.0	µg/L	UJ	ERPD-LCS
Selenium, Dissolved	E200.8	OPIS-1	2212A11-004E	0.0022	0.0050	mg/L	J	MDLRL
Selenium, Total	E200.8	OPIS-1	2212A11-004D	0.0045	0.0050	mg/L	J	MDLRL
Silver, Dissolved	E 200.7	EB-12-15-22	2212A11-001E	ND	0.0050	mg/L	UJ	LR-MS
Silver, Dissolved	E 200.7	MKTF-30	2212A11-002E	0.0020	0.0050	mg/L	J-	LR-MS, MDLRL
Silver, Dissolved	E 200.7	STP-1-NW	2212A11-003E	0.0016	0.0050	mg/L	J-	LR-MS, MDLRL
Silver, Dissolved	E 200.7	OPIS-1	2212A11-004E	0.0019	0.0050	mg/L	J-	LR-MS, MDLRL
Silver, Dissolved	E 200.7	Dup-12-15-22	2212A11-006E	0.0013	0.0050	mg/L	J-	LR-MS, MDLRL
Silver, Total	E 200.7	MKTF-30	2212A11-002D	0.0021	0.0050	mg/L	J	MDLRL
Silver, Total	E 200.7	STP-1-NW	2212A11-003D	0.0022	0.0050	mg/L	J	MDLRL
Silver, Total	E 200.7	OPIS-1	2212A11-004D	0.0019	0.0050	mg/L	J	MDLRL



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Analyte	Method	Field Sample ID	Lab Sample ID	Result	Limit	Units	Reviewer Qualifier	DV Flag Reasons
Silver, Total	E 200.7	Dup-12-15-22	2212A11-006D	0.0019	0.0050	mg/L	J	MDLRL
TPH DRO	SW8015	MKTF-30	2212A11-002C	0.33	0.064	mg/L	JB	MBD
TPH DRO	SW8015	STP-1-NW	2212A11-003C	0.20	0.064	mg/L	JB	MBD
TPH DRO	SW8015	Dup-12-15-22	2212A11-006C	0.20	0.064	mg/L	JB	MBD
TPH DRO	SW8015	EB-12-15-22	2212A11-001C	0.03	0.064	mg/L	U	MBD, MDLRL
TPH GRO	SW8015	OPIS-1	2212a11-004a	0.44	0.050	mg/L	J+	HR-SUR
TPH GRO	SW8015	MKTF-30	2212a11-002a	0.020	0.050	mg/L	J	MDLRL
TPH ORO	SW8015	STP-1-NW	2212A11-003C	0.074	0.080	mg/L	J	MDLRL
Trichloroethene	SW8260B	MKTF-30	2212a11-002a	0.95	1.0	µg/L	J	MDLRL
Vanadium, Dissolved	E 200.7	EB-12-15-22	2212A11-001E	ND	0.050	mg/L	UJ	LR-MS
Vanadium, Dissolved	E 200.7	MKTF-30	2212A11-002E	0.0031	0.050	mg/L	J-	LR-MS, MDLRL
Vanadium, Dissolved	E 200.7	STP-1-NW	2212A11-003E	0.039	0.050	mg/L	J-	LR-MS, MDLRL
Vanadium, Dissolved	E 200.7	OPIS-1	2212A11-004E	0.010	0.050	mg/L	J-	LR-MS, MDLRL
Vanadium, Dissolved	E 200.7	Dup-12-15-22	2212A11-006E	0.029	0.050	mg/L	J-	LR-MS, MDLRL
Vanadium, Total	E 200.7	MKTF-30	2212A11-002D	0.015	0.050	mg/L	J	MDLRL
Vanadium, Total	E 200.7	STP-1-NW	2212A11-003D	0.028	0.050	mg/L	J	MDLRL
Vanadium, Total	E 200.7	OPIS-1	2212A11-004D	0.018	0.050	mg/L	J	MDLRL
Vanadium, Total	E 200.7	Dup-12-15-22	2212A11-006D	0.028	0.050	mg/L	J	MDLRL
Zinc, Dissolved	E 200.7	EB-12-15-22	2212A11-001E	ND	0.010	mg/L	UJ	LR-MS
Zinc, Dissolved	E 200.7	MKTF-30	2212A11-002E	ND	0.010	mg/L	UJ	LR-MS
Zinc, Dissolved	E 200.7	STP-1-NW	2212A11-003E	ND	0.010	mg/L	UJ	LR-MS
Zinc, Dissolved	E 200.7	Dup-12-15-22	2212A11-006E	ND	0.010	mg/L	UJ	LR-MS
Zinc, Dissolved	E 200.7	OPIS-1	2212A11-004E	0.0097	0.010	mg/L	J-	LR-MS, MDLRL
Zinc, Total	E 200.7	MKTF-30	2212A11-002D	0.0096	0.010	mg/L	J	MDLRL
Zinc, Total	E 200.7	OPIS-1	2212A11-004D	0.0079	0.010	mg/L	J	MDLRL



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Client: Marathon Oil	Laboratory: Hall Environmental Analysis Laboratory					
Project Name: Western Refining Southwest, Quarterly GW	Sample Matrix: Groundwater					
Project Number: 697-082-003 Task: 0002	Sample Start Date: 12/22/2022					
Date Validated: 02/14/2023	Sample End Date: 12/22/2022					
Parameters Included:						
<ul> <li>Volatile Organic Compounds (VOC) by Environmental Protection Agency (EPA) Test Methods for Evaluating Solid Waste (SW-846) Method 8260B</li> </ul>						
<ul> <li>1,2-Dibromoethane (EDB) by EPA Method 504.1</li> </ul>						
<ul> <li>Semivolatile Organic Compounds (SVOC) by SW-846 Method 8270C and Method 8270C with Selected Ion Monitoring (SIM)</li> </ul>						
<ul> <li>Total Petroleum Hydrocarbons (TPH) Gasoline Range Or</li> </ul>	ganics (GRO) by SW-846 Method 8015D					
<ul> <li>TPH Diesel Range Organics (DRO) and Motor Oil Range</li> </ul>	Organics (MRO) by SW-846 Method 8015D Modified					
<ul> <li>Total and Dissolved Metals by EPA Method 200.7 and Method</li> </ul>	ethod 200.8					
<ul> <li>Total and Dissolved Mercury by EPA Method 245.1</li> </ul>						
<ul> <li>Cyanide by Standard Methods for the Examination of Wat</li> </ul>	ter and Wastewater (SM) Method 4500 CN E					
Laboratory Project ID: 2212D48						
Data Validator: Daran O'Hollearn, Lead Project Scientist	Data Validator: Daran O'Hollearn, Lead Project Scientist					
Reviewer: Mike Phillips, Senior Chemist						

## DATA EVALUATION CRITERIA SUMMARY

A Tier II Data Validation was performed by Trihydro Corporation's Chemical Data Evaluation Services Group on the analytical data report packages generated by Hall Environmental Analysis Laboratory of Albuquerque, New Mexico, with additional data from Pace Analytical National of Mount Juliet, Tennessee evaluating samples from the Marathon Oil site, located in Gallup, New Mexico.

Precision, accuracy, method compliance, and completeness of this data package were assessed during this data review. Precision was determined by evaluating the calculated relative percent difference (RPD) values from:

- Field duplicate pairs
- Laboratory duplicate pairs
- Matrix spike (MS) and matrix spike duplicate (MSD) pairs
- Laboratory control sample (LCS) and laboratory control sample duplicate (LCSD) pairs

Laboratory accuracy was established by reviewing the demonstrated percent recoveries (%R) of the following items to verify that data are not biased.

- MS/MSD samples
- LCS/LCSD samples
- Organic system monitoring compounds (surrogates)



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Field accuracy was established by collecting and analyzing the following samples to monitor for possible ambient or cross contamination during sampling and transportation.

- Trip blanks
- Field blanks
- Equipment blanks

Method compliance was established by reviewing sample integrity, holding times, detection limits, surrogate recoveries, laboratory blanks, initial and continuing calibrations (where applicable), and the LCS/LCSD percent recoveries against method-specific requirements.

Completeness was evaluated by determining the overall ratio of the number of samples and analyses planned versus the number of samples with valid analyses. Determination of completeness included a review of the chain-of-custody (CoC), laboratory analytical methods, and other laboratory and field documents associated with this analytical data set.

Client Sample ID	Laboratory Sample Number
EB-12-22-22	2212d48-001
OW-1	2212d48-002
BW-4B	2212d48-003
BW-5C	2212d48-004
BW-5B	2212d48-005
MKTF-44	2212d48-006
OW-10	2212d48-007
MKTF-43	2212d48-008
FB-12-22-22	2212d48-009
DUP-12-22-22	2212d48-010
Trip Blank	2212d48-011

## SAMPLE NUMBERS TABLE





The laboratory data were reviewed to evaluate compliance with the methods and the quality of the reported data. Assessment of CoC completeness is included in Item 3 of the Data Validation Checklist. A check mark ( $\checkmark$ ) indicates that the referenced validation criteria were deemed acceptable, whereas a crossed circle ( $\otimes$ ) indicates validation criteria for which the data have been qualified by the data validator. An empty circle (O) indicates that the specified criterion does not apply to the reviewed data. Details are noted in the tables below.

### Validation Criteria

- ✓ Data Completeness
- ✓ CoC Documentation (Item 3)
- ✓ Holding Times and Preservation (Items 6 and 7)
- O Initial and Continuing Calibrations (Items 9 and 10)
- ⊗ Laboratory Blanks (Items 11 and 12)
- ✓ MS/MSD (Items 13 and 14)
- ⊗ LCS/LCSD (Items 15 and 16)
- System Monitoring Compounds (i.e., Surrogates) (Item 17)
- ⊗ Trip, Field, and Equipment Blanks (Items 18 and 19)
- ✓ Field Duplicates (Items 20 and 21)
- ✓ Laboratory Duplicates (Item 22)

## **Guidance References**

Chemical data validation was conducted in accordance with the United States Environmental Protection Agency (USEPA) Contract Laboratory Program (CLP) National Functional Guidelines for the analyses listed below, or by the appropriate method if not covered in the National Functional Guidelines.

- Data for organic analyses were evaluated according to validation criteria set forth in the USEPA CLP National Functional Guidelines for Organic Superfund Methods Data Review, document number EPA-540-R-20-005, November 2020 with additional reference to the USEPA CLP National Functional Guidelines for Organic Data Review, document number EPA 540/R-99/008, October 1999.
- Data for inorganic analyses were evaluated according to validation criteria set forth in the USEPA CLP National Functional Guidelines for Inorganic Superfund Methods Data Review, document number EPA-540-R-20-006, November 2020 with additional reference to the USEPA CLP National Functional Guidelines for Inorganic Data Review, document number EPA 540-R-04-004, October 2004.
- Review of field duplicates was conducted according to the USEPA Region I New England Environmental Data Review Supplement for Region 1 Data Review Elements and Superfund Specific Guidance/Procedures, EQADR-Supplement2, September 2020.
- Trihydro Data Validation Variance Documentation, April 2022.



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## **OVERALL DATA PACKAGE ASSESSMENT**

Based on a data validation review, the data are acceptable as delivered. Data qualified by the laboratory are discussed in Item 2 of the Validation Criteria Checklist.

The purpose of validating data and assigning qualifiers is to assist in proper data interpretation. Data that are not qualified meet the site data quality objectives. If values are assigned qualifiers other than an R (rejected, data not usable), the data may be used for site evaluation; however, consideration should be given to the reasons for qualification when interpreting sample concentrations. Data points that are assigned an R qualifier should not be used for site evaluation purposes.

If applicable, text was identified in **bold font** in the Validation Criteria Checklist to indicate that further action and/or qualification of the data were required. Data may have been qualified with J data flags by the laboratory if the result was greater than or equal to the method detection limit (MDL) but less than the reporting limit (RL). These laboratory-applied J flags were preserved, if present, and included in the Data Qualification Summary table at the end of this report. If applicable, data validation qualifiers were added for the items noted with crossed circles in the Validation Criteria section above. Please see the Data Qualification Summary table at the end of this report.

If data would be qualified with more than one flag, one qualifier was assigned based on the severity; however, all reasons for qualification were retained. Data that would be qualified with both J+ and J- flags were evaluated based on validation criteria and assigned the appropriate flag. The hierarchy of qualifiers from the most to least severe is as follows:

Data qualifiers used during this validation are included in the following table.

<u>Qualifier</u>	Definition
J	Estimated concentration
J+	The result is an estimated concentration, but may be biased high
JB	Estimated concentration due to blank contamination
U	Evaluated to be undetected at the reporting limit
R	Rejected, data not usable

### **Data Completeness**

The analyses were performed as requested on the CoC records. The associated samples were received by the laboratory and analyzed properly unless otherwise noted in the Criteria Checklist below. The complete data package consisted of 720 data points. The data completeness calculation does not include any submitted blank sample results. Seven data points were rejected. The data completeness measure for this data package is calculated to be 99.03% and is acceptable.



		VALIDATION	I CRITERIA CHECKLIST			
1. Was the re	port free of non	-conformances identified	by the laboratory?	N	D	
Comments: The laboratory noted the following analytical non-conformances related to this data set.						
Method 8270C EPA Method 82	and Method 82 270 instead of E	70C SIM: 1-Methylnapht PA Method 8270 SIM be	halene, 2-methylnaphthalene, and nap cause of their elevated concentrations	ohthalene were for samples O	reported by W-1.	
1-Methylnaphth concentration f	nalene was repo or sample BW-5	orted by EPA Method 827 5C	0 instead of EPA Method 8270 SIM be	ecause of its el	evated	
<u>Method 80156</u> with a "B". The	<u>D DRO/MRO</u> : T aboratory cont	he method blank had a lo trol spike (LCS) had an e	ow-level detection for DRO. Samples v levated recovery.	vith detections	are flagged	
2. Were the o If no, defin	lata free of data e.	qualification flags and/or	notes used by the laboratory?	No	0	
Comments: Th	e laboratory us	ed the following data qua	lification flags with this data set.			
B – Analyte det	tected in the ass	sociated method blank.				
E – Above qua	ntitation range /	estimated value. This fla	g was mistakenly applied according to	the results rep	orted.	
J – Analyte det	ected below qua	antitation limits.				
J3 – The assoc	iated batch QC	was outside the establish	ned quality control range for precision.			
J6 – The samp	le matrix interfe	red with the ability to mak	e any accurate determination; spike v	alue is low.		
S – % Recover	y outside of ran	ge due to dilution or matr	ix interference.			
* – Value excee	eds maximum c	ontaminant level.				
3. Were sam	ple CoC forms a	and custody procedures o	complete?	N	D	
Comments: Th and laboratory sealed, and cus	ne CoC records personnel signa stody seals were	from field to laboratory w atures, dates, and times o e present and intact on th	ere complete, and custody was mainta f receipt. The laboratory noted that th e shipping containers.	iined as evider e shipping con	nced by field tainers were	
The trip blank s laboratory logg	ample was rece ed in the sample	eived by the laboratory, b e and performed the appr	ut the parameters requested were not opriate volatile analyses. Validation a	indicated on th ction was not r	e CoC. The equired.	
4. Were dete permit, or i	ction limits in ac method, or indic	cordance with the quality ated as acceptable?	assurance project plan (QAPP),	Ye	S	
Comments: Th	e detection limi	ts appeared to be accept	able. The following dilutions were app	lied.		
	Method	Sample(s)	<u>Analyte(s)</u>	<u>Dilution</u> Factor		
	200.7	MKTF-43	Total Metals	5		
	200.8	OW-10, BW-5C	Select Total and Dissolved Metals	5		
	200.8	MKTF-43	Dissolved Metals	10		
	200.8	MKTF-43	Total Metals	20		



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VALIDATION CRITERIA CHECKLIST							
<ol><li>Were the reported analytical methods and constituents in compliance with the QAPP, permit, or CoC?</li></ol>	No						
Comments: The reported analytical methods were in compliance with the CoC, and the laboratory reported the requested constituents in accordance with the CoC, with the following exceptions.							
The CoC requested total and dissolved metals using only Method 200.7; however, the laboratory analyzed the samples using both Method 200.7 and Method 200.8. This substituted analytical method, Method 200.8, met similar sensitivity, accuracy, and precision goals and, therefore, was an acceptable replacement.							
The CoC requested cyanide using Method 335.4; however, the laboratory analyzed the samples using Nethod Structure analytical method met similar sensitivity, accuracy, and precision goals and, therefore, replacement.	Method 4500 CN E. was an acceptable						
6. Were samples received in good condition within method-specified requirements?	No						
Comments: Samples were received on ice, in good condition, and with the cooler temperatures both wi recommended temperature range of $4^{\circ}C \pm 2^{\circ}C$ at $0.4^{\circ}C$ to $3.1^{\circ}C$ as noted on Sample Log-in Check List transferred to Pace National were received in good condition with the cooler temperature outside the received at $0.4^{\circ}C$ as noted on the CoC.	thin and outside the . Samples commended range						
The cooler temperatures below 2.0°C were judged as acceptable since the laboratory did not report the as broken or frozen.	sample containers						
7. Were samples extracted/digested and analyzed within method-specified or technical holding times?	Yes						
Comments: The samples were extracted/digested and analyzed within method-specific holding times.							
8. Were reported units appropriate for the sample matrix/matrices and analytical method(s)? Specify if wet or dry units were used for soil.	Yes						
Comments: The results were reported in concentration units of micrograms per liter ( $\mu$ g/L) and milligram which were acceptable for the sample matrix and the analyses requested.	ns per liter (mg/L),						
9. Did the laboratory provide any specific initial and/or continuing calibration results?	No						
Comments: Initial and continuing calibration data were not included as part of this data set.							
10. If initial and/or continuing calibration results were provided, were the results within acceptable limits?	N/A						
Comments: Initial and continuing calibration data were not included as part of this data set.							
11. Was the total number of laboratory blank samples prepared equal to at least 5% of the total number of samples or analyzed as required by the method?	Yes						
Comments: The total number of laboratory blank samples prepared was equal to at least 5% of the tota samples.	l number of						



		١	ALIDATION CRIT	ERIA CHECKLIS	т	
12. Were targ	et analytes rep	orted as not d	etected in the labor	ratory blanks?		No
Comments: T	arget analytes	were reported	as not detected in	the laboratory bla	nks, with the follow	ing exceptions.
		Method	Analyte	<u>Batch</u>	Concentration	
		200.7	Total Zinc	72387	0.0051 mg/L	
		8015D	TPH DRO	72336	0.079 mg/L	
Detections of than the appl associated sa were assigne qualification.	total zinc and icable reportin amples that we d JB qualifiers	TPH DRO in ag limits were are greater that b. Non-detection	the associated sa assigned U quali an the reporting li ons of the identified	imples that were fiers. Detections mits but less tha d analytes in the a	less than the blan s of total zinc and an or equal to 10 t associated samples	nk results and/or less TPH DRO in the imes the blank results is did not require
13. Was the to number of	otal number of f samples or an	MS samples p alyzed as requ	repared equal to a uired by the metho	t least 5% of the t d?	otal	Yes
Comments: T although MS s analytical batc	he total numbe amples were n h in this sample	r of matrix spil ot prepared/re e set has been	ke samples prepare ported for all analy n indicated below.	ed was equal to at ses and/or batche	t least 5% of the tot es. The matrix spik	al number of samples, e sample source for each
	Method	A	nalytes	Batch	MS Sample S	ource
	200.7	Tota	al Metals	72387	Not Prepa	red
	200.7	Dissol	ved Metals	A93766	Not Prepa	red
	200.8	Tota	al Metals	72387	Not Prepa	red
	200.8	Dissol	ved Metals	A93855	Not Prepa	red
	200.8	Dissol	ved Metals	A93877	Not Prepa	red
	200.8	Dissol	ved Metals	A93915	Not Prepa	red
	245.1	Total and D	issolved Mercury	72445	EB-12-22-	22
	504.1		EDB	72358	Not Prepa	red
	4500CN E	C	yanide	WG1980609	Not Associa	ated
	4500CN E	C	yanide	WG1980984	MKTF-43, FB-1	2-22-22
	8015D	TPH DF	RO and MRO	72336	Not Prepa	red
	8015D	TP	'H GRO	R93580	OW-1	
	8015D	TP	H GRO	R93606	Not Prepa	red
	8260B	١	/OCs	R93684	Not Prepa	red
	8270C SIM	S	VOCs	72320	Not Prepa	red
	8270C	S	VOCs	72320	Not Prepa	red
Not Associated	– The MS sample	e source was no	t associated with this	project.		
Not Prepared –	Matrix spikes we	re not prepared/	reported for this batc	h.		
14. For MS/M within dat	SDs prepared a validation or l	from project sa aboratory qua	amples, were perce lity control (QC) lin	ent recoveries and nits?	I RPDs	Yes
Comments: T limits.	he MS/MSD pe	rcent recoveri	es and RPDs for p	roject samples we	ere within data valio	ation or laboratory QC
The MS recover 89.3%. Howe	ery for cyanide ver, the recove	in Method 450 ry was within c	00CN E batch WG1 data validation limit	980984 was outs s of 75-125%.  Va	ide the laboratory ( Ilidation action was	QC limits of 90.0-110% at not required.
The percent re but data were	ecoveries and F not qualified ba	RPD values for used on those	MS/MSDs prepare results since matrix	ed from non-proje similarity to proje	ct samples were ev ect samples could r	aluated and considered, not be guaranteed.

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🐨 Trihydro

samples	total number of or analyzed a	of LCSs analyzed equal to s required by the method?	at least 5%	of the total nur	nber of	Yes	
Comments:	The total num	ber of LCS samples analyz	zed was eq	ual to at least 5°	% of the total n	umber of sample	es.
16. Were LC laboratc	CS/LCSD perce ory QC limits?	ent recoveries and LCS/LC	SD RPDs	within data valio	lation or	No	
Comments: limits, with th	The LCS and te following exe	LCSD percent recoveries a ceptions.	and LCS/LC	SD RPDs were	e within data va	lidation and labo	oratory Q
	<u>Method</u>	<u>Analyte</u>	<u>Batch</u>	<u>LCS</u> <u>Recovery</u>	LCSD Recovery	LCS/LCSD QC Limits	
	200.7	Total Cobalt	72387	195%		70-130%	
	8015D	TPH DRO	72336	137%	134%	31.2-125%	
Comments:	Surrogate recove	overies were within laborat	ory QC limi	ts, with the follo	wing exception	is.	
	Method	Surrogate		Sample Surrogate		OC Limits	
	8270C	2-Eluorophenol		MKTF-43	1 10%	15-84 5%	
	01.00				4.00%	15-67%	
	8270C	Phenol-d₅		IVIN I F-43	4.92%	13-07 /0	
Since Mathe	8270C 8270C	Phenol-d₅ 2,4,6-Tribromophenol	t ovoilable f	MKTF-43 MKTF-43	4.92% 1.52%	15-108%	to all of t
Since Metho target analyte base/neutral The analyte sample MKT qualifiers to Qualification	8270C 8270C surro es in a given fr ) were outside s in the acid f FF-43 were les indicate reject of sample data	Phenol-d₅ 2,4,6-Tribromophenol gate associations were no action (acid or base/neutra the acceptance range. raction of sample MKTF- ss than 10%, the results f cted (not usable) data ba a was not required based of	t available f al) when two 43 were no for the asso sed on evi on surrogate	MKTF-43 MKTF-43 from the laborat o or more surro ot detected. Si ociated acid fra dence of extre e non-conforma	4.92% 1.52% ory, qualificatio gates from the nce the recove action analyte me low bias. Inces in QC sar	15-108% n was assigned same fraction (a pries of the sur s were assigne	to all of t acid or rogates i ad R vironment
Since Metho target analyte base/neutral The analyte sample MKT qualifiers to Qualification samples wer	8270C 8270C surro es in a given fr ) were outside s in the acid f F-43 were les indicate reject of sample data e evaluated ba	Phenol-ds 2,4,6-Tribromophenol gate associations were no raction (acid or base/neutra the acceptance range. raction of sample MKTF- ss than 10%, the results f cted (not usable) data ba a was not required based of ased on their specific surro	t available f al) when two <b>43 were no</b> <b>for the ass</b> <b>sed on evi</b> on surrogate gate recove	MKTF-43 MKTF-43 from the laborat o or more surro ot detected. Si ociated acid fra dence of extre e non-conforma eries.	4.92% 1.52% ory, qualificatio gates from the nce the recove action analyte me low bias. Inces in QC sar	15-108% 15-108% n was assigned same fraction (a eries of the sur s were assigne nples as the en	to all of t acid or rogates i ed R vironment
Since Metho target analyte base/neutral <b>The analyte</b> <b>sample MKT</b> <b>qualification</b> samples wer 18. Were the collected project g	8270C 8270C surro es in a given fr ) were outside s in the acid f F-43 were less indicate reject of sample data e evaluated base e number of tri d equal to at le guidelines, QA	Phenol-d₅ 2,4,6-Tribromophenol gate associations were no action (acid or base/neutra the acceptance range. raction of sample MKTF- ss than 10%, the results f cted (not usable) data ba a was not required based of ased on their specific surro p blank, field blank, and/or ast 10% of the total number PP, SAP, or permit?	t available f al) when two <b>43 were no</b> for the asse sed on evi gate recove r equipment er of sample	MKTF-43 MKTF-43 from the laborat o or more surro ot detected. Si ociated acid fra dence of extre e non-conforma eries. t blank samples es or as require	4.92% 1.52% ory, qualificatio gates from the nce the recove action analytes me low bias. Inces in QC sar d by the	n was assigned same fraction (a eries of the sur s were assigne nples as the en Yes	to all of t acid or rogates i ed R vironment



	١	ALIDATIO	N CRITERIA CHECKLIST					
19. Were target analytes reported as not detected in the trip blank, field blank, and/or No equipment blank samples?								
Comments: Target analytes were not detected in the trip blank, field blank, and equipment blank samples with the following exceptions.								
	Blank Sample ID							
	EB-12-22-22	8015D	TPH DRO	0.019				
	EB-12-22-22	245.1	Total Mercury	0.00014				
	EB-12-22-22	245.1	<b>Dissolved Mercury</b>	0.00013				
and/or less than the associated sample assigned JB qualifi	Detections of total mercury and dissolved mercury in the associated samples that were less than the blank results and/or less than the applicable reporting limits were assigned U qualifiers. Detections of total mercury in the associated samples that were greater than the reporting limits but less than 10 times the blank results were assigned JB qualifiers.							
The TPH DRO results in Method 8015D batch 72366 were previously qualified due to a laboratory blank detection; therefore, additional qualification due to the equipment blank contamination was not required.								
20. Was the numbe number of samp	r of field duplicates coll bles or as required by th	ected equal ne project gu	to at least 10% of the total uidelines, QAPP, SAP, or perr	nit?	Yes			
Comments: The nur	mber of field duplicates	collected w	as equal to at least 10% of the	e number of sample	es.			
Sample Dup-12-22-2	22 was collected as a fi	eld duplicate	e of sample OW-1.					
21. Were field duplicate RPD values within data validation QC limits (soil 0-50%, water Yes 0-30%, or air 0-25%)?								
Comments: As indicated in the Field Duplicate Summary Table at the end of this report, field duplicate RPD values were within data validation QC limits of 0-30% for water samples.								
22. For laboratory d validation or lab	22. For laboratory duplicates prepared from project samples, were RPDs within data N/A validation or laboratory QC limits?							
Comments: Laborat associated with this	tory duplicates were pre data set and the analys	epared for the	ne analysis of cyanide in batch e in batch WG1980984 from s	n WG1980609 from samples MKTF-44	n samples not and OW-10.			
The RPDs for labora reported as not dete	tory duplicates prepare cted in samples MKTF-	ed from proje 44 and OW	ect samples were not applicat -10.	le because the me	easurements were			
The RPD value for the but data were not qu	ne laboratory duplicate alified based on these	samples pre results since	epared from non-project samp e matrix similarity to project sa	les were evaluated amples could not be	l and considered, e guaranteed.			



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VALIDATION CRITERIA CHECKLIST					
23. Were the following data relationships realistic?					
• Target analytes were reported by more than one method (e.g., 8260/8270, EPH/8270)?	N/A				
Comments: Target analytes were not reported by more than one method.					
<ul> <li>Both total and dissolved metals analyses were performed, and the total metals results were greater than or equal to the dissolved metals results?</li> </ul>	No				

Comments: The following table contains the exceptions in which the dissolved metals results exceeded the total metals results.

Sample ID	Analyte	<u>Total Result</u> (mg/L)	Dissolved Result (mg/L)
OW-1	Mercury	0.00012	0.00014
BW-5B	Arsenic	0.0013	0.0017
BW-5C	Arsenic	ND	0.0013
OW-1	Barium	0.034	0.035
MKTF-43	Beryllium	ND	0.00085
MKTF-43	Nickel	ND	0.0056
BW-4B	Selenium	ND	0.0016
BW-5B	Selenium	0.0015	0.0064
BW-5C	Selenium	ND	0.010
DUP-12-22-22	Selenium	ND	0.0044
MKTF-43	Selenium	ND	0.088
MKTF-44	Selenium	0.014	0.015
OW-1	Selenium	0.0015	0.0047
OW-10	Selenium	0.0076	0.015
BW-5C	Silver	ND	0.0013
MKTF-43	Silver	ND	0.025
MKTF-43	Vanadium	ND	0.0058
BW-5C	Zinc	ND	0.0088
BW-5B	Zinc	ND	0.011
OW-10	Zinc	ND	0.0069

The EPA has not provided guidance or requirements for the evaluation, validation, and qualification of dissolved metals results that exceed the corresponding total metals results. Therefore, qualification of results was not performed based on these data.



Client Sample ID: OW-1 Field Duplicate Sample ID: DUP-12-22-22							
Analyte	Analyte Method Laboratory Result Duplicate Res						
Barium, Dissolved	E 200.7	0.035 mg/L	0.034 mg/L	2.9%			
Barium, Total	E 200.7	0.034 mg/L	0.037 mg/L	8.5%			
Vanadium, Dissolved	E 200.7	0.044 mg/L	0.043 mg/L	2.3% +/-RL			
Vanadium, Total	E 200.7	0.049 mg/L	0.052 mg/L	5.9% +/-RL			
Arsenic, Dissolved	E200.8	0.00078 mg/L	0.00075 mg/L	3.9% +/-RL			
Arsenic, Total	E200.8	0.00088 mg/L	0.00092 mg/L	4.4% +/-RL			
Selenium, Dissolved	E200.8	0.0047 mg/L	0.0044 mg/L	6.6%			
Selenium, Total	E200.8	0.0015 mg/L	ND (0.0010 mg/L)	DL			
Mercury, Dissolved	E245.1	0.00014 mg/L	0.00012 mg/L	15.4% +/-RL			
Mercury, Total	E245.1	0.00012 mg/L	0.00012 mg/L	0.0% +/-RL			
TPH DRO	SW8015	0.028 mg/L	0.029 mg/L	3.5% +/-RL			

### FIELD DUPLICATE SUMMARY

Field duplicate RPD control limits are not to exceed 30% for water as established by USEPA Region I - New England Environmental Data Review Supplement for Region 1 Data Review Elements and Superfund Specific Guidance/Procedures, EQADR-Supplement2, September 2020.

DL – Indicates that the analyte was detected in one of the duplicate samples and was undetected in the other sample, and therefore an RPD could not be calculated. Data were not qualified since the detection was within two times the reporting limit. Non-detected results are indicated above with the applicable reporting limit as ND (RL).

+/-RL – Indicates that the detections in both of the samples were within two times the reporting limit. Qualification of data was not required.



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## DATA QUALIFICATION SUMMARY

Abbreviation	Reason
EBD	Equipment blank detection
HR-LCS	The LCS and/or LCSD percent recovery was greater than the upper acceptable limit indicating a possible high bias.
LR-SUR	The surrogate percent recovery was less than the lower acceptable limit indicating a possible low bias.
MBD	Method blank detection
MDLRL	Flagged by the laboratory: The result was greater than the MDL but less than the RL.

Analyte	Method	Field Sample ID	Lab Sample ID	Result	Limit	Units	Reviewer Qualifier	DV Flag Reasons
1,4-Dioxane	SW8270C	BW-5B	2212d48-005c	0.64	1.0	µg/L	J	MDLRL
2,4,6-Trichlorophenol	SW8270C	MKTF-43	2212d48-008c	ND	10	µg/L	R	LR-SUR
2,4-Dimethylphenol	SW8270C	MKTF-43	2212d48-008c	ND	10	µg/L	R	LR-SUR
2,4-Dinitrophenol	SW8270C	MKTF-43	2212d48-008c	ND	20	µg/L	R	LR-SUR
2-Methylphenol	SW8270C	MKTF-43	2212d48-008c	ND	10	µg/L	R	LR-SUR
3,4-Methylphenol	SW8270C	MKTF-43	2212d48-008c	ND	10	µg/L	R	LR-SUR
Arsenic, Dissolved	E200.8	OW-1	2212D48-002E	0.00078	0.0010	mg/L	J	MDLRL
Arsenic, Dissolved	E200.8	DUP-12-22-22	2212D48-010E	0.00075	0.0010	mg/L	J	MDLRL
Arsenic, Total	E200.8	OW-1	2212D48-002D	0.00088	0.0010	mg/L	J	MDLRL
Arsenic, Total	E200.8	OW-10	2212D48-007D	0.00061	0.0010	mg/L	J	MDLRL
Arsenic, Total	E200.8	DUP-12-22-22	2212D48-010D	0.00092	0.0010	mg/L	J	MDLRL
Benzoic Acid	SW8270C	MKTF-43	2212d48-008c	ND	20	µg/L	R	LR-SUR
Beryllium, Dissolved	E 200.7	MKTF-43	2212D48-008E	0.00085	0.0020	mg/L	J	MDLRL
Chromium, Total	E 200.7	BW-4B	2212D48-003D	0.0053	0.0060	mg/L	J	MDLRL
Chromium, Total	E 200.7	BW-5C	2212D48-004D	0.0046	0.0060	mg/L	J	MDLRL
Chromium, Total	E 200.7	MKTF-44	2212D48-006D	0.0038	0.0060	mg/L	J	MDLRL
Cobalt, Total	E 200.7	OW-10	2212D48-007D	0.0062	0.0060	mg/L	J+	HR-LCS



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Analyte	Method	Field Sample ID	Lab Sample ID	Result	Limit	Units	Reviewer Qualifier	DV Flag Reasons
Cobalt, Total	E 200.7	MKTF-43	2212D48-008D	0.095	0.030	mg/L	J+	HR-LCS
Cobalt, Total	E 200.7	BW-4B	2212D48-003D	0.0037	0.0060	mg/L	J+	HR-LCS, MDLRL
Cobalt, Total	E 200.7	BW-5C	2212D48-004D	0.0059	0.0060	mg/L	J+	HR-LCS, MDLRL
Cobalt, Total	E 200.7	BW-5B	2212D48-005D	0.0057	0.0060	mg/L	J+	HR-LCS, MDLRL
Cobalt, Total	E 200.7	MKTF-44	2212D48-006D	0.0054	0.0060	mg/L	J+	HR-LCS, MDLRL
Mercury, Dissolved	E245.1	EB-12-22-22	2212D48-001E	0.00013	0.00020	mg/L	U	EBD, MDLRL
Mercury, Dissolved	E245.1	OW-1	2212D48-002E	0.00014	0.00020	mg/L	U	EBD, MDLRL
Mercury, Dissolved	E245.1	BW-4B	2212D48-003E	0.00010	0.00020	mg/L	U	EBD, MDLRL
Mercury, Dissolved	E245.1	BW-5C	2212D48-004E	0.00013	0.00020	mg/L	U	EBD, MDLRL
Mercury, Dissolved	E245.1	BW-5B	2212D48-005E	0.00013	0.00020	mg/L	U	EBD, MDLRL
Mercury, Dissolved	E245.1	MKTF-44	2212D48-006E	0.00010	0.00020	mg/L	U	EBD, MDLRL
Mercury, Dissolved	E245.1	OW-10	2212D48-007E	0.00011	0.00020	mg/L	U	EBD, MDLRL
Mercury, Dissolved	E245.1	MKTF-43	2212D48-008E	0.000093	0.00020	mg/L	U	EBD, MDLRL
Mercury, Dissolved	E245.1	DUP-12-22-22	2212D48-010E	0.00012	0.00020	mg/L	U	EBD, MDLRL
Mercury, Total	E245.1	BW-5C	2212D48-004D	0.00027	0.00020	mg/L	JB	EBD
Mercury, Total	E245.1	EB-12-22-22	2212D48-001D	0.00014	0.00020	mg/L	U	EBD, MDLRL
Mercury, Total	E245.1	OW-1	2212D48-002D	0.00012	0.00020	mg/L	U	EBD, MDLRL
Mercury, Total	E245.1	BW-4B	2212D48-003D	0.00013	0.00020	mg/L	U	EBD, MDLRL
Mercury, Total	E245.1	BW-5B	2212D48-005D	0.00013	0.00020	mg/L	U	EBD, MDLRL
Mercury, Total	E245.1	MKTF-44	2212D48-006D	0.00011	0.00020	mg/L	U	EBD, MDLRL
Mercury, Total	E245.1	OW-10	2212D48-007D	0.00011	0.00020	mg/L	U	EBD, MDLRL
Mercury, Total	E245.1	MKTF-43	2212D48-008D	0.000097	0.00020	mg/L	U	EBD, MDLRL
Mercury, Total	E245.1	DUP-12-22-22	2212D48-010D	0.00012	0.00020	mg/L	U	EBD, MDLRL
Nickel, Dissolved	E 200.7	MKTF-43	2212D48-008E	0.0056	0.010	mg/L	J	MDLRL
Phenol	SW8270C	MKTF-43	2212d48-008c	ND	20	µg/L	R	LR-SUR
Silver, Dissolved	E 200.7	BW-5C	2212D48-004E	0.0013	0.0050	mg/L	J	MDLRL
TPH DRO	SW8015	BW-5C	2212D48-004C	0.081	0.064	mg/L	JB	HR-LCS, MBD



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Analyte	Method	Field Sample ID	Lab Sample ID	Result	Limit	Units	Reviewer Qualifier	DV Flag Reasons
TPH DRO	SW8015	MKTF-43	2212D48-008C	0.13	0.064	mg/L	JB	HR-LCS, MBD
TPH DRO	SW8015	EB-12-22-22	2212D48-001C	0.019	0.064	mg/L	U	HR-LCS, MBD, MDLRL
TPH DRO	SW8015	OW-1	2212D48-002C	0.028	0.064	mg/L	U	HR-LCS, MBD, MDLRL
TPH DRO	SW8015	BW-4B	2212D48-003C	0.063	0.064	mg/L	U	HR-LCS, MBD, MDLRL
TPH DRO	SW8015	BW-5B	2212D48-005C	0.039	0.064	mg/L	U	HR-LCS, MBD, MDLRL
TPH DRO	SW8015	MKTF-44	2212D48-006C	0.024	0.064	mg/L	U	HR-LCS, MBD, MDLRL
TPH DRO	SW8015	OW-10	2212D48-007C	0.069	0.064	mg/L	U	HR-LCS, MBD
TPH DRO	SW8015	DUP-12-22-22	2212D48-010C	0.029	0.064	mg/L	U	HR-LCS, MBD, MDLRL
TPH GRO	SW8015	BW-5C	2212d48-004a	0.02	0.05	mg/L	J	MDLRL
Vanadium, Dissolved	E 200.7	OW-1	2212D48-002E	0.044	0.050	mg/L	J	MDLRL
Vanadium, Dissolved	E 200.7	BW-4B	2212D48-003E	0.016	0.050	mg/L	J	MDLRL
Vanadium, Dissolved	E 200.7	BW-5C	2212D48-004E	0.0034	0.050	mg/L	J	MDLRL
Vanadium, Dissolved	E 200.7	BW-5B	2212D48-005E	0.012	0.050	mg/L	J	MDLRL
Vanadium, Dissolved	E 200.7	OW-10	2212D48-007E	0.0064	0.050	mg/L	J	MDLRL
Vanadium, Dissolved	E 200.7	MKTF-43	2212D48-008E	0.0058	0.050	mg/L	J	MDLRL
Vanadium, Dissolved	E 200.7	DUP-12-22-22	2212D48-010E	0.043	0.050	mg/L	J	MDLRL
Vanadium, Total	E 200.7	OW-1	2212D48-002D	0.049	0.050	mg/L	J	MDLRL
Vanadium, Total	E 200.7	BW-4B	2212D48-003D	0.037	0.050	mg/L	J	MDLRL
Vanadium, Total	E 200.7	BW-5C	2212D48-004D	0.0099	0.050	mg/L	J	MDLRL
Vanadium, Total	E 200.7	BW-5B	2212D48-005D	0.013	0.050	mg/L	J	MDLRL
Vanadium, Total	E 200.7	OW-10	2212D48-007D	0.0073	0.050	mg/L	J	MDLRL
Zinc, Dissolved	E 200.7	BW-5C	2212D48-004E	0.0088	0.010	mg/L	J	MDLRL
Zinc, Dissolved	E 200.7	OW-10	2212D48-007E	0.0069	0.010	mg/L	J	MDLRL
Zinc, Total	E 200.7	MKTF-44	2212D48-006D	0.014	0.010	mg/L	JB	MBD
Zinc, Total	E 200.7	BW-4B	2212D48-003D	0.0065	0.010	mg/L	U	MBD, MDLRL



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Client: Marathon Oil	Laboratory: Hall Environmental Analysis Laboratory				
Project Name: Western Refining Southwest, Quarterly GW	Sample Matrix: Groundwater				
Project Number: 697-082-003 Task: 0002	Sample Start Date: 12/27/2022				
Date Validated: 02/14/2023	Sample End Date: 12/27/2022				
Parameters Included:					
<ul> <li>Volatile Organic Compounds (VOC) by Environmental Pro Waste (SW-846) Method 8260B</li> </ul>	otection Agency (EPA) Test Methods for Evaluating Solid				
<ul> <li>1,2-Dibromoethane (EDB) by EPA Method 504.1</li> </ul>					
<ul> <li>Semivolatile Organic Compounds (SVOC) by SW-846 Method 8270C and Method 8270C with Selected Ion Monitoring (SIM)</li> </ul>					
<ul> <li>Total Petroleum Hydrocarbons (TPH) Gasoline Range Or</li> </ul>	ganics (GRO) by SW-846 Method 8015D				
<ul> <li>TPH Diesel Range Organics (DRO) and Motor Oil Range</li> </ul>	Organics (MRO) by SW-846 Method 8015D Modified				
<ul> <li>Total and Dissolved Metals by EPA Method 200.7 and Method 200.8</li> </ul>					
<ul> <li>Total and Dissolved Mercury by EPA Method 245.1</li> </ul>					
<ul> <li>Cyanide by Standard Methods for the Examination of Water and Wastewater (SM) Method 4500 CN E</li> </ul>					
Laboratory Project ID: 2212E09					
Data Validator: Daran O'Hollearn, Lead Project Scientist					
Reviewer: Charles Ballek, Senior Chemist					

## DATA EVALUATION CRITERIA SUMMARY

A Tier II Data Validation was performed by Trihydro Corporation's Chemical Data Evaluation Services Group on the analytical data report packages generated by Hall Environmental Analysis Laboratory of Albuquerque, New Mexico, with additional data from Pace Analytical National of Mount Juliet, Tennessee evaluating samples from the Marathon Oil site, located in Gallup, New Mexico.

Precision, accuracy, method compliance, and completeness of this data package were assessed during this data review. Precision was determined by evaluating the calculated relative percent difference (RPD) values from:

- Field duplicate pairs
- Laboratory duplicate pairs
- Matrix spike (MS) and matrix spike duplicate (MSD) pairs
- Laboratory control sample (LCS) and laboratory control sample duplicate (LCSD) pairs

Laboratory accuracy was established by reviewing the demonstrated percent recoveries (%R) of the following items to verify that data are not biased.

- MS/MSD samples
- LCS/LCSD samples
- Organic system monitoring compounds (surrogates)



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Field accuracy was established by collecting and analyzing the following samples to monitor for possible ambient or cross contamination during sampling and transportation.

- Trip blanks
- Field blanks
- Equipment blanks

Method compliance was established by reviewing sample integrity, holding times, detection limits, surrogate recoveries, laboratory blanks, initial and continuing calibrations (where applicable), and the LCS/LCSD percent recoveries against method-specific requirements.

Completeness was evaluated by determining the overall ratio of the number of samples and analyses planned versus the number of samples with valid analyses. Determination of completeness included a review of the chain-of-custody (CoC), laboratory analytical methods, and other laboratory and field documents associated with this analytical data set.

Client Sample ID	Laboratory Sample Number
EB-12-27-22	2212e09-001
OW-50	2212e09-002
OW-52	2212e09-003
OW-29	2212e09-004
OW-54	2212e09-005
OW-66	2212e09-006
OW-55	2212e09-007
FB-12-27-22	2212e09-008
Dup-12-27-22	2212e09-009
Trip Blank	2212e09-010

### SAMPLE NUMBERS TABLE





The laboratory data were reviewed to evaluate compliance with the methods and the quality of the reported data. Assessment of CoC completeness is included in Item 3 of the Data Validation Checklist. A check mark ( $\checkmark$ ) indicates that the referenced validation criteria were deemed acceptable, whereas a crossed circle ( $\otimes$ ) indicates validation criteria for which the data have been qualified by the data validator. An empty circle (O) indicates that the specified criterion does not apply to the reviewed data. Details are noted in the tables below.

### Validation Criteria

- ✓ Data Completeness
- ✓ CoC Documentation (Item 3)
- ✓ Holding Times and Preservation (Items 6 and 7)
- O Initial and Continuing Calibrations (Items 9 and 10)
- ⊗ Laboratory Blanks (Items 11 and 12)
- ⊗ MS/MSD (Items 13 and 14)
- ⊗ LCS/LCSD (Items 15 and 16)
- ✓ System Monitoring Compounds (i.e., Surrogates) (Item 17)
- ⊗ Trip, Field, and Equipment Blanks (Items 18 and 19)
- ✓ Field Duplicates (Items 20 and 21)
- ✓ Laboratory Duplicates (Item 22)

## **Guidance References**

Chemical data validation was conducted in accordance with the United States Environmental Protection Agency (USEPA) Contract Laboratory Program (CLP) National Functional Guidelines for the analyses listed below, or by the appropriate method if not covered in the National Functional Guidelines.

- Data for organic analyses were evaluated according to validation criteria set forth in the USEPA CLP National Functional Guidelines for Organic Superfund Methods Data Review, document number EPA-540-R-20-005, November 2020 with additional reference to the USEPA CLP National Functional Guidelines for Organic Data Review, document number EPA 540/R-99/008, October 1999.
- Data for inorganic analyses were evaluated according to validation criteria set forth in the USEPA CLP National Functional Guidelines for Inorganic Superfund Methods Data Review, document number EPA-540-R-20-006, November 2020 with additional reference to the USEPA CLP National Functional Guidelines for Inorganic Data Review, document number EPA 540-R-04-004, October 2004.
- Review of field duplicates was conducted according to the USEPA Region I New England Environmental Data Review Supplement for Region 1 Data Review Elements and Superfund Specific Guidance/Procedures, EQADR-Supplement2, September 2020.
- Trihydro Data Validation Variance Documentation, April 2022.



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## OVERALL DATA PACKAGE ASSESSMENT

Based on a data validation review, the data are acceptable as delivered. Data qualified by the laboratory are discussed in Item 2 of the Validation Criteria Checklist.

The purpose of validating data and assigning qualifiers is to assist in proper data interpretation. Data that are not qualified meet the site data quality objectives. If values are assigned qualifiers other than an R (rejected, data not usable), the data may be used for site evaluation; however, consideration should be given to the reasons for qualification when interpreting sample concentrations. Data points that are assigned an R qualifier should not be used for site evaluation purposes.

If applicable, text was identified in **bold font** in the Validation Criteria Checklist to indicate that further action and/or qualification of the data were required. Data may have been qualified with J data flags by the laboratory if the result was greater than or equal to the method detection limit (MDL) but less than the reporting limit (RL). These laboratory-applied J flags were preserved, if present, and included in the Data Qualification Summary table at the end of this report. If applicable, data validation qualifiers were added for the items noted with crossed circles in the Validation Criteria section above. Please see the Data Qualification Summary table at the end of this report.

If data would be qualified with more than one flag, one qualifier was assigned based on the severity; however, all reasons for qualification were retained. Data that would be qualified with both J+ and J- flags were evaluated based on validation criteria and assigned the appropriate flag. The hierarchy of qualifiers from the most to least severe is as follows:

R > JB/U > NJ > J+/J- > J/UJ

Data qualifiers used during this validation are included in the following table.

<u>Qualifier</u>	Definition
J	Estimated concentration
J+	The result is an estimated concentration, but may be biased high
J-	The result is an estimated concentration, but may be biased low
UJ	Estimated reporting limit
U	Evaluated to be undetected at the reporting limit
JB	Estimated concentration due to blank contamination

### **Data Completeness**

The analyses were performed as requested on the CoC records. The associated samples were received by the laboratory and analyzed properly unless otherwise noted in the Criteria Checklist below. The complete data package consisted of 630 data points. The data completeness calculation does not include any submitted blank sample results. Data points were not rejected. The data completeness measure for this data package is calculated to be 100% and is acceptable.



		VALIDATION	CRITERIA CHECKLIST					
1. Was the report free of non-conformances identified by the laboratory? No								
Comments:	Comments: The laboratory noted the following analytical non-conformances related to this data set.							
Method 8270 EPA Method 66.	OC and Method 8 8270 instead o	8270C SIM: 1-Methylnaphtha f EPA Method 8270 SIM beca	alene, 2-methylnaphthalene, and napht ause of their elevated concentrations fo	halene were reported by r samples OW-55 and OW-				
Method 8015 with a "B".	<u>Method 80156D DRO/MRO</u> : The method blank had a low-level detection for DRO. Samples with detections are flagged vith a "B".							
2. Were the If no, de	e data free of da fine.	ata qualification flags and/or n	notes used by the laboratory?	No				
Comments:	The laboratory	used the following data qualif	ication flags with this data set.					
B – Analyte o	letected in the a	associated method blank.						
D – Sample o	diluted due to m	atrix.						
J – Analyte d	etected below of	quantitation limits.						
J6 – The san	nple matrix inter	fered with the ability to make	any accurate determination; spike valu	ie is low.				
S – % Recov	ery outside of r	ange due to dilution or matrix	interference.					
* – Value exc	eeds maximum	i contaminant level.						
3. Were sa	mple CoC form	s and custody procedures co	mplete?	No				
Comments: and laborato sealed, and o	The CoC record ry personnel sig custody seals w	ls from field to laboratory wer natures, dates, and times of ere present and intact on the	e complete, and custody was maintain receipt. The laboratory noted that the s shipping containers.	ed as evidenced by field shipping containers were				
The trip blan	k sample was re gged in the sam	eceived by the laboratory, but ple and performed the approp	the parameters requested were not inc priate volatile analyses. Validation acti	dicated on the CoC. The on was not required.				
4. Were de permit, c	tection limits in or method, or ine	accordance with the quality a dicated as acceptable?	assurance project plan (QAPP),	Yes				
Comments:	The detection li	mits appeared to be acceptat	ole. The following dilutions were applie	d.				
	Method	Sample(s)	<u>Analyte(s)</u>	<u>Dilution</u> Factor				
	8015D	OW-66, OW-55	TPH DRO and MRO	2				
	8260B	OW-29	Select VOCs	2				
	200.7	OW-66	Total and Dissolved Barium	5				
	200.8	OW-54	Total Lead	5				
	8260B	OW-54	Select VOCs	5				
	8260B	OW-29	МТВЕ	20				
	8015D	OW-66, OW-55	TPH GRO	50				
	8260B	OW-54	МТВЕ	50				
	8260B	OW-66, OW-55	Select VOCs	50				
	8260B	OW-66	Benzene, Toluene, Total Xylenes	500				
5. Were the	e reported analy	rtical methods and constituen	ts in compliance with the	No				
Comments: constituents	The reported ar	nalytical methods were in corr vith the CoC, with the followin	npliance with the CoC, and the laborato g exceptions.	ry reported the requested				

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VALIDATION CRITERIA CHECKLIST	
The CoC requested total and dissolved metals using only Method 200.7; however, the laboratory anal using both Method 200.7 and Method 200.8. This substituted analytical method, Method 200.8, met s accuracy, and precision goals and, therefore, was an acceptable replacement.	yzed the samples imilar sensitivity,
The CoC requested cyanide using Method 335.4; however, the laboratory analyzed the samples using This substituted analytical method met similar sensitivity, accuracy, and precision goals and, therefore replacement.	g Method 4500 CN E. e, was an acceptable
6. Were samples received in good condition within method-specified requirements?	No
Comments: Samples were received on ice, in good condition, and with the cooler temperatures both recommended temperature range of $4^{\circ}C \pm 2^{\circ}C$ between $0.2^{\circ}C$ and $4.6^{\circ}C$ as noted on Sample Log-in transferred to Pace National were received in good condition with the cooler temperature within the re $2.5^{\circ}C$ as noted on the CoC.	within and outside the Check List. Samples commended range at
The cooler temperatures below 2.0°C were judged as acceptable since the laboratory did not report the as broken or frozen.	e sample containers
7. Were samples extracted/digested and analyzed within method-specified or technical holding times?	Yes
Comments: The samples were extracted/digested and analyzed within method-specific holding times	
<ol> <li>Were reported units appropriate for the sample matrix/matrices and analytical method(s)? Specify if wet or dry units were used for soil.</li> </ol>	Yes
Comments: The results were reported in concentration units of micrograms per liter ( $\mu$ g/L) and milligraphic which were acceptable for the sample matrix and the analyses requested.	ams per liter (mg/L),
9. Did the laboratory provide any specific initial and/or continuing calibration results?	No
Comments: Initial and continuing calibration data were not included as part of this data set.	
10. If initial and/or continuing calibration results were provided, were the results within acceptable limits?	N/A
Comments: Initial and continuing calibration data were not included as part of this data set.	
11. Was the total number of laboratory blank samples prepared equal to at least 5% of the total number of samples or analyzed as required by the method?	Yes
Comments: The number of laboratory blank samples prepared was equal to at least 5% of the total number	umber of samples.



No

Yes

## VALIDATION CRITERIA CHECKLIST

12. Were target analytes reported as not detected in the laboratory blanks?

Comments: Target analytes were reported as not detected in the laboratory blanks, with the following exceptions.

Method	<u>Analyte</u>	<u>Batch</u>	Concentration
200.7	Total Zinc	72409	0.0045 mg/L
200.8	Total Antimony	72409	0.00062 mg/L
245.1	Mercury	72446	0.000099 mg/L
8015D	TPH DRO	72386	0.10 mg/L

Detections of total zinc, total and dissolved mercury, and TPH DRO in the associated samples that were less than the blank results and/or less than the applicable reporting limits were assigned U qualifiers. Detections of total zinc, total mercury, and TPH DRO in the associated samples that were greater than the reporting limits but less than or equal to 10 times the blank results were assigned JB qualifiers. Non-detections of these analytes in the associated samples and results greater than ten times the blank concentration did not require qualification.

13. Was the total number of MS samples prepared equal to at least 5% of the total number of samples or analyzed as required by the method?

Comments: The total number of matrix spike samples prepared was equal to at least 5% of the total number of samples, although MS samples were not prepared/reported for all analyses and/or batches. The matrix spike sample source for each analytical batch in this sample set has been indicated below.

Method	<u>Analytes</u>	Batch	MS Sample Source
200.7	Total Metals	72409	Not Prepared
200.7	Dissolved Zinc	A93838	OW-52
200.7	Dissolved Metals	B93766	Not Prepared
200.8	Total Metals	72409	OW-50, EB-12-27-22
200.8	Dissolved Metals	A93855	Not Prepared
245.1	Total and Dissolved Mercury	72446	Not Prepared
504.1	EDB	72358	Not Prepared
4500CN E	Cyanide	WG1980984	Not Associated
4500CN E	Cyanide	WG1981929	OW-55, Not Associated
8015D	TPH DRO and MRO	72386	Not Prepared
8015D	TPH GRO	R93693	OW-66
8260B	VOCs	R93710	Not Prepared
8270C SIM	SVOCs	72347	Not Prepared
8270C	SVOCs	R93725	Not Prepared

Not Associated – The MS sample source was not associated with this project.

Not Prepared – Matrix spikes were not prepared/reported for this batch.

14. For MS/MSDs prepared from project samples, were percent recoveries and RPDs within data validation or laboratory quality control (QC) limits?

No

Comments: The MS/MSD percent recoveries and RPDs for project samples were within data validation or laboratory QC limits, with the following exception.

The recovery for TPH GRO in the MS for Method 8015D batch R93693 was outside the QC limits of 70-130% at 43.0%. Detections of TPH GRO in the associated samples were qualified as J-, and non-detections were qualified as UJ due to evidence of potential low bias.

The percent recoveries and RPD values for MS/MSDs prepared from non-project samples were evaluated and considered but data were not qualified based on those results since matrix similarity to project samples could not be guaranteed.

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samples	15. Was the total number of LCSs analyzed equal to at least 5% of the total number of Yes samples or analyzed as required by the method?						
Comments:	The total numb	er of LCS samples analy	zed was equ	al to at least 5%	6 of the total nι	mber of samples.	
16. Were LCS/LCSD percent recoveries and LCS/LCSD RPDs within data validation or No laboratory QC limits?							
Comments: imits, with th	The LCS and L te following exc	.CSD percent recoveries eptions.	and LCS/LC	SD RPDs were	within data val	idation and laborator	y QC
	<u>Method</u>	<u>Analyte</u>	<u>Batch</u>	<u>LCS</u> Recovery	<u>LCSD</u> <u>Recovery</u>	LCS/LCSD QC Limits	
	200.7	Total Cobalt	72409	140%		70-130%	
	200.7	Total Nickel	72409	139%		70-130%	
	200.7	<b>Dissolved Nickel</b>	B93766	<b>68.9%</b>		70-130%	
	200.8	Total Selenium	72409	69.0%		70-130%	
	245.1	Mercury	72446	144%		70-130%	
17. Were su	irrogate recove	ries within laboratory QC	limits?	e with the follow	ving oxcontion	No	
Comments: Surrogate recoveries were within laboratory QC limits, with the following exceptions. Since Method 8270C surrogate associations were not available from the laboratory, qualification was assigned to all of the target analytes in a given fraction (acid or base/neutral) when two or more surrogates from the same fraction (acid or base/neutral) were outside the acceptance range. This condition did not exist for the Method 8270C analysis of sample OW-66 since only the recovery for the surrogate 2-fluorophenol was outside laboratory limits of 15-84.5% at 0%, and							
qualification	of sample data	ery for the surrogate 2-fl was not required.	uoropnenoi w	as outside labo	oratory limits of	270C analysis of sam 15-84.5% at 0%, and	n nple d
qualification Qualification samples wer	of sample data of sample data e evaluated ba	ery for the surrogate 2-fl was not required. was not required based sed on their specific surr	on surrogate	/as outside labo e non-conforma ries.	oratory limits of nces in QC san	270C analysis of sam 15-84.5% at 0%, and nples as the environn	nental
qualification Qualification samples wer 18. Were th collecter project o	of sample data of sample data e evaluated ba e number of trip d equal to at lea guidelines, QAF	ery for the surrogate 2-fl was not required. was not required based sed on their specific surr blank, field blank, and/c ast 10% of the total numb PP, SAP, or permit?	on surrogate ogate recove or equipment per of sample	vas outside labo e non-conformal ries. blank samples s or as required	oratory limits of nces in QC san	270C analysis of sam 15-84.5% at 0%, and nples as the environn Yes	nental



19. Were target	analytes reported as not d	letected in th	ne trip blank, field blank, and/	or	No
Comments: Tar exceptions.	get analytes were not dete	cted in the tr	ip blank, field blank, and equ	ipment blank sampl	es with the following
	Blank Sample ID	Method	Analyte	Concentration (mg/L)	
	EB-12-27-22	8015D	TPH DRO	0.041	
	EB-12-27-22	200.7	Dissolved Vanadium	0.0017	
	EB-12-27-22	245.1	Total Mercury	0.000099	
	EB-12-27-22	245.1	Dissolved Mercury	0.00010	
Detections of d were assigned	issolved vanadium in the U qualifiers.	e associatec	I samples that were less the	an the applicable r	eporting limits
The TPH DRO retherefore, addition	esults in Method 8015D ba onal qualification due to the	tch 72386 w equipment	rere previously qualified due t blank detection was not requ	o a laboratory blanl ired.	detection;
The total and dis detections; there	solved mercury results in I fore, additional qualificatio	Method 245. n due to the	1 batch 72446 were previous equipment blank detections	ly qualified due to la was not required.	aboratory blank
20. Was the nur number of s	mber of field duplicates col amples or as required by t	lected equal he project gu	to at least 10% of the total uidelines, QAPP, SAP, or per	mit?	Yes
Comments: The	e number of field duplicates	collected w	as equal to at least 10% of th	e number of sample	es.
Sample Dup-12-	27-22 was collected as a f	ield duplicate	e of sample OW-50.		
21. Were field d 0-30%, or a	luplicate RPD values withir ir 0-25%)?	n data valida	tion QC limits (soil 0-50%, wa	ater	Yes
Comments: As within data valid	indicated in the Field Dupli ation QC limits of 0-30% fo	cate Summa r water sam	nry Table at the end of this rep ples.	oort, field duplicate	RPD values were
22. For laborate validation or	ory duplicates prepared from r laboratory QC limits?	m project sai	mples, were RPDs within data	а	Yes
Comments: Lab associated with associated with	ooratory duplicates were prothing this data set, and the analy this data set.	epared for th vsis of cyanic	ne analysis of cyanide in batc de in batch WG1981929 from	h WG1980984 from sample OW-66 and	samples not from a sample not
The RPD for the	laboratory duplicate prepa	red from pro	pject sample OW-66 was with	in laboratory accep	tance limits
	for the laboratory duplicate	samples pre	epared from non-project same	oles were evaluated	l and considered



VALIDATION CRITERIA CHECKLIST							
23. Were the following data relationships realistic?							
• Target analytes were reported by more than one method (e.g., 8260/8270, EPH/8270)?	Yes						
Comments: Target analytes were not reported by more than one method.							
<ul> <li>Both total and dissolved metals analyses were performed, and the total metals results were greater than or equal to the dissolved metals results?</li> </ul>	Νο						

Comments: The following table contains the exceptions in which the dissolved metals results exceeded the total metals results.

Sample ID	Analyte	<u>Total Result</u> (mg/L)	Dissolved Result (mg/L)
OW-52	Mercury	0.000097	0.00012
OW-54	Arsenic	0.0040	0.0054
OW-55	Arsenic	0.0059	0.0095
OW-50	Barium	0.052	0.053
OW-52	Barium	0.027	0.028
OW-29	Barium	0.086	0.091
DUP-12-27-22	Barium	0.049	0.053
DUP-12-27-22	Selenium	ND	0.0017
OW-29	Selenium	0.0012	0.0069
OW-50	Selenium	ND	0.0019
OW-52	Selenium	ND	0.0012
OW-54	Selenium	0.0028	0.0092
OW-66	Selenium	0.0018	0.0059
EB-12-27-22	Vanadium	ND	0.0017
OW-50	Vanadium	ND	0.0025
OW-52	Vanadium	ND	0.0027
OW-29	Vanadium	ND	0.0025
DUP-12-27-22	Vanadium	ND	0.0021
OW-50	Zinc	0.0044	0.0073
OW-52	Zinc	0.0092	0.014
OW-29	Zinc	ND	0.024

The EPA has not provided guidance or requirements for the evaluation, validation, and qualification of dissolved metals results that exceed the corresponding total metals results. Therefore, qualification of results was not performed based on these data.



Client Sample ID: OW-50 Field Duplicate Sample ID: DUP-12-27-22							
Analyte	Method	Laboratory Result	Duplicate Result	Relative Percent Difference (RPD)			
MTBE	SW8260B	69 µg/L	64 µg/L	7.5%			
TPH GRO	SW8015	0.062 mg/L	0.063 mg/L	1.6% +/-RL			
TPH DRO	SW8015	0.023 mg/L	0.059 mg/L	87.8% +/-RL			
Barium, Dissolved	E 200.7	0.053 mg/L	0.053 mg/L	0.0%			
Barium, Total	E 200.7	0.052 mg/L	0.049 mg/L	5.9%			
Vanadium, Dissolved	E 200.7	0.0025 mg/L	0.0021 mg/L	17.4% +/-RL			
Zinc, Dissolved	E 200.7	0.0073 mg/L	ND (0.010 mg/L)	DL			
Zinc, Total	E 200.7	0.0044 mg/L	ND (0.010 mg/L)	DL			
Arsenic, Dissolved	E200.8	0.0028 mg/L	0.0026 mg/L	7.4%			
Arsenic, Total	E200.8	0.0023 mg/L	0.0021 mg/L	9.1%			
Mercury, Dissolved	E245.1	0.00010 mg/L	0.00010 mg/L	0.0% +/-RL			
Mercury, Total	E245.1	0.00010 mg/L	0.00011 mg/L	9.5% +/-RL			

### FIELD DUPLICATE SUMMARY

Field duplicate RPD control limits are not to exceed 30% for water as established by USEPA Region I - New England Environmental Data Review Supplement for Region 1 Data Review Elements and Superfund Specific Guidance/Procedures, EQADR-Supplement2, September 2020.

DL – Indicates that the analyte was detected in one of the duplicate samples and was undetected in the other sample, and therefore an RPD could not be calculated. Data were not qualified since the detection was within two times the reporting limit. Non-detected results are indicated above with the applicable reporting limit as ND (RL).

+/-RL – Indicates that the detections in both of the samples were within two times the reporting limit. Qualification of data was not required.



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## DATA QUALIFICATION SUMMARY

Abbreviation	Reason
EBD	Equipment blank detection
HR-LCS	The LCS and/or LCSD percent recovery was greater than the upper acceptable limit indicating a possible high bias.
LR-LCS	The LCS and/or LCSD percent recovery was less than the lower acceptable limit indicating a possible low bias.
LR-MS	The MS and/or MSD percent recovery was less than the lower acceptable limit indicating possible matrix interference.
MBD	Method blank detection
MDLRL	Flagged by the laboratory: The result was greater than the MDL but less than the RL.

Analyte	Method	Field Sample ID	Lab Sample ID	Result	Limit	Units	Reviewer Qualifier	DV Flag Reasons
1,4-Dioxane	SW8270C	OW-29	2212E09-004C	0.86	1.0	µg/L	J	MDLRL
1,4-Dioxane	SW8270C	OW-54	2212e09-005c	0.84	1.0	µg/L	J	MDLRL
1-Methylnaphthalene	SW8270C	OW-54	2212e09-005c	0.20	0.30	µg/L	J	MDLRL
Acenaphthene	SW8270C	OW-66	2212E09-006C	0.24	0.30	µg/L	J	MDLRL
Anthracene	SW8270C	OW-55	2212E09-007C	0.22	0.30	µg/L	J	MDLRL
Arsenic, Dissolved	E200.8	OW-52	2212E09-003E	0.00096	0.0010	mg/L	J	MDLRL
Arsenic, Total	E200.8	OW-52	2212E09-003D	0.00045	0.0010	mg/L	J	MDLRL
Beryllium, Total	E 200.7	OW-54	2212E09-005D	0.0012	0.0020	mg/L	J	MDLRL
Beryllium, Total	E 200.7	OW-66	2212E09-006D	0.00076	0.0020	mg/L	J	MDLRL
Beryllium, Total	E 200.7	OW-55	2212E09-007D	0.0018	0.0020	mg/L	J	MDLRL
Cobalt, Dissolved	E 200.7	OW-55	2212E09-007E	0.0057	0.0060	mg/L	J	MDLRL
Cobalt, Total	E 200.7	OW-54	2212E09-005D	0.085	0.0060	mg/L	J+	HR-LCS
Cobalt, Total	E 200.7	OW-55	2212E09-007D	0.036	0.0060	mg/L	J+	HR-LCS
Cobalt, Total	E 200.7	OW-66	2212E09-006D	0.0040	0.0060	mg/L	U	HR-LCS, MBD, MDLRL
Mercury, Dissolved	E245.1	EB-12-27-22	2212E09-001E	0.00010	0.00020	mg/L	U	HR-LCS, MBD, MDLRL
Mercury, Dissolved	E245.1	OW-50	2212E09-002E	0.00010	0.00020	mg/L	U	HR-LCS, MBD, MDLRL



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Analyte	Method	Field Sample ID	Lab Sample ID	Result	Limit	Units	Reviewer Qualifier	DV Flag Reasons
Mercury, Dissolved	E245.1	OW-52	2212E09-003E	0.00012	0.00020	mg/L	U	HR-LCS, MBD, MDLRL
Mercury, Dissolved	E245.1	OW-54	2212E09-005E	0.000099	0.00020	mg/L	U	HR-LCS, MBD, MDLRL
Mercury, Dissolved	E245.1	OW-66	2212E09-006E	0.00010	0.00020	mg/L	U	HR-LCS, MBD, MDLRL
Mercury, Dissolved	E245.1	Dup-12-27-22	2212E09-009E	0.00010	0.00020	mg/L	U	HR-LCS, MBD, MDLRL
Mercury, Total	E245.1	OW-54	2212E09-005D	0.00023	0.00020	mg/L	JB	HR-LCS, MBD
Mercury, Total	E245.1	EB-12-27-22	2212E09-001D	0.000099	0.00020	mg/L	U	HR-LCS, MBD, MDLRL
Mercury, Total	E245.1	OW-50	2212E09-002D	0.00010	0.00020	mg/L	U	HR-LCS, MBD, MDLRL
Mercury, Total	E245.1	OW-52	2212E09-003D	0.000097	0.00020	mg/L	U	HR-LCS, MBD, MDLRL
Mercury, Total	E245.1	OW-29	2212E09-004D	0.000097	0.00020	mg/L	U	HR-LCS, MBD, MDLRL
Mercury, Total	E245.1	OW-66	2212E09-006D	0.00012	0.00020	mg/L	U	HR-LCS, MBD, MDLRL
Mercury, Total	E245.1	OW-55	2212E09-007D	0.00011	0.00020	mg/L	U	HR-LCS, MBD, MDLRL
Mercury, Total	E245.1	Dup-12-27-22	2212E09-009D	0.00011	0.00020	mg/L	U	HR-LCS, MBD, MDLRL
Nickel, Dissolved	E 200.7	OW-29	2212E09-004E	0.028	0.010	mg/L	J-	LR-LCS
Nickel, Dissolved	E 200.7	OW-54	2212E09-005E	0.21	0.010	mg/L	J-	LR-LCS
Nickel, Dissolved	E 200.7	OW-66	2212E09-006E	0.30	0.010	mg/L	J-	LR-LCS
Nickel, Dissolved	E 200.7	OW-55	2212E09-007E	0.22	0.010	mg/L	J-	LR-LCS
Nickel, Dissolved	E 200.7	EB-12-27-22	2212E09-001E	ND	0.010	mg/L	UJ	LR-LCS
Nickel, Dissolved	E 200.7	OW-50	2212E09-002E	ND	0.010	mg/L	UJ	LR-LCS
Nickel, Dissolved	E 200.7	OW-52	2212E09-003E	ND	0.010	mg/L	UJ	LR-LCS
Nickel, Dissolved	E 200.7	Dup-12-27-22	2212E09-009E	ND	0.010	mg/L	UJ	LR-LCS
Nickel, Total	E 200.7	OW-29	2212E09-004D	0.029	0.010	mg/L	J+	HR-LCS
Nickel, Total	E 200.7	OW-54	2212E09-005D	0.23	0.010	mg/L	J+	HR-LCS
Nickel, Total	E 200.7	OW-66	2212E09-006D	0.33	0.010	mg/L	J+	HR-LCS
Nickel, Total	E 200.7	OW-55	2212E09-007D	0.25	0.010	mg/L	J+	HR-LCS
Selenium, Total	E200.8	OW-29	2212E09-004D	0.0012	0.0010	mg/L	J-	LR-LCS
Selenium, Total	E200.8	OW-54	2212E09-005D	0.0028	0.0010	mg/L	J-	LR-LCS
Selenium, Total	E200.8	OW-66	2212E09-006D	0.0018	0.0010	mg/L	J-	LR-LCS



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Analyte	Method	Field Sample ID	Lab Sample ID	Result	Limit	Units	Reviewer Qualifier	DV Flag Reasons
Selenium, Total	E200.8	OW-55	2212E09-007D	0.0048	0.0010	mg/L	J-	LR-LCS
Selenium, Total	E200.8	EB-12-27-22	2212E09-001D	ND	0.0010	mg/L	UJ	LR-LCS
Selenium, Total	E200.8	OW-50	2212E09-002D	ND	0.0010	mg/L	UJ	LR-LCS
Selenium, Total	E200.8	OW-52	2212E09-003D	ND	0.0010	mg/L	UJ	LR-LCS
Selenium, Total	E200.8	Dup-12-27-22	2212E09-009D	ND	0.0010	mg/L	UJ	LR-LCS
TPH DRO	SW8015	OW-29	2212E09-004C	0.43	0.064	mg/L	JB	MBD
TPH DRO	SW8015	EB-12-27-22	2212E09-001C	0.041	0.064	mg/L	U	MBD, MDLRL
TPH DRO	SW8015	OW-50	2212E09-002C	0.023	0.064	mg/L	U	MBD, MDLRL
TPH DRO	SW8015	OW-52	2212E09-003C	0.045	0.064	mg/L	U	MBD, MDLRL
TPH DRO	SW8015	Dup-12-27-22	2212E09-009C	0.059	0.064	mg/L	U	MBD, MDLRL
TPH GRO	SW8015	OW-50	2212e09-002a	0.062	0.050	mg/L	J-	LR-MS
TPH GRO	SW8015	OW-29	2212e09-004a	2.7	0.050	mg/L	J-	LR-MS
TPH GRO	SW8015	OW-54	2212e09-005a	1.4	0.050	mg/L	J-	LR-MS
TPH GRO	SW8015	OW-66	2212e09-006a	240	2.5	mg/L	J-	LR-MS
TPH GRO	SW8015	OW-55	2212e09-007a	27	2.5	mg/L	J-	LR-MS
TPH GRO	SW8015	Dup-12-27-22	2212e09-009a	0.063	0.050	mg/L	J-	LR-MS
TPH GRO	SW8015	EB-12-27-22	2212e09-001a	ND	0.050	mg/L	UJ	LR-MS
TPH GRO	SW8015	OW-52	2212e09-003a	ND	0.050	mg/L	UJ	LR-MS
Vanadium, Dissolved	E 200.7	OW-50	2212E09-002E	0.0025	0.050	mg/L	U	EBD, MDLRL
Vanadium, Dissolved	E 200.7	OW-52	2212E09-003E	0.0027	0.050	mg/L	U	EBD, MDLRL
Vanadium, Dissolved	E 200.7	OW-29	2212E09-004E	0.0025	0.050	mg/L	U	EBD, MDLRL
Vanadium, Dissolved	E 200.7	OW-54	2212E09-005E	0.0051	0.050	mg/L	U	EBD, MDLRL
Vanadium, Dissolved	E 200.7	OW-66	2212E09-006E	0.0062	0.050	mg/L	U	EBD, MDLRL
Vanadium, Dissolved	E 200.7	OW-55	2212E09-007E	0.0057	0.050	mg/L	U	EBD, MDLRL
Vanadium, Dissolved	E 200.7	Dup-12-27-22	2212E09-009E	0.0021	0.050	mg/L	U	EBD, MDLRL
Vanadium, Dissolved	E 200.7	EB-12-27-22	2212E09-001E	0.0017	0.050	mg/L	J	MDLRL
Vanadium, Total	E 200.7	OW-54	2212E09-005D	0.027	0.050	mg/L	J	MDLRL



Analyte	Method	Field Sample ID	Lab Sample ID	Result	Limit	Units	Reviewer Qualifier	DV Flag Reasons
Vanadium, Total	E 200.7	OW-66	2212E09-006D	0.027	0.050	mg/L	J	MDLRL
Vanadium, Total	E 200.7	OW-55	2212E09-007D	0.036	0.050	mg/L	J	MDLRL
Zinc, Dissolved	E 200.7	OW-50	2212E09-002E	0.0073	0.010	mg/L	J	MDLRL
Zinc, Dissolved	E 200.7	OW-54	2212E09-005E	0.0058	0.010	mg/L	J	MDLRL
Zinc, Dissolved	E 200.7	OW-66	2212E09-006E	0.0070	0.010	mg/L	J	MDLRL
Zinc, Dissolved	E 200.7	OW-55	2212E09-007E	0.0041	0.010	mg/L	J	MDLRL
Zinc, Total	E 200.7	OW-54	2212E09-005D	0.023	0.010	mg/L	JB	MBD
Zinc, Total	E 200.7	OW-66	2212E09-006D	0.012	0.010	mg/L	JB	MBD
Zinc, Total	E 200.7	OW-55	2212E09-007D	0.040	0.010	mg/L	JB	MBD
Zinc, Total	E 200.7	OW-50	2212E09-002D	0.0044	0.010	mg/L	U	MBD, MDLRL
Zinc, Total	E 200.7	OW-52	2212E09-003D	0.0092	0.010	mg/L	U	MBD, MDLRL



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Client: Marathon Oil	Laboratory: Hall Environmental Analysis Laboratory				
Project Name: Western Refining Southwest, Quarterly GW	Sample Matrix: Groundwater				
Project Number: 697-082-003 Task: 0002	Sample Start Date: 12/28/2022				
Date Validated: 02/15/2023	Sample End Date: 12/28/2022				
Parameters Included:					
<ul> <li>Volatile Organic Compounds (VOC) by Environmental Pro Waste (SW-846) Method 8260B</li> </ul>	otection Agency (EPA) Test Methods for Evaluating Solid				
<ul> <li>1,2-Dibromoethane (EDB) by EPA Method 504.1</li> </ul>					
<ul> <li>Semivolatile Organic Compounds (SVOC) by SW-846 Me Monitoring (SIM)</li> </ul>	thod 8270C and Method 8270C with Selected Ion				
<ul> <li>Total Petroleum Hydrocarbons (TPH) Gasoline Range Or</li> </ul>	ganics (GRO) by SW-846 Method 8015D				
<ul> <li>TPH Diesel Range Organics (DRO) and Motor Oil Range</li> </ul>	Organics (MRO) by SW-846 Method 8015D Modified				
<ul> <li>Total and Dissolved Metals by EPA Method 200.7 and Method</li> </ul>	ethod 200.8				
<ul> <li>Total and Dissolved Mercury by EPA Method 245.1</li> </ul>					
<ul> <li>Cyanide by Standard Methods for the Examination of Water and Wastewater (SM) Method 4500 CN E</li> </ul>					
Laboratory Project ID: 2212E57					
Data Validator: Daran O'Hollearn, Lead Project Scientist					
Reviewer: Mike Phillips, Senior Chemist					

## DATA EVALUATION CRITERIA SUMMARY

A Tier II Data Validation was performed by Trihydro Corporation's Chemical Data Evaluation Services Group on the analytical data report packages generated by Hall Environmental Analysis Laboratory of Albuquerque, New Mexico, with additional data from Pace Analytical National of Mount Juliet, Tennessee evaluating samples from the Marathon Oil site, located in Gallup, New Mexico.

Precision, accuracy, method compliance, and completeness of this data package were assessed during this data review. Precision was determined by evaluating the calculated relative percent difference (RPD) values from:

- Field duplicate pairs
- Laboratory duplicate pairs
- Matrix spike (MS) and matrix spike duplicate (MSD) pairs
- Laboratory control sample (LCS) and laboratory control sample duplicate (LCSD) pairs

Laboratory accuracy was established by reviewing the demonstrated percent recoveries (%R) of the following items to verify that data are not biased.

- MS/MSD samples
- LCS/LCSD samples
- Organic system monitoring compounds (surrogates)



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Field accuracy was established by collecting and analyzing the following samples to monitor for possible ambient or cross contamination during sampling and transportation.

- Trip blanks
- Field blanks
- Equipment blanks

Method compliance was established by reviewing sample integrity, holding times, detection limits, surrogate recoveries, laboratory blanks, initial and continuing calibrations (where applicable), and the LCS/LCSD percent recoveries against method-specific requirements.

Completeness was evaluated by determining the overall ratio of the number of samples and analyses planned versus the number of samples with valid analyses. Determination of completeness included a review of the chain-of-custody (CoC), laboratory analytical methods, and other laboratory and field documents associated with this analytical data set.

Client Sample ID	Laboratory Sample Number
EB-12-28-22	2212E57-001
OW-13	2212E57-002
OW-56	2212E57-003
OW-59	2212E57-004
OW-67	2212E57-005
OW-68	2212E57-006
OW-60	2212E57-007
FB-12-28-22	2212E57-008
Dup-12-28-22	2212E57-009
Trip Blank	2212E57-010

## SAMPLE NUMBERS TABLE



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The laboratory data were reviewed to evaluate compliance with the methods and the quality of the reported data. Assessment of CoC completeness is included in Item 3 of the Data Validation Checklist. A check mark ( $\checkmark$ ) indicates that the referenced validation criteria were deemed acceptable, whereas a crossed circle ( $\otimes$ ) indicates validation criteria for which the data have been qualified by the data validator. An empty circle (O) indicates that the specified criterion does not apply to the reviewed data. Details are noted in the tables below.

### Validation Criteria

- ✓ Data Completeness
- ✓ CoC Documentation (Item 3)
- ✓ Holding Times and Preservation (Items 6 and 7)
- O Initial and Continuing Calibrations (Items 9 and 10)
- ⊗ Laboratory Blanks (Items 11 and 12)
- ⊗ MS/MSD (Items 13 and 14)
- ⊗ LCS/LCSD (Items 15 and 16)
- System Monitoring Compounds (i.e., Surrogates) (Item 17)
- ⊗ Trip, Field, and Equipment Blanks (Items 18 and 19)
- ✓ Field Duplicates (Items 20 and 21)
- ✓ Laboratory Duplicates (Item 22)

## **Guidance References**

Chemical data validation was conducted in accordance with the United States Environmental Protection Agency (USEPA) Contract Laboratory Program (CLP) National Functional Guidelines for the analyses listed below, or by the appropriate method if not covered in the National Functional Guidelines.

- Data for organic analyses were evaluated according to validation criteria set forth in the USEPA CLP National Functional Guidelines for Organic Superfund Methods Data Review, document number EPA-540-R-20-005, November 2020 with additional reference to the USEPA CLP National Functional Guidelines for Organic Data Review, document number EPA 540/R-99/008, October 1999.
- Data for inorganic analyses were evaluated according to validation criteria set forth in the USEPA CLP National Functional Guidelines for Inorganic Superfund Methods Data Review, document number EPA-540-R-20-006, November 2020 with additional reference to the USEPA CLP National Functional Guidelines for Inorganic Data Review, document number EPA 540-R-04-004, October 2004.
- Review of field duplicates was conducted according to the USEPA Region I New England Environmental Data Review Supplement for Region 1 Data Review Elements and Superfund Specific Guidance/Procedures, EQADR-Supplement2, September 2020.
- Trihydro Data Validation Variance Documentation, April 2022.



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### **OVERALL DATA PACKAGE ASSESSMENT**

Based on a data validation review, the data are acceptable as delivered. Data qualified by the laboratory are discussed in Item 2 of the Validation Criteria Checklist.

The purpose of validating data and assigning qualifiers is to assist in proper data interpretation. Data that are not qualified meet the site data quality objectives. If values are assigned qualifiers other than an R (rejected, data not usable), the data may be used for site evaluation; however, consideration should be given to the reasons for qualification when interpreting sample concentrations. Data points that are assigned an R qualifier should not be used for site evaluation purposes.

If applicable, text was identified in **bold font** in the Validation Criteria Checklist to indicate that further action and/or qualification of the data were required. Data may have been qualified with J data flags by the laboratory if the result was greater than or equal to the method detection limit (MDL) but less than the reporting limit (RL). These laboratory-applied J flags were preserved, if present, and included in the Data Qualification Summary table at the end of this report. If applicable, data validation qualifiers were added for the items noted with crossed circles in the Validation Criteria section above. Please see the Data Qualification Summary table at the end of this report.

If data would be qualified with more than one flag, one qualifier was assigned based on the severity; however, all reasons for qualification were retained. Data that would be qualified with both J+ and J- flags were evaluated based on validation criteria and assigned the appropriate flag. The hierarchy of qualifiers from the most to least severe is as follows:

Data qualifiers used during this validation are included in the following table.

<u>Qualifier</u>	Definition
J	Estimated concentration
J+	The result is an estimated concentration, but may be biased high
J-	The result is an estimated concentration, but may be biased low
UJ	Estimated reporting limit
U	Evaluated to be undetected at the reporting limit
JB	Estimated concentration due to blank contamination
R	Rejected, data not usable

### **Data Completeness**

The analyses were performed as requested on the CoC records. The associated samples were received by the laboratory and analyzed properly unless otherwise noted in the Criteria Checklist below. The complete data package consisted of 630 data points. The data completeness calculation does not include any submitted blank sample results. Twenty-one data points were rejected. The data completeness measure for this data package is calculated to be 96.67% and is acceptable.


VALIDATION CRITERIA CHECKLIST						
1. Was the report free of non-conformances identified by the laboratory? No						
Comments: The laboratory noted the following analytical non-conformances related to this data set.						
<u>Method 80156D DRO/MRO</u> : The method blank had a low-level detection for DRO. Samples with detections are flagged with a "B". The laboratory control spike for DRO/MRO had an elevated recovery for OW-67, OW-68, OW60, and Dup-12-28-22.						
Method 80156D GRO: The surrogate recoveries for OW-56, OW59, OW67, OW 68, and OW60 all had elevated surrogate recoveries because of matrix interference. A large peak was detected at the same retention time as the surrogate.						
2. Were the data free of data qualification flags and/or notes used by the laboratory? No If no, define.						
Comments: The laboratory used the following data qualification flags with this data set.						
B – Analyte detected in the associated method blank.						
E – Above quantitation range / estimated value. This flag was mistakenly applied according to the results reported.						
J – Analyte detected below quantitation limits.						
R – % RPD outside of range.						
S – % Recovery outside of range due to dilution or matrix interference.						
* – Value exceeds maximum contaminant level.						
3. Were sample CoC forms and custody procedures complete? No						
Comments: The CoC records from field to laboratory were complete, and custody was maintained as evidenced by field and laboratory personnel signatures, dates, and times of receipt. Custody seals were not present because the samples were transferred to a laboratory field courier service for transport from the field to the laboratory, and custody was maintained at all times.						
The trip blank sample was received by the laboratory, but the parameters requested were not indicated on the CoC. The laboratory logged in the sample and performed the appropriate volatile analyses. Validation action was not required.						
4. Were detection limits in accordance with the quality assurance project plan (QAPP), Yes permit, or method, or indicated as acceptable?						
Comments: The detection limits appeared to be acceptable. The following dilutions were applied.						
MethodSample(s)Analyte(s)DilutionFactor						
200.7 OW-60 Dissolved Metals 5						
200.8 OW-67 Select Dissolved Metals 5						
200.8 OW-59, OW-67, OW-68 Total Metals 5						
200.7 Dup-12-28-22 Dissolved Metals 10						



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VALIDATION CRITERIA CHECKLIST						
<ol><li>Were the reported analytical methods and constituents in compliance with the QAPP, permit, or CoC?</li></ol>	No					
Comments: The reported analytical methods were in compliance with the CoC, and the laboratory reported the requested constituents in accordance with the CoC, with the following exceptions.						
The CoC requested total and dissolved metals using only Method 200.7; however, the laborator using both Method 200.7 and Method 200.8. This substituted analytical method, Method 200.8, accuracy, and precision goals and, therefore, was an acceptable replacement.	y analyzed the samples met similar sensitivity,					
The CoC requested cyanide using Method 335.4; however, the laboratory analyzed the samples This substituted analytical method met similar sensitivity, accuracy, and precision goals and, the replacement.	s using Method 4500 CN E. erefore, was an acceptable					
6. Were samples received in good condition within method-specified requirements?	No					
Comments: Samples were received on ice, in good condition, and with the cooler temperatures temperature range of $4^{\circ}C \pm 2^{\circ}C$ between $0.2^{\circ}C$ to $1.1^{\circ}C$ as noted on Sample Log-in Check List transferred to Pace National were received in good condition with the cooler temperature outside at $1.6^{\circ}C$ as noted on the CoC.	outside the recommended and on the CoC. Samples e the recommended range					
The cooler temperatures below 2.0°C were judged as acceptable since the laboratory did not re as broken or frozen.	port the sample containers					
7. Were samples extracted/digested and analyzed within method-specified or technical holding times?	Yes					
Comments: The samples were extracted/digested and analyzed within method-specific holding	times.					
8. Were reported units appropriate for the sample matrix/matrices and analytical method(s)? Specify if wet or dry units were used for soil.	Yes					
Comments: The results were reported in concentration units of micrograms per liter ( $\mu$ g/L) and which were acceptable for the sample matrix and the analyses requested.	milligrams per liter (mg/L),					
9. Did the laboratory provide any specific initial and/or continuing calibration results?	No					
Comments: Initial and continuing calibration data were not included as part of this data set.						
10. If initial and/or continuing calibration results were provided, were the results within acceptable limits?	N/A					
Comments: Initial and continuing calibration data were not included as part of this data set.						
11. Was the total number of laboratory blank samples prepared equal to at least 5% of the total number of samples or analyzed as required by the method?	Yes					
Comments: The total number of laboratory blank samples prepared was equal to at least 5% of samples.	the total number of					



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12. Were target analytes reported as not detected in the laboratory blanks?

Comments: Target analytes were reported as not detected in the laboratory blanks, with the following exceptions.

Method	<u>Analyte</u>	<u>Batch</u>	Concentration
200.7	Total Zinc	72409	0.0045 mg/L
200.8	Total Antimony	72409	0.00062 mg/L
8015D	TPH DRO	72386	0.10 mg/L
8015D	TPH DRO	72395	0.10 mg/L

Detections of total zinc and TPH DRO in the associated samples that were less than the blank results and/or less than the applicable reporting limits were assigned U qualifiers. Detections of total zinc and TPH DRO in the associated samples that were greater than the reporting limits but less than or equal to 10 times the blank results were assigned JB qualifiers. Non-detections of these analytes in the associated samples and results greater than ten times the blank concentration did not require qualification.

13. Was the total number of MS samples prepared equal to at least 5% of the total

Yes

No

number of samples or analyzed as required by the method?

Comments: The total number of matrix spike samples prepared was equal to at least 5% of the total number of samples, although MS samples were not prepared/reported for all analyses and/or batches. The matrix spike sample source for each analytical batch in this sample set has been indicated below.

Method	Analytes	Batch	MS Sample Source
200.7	Total Metals	72409	EB-12-28-22, OW-13
200.7	Dissolved Metals	A93838	Not Prepared
200.7	Dissolved Cobalt	A94009	Not Prepared
200.7	Dissolved Metals	B93766	Not Prepared
200.7	<b>Dissolved Metals</b>	C93766	OW-56
200.8	Total Metals	72409	Not Prepared
200.8	<b>Dissolved Metals</b>	A93877	Not Prepared
200.8	Dissolved Metals	B93855	EB-12-28-22, OW-13
245.1	Total and Dissolved Mercury	72553	Dup-12-28-22
504.1	EDB	72430	Not Prepared
4500CN E	Cyanide	WG1981929	Not Associated, OW-13
8015D	TPH DRO and MRO	72386	Not Prepared
8015D	TPH DRO and MRO	72395	Not Prepared
8015D	TPH GRO	R93693	Not Prepared
8260B	VOCs	R93727	Not Prepared
8260B	VOCs	R93747	Not Prepared
8270C SIM	SVOCs	72406	Not Prepared
8270C	SVOCs	72406	Not Prepared

Not Associated – The MS sample source was not associated with this project.

Not Prepared – Matrix spikes were not prepared/reported for this batch.



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	VALIDATION CRITERIA CHECKLIST						
14. For M within data	14. For MS/MSDs prepared from project samples, were percent recoveries and RPDs No within data validation or laboratory quality control (QC) limits?						
Comments limits, with	s: The MS/MSD percent recover the following exception.	veries and F	RPDs for proje	ect samples were	e within data va	alidation or lab	oratory QC
The MS p	ercent recovery for total zine	c in Method	d 200.7 batch	72409 was out	side the QC li	mits of 75-12	5% at 127%.
Detection	s of total zinc in the associa	ted sample	es were assig	ned J+ qualifie	ers due to evic	lence of pote	ntial high
bias. Non	i-detections of total zinc in the	associated	samples did r	not require quali	fication based	on this non-co	nformance.
I ne perce	nt recoveries and RPD values	TOF INS/INS	Us prepared f	rom non-project	samples were	evaluated and	antood
							anteeu.
15. Was t	ne total number of LCSs analy	/zed equal t	to at least 5%	of the total hum	ber of	Yes	•
samples o	i analyzed as required by the	metriou					
Comments	s: The total number of LCS sa	mples anal	yzed was equ	al to at least 5%	o of the total nu	mber of samp	les.
16. Were	LCS/LCSD percent recoveries	s and LCS/L	_CSD RPDs w	vithin data valida	ation or	No	
laboratory	QC limits?						
Comments limits, with	s: The LCS and LCSD percen the following exceptions.	t recoveries	s and LCS/LC	SD RPDs were	within data vali	dation and lab	oratory QC
Mathad	Analyta	Batab	LCS	LCSD	LCS/LCSD	LCS/LCSD	RPD QC
	Analyte	Daton	<u>Recovery</u>	<u>Recovery</u>	QC Limits	<u>RPD</u>	<u>Limits</u>
200.7	Total Cobalt	72409	140%		70-130%		
200.7	Total Nickel	72409	139%		70-130%		
200.7	<b>Dissolved Nickel</b>	B93766	<b>68.9%</b>		70-130%		
200.8	Total Selenium	72409	69.0%		70-130%		
8015D	TPH DRO	72395	138%	Acceptable	31.2-125%	25.2%	20%
Detections of total cobalt, total nickel, and TPH DRO in the associated samples were assigned J+ qualifiers due to evidence of potential high bias. Non-detections of total cobalt and total nickel in the associated samples did not require qualification.							
Detection were qual	s of total selenium were ass lified as UJ due to evidence	igned J- qu of potentia	ualifiers, and I low bias.	non-detections	s of dissolved	nickel and to	otal selenium

TPH DRO was detected in the associated samples, and these results were qualified as J due to evidence of poor precision.



17. Were surrogate recoveries within laboratory QC limits?

No

Comments: Surrogate recoveries were within QC limits, with the following exceptions.

<u>Method</u>	Surrogate	<u>Sample</u>	<u>Surrogate</u> <u>Recovery</u>	QC Limits
8015D	BFB	OW-56	551%	70-130%
8260B	Dibromofluoromethane	OW-56	144%	70-130%
8015D	BFB	OW-59	5,320%	70-130%
8270C	2-Fluorophenol	OW-59	9.65%	15-84.5%
8270C	2,4,6-Tribromophenol	OW-59	5.51%	15-108%
8015D	BFB	OW-67	607%	70-130%
8270C	2-Fluorophenol	OW-67	1.92%	15-84.5%
8270C	Phenol-d₅	OW-67	6.32%	15-67%
8270C	2,4,6-Tribromophenol	OW-67	2.88%	15-108%
8015D	BFB	OW-68	2,720%	70-130%
8270C	2-Fluorophenol	OW-68	3.37%	15-84.5%
8270C	Phenol-d₅	OW-68	10.7%	15-67%
8270C	2,4,6-Tribromophenol	OW-68	5.87%	15-108%
8015D	BFB	OW-60	134%	70-130%
8270C	2-Fluorophenol	OW-60	12.2%	15-84.5%
8270C	2,4,6-Tribromophenol	OW-60	7.99%	15-108%

TPH GRO was detected in the Method 8015D analysis of samples OW-56, OW-59, OW-67, and OW-68, and these results were assigned J+ qualifiers due to evidence of potential high bias. TPH GRO was not detected in sample OW-60, and qualification of data was not required.

Since Method 8260B surrogate associations were not available from the laboratory, qualification was assigned to all of the target analytes when one or more surrogates was outside the acceptance range. The associated target analytes in sample OW-56 with the surrogate dibromofluoromethane recovery that was greater than the upper laboratory QC limit were qualified as J+ if detected in affected samples due to potential high bias. Qualification was not required for non-detected analytes associated with this surrogate.

Since Method 8270C surrogate associations were not available from the laboratory, qualification was assigned to all of the target analytes in a given fraction (acid or base/neutral) when two or more surrogates from the same fraction (acid or base/neutral) were outside the acceptance range. The analytes in the acid fraction of samples OW-59, OW-67, OW-68, and OW-60 were not detected. Since the recoveries of at least 2 of 3 surrogates in samples OW-59, OW-67, and OW-68 were less than 10%, the results for the associated acid fraction analytes were assigned R qualifiers to indicate rejected (not usable) data based on evidence of extreme low bias. Only 1 of 3 acid fraction surrogates was less than 10% for sample OW-60; therefore, the associated acid fraction analytes were assigned UJ qualifiers due to evidence of potential low bias.

Qualification of sample data was not required based on surrogate non-conformances in QC samples as the environmental samples were evaluated based on their specific surrogate recoveries.

18.	Were the number of trip blank, field blank, and/or equipment blank samples	Yes	
	collected equal to at least 10% of the total number of samples or as required by the		
	project guidelines, QAPP, SAP, or permit?		

Comments: The number of trip, field, and equipment blanks collected was equal to at least 10% of the number of samples. One trip blank sample, Trip Blank, one field blank sample, FB-12-28-22, and one equipment blank sample, EB-12-28-22, were collected as part of this sample set.



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VALIDATION CRITERIA CHECKLIST							
19. Were target analytes reported as not detected in the trip blank, field blank, and/or No equipment blank samples?							
Comments: Target a exceptions.	Comments: Target analytes were not detected in the trip blank, field blank, and equipment blank samples with the following exceptions.						
Blank Sample ID         Method         Analyte         Concentration (mg/L)							
	EB-12-28-22	200.7	Dissolved Vanadium	0.0020			
	EB-12-28-22	245.1	Total Mercury	0.00018			
	EB-12-28-22	245.1	<b>Dissolved Mercury</b>	0.000091			
	EB-12-28-22	8015D	TPH DRO	0.025			
<ul> <li>mercury in the associated samples that were greater than the reporting limits but less than 10 times the blank results were assigned JB qualifiers. Non-detections of the identified analytes in the associated samples did not require qualification.</li> <li>The TPH DRO results in Method 8015D batch 72386 and batch 72395 were previously qualified due to laboratory blank detections; therefore, additional qualification due to the equipment blank contamination was not required.</li> <li>20. Was the number of field duplicates collected equal to at least 10% of the total number of samples or as required by the project guidelines, QAPP, SAP, or permit?</li> <li>Comments: The number of field duplicates collected was equal to at least 10% of the number of samples.</li> <li>Sample Dup-12-28-22 was collected as a field duplicate of sample OW-13.</li> </ul>							
21. Were field dupli 0-30%, or air 0-	cate RPD values within 25%)?	data validat	tion QC limits (soil 0-50%, wa	ter	Yes		
Comments: As indicated in the Field Duplicate Summary Table at the end of this report, field duplicate RPD values were within data validation QC limits of 0-30% for water samples.							
22. For laboratory duplicates prepared from project samples, were RPDs within data N/A validation or laboratory QC limits?							
Comments: Laboratory duplicates were prepared for the analysis of cyanide in batch WG1981929 from samples not associated with this data set.							
The RPD values for but data were not qu	the laboratory duplicate alified based on these	e samples pi results since	repared from non-project sam e matrix similarity to project sa	ples were evaluate amples could not b	ed and considered, e guaranteed.		



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VALIDATION CRITERIA CHECKLIST								
23. Were the following da	ta relationships realist	ic?						
• Target analytes v EPH/8270)?	<ul> <li>Target analytes were reported by more than one method (e.g., 8260/8270, N/A EPH/8270)?</li> </ul>							
Comments: Target analyt	Comments: Target analytes were not reported by more than one method.							
• Both total and dissolved metals analyses were performed, and the total metals No results were greater than or equal to the dissolved metals results?								
Comments: The following	table contains the exe	ceptions in which th	ne dissolved metals					
results exceeded the total	metais results.							
Sample ID	<u>Analyte</u>	<u>Iotal Result</u> (mg/L)	Dissolved Result (mg/L)					
OW-13	Mercury	0.00017	0.00020					
OW-13	Arsenic	0.00061	0.0013					
DUP-12-28-22	Arsenic	0.00067	0.0010					
OW-13	Barium	0.019	0.020					
DUP-12-28-22	Barium	0.019	0.022					
OW-59	Beryllium	ND	0.00072					
OW-13	Selenium	ND	0.0022					
OW-56	Selenium	0.0023	0.0075					
OW-59	Selenium	0.0069	0.019					
OW-67	Selenium	0.0067	0.031					
OW-68	Selenium	0.0065	0.017					
OW-60	Selenium	0.016	0.034					
DUP-12-28-22	Selenium	0.0011	0.0022					
OW-59	Silver	ND	0.0028					
OW-67	Silver	ND	0.014					
OW-68	Silver	ND	0.0065					
EB-12-28-22	Vanadium	ND	0.0020					
OW-13	Vanadium	ND	0.0040					
Sample ID	Sample ID         Analyte         Total Result (mg/L)         Dissolved Result (mg/L)							
OW-60	Vanadium	0.011	0.015					
OW-13	Zinc	ND	0.016					
The EPA has not provided qualification of dissolved n results. Therefore, qualific	l guidance or requirem netals results that exc cation of results was n	nents for the evaluated the corresponded the corresponded the corresponded to the corresponded based of performed based to the corresponded to the	tion, validation, and ling total metals d on these data.					

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🐨 Trihydro

Client Sample ID: OW-13 Field Duplicate Sample ID: DUP-12-28-22							
Analyte	Method	Relative Percent Difference (RPD)					
Barium, Dissolved	E 200.7	0.020 mg/L	0.022 mg/L	9.5%			
Barium, Total	E 200.7	0.019 mg/L	0.019 mg/L	0.0%			
Vanadium, Dissolved	E 200.7	0.0040 mg/L	ND (0.50 mg/L)	DL			
Zinc, Dissolved	E 200.7	0.016 mg/L	ND (0.10 mg/L)	DL			
Zinc, Total	E 200.7	ND (0.010 mg/L)	0.0068 mg/L	DL			
Arsenic, Dissolved	E200.8	0.0013 mg/L	0.0010 mg/L	26.1% +/-RL			
Arsenic, Total	E200.8	0.00061 mg/L	0.00067 mg/L	9.4% +/-RL			
Selenium, Dissolved	E200.8	0.0022 mg/L	0.0022 mg/L	0.0%			
Selenium, Total	E200.8	ND (0.0010 mg/L)	0.0011 mg/L	DL			
Mercury, Dissolved	E245.1	0.00020 mg/L	ND (0.00020 mg/L)	DL			
Mercury, Total	E245.1	0.00017 mg/L	ND (0.00020 mg/L)	DL			
TPH DRO	SW8015	0.061 mg/L	0.059 mg/L	3.3% +/-RL			
TPH GRO	SW8015	0.098 mg/L	0.094 mg/L	4.2% +/-RL			
MTBE	SW8260B	97 μg/L	99 µg/L	2.0%			

### FIELD DUPLICATE SUMMARY

Field duplicate RPD control limits are not to exceed 30% for water as established by USEPA Region I - New England Environmental Data Review Supplement for Region 1 Data Review Elements and Superfund Specific Guidance/Procedures, EQADR-Supplement2, September 2020.

DL – Indicates that the analyte was detected in one of the duplicate samples and was undetected in the other sample, and therefore an RPD could not be calculated. Data were not qualified since the detection was within two times the reporting limit. Non-detected results are indicated above with the applicable reporting limit as ND (RL).

+/-RL – Indicates that the detections in both of the samples were within two times the reporting limit. Qualification of data was not required.



## DATA QUALIFICATION SUMMARY

Abbreviation	Reason
EBD	Equipment blank detection
ERPD-LCS	The LCS/LCSD RPD exceeded the upper acceptable limit indicating poor precision.
HR-LCS	The LCS and/or LCSD percent recovery was greater than the upper acceptable limit indicating a possible high bias.
HR-SUR	The surrogate percent recovery was greater than the upper acceptable limit indicating a possible high bias.
LR-LCS	The LCS and/or LCSD percent recovery was less than the lower acceptable limit indicating a possible low bias.
LR-SUR	The surrogate percent recovery was less than the lower acceptable limit indicating a possible low bias.
HR-MS	The MS and/or MSD percent recovery was greater than the upper acceptable limit indicating possible matrix interference.
MBD	Method blank detection
MDLRL	Flagged by the laboratory: The result was greater than the MDL but less than the RL.

Analyte	Method	Field Sample ID	Lab Sample ID	Result	Limit	Units	Reviewer Qualifier	DV Flag Reasons
1,2,4-Trimethylbenzene	SW8260B	OW-56	2212e57-003a	1.4	1.0	µg/L	J+	HR-SUR
1,2-Dichloroethane	SW8260B	OW-56	2212e57-003a	5.2	1.0	µg/L	J+	HR-SUR
1,4-Dioxane	SW8270C	OW-56	2212e57-003c	0.22	1.0	µg/L	J	MDLRL
2,4,6-Trichlorophenol	SW8270C	OW-59	2212E57-004C	ND	10	µg/L	R	LR-SUR
2,4,6-Trichlorophenol	SW8270C	OW-67	2212e57-005c	ND	10	µg/L	R	LR-SUR
2,4,6-Trichlorophenol	SW8270C	OW-68	2212e57-006c	ND	10	µg/L	R	LR-SUR
2,4,6-Trichlorophenol	SW8270C	OW-60	2212e57-007c	ND	10	µg/L	UJ	LR-SUR
2,4-Dimethylphenol	SW8270C	OW-59	2212E57-004C	ND	10	µg/L	R	LR-SUR
2,4-Dimethylphenol	SW8270C	OW-67	2212e57-005c	ND	10	µg/L	R	LR-SUR
2,4-Dimethylphenol	SW8270C	OW-68	2212e57-006c	ND	10	µg/L	R	LR-SUR
2,4-Dimethylphenol	SW8270C	OW-60	2212e57-007c	ND	10	µg/L	UJ	LR-SUR
2,4-Dinitrophenol	SW8270C	OW-59	2212E57-004C	ND	20	µg/L	R	LR-SUR
2,4-Dinitrophenol	SW8270C	OW-67	2212e57-005c	ND	20	µg/L	R	LR-SUR



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Analyte	Method	Field Sample ID	Lab Sample ID	Result	Limit	Units	Reviewer Qualifier	DV Flag Reasons
2,4-Dinitrophenol	SW8270C	OW-68	2212e57-006c	ND	20	µg/L	R	LR-SUR
2,4-Dinitrophenol	SW8270C	OW-60	2212e57-007c	ND	20	µg/L	UJ	LR-SUR
2-Methylphenol	SW8270C	OW-59	2212E57-004C	ND	10	µg/L	R	LR-SUR
2-Methylphenol	SW8270C	OW-67	2212e57-005c	ND	10	µg/L	R	LR-SUR
2-Methylphenol	SW8270C	OW-68	2212e57-006c	ND	10	µg/L	R	LR-SUR
2-Methylphenol	SW8270C	OW-60	2212e57-007c	ND	10	µg/L	UJ	LR-SUR
3,4-Methylphenol	SW8270C	OW-59	2212E57-004C	ND	10	µg/L	R	LR-SUR
3,4-Methylphenol	SW8270C	OW-67	2212e57-005c	ND	10	µg/L	R	LR-SUR
3,4-Methylphenol	SW8270C	OW-68	2212e57-006c	ND	10	µg/L	R	LR-SUR
3,4-Methylphenol	SW8270C	OW-60	2212e57-007c	ND	10	µg/L	UJ	LR-SUR
Arsenic, Total	E200.8	OW-13	2212E57-002D	0.00061	0.0010	mg/L	J	MDLRL
Arsenic, Total	E200.8	OW-59	2212E57-004D	0.0048	0.0050	mg/L	J	MDLRL
Arsenic, Total	E200.8	OW-67	2212E57-005D	0.0034	0.0050	mg/L	J	MDLRL
Arsenic, Total	E200.8	Dup-12-28-22	2212E57-009D	0.00067	0.0010	mg/L	J	MDLRL
Benzene	SW8260B	OW-56	2212e57-003a	1.9	1.0	µg/L	J+	HR-SUR
Benzoic Acid	SW8270C	OW-59	2212E57-004C	ND	20	µg/L	R	LR-SUR
Benzoic Acid	SW8270C	OW-67	2212e57-005c	ND	20	µg/L	R	LR-SUR
Benzoic Acid	SW8270C	OW-68	2212e57-006c	ND	20	µg/L	R	LR-SUR
Benzoic Acid	SW8270C	OW-60	2212e57-007c	ND	20	µg/L	UJ	LR-SUR
Beryllium, Dissolved	E 200.7	OW-59	2212E57-004E	0.00072	0.0020	mg/L	J	MDLRL
Chromium, Total	E 200.7	OW-68	2212E57-006D	0.0060	0.0060	mg/L	J	MDLRL
Cobalt, Total	E 200.7	OW-56	2212E57-003D	0.0073	0.0060	mg/L	J+	HR-LCS
Cobalt, Total	E 200.7	OW-59	2212E57-004D	0.0087	0.0060	mg/L	J+	HR-LCS
Cobalt, Total	E 200.7	OW-67	2212E57-005D	0.032	0.0060	mg/L	J+	HR-LCS
Cobalt, Total	E 200.7	OW-68	2212E57-006D	0.086	0.0060	mg/L	J+	HR-LCS
Cobalt, Total	E 200.7	OW-60	2212E57-007D	0.0054	0.0060	mg/L	J+	HR-LCS, MDLRL
Fluoranthene	SW8270C	OW-59	2212E57-004C	0.14	0.30	µg/L	J	MDLRL



Analyte	Method	Field Sample ID	Lab Sample ID	Result	Limit	Units	Reviewer Qualifier	DV Flag Reasons
Fluorene	SW8270C	OW-68	2212e57-006c	0.12	0.30	µg/L	J	MDLRL
Isopropylbenzene	SW8260B	OW-56	2212e57-003a	3.0	1.0	µg/L	J+	HR-SUR
Lead, Dissolved	E200.8	OW-56	2212E57-003E	0.00022	0.0005	mg/L	J	MDLRL
Lead, Total	E200.8	OW-59	2212E57-004D	0.0013	0.0025	mg/L	J	MDLRL
Mercury, Dissolved	E245.1	OW-56	2212E57-003E	0.00022	0.00020	mg/L	JB	EBD
Mercury, Dissolved	E245.1	OW-13	2212E57-002E	0.00020	0.00020	mg/L	U	EBD, MDLRL
Mercury, Dissolved	E245.1	EB-12-28-22	2212E57-001E	0.000091	0.00020	mg/L	J	MDLRL
Mercury, Total	E245.1	OW-56	2212E57-003D	0.00029	0.00020	mg/L	JB	EBD
Mercury, Total	E245.1	OW-13	2212E57-002D	0.00017	0.00020	mg/L	U	EBD, MDLRL
Mercury, Total	E245.1	EB-12-28-22	2212E57-001D	0.00018	0.00020	mg/L	J	MDLRL
MTBE	SW8260B	OW-56	2212e57-003a	14	1.0	µg/L	J+	HR-SUR
Nickel, Dissolved	E 200.7	EB-12-28-22	2212E57-001E	ND	0.010	mg/L	UJ	LR-LCS
Nickel, Total	E 200.7	OW-56	2212E57-003D	0.078	0.010	mg/L	J+	HR-LCS
Nickel, Total	E 200.7	OW-59	2212E57-004D	0.044	0.010	mg/L	J+	HR-LCS
Nickel, Total	E 200.7	OW-67	2212E57-005D	0.12	0.010	mg/L	J+	HR-LCS
Nickel, Total	E 200.7	OW-68	2212E57-006D	0.2	0.010	mg/L	J+	HR-LCS
Phenol	SW8270C	OW-59	2212E57-004C	ND	20	µg/L	R	LR-SUR
Phenol	SW8270C	OW-67	2212e57-005c	ND	20	µg/L	R	LR-SUR
Phenol	SW8270C	OW-68	2212e57-006c	ND	20	µg/L	R	LR-SUR
Phenol	SW8270C	OW-60	2212e57-007c	ND	20	µg/L	UJ	LR-SUR
Selenium, Total	E200.8	OW-56	2212E57-003D	0.0023	0.0010	mg/L	J-	LR-LCS
Selenium, Total	E200.8	OW-59	2212E57-004D	0.0069	0.0050	mg/L	J-	LR-LCS
Selenium, Total	E200.8	OW-67	2212E57-005D	0.0067	0.0050	mg/L	J-	LR-LCS
Selenium, Total	E200.8	OW-68	2212E57-006D	0.0065	0.0050	mg/L	J-	LR-LCS
Selenium, Total	E200.8	OW-60	2212E57-007D	0.016	0.0010	mg/L	J-	LR-LCS
Selenium, Total	E200.8	Dup-12-28-22	2212E57-009D	0.0011	0.0010	mg/L	J-	LR-LCS
Selenium, Total	E200.8	EB-12-28-22	2212E57-001D	ND	0.0010	mg/L	UJ	LR-LCS



Analyte	Method	Field Sample ID	Lab Sample ID	Result	Limit	Units	Reviewer Qualifier	DV Flag Reasons
Selenium, Total	E200.8	OW-13	2212E57-002D	ND	0.0010	mg/L	UJ	LR-LCS
Silver, Dissolved	E 200.7	OW-59	2212E57-004E	0.0028	0.0050	mg/L	J	MDLRL
TPH DRO	SW8015	OW-56	2212E57-003C	0.82	0.064	mg/L	JB	MBD
TPH DRO	SW8015	OW-59	2212E57-004C	0.50	0.064	mg/L	JB	MBD
TPH DRO	SW8015	EB-12-28-22	2212E57-001C	0.025	0.064	mg/L	U	MBD, MDLRL
TPH DRO	SW8015	OW-13	2212E57-002C	0.061	0.064	mg/L	U	MBD, MDLRL
TPH DRO	SW8015	OW-68	2212E57-006C	1.7	0.064	mg/L	J+	ERPD-LCS, HR-LCS
TPH DRO	SW8015	OW-67	2212E57-005C	0.67	0.064	mg/L	JB	ERPD-LCS, HR-LCS, MBD
TPH DRO	SW8015	OW-60	2212E57-007C	0.15	0.064	mg/L	JB	ERPD-LCS, HR-LCS, MBD
TPH DRO	SW8015	Dup-12-28-22	2212E57-009C	0.059	0.064	mg/L	U	ERPD-LCS, HR-LCS, MBD, MDLRL
TPH GRO	SW8015	OW-56	2212e57-003a	0.22	0.050	mg/L	J+	HR-SUR
TPH GRO	SW8015	OW-59	2212e57-004a	0.26	0.050	mg/L	J+	HR-SUR
TPH GRO	SW8015	OW-67	2212e57-005a	0.077	0.050	mg/L	J+	HR-SUR
TPH GRO	SW8015	OW-68	2212e57-006a	0.85	0.050	mg/L	J+	HR-SUR
TPH ORO	SW8015	OW-67	2212E57-005C	0.060	0.080	mg/L	J	MDLRL
Vanadium, Dissolved	E 200.7	OW-13	2212E57-002E	0.004	0.050	mg/L	U	EBD, MDLRL
Vanadium, Dissolved	E 200.7	OW-56	2212E57-003E	0.0034	0.050	mg/L	U	EBD, MDLRL
Vanadium, Dissolved	E 200.7	OW-59	2212E57-004E	0.0061	0.050	mg/L	U	EBD, MDLRL
Vanadium, Dissolved	E 200.7	OW-67	2212E57-005E	0.0063	0.050	mg/L	U	EBD, MDLRL
Vanadium, Dissolved	E 200.7	OW-68	2212E57-006E	0.012	0.050	mg/L	U	EBD, MDLRL
Vanadium, Dissolved	E 200.7	OW-60	2212E57-007E	0.015	0.25	mg/L	U	EBD, MDLRL
Vanadium, Dissolved	E 200.7	EB-12-28-22	2212E57-001E	0.0020	0.050	mg/L	J	MDLRL
Vanadium, Total	E 200.7	OW-56	2212E57-003D	0.0057	0.050	mg/L	J	MDLRL
Vanadium, Total	E 200.7	OW-59	2212E57-004D	0.0094	0.050	mg/L	J	MDLRL
Vanadium, Total	E 200.7	OW-67	2212E57-005D	0.016	0.050	mg/L	J	MDLRL
Vanadium, Total	E 200.7	OW-68	2212E57-006D	0.045	0.050	mg/L	J	MDLRL



Analyte	Method	Field Sample ID	Lab Sample ID	Result	Limit	Units	Reviewer Qualifier	DV Flag Reasons
Vanadium, Total	E 200.7	OW-60	2212E57-007D	0.011	0.050	mg/L	J	MDLRL
Xylenes, Total	SW8260B	OW-56	2212e57-003a	2.1	1.5	µg/L	J+	HR-SUR
Zinc, Dissolved	E 200.7	OW-56	2212E57-003E	0.0033	0.010	mg/L	J	MDLRL
Zinc, Dissolved	E 200.7	OW-68	2212E57-006E	0.0069	0.010	mg/L	J	MDLRL
Zinc, Total	E 200.7	OW-56	2212E57-003D	0.011	0.010	mg/L	JB	HR-MS, MBD
Zinc, Total	E 200.7	OW-59	2212E57-004D	0.011	0.010	mg/L	JB	HR-MS, MBD
Zinc, Total	E 200.7	OW-68	2212E57-006D	0.045	0.010	mg/L	JB	HR-MS, MBD
Zinc, Total	E 200.7	OW-60	2212E57-007D	0.012	0.010	mg/L	JB	HR-MS, MBD
Zinc, Total	E 200.7	OW-67	2212E57-005D	0.0073	0.010	mg/L	U	HR-MS, MBD, MDLRL
Zinc, Total	E 200.7	Dup-12-28-22	2212E57-009D	0.0068	0.010	mg/L	U	HR-MS, MBD, MDLRL



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Client: Marathon Oil	Laboratory: Hall Environmental Analysis Laboratory					
Project Name: Western Refining Southwest, Quarterly GW	Sample Matrix: Groundwater					
Project Number: 697-082-003 Task: 0002	Sample Start Date: 12/29/2022					
Date Validated: 02/15/2023	Sample End Date: 12/29/2022					
Parameters Included:						
<ul> <li>Volatile Organic Compounds (VOC) by Environmental Protection Agency (EPA) Test Methods for Evaluating Solid Waste (SW-846) Method 8260B</li> </ul>						
<ul> <li>1,2-Dibromoethane (EDB) by EPA Method 504.1</li> </ul>						
<ul> <li>Semivolatile Organic Compounds (SVOC) by SW-846 Method 8270C and Method 8270C with Selected Ion Monitoring (SIM)</li> </ul>						
<ul> <li>Total Petroleum Hydrocarbons (TPH) Gasoline Range Or</li> </ul>	ganics (GRO) by SW-846 Method 8015D					
<ul> <li>TPH Diesel Range Organics (DRO) and Motor Oil Range</li> </ul>	Organics (MRO) by SW-846 Method 8015D Modified					
<ul> <li>Total and Dissolved Metals by EPA Method 200.7 and Method</li> </ul>	thod 200.8					
<ul> <li>Total and Dissolved Mercury by EPA Method 245.1</li> </ul>						
<ul> <li>Chemical Oxygen Demand (COD) by EPA Method 410.4</li> </ul>						
<ul> <li>Cyanide by Standard Methods for the Examination of Wat</li> </ul>	er and Wastewater (SM) Method 4500 CN E					
<ul> <li>Biochemical Oxygen Demand (BOD) by SM Method 5210</li> </ul>	В					
Laboratory Project ID: 2212F05						
Data Validator: Daran O'Hollearn, Lead Project Scientist						
Reviewer: Charles Ballek, Senior Chemist						

## DATA EVALUATION CRITERIA SUMMARY

A Tier II Data Validation was performed by Trihydro Corporation's Chemical Data Evaluation Services Group on the analytical data report packages generated by Hall Environmental Analysis Laboratory of Albuquerque, New Mexico, with additional data from Pace Analytical National of Mount Juliet, Tennessee evaluating samples from the Marathon Oil site, located in Gallup, New Mexico.

Precision, accuracy, method compliance, and completeness of this data package were assessed during this data review. Precision was determined by evaluating the calculated relative percent difference (RPD) values from:

- Field duplicate pairs
- Laboratory duplicate pairs
- Matrix spike (MS) and matrix spike duplicate (MSD) pairs
- Laboratory control sample (LCS) and laboratory control sample duplicate (LCSD) pairs

Laboratory accuracy was established by reviewing the demonstrated percent recoveries (%R) of the following items to verify that data are not biased.

- MS/MSD samples
- LCS/LCSD samples
- Organic system monitoring compounds (surrogates)





Field accuracy was established by collecting and analyzing the following samples to monitor for possible ambient or cross contamination during sampling and transportation.

- Field blanks
- Equipment blanks

Method compliance was established by reviewing sample integrity, holding times, detection limits, surrogate recoveries, laboratory blanks, initial and continuing calibrations (where applicable), and the LCS/LCSD percent recoveries against method-specific requirements.

Completeness was evaluated by determining the overall ratio of the number of samples and analyses planned versus the number of samples with valid analyses. Determination of completeness included a review of the chain-of-custody (CoC), laboratory analytical methods, and other laboratory and field documents associated with this analytical data set.

Client Sample ID	Laboratory Sample Number
EB-12-29-22	2212F05-001
OW-30	2212F05-002
OW-14	2212F05-003
STP-1 to EP-2	2212F05-004
MKTF-41	2212F05-005
MKTF-32	2212F05-006
FB-12-29-22	2212F05-007
Dup-12-29-22	2212F05-008

#### SAMPLE NUMBERS TABLE





The laboratory data were reviewed to evaluate compliance with the methods and the quality of the reported data. Assessment of CoC completeness is included in Item 3 of the Data Validation Checklist. A check mark ( $\checkmark$ ) indicates that the referenced validation criteria were deemed acceptable, whereas a crossed circle ( $\otimes$ ) indicates validation criteria for which the data have been qualified by the data validator. An empty circle (O) indicates that the specified criterion does not apply to the reviewed data. Details are noted in the tables below.

#### Validation Criteria

- ✓ Data Completeness
- ⊗ Laboratory Qualifiers (Item 2)
- ✓ CoC Documentation (Item 3)
- ✓ Holding Times and Preservation (Items 6 and 7)
- O Initial and Continuing Calibrations (Items 9 and 10)
- ⊗ Laboratory Blanks (Items 11 and 12)
- ✓ MS/MSD (Items 13 and 14)
- ⊗ LCS/LCSD (Items 15 and 16)
- ✓ System Monitoring Compounds (i.e., Surrogates) (Item 17)
- ⊗ Field and Equipment Blanks (Items 18 and 19)
- ⊗ Field Duplicates (Items 20 and 21)
- ✓ Laboratory Duplicates (Item 22)

### **Guidance References**

Chemical data validation was conducted in accordance with the United States Environmental Protection Agency (USEPA) Contract Laboratory Program (CLP) National Functional Guidelines for the analyses listed below, or by the appropriate method if not covered in the National Functional Guidelines.

- Data for organic analyses were evaluated according to validation criteria set forth in the USEPA CLP National Functional Guidelines for Organic Superfund Methods Data Review, document number EPA-540-R-20-005, November 2020 with additional reference to the USEPA CLP National Functional Guidelines for Organic Data Review, document number EPA 540/R-99/008, October 1999.
- Data for inorganic analyses were evaluated according to validation criteria set forth in the USEPA CLP National Functional Guidelines for Inorganic Superfund Methods Data Review, document number EPA-540-R-20-006, November 2020 with additional reference to the USEPA CLP National Functional Guidelines for Inorganic Data Review, document number EPA 540-R-04-004, October 2004.
- Review of field duplicates was conducted according to the USEPA Region I New England Environmental Data Review Supplement for Region 1 Data Review Elements and Superfund Specific Guidance/Procedures, EQADR-Supplement2, September 2020.
- Trihydro Data Validation Variance Documentation, April 2022.





### **OVERALL DATA PACKAGE ASSESSMENT**

Based on a data validation review, the data are acceptable as delivered. Data qualified by the laboratory are discussed in Item 2 of the Validation Criteria Checklist.

The purpose of validating data and assigning qualifiers is to assist in proper data interpretation. Data that are not qualified meet the site data quality objectives. If values are assigned qualifiers other than an R (rejected, data not usable), the data may be used for site evaluation; however, consideration should be given to the reasons for qualification when interpreting sample concentrations. Data points that are assigned an R qualifier should not be used for site evaluation purposes.

If applicable, text was identified in **bold font** in the Validation Criteria Checklist to indicate that further action and/or qualification of the data were required. Data may have been qualified with J data flags by the laboratory if the result was greater than or equal to the method detection limit (MDL) but less than the reporting limit (RL). These laboratory-applied J flags were preserved, if present, and included in the Data Qualification Summary table at the end of this report. If applicable, data validation qualifiers were added for the items noted with crossed circles in the Validation Criteria section above. Please see the Data Qualification Summary table at the end of this report.

If data would be qualified with more than one flag, one qualifier was assigned based on the severity; however, all reasons for qualification were retained. Data that would be qualified with both J+ and J- flags were evaluated based on validation criteria and assigned the appropriate flag. The hierarchy of qualifiers from the most to least severe is as follows:

R > JB/U > NJ > J+/J- > J/UJ

Data qualifiers used during this validation are included in the following table.

<u>Qualifier</u>	Definition
J	Estimated concentration
J+	The result is an estimated concentration, but may be biased high
J-	The result is an estimated concentration, but may be biased low
UJ	Estimated reporting limit
U	Evaluated to be undetected at the reporting limit
JB	Estimated concentration due to blank contamination

#### **Data Completeness**

The analyses were performed as requested on the CoC records. The associated samples were received by the laboratory and analyzed properly unless otherwise noted in the Criteria Checklist below. The complete data package consisted of 542 data points. The data completeness calculation does not include any submitted blank sample results. Data points were not rejected. The data completeness measure for this data package is calculated to be 100% and is acceptable.



VALIDATION CRITERIA CHECKLIST							
1. Was the report free of non-conformances identified by the laboratory? No							
Comments: The laboratory noted the following analytical non-conformances related to this data set.							
<u>Method 9223B</u> : The sample to be analyzed for E. Coli was received on Friday 12/30/2022 and the laboratory was not accepting E. Coli samples on this day due to the New Year holiday.							
<u>Method 8015D DRO</u> : The method blank had a low-level detection for TPH DRO. Samples with detections are flagged with a "B". The laboratory control spike for DRO / MRO had an elevated recovery.							
Method 8270C SIM: The 1,4-dioxane detection for sample MKTF-32 is "E" flagged because the result is above the calibration range.							
<ol> <li>Were the data free of data qualification flags and/or notes used by the laboratory?</li> <li>No</li> <li>If no, define.</li> </ol>							
Comments: The laboratory used the following data qualification flags with this data set.							
B – Analyte detected in the associated method blank.							
E – Estimated value. <b>TPH DRO results for multiple samples and the 1,4-dioxane for sample MKTF-32 were flagged</b> by the laboratory with the E flag. These results were detections and were assigned J qualifiers based on the laboratory flags.							
J – Analyte detected below quantitation limits.							
J5 – The sample matrix interfered with the ability to make any accurate determination; spike value is high.							
R – % RPD outside of range.							
S – % Recovery outside of range due to dilution or matrix interference.							
* – Value exceeds maximum contaminant level.							
3. Were sample CoC forms and custody procedures complete? Yes							
Comments: The CoC records from field to laboratory were complete, and custody was maintained as evidenced by field and laboratory personnel signatures, dates, and times of receipt. Custody seals were not present because the samples were transferred to a laboratory field courier service for transport from the field to the laboratory, and custody was maintained at all times.							
4. Were detection limits in accordance with the quality assurance project plan (QAPP), Yes permit, or method, or indicated as acceptable?							
Comments: The detection limits appeared to be acceptable. The following dilutions were applied.							
Method         Sample(s)         Analyte(s)         Dilution Factor							
200.7         OW-30, MKTF-41         Dissolved Metals         5							
200.7   OW-14   Total and Dissolved Barium   5							
200.8         MKTF-41         Dissolved Arsenic         5							
8260B OW-30, MKTF-32, Dup-12-29-22 MTBE 10							
8015D OW-14 TPH GRO 50							
8260B         OW-14         Select VOCs         50							
8260B OW-14 Benzene 500							

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VALIDATION CRITERIA CHECKLIST							
5. Were the reported analytical methods and constituents in compliance with the QAPP, permit, or CoC?	No						
Comments: The reported analytical methods were in compliance with the CoC, and the laboratory reported the requested constituents in accordance with the CoC, with the following exceptions.							
The CoC requested total and dissolved metals using only Method 200.7; however, the laboratory analy using both Method 200.7 and Method 200.8. This substituted analytical method, Method 200.8, met sir accuracy, and precision goals and, therefore, was an acceptable replacement.	zed the samples nilar sensitivity,						
The CoC requested cyanide using Method 335.4; however, the laboratory analyzed the samples using This substituted analytical method met similar sensitivity, accuracy, and precision goals and, therefore, replacement.	Method 4500 CN E. was an acceptable						
6. Were samples received in good condition within method-specified requirements?	No						
Comments: Samples were received on ice, in good condition, and with the cooler temperatures both w recommended temperature range of 4°C ± 2°C between 0.5°C and 2.2°C as noted on the CoC and Sar List. Samples transferred to Pace National were received in good condition with the cooler temperature recommended range at 5.0°C as noted on the CoC.	ithin and outside the mple Log-in Check within the						
The cooler temperatures below 2.0°C were judged as acceptable since the laboratory did not report the as broken or frozen.	e sample containers						
7. Were samples extracted/digested and analyzed within method-specified or technical holding times?	Yes						
Comments: The samples were extracted/digested and analyzed within method-specific holding times.							
8. Were reported units appropriate for the sample matrix/matrices and analytical method(s)? Specify if wet or dry units were used for soil.	Yes						
Comments: The results were reported in concentration units of micrograms per liter ( $\mu$ g/L) and milligram which were acceptable for the sample matrix and the analyses requested.	ms per liter (mg/L),						
9. Did the laboratory provide any specific initial and/or continuing calibration results?	No						
Comments: Initial and continuing calibration data were not included as part of this data set.							
10. If initial and/or continuing calibration results were provided, were the results within acceptable limits?	N/A						
Comments: Initial and continuing calibration data were not included as part of this data set.							
11. Was the total number of laboratory blank samples prepared equal to at least 5% of the total number of samples or analyzed as required by the method?	Yes						
Comments: The total number of laboratory blank samples prepared was equal to at least 5% of the tota samples.	al number of						
12. Were target analytes reported as not detected in the laboratory blanks?	No						
Comments: Target analytes were reported as not detected in the laboratory blanks, with the following e	exception.						
TPH DRO was detected in the laboratory blank for Method 8015D batch 72395 at a concentration DRO was detected in associated sample EB-12-29-22 at a concentration less than the laboratory the result was qualified with a U flag. TPH DRO results for the associated samples that were greater the result qualified with a U flag.	of 0.10 mg/L. TPH reporting limit and eater than the blank						

detection and the laboratory reporting limit but less than 10 times the blank concentration were qualified with a JB flag. Detections of this analyte in the associated samples greater than ten times the blank concentration did not require qualification.



13. Was the total number of MS samples prepared equal to at least 5% of the total number of samples or analyzed as required by the method?

Yes

Comments: The total number of matrix spike samples prepared was equal to at least 5% of the total number of samples, although MS samples were not prepared/reported for all analyses and/or batches. The matrix spike sample source for each analytical batch in this sample set has been indicated below.

<u>Method</u>	<u>Analytes</u>	<u>Batch</u>	MS Sample Source
200.7	Total Metals	72410	Not Prepared
200.7	Dissolved Metals	A93838	Not Prepared
200.7	Dissolved Zinc	A94009	Not Prepared
200.7	Dissolved Metals	C93766	Not Prepared
200.8	Total Metals	72410	Not Prepared
200.8	Dissolved Arsenic	A93877	Not Prepared
200.8	Dissolved Metals	B93855	Not Prepared
245.1	Total and Dissolved Mercury	72676	Not Prepared
410.4	COD	WG1983632	Not Associated
504.1	EDB	72430	STP-1 to EP-2
4500CN E	Cyanide	WG1982605	Not Associated
5210B	BOD	72380	Not Prepared
8015D	TPH DRO and MRO	72395	Not Prepared
8015D	TPH GRO	R93719	OW-30
8260B	VOCs	R93747	OW-30
8260B	VOCs	R93792	Not Prepared
8270C	SVOCs	72406	Not Prepared
8270C SIM	SVOCs	72406	Not Prepared
8270C	SVOCs	72443	Not Prepared
8270C SIM	SVOCs	72443	Not Prepared
8270C SIM	SVOCs	R93750	Not Prepared

Not Associated – The MS sample source was not associated with this project. Not Prepared – Matrix spikes were not prepared/reported for this batch.

14. For MS/MSDs prepared from project samples, were percent recoveries and RPDs Yes within data validation or laboratory quality control (QC) limits?

Comments: The percent recoveries and RPDs for MS/MSDs prepared from project samples were within data validation and laboratory QC limits.

The percent recoveries and RPD values for MS/MSDs prepared from non-project samples were evaluated and considered, but data were not qualified based on those results since matrix similarity to project samples could not be guaranteed.

15. Was the total number of LCSs analyzed equal to at least 5% of the total number of Yes samples or analyzed as required by the method?

Comments: The total number of LCS samples analyzed was equal to at least 5% of the total number of samples.



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16. Were LCS/LCSD percent recoveries and LCS/LCSD RPDs within data validation or laboratory QC limits?

Comments: The LCS and LCSD percent recoveries and LCS/LCSD RPDs were within data validation and laboratory QC limits, with the following exceptions.

<u>Method</u>	Analyte	<u>Batch</u>	<u>LCS</u> <u>Recovery</u>	<u>LCSD</u> <u>Recovery</u>	LCS/LCSD QC Limits	LCS/LCSD RPD	<u>RPD</u> <u>QC</u> Limits
200.7	Total Barium	72410	145%		70-130%		
8015D	TPH DRO	72395	138%	Acceptable	31.2-125%	25.2%	20%
8270C SIM	Naphthalene	72443	Acceptable	Acceptable	15-78.3%	63.0%	31.7%
8270C SIM	1-Methylnaphthalene	72443	Acceptable	Acceptable	15-79.6%	70.6%	31.4%
8270C SIM	2-Methylnaphthalene	72443	Acceptable	Acceptable	15-78.6%	76.9%	30.5%
8270C SIM	Acenaphthene	72443	Acceptable	Acceptable	15-92%	70.3%	30.5%
8270C SIM	Fluorene	72443	Acceptable	Acceptable	15-96%	50.5%	25.1%
8270C SIM	Phenanthrene	72443	Acceptable	Acceptable	21-103%	28.1%	26.4%
8270C SIM	Anthracene	72443	Acceptable	Acceptable	21.1-106%	19.5%	14.4%
5210B	BOD	72380	69.2%		84.6-115.4%		

Total barium and TPH DRO were detected in associated samples, and the results were qualified as J+ based on the evidence of potential high bias. Non-detections of total barium in the associated samples did not require qualification based on the evidence of potential high bias.

The analytes with LCS/LCSD RPD values that exceeded the QC limit were assigned J qualifiers for detections and UJ for non-detections for the associated samples due to evidence of poor precision.

The target analyte BOD was detected in associated sample STP-1 to EP-2, and the result was qualified as J- based on the evidence of potential low bias.

17. Were surrogate recoveries within laboratory QC limits?

No

No

Comments: Surrogate recoveries were within laboratory QC limits, with the following exceptions.

Method	Surrogate	<u>Sample</u>	<u>Surrogate</u> Recovery	QC Limits
8270C	2-Fluorophenol	MKTF-32	103%	15-84.5%
8270C	Phenol-d₅	MKTF-32	71.9%	15-67%
8270C	2,4,6-Tribromophenol	MKTF-32	151%	15-108%
8270C	Nitrobenzene-d₅	MKTF-32	116%	16.8-112%
8270C	2-Fluorobiphenyl	MKTF-32	106%	15-101%
8270C	4-Terphenyl-d <sub>14</sub>	MKTF-32	142%	34.4-134%
8270C	2,4,6-Tribromophenol	OW-14	10.7%	15-108%
8270C SIM	Nitrobenzene-d₅	MKTF-32	113%	15-108%

Since Method 8270C and 8270C SIM surrogate associations were not available from the laboratory, qualification was assigned to all of the target analytes in a given fraction (acid or base/neutral) when two or more surrogates from the same fraction (acid or base/neutral) were outside the acceptance range. This condition did not exist for the Method 8270C analysis of sample OW-14 and the Method 8270C SIM analysis of sample MKTF-32, and qualification of sample data was not required.

The associated analytes were not detected in sample MKTF-32. Qualification of data was not required due to evidence of potential high bias.



Qualification of sample data was not required based on surrogate non-conformances in QC samples as the environmental samples were evaluated based on their specific surrogate recoveries.

18. Were the number of trip blank, field blank, and/or equipment blank samples collected equal to at least 10% of the total number of samples or as required by the project guidelines, QAPP, SAP, or permit?

Comments: The number of trip, field, and equipment blanks collected was equal to at least 10% of the number of samples. One field blank sample, FB-12-29-22, and one equipment blank sample, EB-12-29-22, were collected as part of this sample set.

19. Were target analytes reported as not detected in the trip blank, field blank, and/or equipment blank samples?

No

Yes

Comments: Target analytes were not detected in the trip blank, field blank, and equipment blank samples with the following exceptions.

Blank Sample ID	<u>Method</u>	Analyte	<u>Concentration</u>
EB-9-9-22	200.7	Total Zinc	0.0065 mg/L
EB-9-9-22	200.8	Total Selenium	0.00090 mg/L
EB-9-9-22	8015D	TPH DRO	0.024 mg/L

Detections of total zinc in the associated samples that were less than the blank results and/or less than the applicable reporting limits were assigned U qualifiers. Detections of total zinc and total selenium in the associated samples that were greater than the reporting limits but less than 10 times the blank results were assigned JB qualifiers. Non-detections of the identified analytes in the associated samples did not require qualification.

The TPH DRO results for the samples in batch 72395 were previously qualified due to a laboratory blank detection; therefore, additional qualification due to the equipment blank detection was not required.

20. Was the number of field duplicates collected equal to at least 10% of the total number of samples or as required by the project guidelines, QAPP, SAP, or permit?

Yes

No

Comments: The number of field duplicates collected was equal to at least 10% of the number of samples.

Sample Dup-12-29-22 was collected as a field duplicate of sample OW-30.

21. Were field duplicate RPD values within data validation QC limits (soil 0-50%, water 0-30%, or air 0-25%)?

Comments: As indicated in the Field Duplicate Summary Table at the end of this report, field duplicate RPD values were within data validation QC limits of 0-30% for water samples, with the following exceptions.

The RPD value for dissolved barium greatly exceeded the data validation limit of 30% at 166.2%. The reported results for dissolved barium were assigned J qualifiers for the parent and field duplicate samples, and J/UJ qualifiers for the associated samples due to evidence of extremely poor precision (RPD > 100%).

The RPD value for total cyanide exceeded the data validation limit of 30% at 72.3%. The total cyanide results for samples OW-30 and Dup-12-29-22 were assigned J qualifiers due to evidence of poor precision.



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22. For labora	tory duplicates prepa	VALIDATION	CRITERIA CHE	<b>CKLIST</b> s within data		N/A
validation	or laboratory QC limi	ts?	·····			
Comments: La	boratory duplicates	were prepared as su	mmarized in the f	following tabl	e.	
	Method <u>Analytes</u>		<u>Batch</u>	<u>Laboi</u> Sa	<u>ratory Duplicate</u> mple Source	
	410.4	COD	WG1983632	983632 Not Associated		
	4500CN E Cyanide WG1982605 Not Associated				t Associated	
Not Associated –	The laboratory duplica	te sample source was i	not associated with	this project.		
The RPD value but data were r	es for the laboratory on the second term of term o	duplicate samples pro	epared from non- matrix similarity	project samp to project sar	bles were evaluated a mples could not be g	and considered uaranteed.
23. Were the f	ollowing data relation	nships realistic?				
Targe	t analytes were repo	rted by more than on	e method (e.g., 8	3260/8270,		Yes
EPH/8	3270)?					
Comments: Ta	arget analvtes were r	not reported by more	than one method	1.		
	<u></u>					
Both t	otal and dissolved m	etals analyses were	performed. and t	he total meta	lls	No
results	s were greater than o	or equal to the dissolv	ved metals result	s?		
Comments: Th results.	e following table cor	itains the exceptions	in which the diss	solved metals	s results exceeded th	e total metals
	Sample ID	Analyt	<u>e</u> <u>Tc</u>	otal Result	Dissolved Result	
		) Antimo			(mg/L)	_
	OW-30				0.0013	
	OW-14	Arsen		0.00000	0.0039	_
	STP-1 to FP-2	Arsen	ic	0.0020	0.0033	_
	Dup-12-29-22	Arsen		0.0010	0.00094	-
	OW-30	Bariur	n	0.12	0.13	
	OW-14	Bariur	n	2.0	2.2	_
	MKTF-41	Bariur	n	0.079	0.082	-
	OW-30	Bervlli	ım	ND	0.0029	-
	OW-14	Nicke	.l	0.084	0.086	1
	OW-30	Seleniu	ım	0.0015	0.0065	1
	OW-14	Seleniu	ım	ND	0.0080	1
	MKTF-41	Seleniu	ım	0.027	0.035	1
	MKTF-32	Seleniu	ım	0.0020	0.0044	1
	Dup-12-29-22	2 Seleniu	ım	ND	0.0057	1
	STP-1 to EP-2	2 Silve	r	ND	0.0036	1
	OW-14	Vanadi	um	ND	0.0019	
	STP-1 to EP-2	2 Vanadi	um	ND	0.0024	
	MKTF-41	Vanadi	um	0.015	0.016	7
The FPA has n	ot provided guidance	e or requirements for	the evaluation w	alidation and	d qualification of dise	- solved metals
results that exc	eed the correspondi	ng total metals result	s. Therefore, qu	alification of	results was not perfo	ormed based or
these data.	,	-	, 1-			



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Client Sample ID: OW-30 Field Duplicate Sample ID: Dup-12-29-22								
Analyte	Method	Laboratory Result	Duplicate Result	Relative Percent Difference (RPD)				
MTBE	SW8260B	910 μg/L	1,000 µg/L	9.4%				
Anthracene	SW8270C	0.26 µg/L	ND (0.30 µg/L)	DL				
TPH GRO	SW8015	0.94 mg/L	0.99 mg/L	5.2%				
TPH DRO	SW8015	2.0 mg/L	2.4 mg/L	18.2%				
TPH ORO	SW8015	0.11 mg/L	0.13 mg/L	16.7% +/-RL				
Cyanide, Total	E335.4	0.00727 mg/L	0.0155 mg/L	72.3%				
Barium, Dissolved	E 200.7	0.13 mg/L	0.012 mg/L	<b>166.2%</b>				
Barium, Total	E 200.7	0.12 mg/L	0.13 mg/L	8.0%				
Beryllium, Dissolved	E 200.7	0.0029 mg/L	ND (0.0020 mg/L)	DL				
Nickel, Dissolved	E 200.7	0.089 mg/L	0.0070 mg/L	170.8% +/-RL				
Nickel, Total	E 200.7	0.098 mg/L	0.10 mg/L	2.0%				
Zinc, Total	E 200.7	ND (0.010 mg/L)	0.0074 mg/L	DL				
Arsenic, Dissolved	E200.8	0.0011 mg/L	0.00094 mg/L	15.7% +/-RL				
Arsenic, Total	E200.8	0.00085 mg/L	0.00063 mg/L	29.7% +/-RL				
Lead, Dissolved	E200.8	0.00025 mg/L	0.00031 mg/L	21.4% +/-RL				
Lead, Total	E200.8	0.00067 mg/L	0.00078 mg/L	15.2% +/-RL				
Selenium, Dissolved	E200.8	0.0065 mg/L	0.0057 mg/L	13.1%				
Selenium, Total	E200.8	0.0015 mg/L	ND (0.0010 mg/L)	DL				

#### FIELD DUPLICATE SUMMARY

Field duplicate RPD control limits are not to exceed 30% for water as established by USEPA Region I - New England Environmental Data Review Supplement for Region 1 Data Review Elements and Superfund Specific Guidance/Procedures, EQADR-Supplement2, September 2020.

DL – Indicates that the analyte was detected in one of the duplicate samples and was undetected in the other sample, and therefore an RPD could not be calculated. Data were not qualified since the detection was within two times the reporting limit. Non-detected results are indicated above with the applicable reporting limit as ND (RL).

+/-RL – Indicates that the detections in both of the samples were within two times the reporting limit. Qualification of data was not required.

The RPD value for dissolved barium greatly exceeded the data validation limit of 30% at 166.2%. The reported results for dissolved barium were assigned J qualifiers for the parent and field duplicate samples, and J/UJ qualifiers for the results for dissolved barium in the associated samples due to evidence of extremely poor precision (RPD > 100%).

The RPD value for total cyanide exceeded the data validation limit of 30% at 72.3%. The total cyanide results for samples OW-30 and Dup-12-29-22 were assigned J qualifiers due to evidence of poor precision.



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## DATA QUALIFICATION SUMMARY

Abbreviation	Reason
EBD	Equipment blank detection
EBL	Flagged as estimated by the laboratory.
ERPD-FD	High field duplicate RPD.
ERPD-LCS	The LCS/LCSD RPD exceeded the upper acceptable limit indicating poor precision.
HR-LCS	The LCS and/or LCSD percent recovery was greater than the upper acceptable limit indicating a possible high bias.
LR-LCS	The LCS and/or LCSD percent recovery was less than the lower acceptable limit indicating a possible low bias.
MBD	Method blank detection
MDLRL	Flagged by the laboratory: The result was greater than the MDL but less than the RL.

Analyte	Method	Field Sample ID	Lab Sample ID	Result	Limit	Units	Reviewer Qualifier	DV Flag Reasons
1,4-Dioxane	SW8270C	MKTF-32	2212f05-006c	34	1.0	µg/L	J	EBL
1-Methylnaphthalene	SW8270C	MKTF-41	2212f05-005c	ND	0.30	µg/L	UJ	ERPD-LCS
1-Methylnaphthalene	SW8270C	MKTF-32	2212f05-006c	ND	0.30	µg/L	UJ	ERPD-LCS
1-Methylnaphthalene	SW8270C	Dup-12-29-22	2212f05-008c	ND	0.30	µg/L	UJ	ERPD-LCS
2-Methylnaphthalene	SW8270C	MKTF-41	2212f05-005c	ND	0.30	µg/L	UJ	ERPD-LCS
2-Methylnaphthalene	SW8270C	MKTF-32	2212f05-006c	ND	0.30	µg/L	UJ	ERPD-LCS
2-Methylnaphthalene	SW8270C	Dup-12-29-22	2212f05-008c	ND	0.30	µg/L	UJ	ERPD-LCS
Acenaphthene	SW8270C	MKTF-41	2212f05-005c	ND	0.30	µg/L	UJ	ERPD-LCS
Acenaphthene	SW8270C	MKTF-32	2212f05-006c	ND	0.30	µg/L	UJ	ERPD-LCS
Acenaphthene	SW8270C	Dup-12-29-22	2212f05-008c	ND	0.30	µg/L	UJ	ERPD-LCS
Anthracene	SW8270C	OW-30	2212F05-002C	0.26	0.30	µg/L	J	MDLRL
Anthracene	SW8270C	MKTF-41	2212f05-005c	ND	0.30	µg/L	UJ	ERPD-LCS
Anthracene	SW8270C	MKTF-32	2212f05-006c	ND	0.30	µg/L	UJ	ERPD-LCS
Anthracene	SW8270C	Dup-12-29-22	2212f05-008c	ND	0.30	µg/L	UJ	ERPD-LCS



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Analyte	Method	Field Sample ID	Lab Sample ID	Result	Limit	Units	Reviewer Qualifier	DV Flag Reasons
Arsenic, Dissolved	E200.8	Dup-12-29-22	2212F05-008E	0.00094	0.0010	mg/L	J	MDLRL
Arsenic, Total	E200.8	OW-30	2212F05-002D	0.00085	0.0010	mg/L	J	MDLRL
Arsenic, Total	E200.8	Dup-12-29-22	2212F05-008D	0.00063	0.0010	mg/L	J	MDLRL
Barium, Dissolved	E 200.7	OW-30	2212F05-002E	0.13	0.010	mg/L	J	ERPD-FD
Barium, Dissolved	E 200.7	OW-14	2212F05-003E	2.2	0.010	mg/L	J	ERPD-FD
Barium, Dissolved	E 200.7	STP-1 to EP-2	2212F05-004E	0.017	0.0020	mg/L	J	ERPD-FD
Barium, Dissolved	E 200.7	MKTF-41	2212F05-005E	0.082	0.010	mg/L	J	ERPD-FD
Barium, Dissolved	E 200.7	MKTF-32	2212F05-006E	0.0039	0.0020	mg/L	J	ERPD-FD
Barium, Dissolved	E 200.7	Dup-12-29-22	2212F05-008E	0.012	0.0020	mg/L	J	ERPD-FD
Barium, Dissolved	E 200.7	EB-12-29-22	2212F05-001E	ND	0.0020	mg/L	UJ	ERPD-FD
Barium, Total	E 200.7	OW-30	2212F05-002D	0.12	0.0030	mg/L	J+	HR-LCS
Barium, Total	E 200.7	OW-14	2212F05-003D	2.0	0.015	mg/L	J+	HR-LCS
Barium, Total	E 200.7	STP-1 to EP-2	2212F05-004D	0.02	0.0030	mg/L	J+	HR-LCS
Barium, Total	E 200.7	MKTF-41	2212F05-005D	0.079	0.0030	mg/L	J+	HR-LCS
Barium, Total	E 200.7	MKTF-32	2212F05-006D	0.11	0.0030	mg/L	J+	HR-LCS
Barium, Total	E 200.7	Dup-12-29-22	2212F05-008D	0.13	0.0030	mg/L	J+	HR-LCS
Beryllium, Dissolved	E 200.7	OW-30	2212F05-002E	0.0029	0.010	mg/L	J	MDLRL
Biochemical Oxygen Demand	SM 5210	STP-1 to EP-2	2212F05-004G	400	2.0	mg/L	J-	LR-LCS
Cyanide, Total	E335.4	OW-30	2212F05-002F	0.00727	0.00500	mg/L	J	ERPD-FD
Cyanide, Total	E335.4	Dup-12-29-22	2212F05-008F	0.0155	0.00500	mg/L	J	ERPD-FD
Fluorene	SW8270C	MKTF-41	2212f05-005c	ND	0.30	µg/L	UJ	ERPD-LCS
Fluorene	SW8270C	MKTF-32	2212f05-006c	ND	0.30	µg/L	UJ	ERPD-LCS
Fluorene	SW8270C	Dup-12-29-22	2212f05-008c	ND	0.30	µg/L	UJ	ERPD-LCS
Lead, Dissolved	E200.8	OW-30	2212F05-002E	0.00025	0.00050	mg/L	J	MDLRL
Lead, Dissolved	E200.8	Dup-12-29-22	2212F05-008E	0.00031	0.00050	mg/L	J	MDLRL
Naphthalene	SW8270C	MKTF-41	2212f05-005c	ND	0.30	µg/L	UJ	ERPD-LCS
Naphthalene	SW8270C	MKTF-32	2212f05-006c	ND	0.30	µg/L	UJ	ERPD-LCS



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Analyte	Method	Field Sample ID	Lab Sample ID	Result	Limit	Units	Reviewer Qualifier	DV Flag Reasons
Naphthalene	SW8270C	Dup-12-29-22	2212f05-008c	ND	0.30	µg/L	UJ	ERPD-LCS
Nickel, Dissolved	E 200.7	Dup-12-29-22	2212F05-008E	0.0070	0.010	mg/L	J	MDLRL
Phenanthrene	SW8270C	MKTF-41	2212f05-005c	ND	0.30	µg/L	UJ	ERPD-LCS
Phenanthrene	SW8270C	MKTF-32	2212f05-006c	ND	0.30	µg/L	UJ	ERPD-LCS
Phenanthrene	SW8270C	Dup-12-29-22	2212f05-008c	ND	0.30	µg/L	UJ	ERPD-LCS
Selenium, Total	E200.8	OW-30	2212F05-002D	0.0015	0.0010	mg/L	JB	EBD
Selenium, Total	E200.8	STP-1 to EP-2	2212F05-004D	0.0024	0.0010	mg/L	JB	EBD
Selenium, Total	E200.8	MKTF-32	2212F05-006D	0.0020	0.0010	mg/L	JB	EBD
Selenium, Total	E200.8	EB-12-29-22	2212F05-001D	0.00090	0.0010	mg/L	J	MDLRL
Silver, Dissolved	E 200.7	STP-1 to EP-2	2212F05-004E	0.0036	0.005	mg/L	J	MDLRL
TPH DRO	SW8015	EB-12-29-22	2212F05-001C	0.024	0.064	mg/L	U	ERPD-LCS, HR-LCS, MBD, MDLRL
TPH DRO	SW8015	OW-30	2212F05-002C	2.0	0.064	mg/L	J+	EBL, ERPD-LCS, HR-LCS
TPH DRO	SW8015	OW-14	2212F05-003C	3.4	0.064	mg/L	J+	EBL, ERPD-LCS, HR-LCS
TPH DRO	SW8015	Dup-12-29-22	2212F05-008C	2.4	0.064	mg/L	J+	EBL, ERPD-LCS, HR-LCS
TPH DRO	SW8015	STP-1 to EP-2	2212F05-004C	0.65	0.064	mg/L	JB	EBL, ERPD-LCS, HR-LCS, MBD
TPH DRO	SW8015	MKTF-41	2212F05-005C	1.0	0.064	mg/L	JB	EBL, ERPD-LCS, HR-LCS, MBD
TPH DRO	SW8015	MKTF-32	2212F05-006C	0.19	0.064	mg/L	JB	EBL, ERPD-LCS, HR-LCS, MBD
Vanadium, Dissolved	E 200.7	OW-14	2212F05-003E	0.0019	0.050	mg/L	J	MDLRL
Vanadium, Dissolved	E 200.7	STP-1 to EP-2	2212F05-004E	0.0024	0.050	mg/L	J	MDLRL
Vanadium, Dissolved	E 200.7	MKTF-41	2212F05-005E	0.016	0.25	mg/L	J	MDLRL
Vanadium, Total	E 200.7	MKTF-41	2212F05-005D	0.015	0.050	mg/L	J	MDLRL
Vanadium, Total	E 200.7	MKTF-32	2212F05-006D	0.015	0.050	mg/L	J	MDLRL
Zinc, Total	E 200.7	STP-1 to EP-2	2212F05-004D	0.028	0.010	mg/L	JB	EBD
Zinc, Total	E 200.7	MKTF-32	2212F05-006D	0.012	0.010	mg/L	JB	EBD
Zinc, Total	E 200.7	OW-14	2212F05-003D	0.0066	0.010	mg/L	U	EBD, MDLRL
Zinc, Total	E 200.7	MKTF-41	2212F05-005D	0.0049	0.010	mg/L	U	EBD, MDLRL



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Analyte	Method	Field Sample ID	Lab Sample ID	Result	Limit	Units	Reviewer Qualifier	DV Flag Reasons
Zinc, Total	E 200.7	Dup-12-29-22	2212F05-008D	0.0074	0.010	mg/L	U	EBD, MDLRL
Zinc, Total	E 200.7	EB-12-29-22	2212F05-001D	0.0065	0.010	mg/L	J	MDLRL



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Client: Marathon Oil	Laboratory: Hall Environmental Analysis Laboratory				
Project Name: Western Refining Southwest, Quarterly GW	Sample Matrix: Groundwater				
Project Number: 697-080-002 Task: 0006	Sample Start Date: 12/06/2022				
Date Validated: 02/14/2023	Sample End Date: 12/06/2022				
Parameters Included:					
<ul> <li>Volatile Organic Compounds (VOC) by Environmental Protection Agency (EPA) Test Methods for Evaluating Solid Waste (SW-846) Method 8260B</li> </ul>					
<ul> <li>1,2-Dibromoethane (EDB) by EPA Method 504.1</li> </ul>					
<ul> <li>Semivolatile Organic Compounds (SVOC) by SW-846 Me Monitoring (SIM)</li> </ul>	thod 8270C and Method 8270C with Selected Ion				
Total Petroleum Hydrocarbons (TPH) Gasoline Range Organics (GRO) by SW-846 Method 8015D					
• TPH Diesel Range Organics (DRO) and Motor Oil Range	Organics (MRO) by SW-846 Method 8015D Modified				
<ul> <li>Total and Dissolved Metals by EPA Method 200.7 and Me</li> </ul>	ethod 200.8				
<ul> <li>Total and Dissolved Mercury by EPA Method 245.1</li> </ul>					
Cyanide by Standard Methods for the Examination of Water and Wastewater (SM) Method 4500 CN E					
Laboratory Project ID: 2212303					
Data Validator: Daran O'Hollearn, Lead Project Scientist					
Reviewer: Charles Ballek, Senior Chemist					

## DATA EVALUATION CRITERIA SUMMARY

A Tier II Data Validation was performed by Trihydro Corporation's Chemical Data Evaluation Services Group on the analytical data report packages generated by Hall Environmental Analysis Laboratory of Albuquerque, New Mexico, with additional data from Pace Analytical National of Mount Juliet, Tennessee, evaluating samples from the Marathon Oil site, located in Gallup, New Mexico.

Precision, accuracy, method compliance, and completeness of this data package were assessed during this data review. Precision was determined by evaluating the calculated relative percent difference (RPD) values from:

- Field duplicate pairs
- Laboratory duplicate pairs
- Matrix spike (MS) and matrix spike duplicate (MSD) pairs
- Laboratory control sample (LCS) and laboratory control sample duplicate (LCSD) pairs

Laboratory accuracy was established by reviewing the demonstrated percent recoveries (%R) of the following items to verify that data are not biased.

- MS/MSD samples
- LCS/LCSD samples
- Organic system monitoring compounds (surrogates)



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Field accuracy was established by collecting and analyzing the following samples to monitor for possible ambient or cross contamination during sampling and transportation.

- Trip blanks
- Field blanks
- Equipment blanks

Method compliance was established by reviewing sample integrity, holding times, detection limits, surrogate recoveries, laboratory blanks, initial and continuing calibrations (where applicable), and the LCS/LCSD percent recoveries against method-specific requirements.

Completeness was evaluated by determining the overall ratio of the number of samples and analyses planned versus the number of samples with valid analyses. Determination of completeness included a review of the chain-of-custody (CoC), laboratory analytical methods, and other laboratory and field documents associated with this analytical data set.

Client Sample ID	Laboratory Sample Number
EB-12-6-22	2212303-001
MKTF-46	2212303-002
MKTF-18R	2212303-003
MKTF-16	2212303-004
PW-3	2212303-005
East LDU	2212303-006
West LDU	2212303-007
FB-12-6-22	2212303-008
DUP-12-6-22	2212303-009
MKTF-38	2212303-010
Trip Blank	2212303-011

### SAMPLE NUMBERS TABLE





The laboratory data were reviewed to evaluate compliance with the methods and the quality of the reported data. Assessment of CoC completeness is included in Item 3 of the Data Validation Checklist. A check mark ( $\checkmark$ ) indicates that the referenced validation criteria were deemed acceptable, whereas a crossed circle ( $\otimes$ ) indicates validation criteria for which the data have been qualified by the data validator. An empty circle (O) indicates that the specified criterion does not apply to the reviewed data. Details are noted in the tables below.

### Validation Criteria

- ✓ Data Completeness
- ✓ CoC Documentation (Item 3)
- ✓ Holding Times and Preservation (Items 6 and 7)
- O Initial and Continuing Calibrations (Items 9 and 10)
- ⊗ Laboratory Blanks (Items 11 and 12)
- ✓ MS/MSD (Items 13 and 14)
- ⊗ LCS/LCSD (Items 15 and 16)
- ⊗ System Monitoring Compounds (i.e., Surrogates) (Item 17)
- 8 Field, Equipment, and Trip Blanks (Items 18 and 19)
- ✓ Field Duplicates (Items 20 and 21)
- ✓ Laboratory Duplicates (Item 22)

#### **Guidance References**

Chemical data validation was conducted in accordance with the United States Environmental Protection Agency (USEPA) Contract Laboratory Program (CLP) National Functional Guidelines for the analyses listed below, or by the appropriate method if not covered in the National Functional Guidelines.

- Data for organic analyses were evaluated according to validation criteria set forth in the USEPA CLP National Functional Guidelines for Organic Superfund Methods Data Review, document number EPA-540-R-20-005, November 2020 with additional reference to the USEPA CLP National Functional Guidelines for Organic Data Review, document number EPA 540/R-99/008, October 1999.
- Data for inorganic analyses were evaluated according to validation criteria set forth in the USEPA CLP National Functional Guidelines for Inorganic Superfund Methods Data Review, document number EPA-540-R-20-006, November 2020 with additional reference to the USEPA CLP National Functional Guidelines for Inorganic Data Review, document number EPA 540-R-04-004, October 2004.
- Review of field duplicates was conducted according to the USEPA Region I New England Environmental Data Review Supplement for Region 1 Data Review Elements and Superfund Specific Guidance/Procedures, EQADR-Supplement2, September 2020.
- Trihydro Data Validation Variance Documentation, April 2022.





### OVERALL DATA PACKAGE ASSESSMENT

Based on a data validation review, the data are acceptable as delivered. Data qualified by the laboratory are discussed in Item 2 of the Validation Criteria Checklist.

The purpose of validating data and assigning qualifiers is to assist in proper data interpretation. Data that are not qualified meet the site data quality objectives. If values are assigned qualifiers other than an R (rejected, data not usable), the data may be used for site evaluation; however, consideration should be given to the reasons for qualification when interpreting sample concentrations. Data points that are assigned an R qualifier should not be used for site evaluation purposes.

If applicable, text was identified in **bold font** in the Validation Criteria Checklist to indicate that further action and/or qualification of the data were required. Data may have been qualified with J data flags by the laboratory if the result was greater than or equal to the method detection limit (MDL) but less than the reporting limit (RL). These laboratory-applied J flags were preserved, if present, and included in the Data Qualification Summary table at the end of this report. If applicable, data validation qualifiers were added for the items noted with crossed circles in the Validation Criteria section above. Please see the Data Qualification Summary table at the end of this report.

If data would be qualified with more than one flag, one qualifier was assigned based on the severity; however, all reasons for qualification were retained. Data that would be qualified with both J+ and J- flags were evaluated based on validation criteria and assigned the appropriate flag. The hierarchy of qualifiers from the most to least severe is as follows:

R > JB/U > NJ > J+/J- > J/UJ

Data qualifiers used during this validation are included in the following table.

<u>Qualifier</u>	Definition
J	Estimated concentration
J+	The result is an estimated concentration, but may be biased high
UJ	Estimated reporting limit
U	Evaluated to be undetected at the reporting limit
JB	Estimated concentration due to blank contamination

### **Data Completeness**

The analyses were performed as requested on the CoC records. The associated samples were received by the laboratory and analyzed properly unless otherwise noted in the Criteria Checklist below. The complete data package consisted of 661 data points. The data completeness calculation does not include any submitted blank sample results. Data points were not rejected. The data completeness measure for this data package is calculated to be 100% and is acceptable.



	VALIDATIO	N CRITERIA CHECKLIST				
1. Was the report free of non-conformances identified by the laboratory? No						
Comments: The	laboratory noted the following analytic	al non-conformances related to this data set.				
Method 8270C ar EPA Method 827	<u>id Method 8270C SIM</u> : 1-Methylnaph ) instead of EPA Method 8270 SIM be	thalene, 2-methylnaphthalene, and naphthalene ecause of their elevated concentrations for samp	were reported by ble MKTF-18R			
Method 8015D D	<u>RO</u> : The method blank had a low-leve	el detection for DRO. Samples with detections a	re flagged with a "B			
2. Were the dat If no, define.	a free of data qualification flags and/o	r notes used by the laboratory?	No			
Comments: The	laboratory used the following data qua	lification flags with this data set.				
B – Analyte detec	ted in the associated method blank.					
J – Analyte detec	ted below quantitation limits.					
J4 – The associa	ed batch QC was outside the establis	hed quality control range for accuracy.				
R – %RPD outsic	e of range.					
S – % Recovery	outside of range due to dilution or mati	rix interference.				
* – Value exceed	s maximum contaminant level.					
3. Were sample	CoC forms and custody procedures of	complete?	No			
Comments: The laboratory persor were not present courier for deliver	CoC record from field to laboratory wa nel signatures, dates, times of receipt nor required on the coolers because t y to the laboratory, and custody was r	as not complete, but custody was maintained as , and the CoC confirmation letter (Attachment A he samples were transferred to a Hall Environm naintained at all times.	evidenced by ). Custody seals ental Field Service			
4. Were detecti permit, or me	on limits in accordance with the quality thod, or indicated as acceptable?	y assurance project plan (QAPP),	Yes			
Comments: The	detection limits appeared to be accept	table. The following dilutions were applied.				
Metho	<u>d</u> <u>Sample(s)</u>	<u>Analyte(s)</u>	Dilution Factor			
200.7	MKTF-18R, East LDU, Wes	t LDU Select Total and Dissolved Metals	5			
200.8	DUP-12-6-22, MKTF-3	8 Select Dissolved Metals	5			
8260	3 MKTF-16	VOCs	5			
8260	3 MKTF-18R	Select VOCs	10			
	D MKTF-18R	TPH GRO	10			
8015						

Were the reported analytical methods and constituents in compliance with th QAPP, permit, or CoC?

Comments: The reported analytical methods were in compliance with the CoC, and the laboratory reported the requested constituents in accordance with the CoC, with the following exceptions.

The CoC requested total and dissolved metals using only Method 200.7; however, the laboratory analyzed the samples using both Method 200.7 and Method 200.8. This substituted analytical method, Method 200.8, met similar sensitivity, accuracy, and precision goals and, therefore, was an acceptable replacement.

The CoC requested cyanide using Method 335.4; however, the laboratory analyzed the samples using Method 4500 CN E. This substituted analytical method met similar sensitivity, accuracy, and precision goals and, therefore, was an acceptable replacement.

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VALIDATION CRITERIA CHECKLIST					
6. Were samples recei	6. Were samples received in good condition within method-specified requirements? No				
Comments: Samples were received on ice, in good condition, and with the cooler temperatures outside the recommended temperature range of 4°C ± 2°C between 0.2°C and 1.3°C as noted on the Sample Log-in Check List. Samples transferred to Pace National were received in good condition with the cooler temperature within the recommended range at 0.4°C as noted on the CoC. The cooler temperatures below 2.0°C were judged as acceptable since the laboratory did not report the sample containers					
as broken and/or frozen.					
<ol> <li>Were samples extra technical holding tin</li> </ol>	7. Were samples extracted/digested and analyzed within method-specified or technical holding times?				
Comments: The sample	es were ext	racted/digested and analyzed wi	thin method-s	pecific holding times	3.
8. Were reported units appropriate for the sample matrix/matrices and analytical Yes method(s)? Specify if wet or dry units were used for soil.					Yes
Comments: The results which were acceptable for	were repo or the sam	rted in concentration units of mic ple matrix and the analyses requ	rograms per l ested.	iter (µg/L) and milligi	rams per liter (mg/L),
9. Did the laboratory p	rovide any	specific initial and/or continuing	calibration re	sults?	Yes
Comments: Detailed calibration information was not provided as part of this laboratory report but limited initial calibration summary data were available for Method 4500CN E.					
10. If initial and/or continuing calibration results were provided, were the results within Yes acceptable limits?					Yes
Comments: The availab	le initial ca	libration summary data were with	nin the accept	tance limits.	
11. Was the total number of laboratory blank samples prepared equal to at least 5% of Yes the total number of samples or analyzed as required by the method?					
Comments: The total number of laboratory blank samples prepared was equal to at least 5% of the total number of samples.					
12. Were target analytes reported as not detected in the laboratory blanks? No					
Comments: Target anal	ytes were i	reported as not detected in the la	boratory blan	ks, with the following	g exceptions.
	<u>Method</u>	Analyte	<u>Batch</u>	Concentration	]
	200.7	Dissolved Barium	B93514	0.0013 mg/L	
	200.8	Dissolved Antimony	A93132	0.0012 mg/L	
	8015D	TPH DRO	71994	0.15 mg/L	]
Detections of the identified analytes in the associated samples that were less than the blank results and/or less than the applicable reporting limits were assigned U qualifiers. Detections of dissolved barium and TPH DRO in the associated samples that were greater than the reporting limits but less than or equal to 10 times the blank results were assigned JB qualifiers. Non-detections of the identified analytes in the associated samples and detections that were above the reporting limit and greater than ten times the blank concentration did not require qualification.					



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13. Was the total number of MS samples prepared equal to at least 5% of the total number of samples or analyzed as required by the method?

Yes

Comments: The total number of matrix spike samples prepared was equal to at least 5% of the total number of samples, although MS samples were not prepared/reported for all analyses and/or batches. The matrix spike sample source for each analytical batch in this sample set has been indicated below.

Method	<u>Analytes</u>	<u>Batch</u>	MS Sample Source
200.7	Total Metals	71965	Not Prepared
200.7	Dissolved Metals	B93514	DUP-12-6-22, MKTF-38
200.8	Total Metals	71965	Not Prepared
200.8	Dissolved Metals	A93132	EB-12-6-22, MKTF-46
200.8	Dissolved Metals	A93305	Not Prepared
200.8	Dissolved Lead	A93335	MKTF-46
200.8	<b>Dissolved Metals</b>	D93335	Not Prepared
245.1	Total and Dissolved Mercury	72127	East LDU
504.1	EDB	71922	Not Prepared
4500CN E	Cyanide	WG1971426	Not Associated
8015D	TPH DRO and MRO	71994	Not Prepared
8015D	TPH GRO	R93213	Not Prepared
8260B	VOCs	R93183	Not Prepared
8260B	VOCs	R93209	MKTF-38
8270C SIM	SVOCs	71974	Not Prepared
8270C	SVOCs	71974	Not Prepared

Not Associated – The MS sample source was not associated with this project.

Not Prepared – Matrix spikes were not prepared/reported for this batch.

14. For MS/MSDs prepared from project samples, were percent recoveries and RPDs within data validation or laboratory quality control (QC) limits?

Yes

Comments: The MS/MSD percent recoveries and RPDs for project samples were within data validation and laboratory QC limits.

The percent recoveries and RPD values for MS/MSDs prepared from non-project samples were evaluated and considered, but data were not qualified based on those results since matrix similarity to project samples could not be guaranteed.

15. Was the total number of LCSs analyzed equal to at least 5% of the total number of samples or analyzed as required by the method?

Comments: The total number of LCS samples analyzed was equal to at least 5% of the total number of samples.

16. Were LCS/LCSD percent recoveries and LCS/LCSD RPDs within data validation or laboratory QC limits?

No

Yes

Comments: The LCS and LCSD percent recoveries and LCS/LCSD RPDs were within data validation and laboratory QC limits, with the following exceptions.

The LCS recovery for cyanide in Method 4500CN E batch WG1971426 (R93762) was outside the acceptance limits of 87.1-120% at 83.8%. Cyanide was not detected in the associated samples, and these results were qualified as UJ due to evidence of potential low bias.

The reported recovery for mercury in the LCS for Method 245.1 batch 72127 was outside the acceptance limits of 70-130% at 134%. Mercury was detected in associated samples and the results were assigned J+ qualifiers due to

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🔊 Trihydro

evidence of potential high bias. The non-detect results for mercury in associated samples did not require qualification based on this LCS non-conformity.

The RPD value for pyrene in the LCS/LCSD analyses for Method 8270C batch 71974 exceeded the laboratory limit of 11.8% at 12.3%. Pyrene was not detected in the associated samples and the results were assigned UJ qualifiers due to evidence of poor precision.

17. Were surrogate recoveries within laboratory QC limits?

No

Yes

No

Comments: Surrogate recoveries were within QC limits, with the following exceptions.

Method	Surrogate/ EIS	Sample	<u>Surrogate</u> <u>Recovery</u>	QC Limits
8015D	BFB	MKTF-16	152%	70-130%
8015D	BFB	East LDU	206%	70-130%
8015D	BFB	West LDU	230%	70-130%
8015D	BFB	MKTF-38	149%	70-130%
8270C	2,4,6-Tribromophenol	PW-3	12.3%	15-108%
8270C	Phenol-d₅	West LDU	0%	15-67%

TPH GRO was detected in the Method 8015D analyses of samples MKTF-16, East LDU, West LDU, and MKTF-38 and these results were qualified as J+ due to evidence of a potential high bias.

Since Method 8270C and 8270C SIM surrogate associations were not available from the laboratory, qualification was assigned to all of the target analytes in a given fraction (acid or base/neutral) when two or more surrogates from the same fraction (acid or base/neutral) were outside the acceptance range. This condition did not exist for the Method 8270C analyses of samples PW-3 and West LDU and qualification of sample data was not required.

Qualification of sample data was not required based on surrogate non-conformances in QC samples as the environmental samples were evaluated based on their specific surrogate recoveries.

18. Were the number of trip blank, field blank, and/or equipment blank samples collected equal to at least 10% of the total number of samples or as required by the project guidelines, QAPP, SAP, or permit?

Comments: The number of trip, field, and equipment blanks collected was equal to at least 10% of the number of samples. One trip blank sample, Trip Blank, one field blank sample, FB-12-6-22, and one equipment blank sample, EB-12-6-22, were collected as part of this sample set.

19. Were target analytes reported as not detected in the trip blank, field blank, and/or equipment blank samples?

Comments: Target analytes were not detected in the trip blank, field blank, and equipment blank samples with the following exceptions.

Blank Sample ID	<u>Method</u>	Analyte	<u>Concentration</u>
EB-12-6-22	200.7	Total Chromium	0.0027 mg/L
EB-12-6-22	200.7	Total Cobalt	0.0050 mg/L
EB-12-6-22	200.7	Barium Dissolved	0.0016 mg/L
EB-12-6-22	200.7	Beryllium Dissolved	0.0010 mg/L
EB-12-6-22	200.7	Dissolved Zinc	0.0072 mg/L
EB-12-6-22	8015D	TPH DRO	0.037 mg/L

Detections of dissolved beryllium and dissolved zinc in the associated samples that were less than the blank results and/or less than the applicable reporting limits were assigned U qualifier. Detections of total cobalt and dissolved zinc in the associated samples that were greater than the reporting limits but less than or equal to 10 times the blank results were assigned JB qualifiers. Non-detections of the identified analytes in the associated samples


VALIDATION CRITERIA CHECKLIST								
and detections that were above the reporting limit and greater than ten times the blank concentration did not require qualification.								
The dissolved bar qualified due to lai not required.	The dissolved barium and TPH DRO results for the samples in batches B93514 and 71994, respectively, were previously qualified due to laboratory blank detections; therefore, additional qualification based on the equipment blank detections was not required.							
20. Was the num number of sa	ber of field duplicates co mples or as required by	llected equal to at leas the project guidelines,	t 10% of the total QAPP, SAP, or perr	nit?	Yes			
Comments: The r	number of field duplicate	s collected was equal t	to at least 10% of the	e number of samples				
Sample DUP-12-6	-22 was collected as a f	ield duplicate of sampl	e MKTF-46.					
21. Were field du 0-30%, or air	plicate RPD values withi 0-25%)?	n data validation QC lii	mits (soil 0-50%, wa	ter	Yes			
Comments: As in within data validat	Comments: As indicated in the Field Duplicate Summary Table at the end of this report, field duplicate RPD values were within data validation QC limits of 0-30% for water samples.							
22. For laboratory validation or l	/ duplicates prepared fro aboratory QC limits?	om project samples, we	ere RPDs within data	I	N/A			
Comments: Labo associated with th The RPD for the la	ratory duplicates were p is data set and sample E aboratory duplicate prep	repared for the analysi EB-12-6-22. ared from a project sar	s of cyanide in batch nple could not be ca	WG1971426 from a lculated because bot	sample not th measurements			
were reported as i	not detected.							
The RPD value fo	r the laboratory duplicate	e sample prepared from	n a non-project sam	ole was evaluated an	d considered, but			
data were not qua	lified based on these res	sults since matrix simila	arity to project sampl	es could not be guar	anteed.			
23. Were the follo	wing data relationships	realistic?						
Target ar     FPH/827	nalytes were reported by	more than one metho	d (e.g., 8260/8270,		N/A			
	0):							
Comments: Targe	et analytes were not repo	orted by more than one	e method.					
Doth tota					Na			
Both tota     results w	i and dissolved metals a ere greater than or equa	Inalyses were performe It to the dissolved meta	ed, and the total met ils results?	ais	NO			
	ore greater analiser eque							
Comments: The f results.	ollowing table contains t	he exceptions in which	the dissolved metal	s results exceeded th	ne total metals			
	Sample ID	Analyte	<u>Total Result</u> (mg/L)	Dissolved Result (mg/L)				
	MKTF-18R	Mercury	ND	0.00013				
	PW-3	Mercury	0.00010	0.00011				
	East LDU Mercury 0.00013 0.00014							
	MKTF-46	Antimony	ND	0.00057				
	MKTF-18R	Antimony	ND	0.00061				
	PW-3	Antimony	ND	0.00066				
	MKTF-38         Antimony         ND         0.00085							



0.0038

0.0035

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PW-3

Arsenic

VALIDATION CRITERIA CHECKLIST							
	Sample ID	Analyte	Total Result	Dissolved Result			
	West DU	Aroopio	(mg/L)	( <u>mg/L)</u>			
		Arsenic	0.00039	0.00002			
	EB-12-0-22	Banum	ND	0.0016			
	EB-12-6-22	Beryllium	ND	0.0010			
	East LDU	Beryllium	0.0012	0.0016			
	West LDU	Beryllium	ND	0.0010			
	MKTF-38	Beryllium	ND	0.0019			
	MKTF-38	Cadmium	ND	0.0011			
	MKTF-46	Selenium	ND	0.00069			
	West LDU	Selenium	ND	0.00048			
	DUP-12-6-22	Selenium	ND	0.00060			
	MKTF-46	Silver	0.0019	0.0032			
	MKTF-18R	Silver	ND	0.0014			
	PW-3	Silver	0.0033	0.0040			
	DUP-12-6-22	Silver	0.0022	0.0030			
	PW-3	Vanadium	ND	0.0038			
	MKTF-38	Vanadium	ND	0.0038			
	EB-12-6-22	Zinc	ND	0.0072			
	MKTF-46	Zinc	ND	0.0080			
	MKTF-18R	Zinc	0.0066	0.19			
	PW-3	Zinc	0.034	0.065			
	East LDU	Zinc	0.22	0.086			
	West LDU	Zinc	0.026	0.13			
	DUP-6-22	Zinc	ND	0.0044			
	MKTF-38	Zinc	ND	0.016			

The EPA has not provided guidance or requirements for the evaluation, validation, and qualification of dissolved metals results that exceed the corresponding total metals results. Therefore, qualification of results was not performed based on these data.



Client Sample ID: MKTF-46 Field Duplicate Sample ID: DUP-12-6-22							
Analyte	Method	Laboratory Result	Duplicate Result	Relative Percent Difference (RPD)			
Chlorobenzene	SW8260B	ND (1.0 µg/L)	0.67 µg/L	DL			
Methylene Chloride	SW8260B	3.9 µg/L	ND (3.0 µg/L)	DL			
1,4-Dioxane	SW8270C	0.84 µg/L	1.1 µg/L	26.8% +/-RL			
TPH GRO	SW8015	0.033 mg/L	0.030 mg/L	9.5% +/-RL			
TPH DRO	SW8015	0.051 mg/L	0.077 mg/L	40.6% +/-RL			
Barium, Dissolved	E 200.7	0.042 mg/L	0.041 mg/L	2.4%			
Barium, Total	E 200.7	0.081 mg/L	0.087 mg/L	7.1%			
Cobalt, Total	E 200.7	0.016 mg/L	0.016 mg/L	0.0%			
Silver, Dissolved	E 200.7	0.0032 mg/L	0.0030 mg/L	6.5% +/-RL			
Silver, Total	E 200.7	0.0019 mg/L	0.0022 mg/L	14.6% +/-RL			
Vanadium, Dissolved	E 200.7	0.0037 mg/L	0.0034 mg/L	8.5% +/-RL			
Vanadium, Total	E 200.7	0.0040 mg/L	0.0044 mg/L	9.5% +/-RL			
Zinc, Dissolved	E 200.7	0.0080 mg/L	0.0044 mg/L	58.1% +/-RL			
Antimony, Dissolved	E200.8	0.00057 mg/L	ND (0.0010 mg/L)	DL			
Arsenic, Dissolved	E200.8	0.00081 mg/L	0.00071 mg/L	13.2% +/-RL			
Arsenic, Total	E200.8	0.0011 mg/L	0.0010 mg/L	9.5% +/-RL			
Lead, Total	E200.8	0.0011 mg/L	0.0011 mg/L	0.0%			
Selenium, Dissolved	E200.8	0.00069 mg/L	0.00060 mg/L	14.0% +/-RL			
Mercury, Dissolved	E245.1	0.00013 mg/L	ND (0.00020 mg/L)	DL			
Mercury, Total	E245.1	0.00017 mg/L	0.00014 mg/L	19.4% +/-RL			

#### FIELD DUPLICATE SUMMARY

Field duplicate RPD control limits are not to exceed 30% for water as established by USEPA Region I - New England Environmental Data Review Supplement for Region 1 Data Review Elements and Superfund Specific Guidance/Procedures, EQADR-Supplement2, September 2020.

DL – Indicates that the analyte was detected in one of the duplicate samples and was undetected in the other sample, and therefore an RPD could not be calculated. Data were not qualified since the detection was within two times the reporting limit. Non-detected results are indicated above with the applicable reporting limit as ND (RL).

+/-RL – Indicates that the detections in both of the samples were within two times the reporting limit. Qualification of data was not required.



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## DATA QUALIFICATION SUMMARY

Abbreviation	Reason
EBD	Equipment blank detection
ERPD-LCS	The LCS/LCSD RPD exceeded the upper acceptable limit indicating poor precision.
HR-SUR	The surrogate percent recovery was greater than the upper acceptable limit indicating a possible high bias.
HR-LCS	The LCS and/or LCSD percent recovery was greater than the upper acceptable limit indicating a possible high bias.
LR-LCS	The LCS and/or LCSD percent recovery was less than the lower acceptable limit indicating a possible low bias.
MBD	Method blank detection
MDLRL	Flagged by the laboratory: The result was greater than the MDL but less than the RL.

Analyte	Method	Field Sample ID	Lab Sample ID	Result	Limit	Units	Reviewer Qualifier	DV Flag Reasons
1,2,4-Trimethylbenzene	SW8260B	West LDU	2212303-007a	0.85	1.0	µg/L	J	MDLRL
1,4-Dioxane	SW8270C	MKTF-46	2212303-002c	0.84	1.0	µg/L	J	MDLRL
1,4-Dioxane	SW8270C	East LDU	2212303-006c	0.26	1.0	µg/L	J	MDLRL
2,4-Dimethylphenol	SW8270C	MKTF-18R	2212303-003c	10	10	µg/L	J	MDLRL
2-Butanone	SW8260B	MKTF-38	2212303-010a	3.7	10	µg/L	J	MDLRL
Acenaphthene	SW8270C	MKTF-38	2212303-010c	0.24	0.30	µg/L	J	MDLRL
Antimony, Dissolved	E200.8	MKTF-46	2212303-002E	0.00057	0.0010	mg/L	U	MBD, MDLRL
Antimony, Dissolved	E200.8	MKTF-18R	2212303-003E	0.00061	0.0010	mg/L	U	MBD, MDLRL
Antimony, Dissolved	E200.8	PW-3	2212303-005E	0.00066	0.0010	mg/L	U	MBD, MDLRL
Antimony, Dissolved	E200.8	MKTF-38	2212303-010E	0.00085	0.0010	mg/L	U	MBD, MDLRL
Arsenic, Dissolved	E200.8	MKTF-46	2212303-002E	0.00081	0.0010	mg/L	J	MDLRL
Arsenic, Dissolved	E200.8	East LDU	2212303-006E	0.00058	0.0010	mg/L	J	MDLRL
Arsenic, Dissolved	E200.8	West LDU	2212303-007E	0.00062	0.0010	mg/L	J	MDLRL
Arsenic, Dissolved	E200.8	DUP-12-6-22	2212303-009E	0.00071	0.0010	mg/L	J	MDLRL
Arsenic, Total	E200.8	East LDU	2212303-006D	0.00079	0.0010	mg/L	J	MDLRL



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Analyte	Method	Field Sample ID	Lab Sample ID	Result	Limit	Units	Reviewer Qualifier	DV Flag Reasons
Arsenic, Total	E200.8	West LDU	2212303-007D	0.00059	0.0010	mg/L	J	MDLRL
Barium, Dissolved	E 200.7	PW-3	2212303-005E	0.012	0.0020	mg/L	JB	MBD
Barium, Dissolved	E 200.7	EB-12-6-22	2212303-001E	0.0016	0.0020	mg/L	U	MBD, MDLRL
Benzo(a)anthracene	SW8270C	MKTF-18R	2212303-003c	0.16	0.30	µg/L	J	MDLRL
Beryllium, Dissolved	E 200.7	East LDU	2212303-006E	0.0016	0.0020	mg/L	U	EBD, MDLRL
Beryllium, Dissolved	E 200.7	West LDU	2212303-007E	0.0010	0.0020	mg/L	U	EBD, MDLRL
Beryllium, Dissolved	E 200.7	MKTF-38	2212303-010E	0.0019	0.0020	mg/L	U	EBD, MDLRL
Beryllium, Dissolved	E 200.7	EB-12-6-22	2212303-001E	0.0010	0.0020	mg/L	J	MDLRL
Beryllium, Total	E 200.7	East LDU	2212303-006D	0.0012	0.0020	mg/L	J	MDLRL
Cadmium, Dissolved	E 200.7	MKTF-38	2212303-010E	0.0011	0.0020	mg/L	J	MDLRL
Chlorobenzene	SW8260B	DUP-12-6-22	2212303-009a	0.67	1.0	µg/L	J	MDLRL
Chromium, Total	E 200.7	EB-12-6-22	2212303-001D	0.0027	0.0060	mg/L	J	MDLRL
Cobalt, Total	E 200.7	MKTF-46	2212303-002D	0.016	0.0060	mg/L	JB	EBD
Cobalt, Total	E 200.7	MKTF-18R	2212303-003D	0.0097	0.0060	mg/L	JB	EBD
Cobalt, Total	E 200.7	PW-3	2212303-005D	0.013	0.0060	mg/L	JB	EBD
Cobalt, Total	E 200.7	DUP-12-6-22	2212303-009D	0.016	0.0060	mg/L	JB	EBD
Cobalt, Total	E 200.7	MKTF-38	2212303-010D	0.011	0.0060	mg/L	JB	EBD
Cobalt, Total	E 200.7	EB-12-6-22	2212303-001D	0.0050	0.0060	mg/L	J	MDLRL
Cyanide, Total	E335.4	EB-12-6-22	2212303-001F	ND	0.0050	mg/L	UJ	LR-LCS
Cyanide, Total	E335.4	MKTF-46	2212303-002F	ND	0.0050	mg/L	UJ	LR-LCS
Cyanide, Total	E335.4	MKTF-18R	2212303-003F	ND	0.0050	mg/L	UJ	LR-LCS
Cyanide, Total	E335.4	PW-3	2212303-005F	ND	0.0050	mg/L	UJ	LR-LCS
Cyanide, Total	E335.4	East LDU	2212303-006F	ND	0.0050	mg/L	UJ	LR-LCS
Cyanide, Total	E335.4	West LDU	2212303-007F	ND	0.0050	mg/L	UJ	LR-LCS
Cyanide, Total	E335.4	DUP-12-6-22	2212303-009F	ND	0.0050	mg/L	UJ	LR-LCS
Cyanide, Total	E335.4	MKTF-38	2212303-010F	ND	0.0050	mg/L	UJ	LR-LCS
Fluoranthene	SW8270C	MKTF-18R	2212303-003c	0.14	0.30	µg/L	J	MDLRL



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Analyte	Method	Field Sample ID	Lab Sample ID	Result	Limit	Units	Reviewer Qualifier	DV Flag Reasons
Fluoranthene	SW8270C	West LDU	2212303-007c	0.14	0.30	µg/L	J	MDLRL
Isopropylbenzene	SW8260B	MKTF-16	2212303-004a	3.2	5.0	µg/L	J	MDLRL
Mercury, Dissolved	E245.1	MKTF-46	2212303-002E	0.00013	0.00020	mg/L	J	HR-LCS, MDLRL
Mercury, Dissolved	E245.1	MKTF-18R	2212303-003E	0.00013	0.00020	mg/L	J	HR-LCS, MDLRL
Mercury, Dissolved	E245.1	PW-3	2212303-005E	0.00011	0.00020	mg/L	J	HR-LCS, MDLRL
Mercury, Dissolved	E245.1	East LDU	2212303-006E	0.00014	0.00020	mg/L	J	HR-LCS, MDLRL
Mercury, Dissolved	E245.1	MKTF-38	2212303-010E	0.00010	0.00020	mg/L	J	HR-LCS, MDLRL
Mercury, Total	E245.1	MKTF-46	2212303-002D	0.00017	0.00020	mg/L	J	HR-LCS, MDLRL
Mercury, Total	E245.1	PW-3	2212303-005D	0.00010	0.00020	mg/L	J	HR-LCS, MDLRL
Mercury, Total	E245.1	East LDU	2212303-006D	0.00013	0.00020	mg/L	J	HR-LCS, MDLRL
Mercury, Total	E245.1	West LDU	2212303-007D	0.00014	0.00020	mg/L	J	HR-LCS, MDLRL
Mercury, Total	E245.1	DUP-12-6-22	2212303-009D	0.00014	0.00020	mg/L	J	HR-LCS, MDLRL
Mercury, Total	E245.1	MKTF-38	2212303-010D	0.00012	0.00020	mg/L	J	HR-LCS, MDLRL
Methylene Chloride	SW8260B	East LDU	2212303-006a	2.9	3.0	µg/L	J	MDLRL
МТВЕ	SW8260B	MKTF-38	2212303-010a	0.91	1.0	µg/L	J	MDLRL
n-Butylbenzene	SW8260B	MKTF-38	2212303-010a	0.85	3.0	µg/L	J	MDLRL
Nickel, Dissolved	E 200.7	MKTF-18R	2212303-003E	0.0075	0.010	mg/L	J	MDLRL
Nickel, Total	E 200.7	MKTF-18R	2212303-003D	0.0084	0.010	mg/L	J	MDLRL
n-Propylbenzene	SW8260B	MKTF-18R	2212303-003a	5.6	10	µg/L	J	MDLRL
Phenol	SW8270C	MKTF-18R	2212303-003c	19	20	µg/L	J	MDLRL
p-Isopropyltoluene	SW8260B	West LDU	2212303-007a	0.64	1.0	µg/L	J	MDLRL
Pyrene	SW8270C	EB-12-6-22	2212303-001c	ND	1.0	µg/L	UJ	ERPD-LCS
Pyrene	SW8270C	MKTF-46	2212303-002c	ND	1.0	µg/L	UJ	ERPD-LCS
Pyrene	SW8270C	MKTF-18R	2212303-003c	ND	1.0	µg/L	UJ	ERPD-LCS
Pyrene	SW8270C	PW-3	2212303-005c	ND	1.0	µg/L	UJ	ERPD-LCS
Pyrene	SW8270C	East LDU	2212303-006c	ND	1.0	µg/L	UJ	ERPD-LCS
Pyrene	SW8270C	West LDU	2212303-007c	ND	1.0	µg/L	UJ	ERPD-LCS



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Analyte	Method	Field Sample ID	Lab Sample ID	Result	Limit	Units	Reviewer Qualifier	DV Flag Reasons
Pyrene	SW8270C	DUP-12-6-22	2212303-009c	ND	1.0	µg/L	UJ	ERPD-LCS
Pyrene	SW8270C	MKTF-38	2212303-010c	ND	1.0	µg/L	UJ	ERPD-LCS
sec-Butylbenzene	SW8260B	West LDU	2212303-007a	0.70	1.0	µg/L	J	MDLRL
sec-Butylbenzene	SW8260B	MKTF-38	2212303-010a	0.98	1.0	µg/L	J	MDLRL
Selenium, Dissolved	E200.8	MKTF-46	2212303-002E	0.00069	0.0010	mg/L	J	MDLRL
Selenium, Dissolved	E200.8	East LDU	2212303-006E	0.00071	0.0010	mg/L	J	MDLRL
Selenium, Dissolved	E200.8	West LDU	2212303-007E	0.00048	0.0010	mg/L	J	MDLRL
Selenium, Dissolved	E200.8	DUP-12-6-22	2212303-009E	0.00060	0.0010	mg/L	J	MDLRL
Silver, Dissolved	E 200.7	MKTF-46	2212303-002E	0.0032	0.0050	mg/L	J	MDLRL
Silver, Dissolved	E 200.7	MKTF-18R	2212303-003E	0.0014	0.0050	mg/L	J	MDLRL
Silver, Dissolved	E 200.7	PW-3	2212303-005E	0.0040	0.0050	mg/L	J	MDLRL
Silver, Dissolved	E 200.7	DUP-12-6-22	2212303-009E	0.0030	0.0050	mg/L	J	MDLRL
Silver, Dissolved	E 200.7	MKTF-38	2212303-010E	0.0035	0.0050	mg/L	J	MDLRL
Silver, Total	E 200.7	MKTF-46	2212303-002D	0.0019	0.0050	mg/L	J	MDLRL
Silver, Total	E 200.7	PW-3	2212303-005D	0.0033	0.0050	mg/L	J	MDLRL
Silver, Total	E 200.7	DUP-12-6-22	2212303-009D	0.0022	0.0050	mg/L	J	MDLRL
Silver, Total	E 200.7	MKTF-38	2212303-010D	0.0021	0.0050	mg/L	J	MDLRL
TPH DRO	SW8015	MKTF-38	2212303-010C	0.43	0.064	mg/L	JB	MBD
TPH DRO	SW8015	DUP-12-6-22	2212303-009C	0.077	0.064	mg/L	U	MBD
TPH DRO	SW8015	EB-12-6-22	2212303-001C	0.037	0.064	mg/L	U	MBD, MDLRL
TPH DRO	SW8015	MKTF-46	2212303-002C	0.051	0.064	mg/L	U	MBD, MDLRL
TPH DRO	SW8015	PW-3	2212303-005C	0.019	0.064	mg/L	U	MBD, MDLRL
TPH GRO	SW8015	MKTF-16	2212303-004a	2.1	0.050	mg/L	J+	HR-SUR
TPH GRO	SW8015	East LDU	2212303-006a	0.52	0.050	mg/L	J+	HR-SUR
TPH GRO	SW8015	West LDU	2212303-007a	0.31	0.050	mg/L	J+	HR-SUR
TPH GRO	SW8015	MKTF-38	2212303-010a	0.29	0.050	mg/L	J+	HR-SUR
TPH GRO	SW8015	MKTF-46	2212303-002a	0.033	0.050	mg/L	J	MDLRL



Analyte	Method	Field Sample ID	Lab Sample ID	Result	Limit	Units	Reviewer Qualifier	DV Flag Reasons
TPH GRO	SW8015	DUP-12-6-22	2212303-009a	0.030	0.050	mg/L	J	MDLRL
Vanadium, Dissolved	E 200.7	MKTF-46	2212303-002E	0.0037	0.050	mg/L	J	MDLRL
Vanadium, Dissolved	E 200.7	PW-3	2212303-005E	0.0038	0.050	mg/L	J	MDLRL
Vanadium, Dissolved	E 200.7	East LDU	2212303-006E	0.0061	0.050	mg/L	J	MDLRL
Vanadium, Dissolved	E 200.7	West LDU	2212303-007E	0.0051	0.050	mg/L	J	MDLRL
Vanadium, Dissolved	E 200.7	DUP-12-6-22	2212303-009E	0.0034	0.050	mg/L	J	MDLRL
Vanadium, Dissolved	E 200.7	MKTF-38	2212303-010E	0.0038	0.050	mg/L	J	MDLRL
Vanadium, Total	E 200.7	MKTF-46	2212303-002D	0.004	0.050	mg/L	J	MDLRL
Vanadium, Total	E 200.7	MKTF-18R	2212303-003D	0.0037	0.050	mg/L	J	MDLRL
Vanadium, Total	E 200.7	DUP-12-6-22	2212303-009D	0.0044	0.050	mg/L	J	MDLRL
Xylenes, Total	SW8260B	West LDU	2212303-007a	0.88	1.5	µg/L	J	MDLRL
Zinc, Dissolved	E 200.7	PW-3	2212303-005E	0.065	0.010	mg/L	JB	EBD
Zinc, Dissolved	E 200.7	MKTF-38	2212303-010E	0.016	0.010	mg/L	JB	EBD
Zinc, Dissolved	E 200.7	MKTF-46	2212303-002E	0.0080	0.010	mg/L	U	EBD, MDLRL
Zinc, Dissolved	E 200.7	DUP-12-6-22	2212303-009E	0.0044	0.010	mg/L	U	EBD, MDLRL
Zinc, Dissolved	E 200.7	EB-12-6-22	2212303-001E	0.0072	0.010	mg/L	J	MDLRL
Zinc, Total	E 200.7	MKTF-18R	2212303-003D	0.0066	0.010	mg/L	J	MDLRL



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# ATTACHMENT A

**CoC Confirmation** 





02/16/2023

Brittany Nelson Trihydro Corporation 1252 Commerce Drive Laramie, WY 82070

Chain of Custody Confirmation

I, Brittany Nelson representing the Marathon Gallup site do confirm the following information inadvertently left off the chain-of-custody (CoC) provided with data set 2212303 or information was not reported accurately in accordance with the field records. In addition, I do confirm that all aqueous samples were provided to the laboratory in the proper, method-referenced, containers and were properly preserved (chemically and physically). The information identified in bold italics will be used to further clarify the CoC documentation.

The required analytical parameters for samples MKTF-38 and Trip Blank were not noted on the CoC.

To the best of my knowledge, the above information is correct.

tany fleeson Brittany Nelson

DATE

This confirmation is an amendment to the chain-of-custody accompanying the Marathon Gallup, Hall Environmental Analysis Laboratory data set 2212303.



Client: Marathon Oil	Laboratory: Hall Environmental Analysis Laboratory			
Project Name: Western Refining Southwest, Quarterly GW	Sample Matrix: Groundwater			
Project Number: 697-080-002 Task: 0006	Sample Start Date: 12/07/2022			
Date Validated: 02/01/2023	Sample End Date: 12/07/2022			
Parameters Included:				
<ul> <li>Volatile Organic Compounds (VOC) by Environmental Pro Waste (SW-846) Method 8260B</li> </ul>	otection Agency (EPA) Test Methods for Evaluating Solid			

- 1,2-Dibromoethane (EDB) by EPA Method 504.1
- Semivolatile Organic Compounds (SVOC) by SW-846 Method 8270C and Method 8270C with Selected Ion Monitoring (SIM)
- Total Petroleum Hydrocarbons (TPH) Gasoline Range Organics (GRO) by SW-846 Method 8015D
- TPH Diesel Range Organics (DRO) and Motor Oil Range Organics (MRO) by SW-846 Method 8015D Modified
- Total and Dissolved Metals by EPA Method 200.7 and Method 200.8
- Total and Dissolved Mercury by EPA Method 245.1
- Cyanide by Standard Methods for the Examination of Water and Wastewater (SM) Method 4500 CN E
- Per- and Polyfluorinated Alkyl Substances (PFAS) by Liquid Chromatography with Tandem Mass Spectrometry (LC-MS/MS) and Isotope Dilution (ID)

Laboratory Project ID: 2212442

Data Validator: Daran O'Hollearn, Lead Project Scientist

Reviewer: Mike Phillips, Senior Chemist

## DATA EVALUATION CRITERIA SUMMARY

A Tier II Data Validation was performed by Trihydro Corporation's Chemical Data Evaluation Services Group on the analytical data report packages generated by Hall Environmental Analysis Laboratory of Albuquerque, New Mexico, with additional data from Pace Analytical National of Mount Juliet, Tennessee, and Enthalpy Analytical Laboratory of El Dorado Hills, California, evaluating samples from the Marathon Oil site, located in Gallup, New Mexico.

Precision, accuracy, method compliance, and completeness of this data package were assessed during this data review. Precision was determined by evaluating the calculated relative percent difference (RPD) values from:

- Field duplicate pairs
- Laboratory duplicate pairs
- Matrix spike (MS) and matrix spike duplicate (MSD) pairs
- Laboratory control sample (LCS) and laboratory control sample duplicate (LCSD) pairs

Laboratory accuracy was established by reviewing the demonstrated percent recoveries (%R) of the following items to verify that data are not biased.

- MS/MSD samples
- LCS/LCSD and ongoing precision and recovery (OPR) samples
- Organic system monitoring compounds (surrogates)





Field accuracy was established by collecting and analyzing the following samples to monitor for possible ambient or cross contamination during sampling and transportation.

- Trip blanks
- Field blanks
- Equipment blanks

Method compliance was established by reviewing sample integrity, holding times, detection limits, surrogate recoveries, laboratory blanks, initial and continuing calibrations (where applicable), and the LCS/LCSD/OPR percent recoveries against method-specific requirements.

Completeness was evaluated by determining the overall ratio of the number of samples and analyses planned versus the number of samples with valid analyses. Determination of completeness included a review of the chain-of-custody (CoC), laboratory analytical methods, and other laboratory and field documents associated with this analytical data set.

Client Sample ID	Laboratory Sample Number
EB-12-7-22	2212442-001
OW-64	2212442-002
OW-12	2212442-003
OW-12A	2212442-004
OW-63	2212442-005
OW-57	2212442-006
DUP-12-7-22	2212442-007
FB-12-7-22	2212442-008
EB-OW-67	2212442-009
Trip Blank	2212442-010

#### SAMPLE NUMBERS TABLE





The laboratory data were reviewed to evaluate compliance with the methods and the quality of the reported data. Assessment of CoC completeness is included in Item 3 of the Data Validation Checklist. A check mark ( $\checkmark$ ) indicates that the referenced validation criteria were deemed acceptable, whereas a crossed circle ( $\otimes$ ) indicates validation criteria for which the data have been qualified by the data validator. An empty circle (O) indicates that the specified criterion does not apply to the reviewed data. Details are noted in the tables below.

#### Validation Criteria

- ✓ Data Completeness
- ✓ CoC Documentation (Item 3)
- ✓ Holding Times and Preservation (Items 6 and 7)
- O Initial and Continuing Calibrations (Items 9 and 10)
- ⊗ Laboratory Blanks (Items 11 and 12)
- ✓ MS/MSD (Items 13 and 14)
- ⊗ LCS/LCSD/OPR (Items 15 and 16)
- System Monitoring Compounds (i.e., Surrogates) (Item 17)
- ⊗ Field, Equipment, and Trip Blanks (Items 18 and 19)
- ✓ Field Duplicates (Items 20 and 21)
- ✓ Laboratory Duplicates (Item 22)

#### **Guidance References**

Chemical data validation was conducted in accordance with the United States Environmental Protection Agency (USEPA) Contract Laboratory Program (CLP) National Functional Guidelines for the analyses listed below, or by the appropriate method if not covered in the National Functional Guidelines.

- Data for organic analyses were evaluated according to validation criteria set forth in the USEPA CLP National Functional Guidelines for Organic Superfund Methods Data Review, document number EPA-540-R-20-005, November 2020 with additional reference to the USEPA CLP National Functional Guidelines for Organic Data Review, document number EPA 540/R-99/008, October 1999.
- Data for inorganic analyses were evaluated according to validation criteria set forth in the USEPA CLP National Functional Guidelines for Inorganic Superfund Methods Data Review, document number EPA-540-R-20-006, November 2020 with additional reference to the USEPA CLP National Functional Guidelines for Inorganic Data Review, document number EPA 540-R-04-004, October 2004.
- Data review and evaluation was performed following criteria set forth in Data Review and Validation Guidelines for Perfluoroalkyl Substances (PFASs) Analyzed Using EPA Method 537, document number EPA 910-R-18-001, November 2018.
- Data were reviewed and evaluated according to criteria set forth in the Department of Defense (DoD) / Department of Energy (DOE) Quality Systems Manual (QSM) for Environmental Laboratories, Version 5.3, 2019.
- Data were reviewed and evaluated according to criteria set forth in Data Validation Guidelines Module 3: Data Validation Procedure for Per- and Polyfluoroalkyl Substances Analysis by QSM Table B-15, United States Department of Defense, Environmental Data Quality Workgroup, May 2020.



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- Review of field duplicates was conducted according to the USEPA Region I New England Environmental Data Review Supplement for Region 1 Data Review Elements and Superfund Specific Guidance/Procedures, EQADR-Supplement2, September 2020.
- Trihydro Data Validation Variance Documentation, April 2022.

## OVERALL DATA PACKAGE ASSESSMENT

Based on a data validation review, the data are acceptable as delivered. Data qualified by the laboratory are discussed in Item 2 of the Validation Criteria Checklist.

The purpose of validating data and assigning qualifiers is to assist in proper data interpretation. Data that are not qualified meet the site data quality objectives. If values are assigned qualifiers other than an R (rejected, data not usable), the data may be used for site evaluation; however, consideration should be given to the reasons for qualification when interpreting sample concentrations. Data points that are assigned an R qualifier should not be used for site evaluation purposes.

If applicable, text was identified in **bold font** in the Validation Criteria Checklist to indicate that further action and/or qualification of the data were required. Data may have been qualified with J data flags by the laboratory if the result was greater than or equal to the method detection limit (MDL) but less than the reporting limit (RL). These laboratory-applied J flags were preserved, if present, and included in the Data Qualification Summary table at the end of this report. If applicable, data validation qualifiers were added for the items noted with crossed circles in the Validation Criteria section above. Please see the Data Qualification Summary table at the end of this report.

If data would be qualified with more than one flag, one qualifier was assigned based on the severity; however, all reasons for qualification were retained. Data that would be qualified with both J+ and J- flags were evaluated based on validation criteria and assigned the appropriate flag. The hierarchy of qualifiers from the most to least severe is as follows:

Data qualifiers used during this validation are included in the following table.

<u>Qualifier</u>	Definition
J	Estimated concentration
J+	The result is an estimated concentration, but may be biased high
J-	The result is an estimated concentration, but may be biased low
UJ	Estimated reporting limit
U	Evaluated to be undetected at the reporting limit
JB	Estimated concentration due to blank contamination
R	Rejected, data not usable

#### **Data Completeness**

The analyses were performed as requested on the CoC records. The associated samples were received by the laboratory and analyzed properly unless otherwise noted in the Criteria Checklist below. The complete data package consisted of 564 data points. The data completeness calculation does not include any submitted blank sample results. Six data points were rejected. The data completeness measure for this data package is calculated to be 98.94% and is acceptable.



VALIDATION CRITERIA CHECKLIST			
1. Was the report fr	ee of non-conformances identified by th	e laboratory?	No
Comments: The labo	pratory noted the following analytical nor	n-conformances related to this data set.	
Method 8270C and M EPA Method 8270 ins 63.	Iethod 8270C SIM: 1-Methylnaphthaler stead of EPA Method 8270 SIM because	ne, 2-methylnaphthalene, and naphthalene e of their elevated concentrations for sam	e were reported by bles OW-57 and OW-
		Cuon of DRO. Samples with detections a	
2. Were the data free lf no, define.	ee of data qualification flags and/or note	s used by the laboratory?	No
Comments: The labo	pratory used the following data qualificat	ion flags with this data set.	
B – Analyte detected	in the associated method blank.		
D – Sample diluted d	ue to matrix.		
J – Analyte detected	below quantitation limits.		
P1 – RPD value not a	applicable for sample concentrations les	s than 5 times the reporting limit.	
R – %RPD outside of	range.		
S – % Recovery outs	ide of range due to dilution or matrix inte	erference.	
* – Value exceeds ma	aximum contaminant level.		
3. Were sample Co	C forms and custody procedures compl	ete?	No
Comments: The CoC and laboratory persor sealed, and custody s	C records from field to laboratory were connel signatures, dates, and times of reconseals were present and intact on the shi	omplete, and custody was maintained as eipt. The laboratory noted that the shippir pping containers.	evidenced by field g containers were
The correct parameter laboratory logged in t	ers were not marked on the CoC for the he sample and performed the appropria	trip blank sample that was received by the te volatile analysis. Validation action was	e laboratory. The not required.
4. Were detection li permit, or metho	mits in accordance with the quality assu d, or indicated as acceptable?	urance project plan (QAPP),	Yes
Comments: The dete	ection limits appeared to be acceptable.	The following dilutions were applied.	
Method	<u>Sample(s)</u>	<u>Analyte(s)</u>	<u>Dilution</u> Factor
8260B	DUP-12-7-22	VOCs	2
200.7	OW-63	Total and Dissolved Barium	5
200.7	OW-57	Dissolved Barium	5
200.8	Multiple Samples	Select Total and Dissolved Metals	5
8260B	OW-12A	Select VOCs	5
8260B	OW-12	Benzene	10
8015D	OW-12A, OW-57	TPH DRO and MRO	10
8015D	OW-12A, OW-63, OW-57	TPH GRO	50
8260B	OW-12A	Select VOCs	50
8260B	OW-63, OW-57	Select VOCs	50
200.7	OW-57	Total Barium	100
8260B	OW-63, OW-57	Benzene	500



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VALIDATION CRITERIA CHECKLIST	
5. Were the reported analytical methods and constituents in compliance with the QAPP, permit, or CoC?	No
Comments: The reported analytical methods were in compliance with the CoC, and the laboratory constituents in accordance with the CoC, with the following exceptions.	y reported the requested
The CoC requested total and dissolved metals using only Method 200.7; however, the laboratory a using both Method 200.7 and Method 200.8. This substituted analytical method, Method 200.8, m accuracy, and precision goals and, therefore, was an acceptable replacement.	analyzed the samples net similar sensitivity,
The CoC requested cyanide using Method 335.4; however, the laboratory analyzed the samples u This substituted analytical method met similar sensitivity, accuracy, and precision goals and, there replacement.	using Method 4500 CN E. efore, was an acceptable
6. Were samples received in good condition within method-specified requirements?	No
Comments: Samples were received on ice, in good condition, and with the cooler temperatures of temperature range of $4^{\circ}C \pm 2^{\circ}C$ between $0.4^{\circ}C$ and $1.1^{\circ}C$ as noted on the Sample Log-in Check I to Pace National were received in good condition with the cooler temperature within the recommended on the CoC. Samples transferred to Enthalpy Analytical Laboratory were received in good commended range at $0.8^{\circ}C$ as noted on the CoC and the Sample Login	utside the recommended List. Samples transferred nded range at 5.5°C as condition with the cooler n Checklist.
The cooler temperatures below 2.0°C were judged as acceptable since the laboratory did not report as broken and/or frozen.	ort the sample containers
7. Were samples extracted/digested and analyzed within method-specified or technical holding times?	Yes
Comments: The samples were extracted/digested and analyzed within method-specific holding time	mes.
8. Were reported units appropriate for the sample matrix/matrices and analytical method(s)? Specify if wet or dry units were used for soil.	Yes
Comments: The results were reported in concentration units of nanograms per liter (ng/L), microg milligrams per liter (mg/L), which were acceptable for the sample matrix and the analyses request	ırams per liter (μg/L), and ed.
9. Did the laboratory provide any specific initial and/or continuing calibration results?	No
Comments: Initial and continuing calibration data were not included as part of this data set.	
10. If initial and/or continuing calibration results were provided, were the results within acceptable limits?	N/A
Comments: Initial and continuing calibration data were not included as part of this data set.	
11. Was the total number of laboratory blank samples prepared equal to at least 5% of the total number of samples or analyzed as required by the method?	Yes
Comments: The total number of laboratory blank samples prepared was equal to at least 5% of the samples.	ne total number of



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			VALIDATION CRITE		т		
12. We	re target analytes	reported a	as not detected in the laborat	ory blanks?		No	
Comme	ents: Target analyt	tes were re	eported as not detected in the	e laboratory blar	nks, with the followir	ng exceptions.	
		Method	<u>Analyte</u>	<u>Batch</u>	Concentration	]	
		200.7	Total Cobalt	71980	0.0048 mg/L		
		200.7	<b>Dissolved Barium</b>	B93514	0.0013 mg/L		
		8015D	TPH DRO	71994	0.15 mg/L		
		8015D	TPH DRO	72049	0.080 mg/L		
applica sample assigne above th	Detections of TPH DRO in the associated samples that were less than the blank results and/or less than the applicable reporting limits were assigned U qualifiers. Detections of total cobalt and TPH DRO in the associated samples that were greater than the reporting limits but less than or equal to 10 times the blank results were assigned JB qualifiers. Non-detections of the identified analytes in the associated samples and detections that were above the reporting limit and greater than ten times the blank concentration did not require gualification.						
13. Wa nur	13. Was the total number of MS samples prepared equal to at least 5% of the total number of samples or analyzed as required by the method?       Yes						
althougl analytic	Comments: The total number of matrix spike samples prepared was equal to at least 5% of the total number of samples, although MS samples were not prepared/reported for all analyses and/or batches. The matrix spike sample source for each analytical batch in this sample set has been indicated below.						
	Method         Analytes         Batch         MS Sample Source						
	200.7		Total Metals	71980	EB-12-7-22	, OW-64	
	200.7		Dissolved Metals	B93514	Not Prep	pared	
	200.8		Total Metals	71980	Not Prep	pared	
	200.8		Dissolved Metals	A93335	EB-12-7	7-22	

	200.7	Dissolved Metals	B93514	Not Prepared
	200.8	Total Metals	71980	Not Prepared
	200.8	Dissolved Metals	A93335	EB-12-7-22
	200.8	Dissolved Metals	A93438	Not Prepared
	200.8	Dissolved Antimony	A93556	Not Prepared
	245.1	Total and Dissolved Mercury	72128	OW-12
	245.1	Total Mercury	72200	Not Prepared
	504.1	EDB	72189	Not Prepared
	PFAS Method	PFAs	B22L133	Not Prepared
	4500CN E	Cyanide	WG1974296	EB-12-7-22
	8015D	TPH DRO and MRO	71994	Not Prepared
	8015D	TPH DRO and MRO	72049	Not Prepared
	8015D	TPH GRO	R93213	Not Prepared
	8260B	VOCs	R93331	Not Prepared
	8260B	VOCs	R93377	Not Prepared
	8260B	VOCs	R93479	Not Prepared
	8270C SIM	SVOCs	71974	Not Prepared
	8270C	SVOCs	71974	Not Prepared
	8270C SIM	SVOCs	72036	Not Prepared
	8270C	SVOCs	72036	Not Prepared
	8270C SIM	SVOCs	R93333	Not Prepared
Not Pred	ared – Matrix spikes	were not prepared/reported for this batch	).	

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VALIDATION CRITERIA CHECKLIST	
14. For MS/MSDs prepared from project samples, were percent recoveries and RPDs within data validation or laboratory quality control (QC) limits?	Yes
Comments: The percent recoveries and RPDs for MS/MSDs prepared from project samples were within data validation and laboratory QC limits.	
15. Was the total number of LCSs analyzed equal to at least 5% of the total number of samples or analyzed as required by the method?	Yes
Comments: The total number of LCS and OPR samples analyzed was equal to at least 5% of the total number	umber of samples.
16. Were LCS/LCSD percent recoveries and LCS/LCSD RPDs within data validation or laboratory QC limits?	No

Comments: The LCS, LCSD and OPR percent recoveries and LCS/LCSD RPDs were within data validation and laboratory QC limits, with the following exceptions.

Method	<u>Analyte</u>	<u>Batch</u>	LCS Bosoveru	LCSD Basevonu	LCS/LCSD	LCS/LCSD	RPD QC
	-		Recovery	Recovery			LIIIIIS
200.7	Total Cobalt	71980	57.1%		70-130%		
200.8	Total Antimony	71980	69.4%		70-130%		
200.8	<b>Dissolved Selenium</b>	A93335	214%		70-130%		
8015D	TPH DRO	72049	Acceptable	Acceptable	31.2-125%	22.7%	20%
8270C	Pyrene	71974	Acceptable	Acceptable	61-123%	12.3%	11.8%
8270C	Pyrene	72036	Acceptable	Acceptable	61-123%	17.9%	11.8%
8270C SIM	Naphthalene	72036	Acceptable	Acceptable	15-78.3%	33.3%	31.7%
8270C SIM	1-Methylnaphthalene	72036	Acceptable	Acceptable	15-79.6%	40.0%	31.4\$
8270C SIM	2-Methylnaphthalene	72036	Acceptable	Acceptable	15-78.6%	39.1%	30.5%
8270C SIM	Acenaphthene	72036	Acceptable	Acceptable	15-92%	37.8%	30.5%
8270C SIM	Fluorene	72036	Acceptable	Acceptable	15-96%	31.4%	25.1%

Detections of total cobalt in the associated samples were qualified as J-, and non-detections of total cobalt and total antimony were qualified UJ due to evidence of potential low bias.

The detection of dissolved selenium in sample OW-12A was qualified as J+ due to evidence of potential high bias. Non-detections of dissolved selenium in the associated samples did not require qualification.

The analytes with LCS/LCSD RPD values that were above the QC limit were qualified as J for detections and UJ for non-detections for the associated samples due to evidence of poor precision.

17. Were surrogate recoveries within laboratory QC limits?

No

Comments: Surrogate/extracted internal standard (EIS) recoveries were within QC limits, with the following exceptions.

<u>Method</u>	Surrogate/ EIS	<u>Sample</u>	<u>Surrogate</u> <u>Recovery</u>	QC Limits
8015D	BFB	OW-64	184%	70-130%
8015D	BFB	OW-12A	143%	70-130%
8270C	2-Fluorophenol	OW-12A	0%	15-84.5%
8270C	Phenol-d₅	OW-12A	0%	15-67%
8015D	BFB	DUP-12-7-22	188%	70-130%
537	<sup>13</sup> C <sub>3</sub> PFBA	OW-63	35.9%	50-150%
537	<sup>13</sup> C <sub>8</sub> PFOSA	OW-63	42.2%	50-150%
537	<sup>13</sup> C <sub>8</sub> PFOSA	EB-OW-67	30.2%	50-150%



## VALIDATION CRITERIA CHECKLIST

TPH GRO was detected in the Method 8015D analyses of samples OW-64, OW-12A, and DUP-12-7-22, and these results were assigned J+ qualifiers due to evidence of potential high bias.

Since Method 8270C and 8270C SIM surrogate associations were not available from the laboratory, qualification was assigned to all of the target analytes in a given fraction (acid or base/neutral) when two or more surrogates from the same fraction (acid or base/neutral) were outside the acceptance range.

Since at least 2 of 3 surrogates were recovered below 10%, the associated analytes that were not detected in the acid fraction of sample OW-12A were qualified as R to indicate rejected (not usable) data based on evidence of extreme low bias. The analyte 2,4-dimethylphenol was detected in sample OW-12A, and this result was qualified as J- due to evidence of potential low bias.

PFBA and PFOSA associated with EIS <sup>13</sup>C<sub>3</sub> PFBA and <sup>13</sup>C<sub>8</sub> PFOSA recoveries between 20% and 50% were qualified as J+ for detections and UJ for non-detections due to the non-conforming EIS recoveries.

The TPH DRO and TPH MRO results for samples OW-12A and OW-57 were not qualified based on the surrogate nonconformances in the Method 8015D analyses since the applied dilution of 10 times resulted in surrogate concentrations below routinely calibrated levels, and those results were deemed unreliable and possibly inaccurate.

Qualification of sample data was not required based on surrogate/EIS non-conformances in QC samples as the environmental samples were evaluated based on their specific surrogate recoveries.

18. Were the number of trip blank, field blank, and/or equipment blank samples collected equal to at least 10% of the total number of samples or as required by the project guidelines, QAPP, SAP, or permit?

Comments: The number of trip, field, and equipment blanks collected was equal to at least 10% of the number of samples. One trip blank sample, Trip Blank, one field blank sample, FB-12-7-22, and two equipment blank samples, EB-12-7-22 and EB-OW-67, were collected as part of this sample set.

19. Were target analytes reported as not detected in the trip blank, field blank, and/or equipment blank samples?

Comments: Target analytes were not detected in the trip blank, field blank, and equipment blank samples with the following exceptions.

Blank Sample ID	<u>Method</u>	Analyte	<u>Concentration</u>
EB-12-7-22	200.7	Dissolved Zinc	0.0065 mg/L
EB-12-7-22	245.1	Total Mercury	0.000095 mg/L
EB-12-7-22	8015D	TPH DRO	0.035 mg/L

Detections of dissolved zinc and total mercury in the associated samples that were less than the blank results and/or less than the applicable reporting limits were assigned U qualifiers. Detections of dissolved zinc and total mercury in the associated samples that were greater than the reporting limits but less than or equal to 10 times the blank results were assigned JB qualifiers. Non-detections of the identified analytes in the associated samples did not require qualification.

The TPH DRO results for the samples in batches 71994 and 72049 were previously qualified due to a laboratory blank detection; therefore, additional qualification due to the equipment blank contamination was not required.

20. Was the number of field duplicates collected equal to at least 10% of the total number of samples or as required by the project guidelines, QAPP, SAP, or permit?

Yes

Yes

No

Comments: The number of field duplicates collected was equal to at least 10% of the number of samples.

Sample DUP-12-7-22 was collected as a field duplicate of sample OW-64.



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VALIDATION CRITERIA CHECKLIST	
21. Were field duplicate RPD values within data validation QC limits (soil 0-50%, water 0-30%, or air 0-25%)?	Yes
Comments: As indicated in the Field Duplicate Summary Table at the end of this report, field duplicate R within data validation QC limits of 0-30% for water samples.	PD values were
22. For laboratory duplicates prepared from project samples, were RPDs within data validation or laboratory QC limits?	N/A
Comments: Laboratory duplicates were prepared for the analysis of cyanide in batch WG1974296 from a associated with this data set and sample OW-12A.	a sample not
The RPD for the laboratory duplicate prepared from a project sample could not be calculated because bo were reported as not detected.	th measurements
The RPD value for the laboratory duplicate sample prepared from a non-project sample was evaluated an data were not qualified based on these results since matrix similarity to project samples could not be gua	nd considered, but ranteed.
23. Were the following data relationships realistic?	
<ul> <li>Target analytes were reported by more than one method (e.g., 8260/8270, EPH/8270)?</li> </ul>	N/A
Comments: Target analytes were not reported by more than one method.	
<ul> <li>Both total and dissolved metals analyses were performed, and the total metals results were greater than or equal to the dissolved metals results?</li> </ul>	No
Comments: The following table contains the exceptions in which the dissolved metals results exceeded t results.	he total metals

Sample ID	<u>Analyte</u>	<u>Total Result</u> (mg/L)	Dissolved Result (mg/L)
OW-12A	Antimony	ND	0.0010
OW-57	Antimony	ND	0.0023
OW-64	Arsenic	0.0022	0.0025
OW-12	Arsenic	0.0015	0.0018
OW-12	Barium	0.019	0.020
OW-12	Lead	ND	0.000071
OW-12A	Nickel	ND	0.0055
OW-12A	Selenium	0.0016	0.0020
OW-12A	Silver	ND	0.0020
OW-57	Silver	ND	0.0016
OW-12	Vanadium	0.012	0.013
EB-12-7-22	Zinc	ND	0.0065
OW-12	Zinc	ND	0.011
OW-12A	Zinc	0.0056	0.0080
OW-63	Zinc	ND	0.0093
DUP-12-7-22	Zinc	ND	0.016

The EPA has not provided guidance or requirements for the evaluation, validation, and qualification of dissolved metals results that exceed the corresponding total metals results. Therefore, qualification of results was not performed based on these data.



Client Sample ID: OW-64 Field Duplicate Sample ID: DUP-12-7-22				
Analyte	Method	Laboratory Result	Duplicate Result	Relative Percent Difference (RPD)
Barium, Dissolved	E 200.7	0.29 mg/L	0.30 mg/L	3.4%
Barium, Total	E 200.7	0.30 mg/L	0.31 mg/L	3.3%
Vanadium, Dissolved	E 200.7	0.0048 mg/L	0.0052 mg/L	8.0% +/-RL
Vanadium, Total	E 200.7	0.0058 mg/L	0.0056 mg/L	3.5% +/-RL
Zinc, Dissolved	E 200.7	ND (0.010 mg/L)	0.016 mg/L	DL
Arsenic, Dissolved	E200.8	0.0025 mg/L	0.0019 mg/L	27.3%
Arsenic, Total	E200.8	0.0022 mg/L	0.0022 mg/L	0.0%
Lead, Dissolved	E200.8	0.000087 mg/L	0.000060 mg/L	36.7% +/-RL
Lead, Total	E200.8	0.00036 mg/L	0.00032 mg/L	11.8% +/-RL
Selenium, Total	E200.8	0.0010 mg/L	ND (0.0010 mg/L)	DL
TPH DRO	SW8015	0.54 mg/L	0.50 mg/L	7.7%
TPH GRO	SW8015	0.47 mg/L	0.46 mg/L	2.2%
1,2,4-Trimethylbenzene	SW8260B	33 µg/L	33 µg/L	0.0%
1,3,5-Trimethylbenzene	SW8260B	1.7 μg/L	1.7 μg/L	0.0% +/-RL
Benzene	SW8260B	5.0 μg/L	4.9 µg/L	2.0%
Ethylbenzene	SW8260B	20 µg/L	20 µg/L	0.0%
lsopropylbenzene	SW8260B	5.1 μg/L	5.3 µg/L	3.8%
n-Propylbenzene	SW8260B	2.4 µg/L	2.3 µg/L	4.3%
p-Isopropyltoluene	SW8260B	0.95 µg/L	1.0 µg/L	5.1% +/-RL
sec-Butylbenzene	SW8260B	1.8 µg/L	2.0 µg/L	10.5% +/-RL
Xylenes, Total	SW8260B	2.7 μg/L	2.4 µg/L	11.8% +/-RL
1-Methylnaphthalene	SW8270C	0.76 µg/L	0.92 µg/L	19.0%
2-Methylnaphthalene	SW8270C	0.16 µg/L	ND (0.30 µg/L)	DL
Acenaphthene	SW8270C	ND (0.30 µg/L)	0.18 µg/L	DL
Anthracene	SW8270C	0.20 µg/L	0.20 µg/L	0.0% +/-RL
Fluoranthene	SW8270C	0.48 µg/L	0.58 µg/L	18.9% +/-RL
Fluorene	SW8270C	0.22 µg/L	0.28 µg/L	24.0% +/-RL
Naphthalene	SW8270C	0.94 µg/L	1.2 µg/L	24.3%
Phenanthrene	SW8270C	0.44 µg/L	0.52 µg/L	16.7% +/-RL
Pyrene	SW8270C	0.34 µg/L	0.46 µg/L	30.0% +/-RL

#### FIELD DUPLICATE SUMMARY

Field duplicate RPD control limits are not to exceed 30% for water as established by USEPA Region I - New England Environmental Data Review Supplement for Region 1 Data Review Elements and Superfund Specific Guidance/Procedures, EQADR-Supplement2, September 2020.

DL – Indicates that the analyte was detected in one of the duplicate samples and was undetected in the other sample, and therefore an RPD could not be calculated. Data were not qualified since the detection was within two times the reporting limit. Non-detected results are indicated above with the applicable reporting limit as ND (RL).

+/-RL – Indicates that the detections in both of the samples were within two times the reporting limit. Qualification of data was not required.



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## DATA QUALIFICATION SUMMARY

Abbreviation	Reason
EBD	Equipment blank detection
ERPD-LCS	The LCS/LCSD RPD exceeded the upper acceptable limit indicating poor precision.
HR-LCS	The LCS and/or LCSD percent recovery was greater than the upper acceptable limit indicating a possible high bias.
HR-SUR	The surrogate percent recovery was greater than the upper acceptable limit indicating a possible high bias.
LR-EIS	The extracted internal standard (EIS) recovery was less than the lower acceptance limit.
LR-LCS	The LCS and/or LCSD percent recovery was less than the lower acceptable limit indicating a possible low bias.
LR-SUR	The surrogate percent recovery was less than the lower acceptable limit indicating a possible low bias.
MBD	Method blank detection
MDLRL	Flagged by the laboratory: The result was greater than the MDL but less than the RL.

Analyte	Method	Field Sample ID	Lab Sample ID	Result	Limit	Units	Reviewer Qualifier	DV Flag Reasons
1,3,5-Trimethylbenzene	SW8260B	OW-12	2212442-003a	0.69	1.0	µg/L	J	MDLRL
1,3,5-Trimethylbenzene	SW8260B	DUP-12-7-22	2212442-007a	1.7	2.0	µg/L	J	MDLRL
1-Methylnaphthalene	SW8270C	OW-12A	2212442-004c	1.3	0.30	µg/L	J	ERPD-LCS
1-Methylnaphthalene	SW8270C	OW-63	2212442-005c	41	5.0	µg/L	J	ERPD-LCS
1-Methylnaphthalene	SW8270C	OW-57	2212442-006c	58	5.0	µg/L	J	ERPD-LCS
1-Methylnaphthalene	SW8270C	DUP-12-7-22	2212442-007c	0.92	0.30	µg/L	J	ERPD-LCS
2,4,6-Trichlorophenol	SW8270C	OW-12A	2212442-004c	ND	10	µg/L	R	LR-SUR
2,4-Dimethylphenol	SW8270C	OW-12A	2212442-004c	7.2	10	µg/L	J-	LR-SUR, MDLRL
2,4-Dinitrophenol	SW8270C	OW-12A	2212442-004c	ND	20	µg/L	R	LR-SUR
2-Methylnaphthalene	SW8270C	OW-64	2212442-002c	0.16	0.30	µg/L	J	MDLRL
2-Methylnaphthalene	SW8270C	OW-12A	2212442-004c	0.68	0.30	µg/L	J	ERPD-LCS
2-Methylnaphthalene	SW8270C	OW-63	2212442-005c	58	5.0.	µg/L	J	ERPD-LCS
2-Methylnaphthalene	SW8270C	OW-57	2212442-006c	37	50	µg/L	J	ERPD-LCS



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Analyte	Method	Field Sample ID	Lab Sample ID	Result	Limit	Units	Reviewer Qualifier	DV Flag Reasons
2-Methylnaphthalene	SW8270C	DUP-12-7-22	2212442-007c	ND	0.300	µg/L	UJ	ERPD-LCS
2-Methylphenol	SW8270C	OW-12A	2212442-004c	ND	10	µg/L	R	LR-SUR
3,4-Methylphenol	SW8270C	OW-12A	2212442-004c	ND	10	µg/L	R	LR-SUR
Acenaphthene	SW8270C	OW-63	2212442-005C	0.74	0.30	µg/L	J	ERPD-LCS
Acenaphthene	SW8270C	OW-12A	2212442-004c	ND	0.30	µg/L	UJ	ERPD-LCS
Acenaphthene	SW8270C	DUP-12-7-22	2212442-007c	0.18	0.30	µg/L	J	ERPD-LCS, MDLRL
Anthracene	SW8270C	OW-64	2212442-002c	0.20	0.30	µg/L	J	MDLRL
Anthracene	SW8270C	OW-63	2212442-005C	0.18	0.30	µg/L	J	MDLRL
Anthracene	SW8270C	OW-57	2212442-006C	0.22	0.30	µg/L	J	MDLRL
Anthracene	SW8270C	DUP-12-7-22	2212442-007c	0.20	0.30	µg/L	J	MDLRL
Antimony, Dissolved	E200.8	OW-57	2212442-006E	0.0023	0.0050	mg/L	J	MDLRL
Antimony, Total	E200.8	EB-12-7-22	2212442-001D	ND	0.0010	mg/L	UJ	LR-LCS
Antimony, Total	E200.8	OW-64	2212442-002D	ND	0.0010	mg/L	UJ	LR-LCS
Antimony, Total	E200.8	OW-12	2212442-003D	ND	0.0010	mg/L	UJ	LR-LCS
Antimony, Total	E200.8	OW-12A	2212442-004D	ND	0.0010	mg/L	UJ	LR-LCS
Antimony, Total	E200.8	OW-63	2212442-005D	ND	0.0010	mg/L	UJ	LR-LCS
Antimony, Total	E200.8	OW-57	2212442-006D	ND	0.0010	mg/L	UJ	LR-LCS
Antimony, Total	E200.8	DUP-12-7-22	2212442-007D	ND	0.0010	mg/L	UJ	LR-LCS
Arsenic, Dissolved	E200.8	OW-57	2212442-006E	0.0020	0.0050	mg/L	J	MDLRL
Arsenic, Dissolved	E200.8	DUP-12-7-22	2212442-007E	0.0019	0.0050	mg/L	J	MDLRL
Benzoic Acid	SW8270C	OW-12A	2212442-004c	ND	20	µg/L	R	LR-SUR
Cobalt, Total	E 200.7	OW-57	2212442-006D	0.058	0.0060	mg/L	J-	LR-LCS
Cobalt, Total	E 200.7	EB-12-7-22	2212442-001D	ND	0.0060	mg/L	UJ	LR-LCS
Cobalt, Total	E 200.7	OW-64	2212442-002D	ND	0.0060	mg/L	UJ	LR-LCS
Cobalt, Total	E 200.7	OW-12	2212442-003D	ND	0.0060	mg/L	UJ	LR-LCS
Cobalt, Total	E 200.7	DUP-12-7-22	2212442-007D	ND	0.0060	mg/L	UJ	LR-LCS
Cobalt, Total	E 200.7	OW-12A	2212442-004D	0.017	0.0060	mg/L	JB	MBD, LR-LCS



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Analyte	Method	Field Sample ID	Lab Sample ID	Result	Limit	Units	Reviewer Qualifier	DV Flag Reasons
Cobalt, Total	E 200.7	OW-63	2212442-005D	0.013	0.0060	mg/L	JB	MBD, LR-LCS
Fluoranthene	SW8270C	OW-57	2212442-006C	0.14	0.30	µg/L	J	MDLRL
Fluorene	SW8270C	OW-64	2212442-002c	0.22	0.30	µg/L	J	MDLRL
Fluorene	SW8270C	OW-63	2212442-005C	1.3	0.30	µg/L	J	ERPD-LCS
Fluorene	SW8270C	OW-12A	2212442-004c	0.12	0.30	µg/L	J	ERPD-LCS, MDLRL
Fluorene	SW8270C	DUP-12-7-22	2212442-007c	0.28	0.30	µg/L	J	ERPD-LCS, MDLRL
Lead, Dissolved	E200.8	OW-64	2212442-002E	0.000087	0.00050	mg/L	J	MDLRL
Lead, Dissolved	E200.8	OW-12	2212442-003E	0.000071	0.00050	mg/L	J	MDLRL
Lead, Dissolved	E200.8	DUP-12-7-22	2212442-007E	0.00006	0.00050	mg/L	J	MDLRL
Lead, Total	E200.8	OW-64	2212442-002D	0.00036	0.00050	mg/L	J	MDLRL
Lead, Total	E200.8	DUP-12-7-22	2212442-007D	0.00032	0.00050	mg/L	J	MDLRL
Mercury, Dissolved	E245.1	OW-12	2212442-003E	0.00013	0.00020	mg/L	J	MDLRL
Mercury, Dissolved	E245.1	OW-57	2212442-006E	0.00011	0.00020	mg/L	J	MDLRL
Mercury, Total	E245.1	OW-57	2212442-006D	0.00031	0.00020	mg/L	JB	EBD
Mercury, Total	E245.1	OW-12	2212442-003D	0.00013	0.00020	mg/L	U	EBD, MDLRL
Mercury, Total	E245.1	EB-12-7-22	2212442-001D	0.000095	0.00020	mg/L	J	MDLRL
Naphthalene	SW8270C	OW-12A	2212442-004c	3.4	0.30	µg/L	J	ERPD-LCS
Naphthalene	SW8270C	OW-63	2212442-005c	140	5.0	µg/L	J	ERPD-LCS
Naphthalene	SW8270C	OW-57	2212442-006c	81	5.0	µg/L	J	ERPD-LCS
Naphthalene	SW8270C	DUP-12-7-22	2212442-007c	1.2	0.30	µg/L	J	ERPD-LCS
Nickel, Dissolved	E 200.7	OW-12A	2212442-004E	0.0055	0.010	mg/L	J	MDLRL
n-Propylbenzene	SW8260B	OW-57	2212442-006a	41	50	µg/L	J	MDLRL
Perfluorobutanoic acid (PFBA)	EPA 537.1	OW-63	2212442-005G	140	2.03	ng/L	J+	LR-EIS
Perfluorooctane Sulfonamide (FOSA)	EPA 537.1	OW-63	2212442-005G	ND	2.03	ng/L	UJ	LR-EIS
Perfluorooctane Sulfonamide (FOSA)	EPA 537.1	EB-OW-67	2212442-009a	ND	1.94	ng/L	UJ	LR-EIS



Analyte	Method	Field Sample ID	Lab Sample ID	Result	Limit	Units	Reviewer Qualifier	DV Flag Reasons
Phenol	SW8270C	OW-12A	2212442-004c	ND	20	µg/L	R	LR-SUR
p-Isopropyltoluene	SW8260B	OW-64	2212442-002a	0.95	1.0	µg/L	J	MDLRL
p-Isopropyltoluene	SW8260B	DUP-12-7-22	2212442-007a	1.0	2.0	µg/L	J	MDLRL
Pyrene	SW8270C	EB-12-7-22	2212442-001c	ND	1.0	µg/L	UJ	ERPD-LCS
Pyrene	SW8270C	OW-12	2212442-003c	ND	1.0	µg/L	UJ	ERPD-LCS
Pyrene	SW8270C	OW-12A	2212442-004c	ND	1.0	µg/L	UJ	ERPD-LCS
Pyrene	SW8270C	OW-63	2212442-005C	ND	1.0	µg/L	UJ	ERPD-LCS
Pyrene	SW8270C	OW-64	2212442-002c	0.34	1.0	µg/L	J	ERPD-LCS, MDLRL
Pyrene	SW8270C	DUP-12-7-22	2212442-007c	0.46	1.0	µg/L	J	ERPD-LCS, MDLRL
Selenium, Dissolved	E200.8	OW-12A	2212442-004E	0.0020	0.0010	mg/L	J+	HR-LCS
Silver, Dissolved	E 200.7	OW-12A	2212442-004E	0.0020	0.0050	mg/L	J	MDLRL
Silver, Dissolved	E 200.7	OW-57	2212442-006E	0.0016	0.0050	mg/L	J	MDLRL
Toluene	SW8260B	OW-63	2212442-005a	42	50	µg/L	J	MDLRL
Toluene	SW8260B	OW-57	2212442-006a	27	50	µg/L	J	MDLRL
TPH DRO	SW8015	OW-64	2212442-002C	0.54	0.064	mg/L	JB	MBD
TPH DRO	SW8015	DUP-12-7-22	2212442-007C	0.50	0.064	mg/L	JB	ERPD-LCS, MBD
TPH DRO	SW8015	EB-12-7-22	2212442-001C	0.035	0.064	mg/L	U	MBD, MDLRL
TPH DRO	SW8015	OW-12	2212442-003C	0.022	0.064	mg/L	U	MBD, MDLRL
TPH DRO	SW8015	OW-63	2212442-005C	2.8	0.064	mg/L	J	ERPD-LCS
TPH DRO	SW8015	OW-57	2212442-006C	5.0	0.64	mg/L	J	ERPD-LCS
TPH GRO	SW8015	OW-64	2212442-002a	0.47	0.050	mg/L	J+	HR-SUR
TPH GRO	SW8015	OW-12A	2212442-004a	14	2.5	mg/L	J+	HR-SUR
TPH GRO	SW8015	DUP-12-7-22	2212442-007a	0.46	0.050	mg/L	J+	HR-SUR
TPH ORO	SW8015	OW-63	2212442-005C	ND	0.080	mg/L	UJ	ERPD-LCS
TPH ORO	SW8015	OW-57	2212442-006C	ND	0.80	mg/L	UJ	ERPD-LCS
TPH ORO	SW8015	DUP-12-7-22	2212442-007C	ND	0.080	mg/L	UJ	ERPD-LCS
Vanadium, Dissolved	E 200.7	OW-64	2212442-002E	0.0048	0.050	mg/L	J	MDLRL



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Analyte	Method	Field Sample ID	Lab Sample ID	Result	Limit	Units	Reviewer Qualifier	DV Flag Reasons
Vanadium, Dissolved	E 200.7	OW-12	2212442-003E	0.013	0.050	mg/L	J	MDLRL
Vanadium, Dissolved	E 200.7	OW-57	2212442-006E	0.0030	0.050	mg/L	J	MDLRL
Vanadium, Dissolved	E 200.7	DUP-12-7-22	2212442-007E	0.0052	0.050	mg/L	J	MDLRL
Vanadium, Total	E 200.7	OW-64	2212442-002D	0.0058	0.050	mg/L	J	MDLRL
Vanadium, Total	E 200.7	OW-12	2212442-003D	0.012	0.050	mg/L	J	MDLRL
Vanadium, Total	E 200.7	DUP-12-7-22	2212442-007D	0.0056	0.050	mg/L	J	MDLRL
Xylenes, Total	SW8260B	DUP-12-7-22	2212442-007a	2.4	3.0	µg/L	J	MDLRL
Zinc, Dissolved	E 200.7	OW-12	2212442-003E	0.011	0.010	mg/L	JB	EBD
Zinc, Dissolved	E 200.7	DUP-12-7-22	2212442-007E	0.016	0.010	mg/L	JB	EBD
Zinc, Dissolved	E 200.7	OW-12A	2212442-004E	0.0080	0.010	mg/L	U	EBD, MDLRL
Zinc, Dissolved	E 200.7	OW-63	2212442-005E	0.0093	0.010	mg/L	U	EBD, MDLRL
Zinc, Dissolved	E 200.7	OW-57	2212442-006E	0.0099	0.010	mg/L	U	EBD, MDLRL
Zinc, Dissolved	E 200.7	EB-12-7-22	2212442-001E	0.0065	0.010	mg/L	J	MDLRL
Zinc, Total	E 200.7	OW-12A	2212442-004D	0.0056	0.010	mg/L	J	MDLRL



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Client: Marathon Oil	Laboratory: Hall Environmental Analysis Laboratory				
Project Name: Western Refining Southwest, Quarterly GW	Sample Matrix: Groundwater				
Project Number: 697-080-002 Task: 0006	Sample Start Date: 12/08/2022				
Date Validated: 01/30/2023	Sample End Date: 12/08/2022				
Parameters Included:					
<ul> <li>Volatile Organic Compounds (VOC) by Environmental Pro Waste (SW-846) Method 8260B</li> </ul>	otection Agency (EPA) Test Methods for Evaluating Solid				
<ul> <li>1,2-Dibromoethane (EDB) by EPA Method 504.1</li> </ul>					
<ul> <li>Semivolatile Organic Compounds (SVOC) by SW-846 Me Monitoring (SIM)</li> </ul>	thod 8270C and Method 8270C with Selected Ion				
<ul> <li>Total Petroleum Hydrocarbons (TPH) Gasoline Range Or</li> </ul>	ganics (GRO) by SW-846 Method 8015D				
<ul> <li>TPH Diesel Range Organics (DRO) and Motor Oil Range</li> </ul>	Organics (MRO) by SW-846 Method 8015D Modified				
<ul> <li>Total and Dissolved Metals by EPA Method 200.7 and Method</li> </ul>	ethod 200.8				
<ul> <li>Total and Dissolved Mercury by EPA Method 245.1</li> </ul>					
<ul> <li>Cyanide by Standard Methods for the Examination of Water</li> </ul>	ter and Wastewater (SM) Method 4500 CN E				
Laboratory Project ID: 2212630					
Data Validator: Daran O'Hollearn, Lead Project Scientist					
Reviewer: Charles Ballek, Senior Chemist					

## DATA EVALUATION CRITERIA SUMMARY

A Tier II Data Validation was performed by Trihydro Corporation's Chemical Data Evaluation Services Group on the analytical data report packages generated by Hall Environmental Analysis Laboratory of Albuquerque, New Mexico, with additional data from Pace Analytical National of Mount Juliet, Tennessee evaluating samples from the Marathon Oil site, located in Gallup, New Mexico.

Precision, accuracy, method compliance, and completeness of this data package were assessed during this data review. Precision was determined by evaluating the calculated relative percent difference (RPD) values from:

- Field duplicate pairs
- Laboratory duplicate pairs
- Matrix spike (MS) and matrix spike duplicate (MSD) pairs
- Laboratory control sample (LCS) and laboratory control sample duplicate (LCSD) pairs

Laboratory accuracy was established by reviewing the demonstrated percent recoveries (%R) of the following items to verify that data are not biased.

- MS/MSD samples
- LCS/LCSD samples
- Organic system monitoring compounds (surrogates)



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Field accuracy was established by collecting and analyzing the following samples to monitor for possible ambient or cross contamination during sampling and transportation.

- Trip blanks
- Field blanks
- Equipment blanks

Method compliance was established by reviewing sample integrity, holding times, detection limits, surrogate recoveries, laboratory blanks, initial and continuing calibrations (where applicable), and the LCS/LCSD percent recoveries against method-specific requirements.

Completeness was evaluated by determining the overall ratio of the number of samples and analyses planned versus the number of samples with valid analyses. Determination of completeness included a review of the chain-of-custody (CoC), laboratory analytical methods, and other laboratory and field documents associated with this analytical data set.

Client Sample ID	Laboratory Sample Number
EB-12-8-22	2212630-001
MKTF-40	2212630-002
MKTF-31	2212630-003
MKTF-27	2212630-004
MKTF-28	2212630-005
MKTF-29	2212630-006
DUP 12-8-22	2212630-007
FB-12-8-22	2212630-008
Trip Blank	2212630-009

#### SAMPLE NUMBERS TABLE





The laboratory data were reviewed to evaluate compliance with the methods and the quality of the reported data. Assessment of CoC completeness is included in Item 3 of the Data Validation Checklist. A check mark ( $\checkmark$ ) indicates that the referenced validation criteria were deemed acceptable, whereas a crossed circle ( $\otimes$ ) indicates validation criteria for which the data have been qualified by the data validator. An empty circle (O) indicates that the specified criterion does not apply to the reviewed data. Details are noted in the tables below.

#### Validation Criteria

- ✓ Data Completeness
- ✓ CoC Documentation (Item 3)
- ✓ Holding Times and Preservation (Items 6 and 7)
- O Initial and Continuing Calibrations (Items 9 and 10)
- ⊗ Laboratory Blanks (Items 11 and 12)
- ✓ MS/MSD (Items 13 and 14)
- ⊗ LCS/LCSD (Items 15 and 16)
- System Monitoring Compounds (i.e., Surrogates) (Item 17)
- ✓ Field, Equipment, and Trip Blanks (Items 18 and 19)
- ⊗ Field Duplicates (Items 20 and 21)
- ✓ Laboratory Duplicates (Item 22)

## **Guidance References**

Chemical data validation was conducted in accordance with the United States Environmental Protection Agency (USEPA) Contract Laboratory Program (CLP) National Functional Guidelines for the analyses listed below, or by the appropriate method if not covered in the National Functional Guidelines.

- Data for organic analyses were evaluated according to validation criteria set forth in the USEPA CLP National Functional Guidelines for Organic Superfund Methods Data Review, document number EPA-540-R-20-005, November 2020 with additional reference to the USEPA CLP National Functional Guidelines for Organic Data Review, document number EPA 540/R-99/008, October 1999.
- Data for inorganic analyses were evaluated according to validation criteria set forth in the USEPA CLP National Functional Guidelines for Inorganic Superfund Methods Data Review, document number EPA-540-R-20-006, November 2020 with additional reference to the USEPA CLP National Functional Guidelines for Inorganic Data Review, document number EPA 540-R-04-004, October 2004.
- Review of field duplicates was conducted according to the USEPA Region I New England Environmental Data Review Supplement for Region 1 Data Review Elements and Superfund Specific Guidance/Procedures, EQADR-Supplement2, September 2020.
- Trihydro Data Validation Variance Documentation, April 2022.





## **OVERALL DATA PACKAGE ASSESSMENT**

Based on a data validation review, the data are acceptable as delivered. Data qualified by the laboratory are discussed in Item 2 of the Validation Criteria Checklist.

The purpose of validating data and assigning qualifiers is to assist in proper data interpretation. Data that are not qualified meet the site data quality objectives. If values are assigned qualifiers other than an R (rejected, data not usable), the data may be used for site evaluation; however, consideration should be given to the reasons for qualification when interpreting sample concentrations. Data points that are assigned an R qualifier should not be used for site evaluation purposes.

If applicable, text was identified in **bold font** in the Validation Criteria Checklist to indicate that further action and/or qualification of the data were required. Data may have been qualified with J data flags by the laboratory if the result was greater than or equal to the method detection limit (MDL) but less than the reporting limit (RL). These laboratory-applied J flags were preserved, if present, and included in the Data Qualification Summary table at the end of this report. If applicable, data validation qualifiers were added for the items noted with crossed circles in the Validation Criteria section above. Please see the Data Qualification Summary table at the end of this report.

If data would be qualified with more than one flag, one qualifier was assigned based on the severity; however, all reasons for qualification were retained. Data that would be qualified with both J+ and J- flags were evaluated based on validation criteria and assigned the appropriate flag. The hierarchy of qualifiers from the most to least severe is as follows:

Data qualifiers used during this validation are included in the following table.

<u>Qualifier</u>	Definition
J	Estimated concentration
J+	The result is an estimated concentration, but may be biased high
UJ	Estimated reporting limit
U	Evaluated to be undetected at the reporting limit
JB	Estimated concentration due to blank contamination
R	Rejected, data not usable

#### **Data Completeness**

The analyses were performed as requested on the CoC records. The associated samples were received by the laboratory and analyzed properly unless otherwise noted in the Criteria Checklist below. The complete data package consisted of 540 data points. The data completeness calculation does not include any submitted blank sample results. Fourteen data points were rejected. The data completeness measure for this data package is calculated to be 97.41% and is acceptable.



		VALIDATION	CRITERIA CHECKLIST					
1. Was the r	eport free of	non-conformances identified	by the laboratory?	No				
Comments: T	he laboratory	noted the following analytica	I non-conformances related to this data	a set.				
<u>Method 8015D</u> a "B".	<u>Method 8015D DRO/MRO</u> : The method blank had a low-level detection for DRO. Samples with detections are flagged with a "B".							
2. Were the If no, defi	data free of c ne.	lata qualification flags and/or	notes used by the laboratory?	No				
Comments: T	he laboratory	used the following data quali	fication flags with this data set.					
B – Analyte de	tected in the	associated method blank.						
J – Analyte de	tected below	quantitation limits.						
P1 – RPD valu	ie not applica	able for sample concentrations	s less than 5 times the reporting limit.					
R – % RPD ou	Itside of rang	e.						
S – % Recove	ry outside of	range due to dilution or matri	x interference.					
* – Value exce	eds maximu	m contaminant level.						
3. Were sam	ple CoC forr	ns and custody procedures co	omplete?	Yes				
Comments: The CoC records from field to laboratory were complete, and custody was maintained as evidenced by field and laboratory personnel signatures, dates, and times of receipt. Custody seals were not present because the samples were transferred to a laboratory field courier service for transport from the field to the laboratory, and custody was maintained at all times.								
4. Were detection limits in accordance with the quality assurance project plan (QAPP), Yes permit, or method, or indicated as acceptable?								
Comments: T	he detection	limits appeared to be accepta	ble. The following dilutions were appl	ied.				
	<u>Method</u>	<u>Sample(s)</u>	<u>Analyte(s)</u>	Dilution Factor				
	8260B	MKTF-31	Select VOCs	2				
	200.8	Multiple Samples	Select Total and Dissolved Metals	5				
	8270C	MKTF-31	1,4-Dioxane	10				
	8260B	MKTF-31	МТВЕ	20				
	200.8	MKTF-28	Dissolved Selenium	50				
Dissolved sele remaining diss dissolved sele	nium was no olved metals nium from thi	t detected in sample MKTF-2 at no dilution and a dilution o s dilution rather than analyse	8 at a dilution of 50 times. The sample f 5. The laboratory did not specify the s performed at lower dilutions with low	e was analyzed reason for repo er detection lim	for the orting its.			
5. Were the QAPP, pe	reported ana rmit, or CoCʻ	lytical methods and constitue ?	nts in compliance with the	No				
Comments: T constituents in	Comments: The reported analytical methods were in compliance with the CoC, and the laboratory reported the requested constituents in accordance with the CoC, with the following exceptions.							
The CoC requested total and dissolved metals using only Method 200.7; however, the laboratory analyzed the samples using both Method 200.7 and Method 200.8. This substituted analytical method, Method 200.8, met similar sensitivity, accuracy, and precision goals and, therefore, was an acceptable replacement.								
The CoC required This substitute replacement.	The CoC requested cyanide using Method 335.4; however, the laboratory analyzed the samples using Method 4500 CN E. This substituted analytical method met similar sensitivity, accuracy, and precision goals and, therefore, was an acceptable replacement.							
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VALIDATION CRITERIA CHECKLIST									
6. Were samples re	6. Were samples received in good condition within method-specified requirements? No								
Comments: Samples recommended tempe List. Samples transfe recommended range	Comments: Samples were received on ice, in good condition, and with the cooler temperatures both within and outside the recommended temperature range of $4^{\circ}C \pm 2^{\circ}C$ at $1.5^{\circ}C$ , $2.1^{\circ}C$ , and $5.0^{\circ}C$ as noted on the CoC and Sample Log-in Check List. Samples transferred to Pace National were received in good condition with the cooler temperature outside the recommended range at $0.6^{\circ}C$ as noted on the CoC.								
as broken or frozen.	as broken or frozen.								
7. Were samples entropy technical holding	xtracted/dige g times?	ested and analyzed within met	thod-specified or		Yes				
Comments: The sam	nples were e	xtracted/digested and analyze	ed within method-	specific holding times.					
8. Were reported u method(s)? Spe	nits appropri cify if wet or	iate for the sample matrix/mat dry units were used for soil.	rices and analytic	al	Yes				
Comments: The resu which were acceptab	ults were rep le for the sa	oorted in concentration units of mple matrix and the analyses	f micrograms per requested.	liter (µg/L) and milligra	ms per liter (mg/L),				
9. Did the laborator	ry provide ar	ny specific initial and/or continu	uing calibration re	sults?	No				
Comments: Initial an	Comments: Initial and continuing calibration data were not included as part of this data set.								
10. If initial and/or co acceptable limits	ontinuing cal	ibration results were provided	, were the results	within	N/A				
Comments: Initial an	d continuing	calibration data were not incl	uded as part of th	iis data set.					
11. Was the total nu the total number	mber of labo of samples	pratory blank samples prepare or analyzed as required by the	d equal to at leas e method?	t 5% of	Yes				
Comments: The tota samples.	I number of	laboratory blank samples prep	pared was equal t	o at least 5% of the to	al number of				
12. Were target ana	lytes reporte	d as not detected in the labora	atory blanks?		No				
Comments: Target a	inalytes were	e reported as not detected in t	he laboratory bla	nks, with the following	exceptions.				
-	Method	Analyte	Batch	Concentration					
	200.7	Total Cadmium	72026	0.016 mg/L	-				
	200.7	<b>Dissolved Barium</b>	B93514	0.0013 mg/L	]				
	200.8	Total Antimony	72026	0.00052 mg/L					
	200.8	Dissolved Antimony	D93335	0.00050 mg/L					
	8015D	TPH DRO	72049	0.080 mg/L	]				
Detections of TPH D	DRO in the a	associated samples that wer	re less than the	blank results and/or I	ess than the				
applicable reporting	g limits were	e assigned U qualifiers. Det s but less than or equal to 1	ections of TPH I	DRO in the associated	d samples that were				
Non-detections of the	greater than the reporting limits but less than or equal to 10 times the blank results were assigned JB qualifiers. Non-detections of the identified analytes in the associated samples and detections that were above the reporting limit and								
greater than ten time	greater than ten times the blank concentration did not require qualification.								



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## VALIDATION CRITERIA CHECKLIST

13. Was the total number of MS samples prepared equal to at least 5% of the total number of samples or analyzed as required by the method?

Yes

Comments: The total number of matrix spike samples prepared was equal to at least 5% of the total number of samples, although MS samples were not prepared/reported for all analyses and/or batches. The matrix spike sample source for each analytical batch in this sample set has been indicated below.

<u>Method</u>	<u>Analytes</u>	<u>Batch</u>	MS Sample Source
200.7	Total Metals	72026	EB-12-8-22, MKTF-40
200.7	Dissolved Metals	B93514	Not Prepared
200.7	Dissolved Metals	B93558	Not Prepared
200.8	Total Metals	72026	Not Prepared
200.8	Dissolved Metals	A93438	Not Prepared
200.8	Dissolved Metals	D93335	EB-12-8-22
245.1	Total and Dissolved Mercury	72201	DUP 12-8-22
504.1	EDB	72190	Not Prepared
4500CN E	Cyanide	WG1974296	Not Associated
8015D	TPH DRO and MRO	72049	Not Prepared
8015D	TPH GRO	A93392	MKTF-40
8260B	VOCs	R93394	Not Prepared
8270C SIM	SVOCs	72036	Not Prepared
8270C	SVOCs	72036	Not Prepared

Not Associated – The MS sample source was not associated with this project.

Not Prepared – Matrix spikes were not prepared/reported for this batch.

14. For MS/MSDs prepared from project samples, were percent recoveries and RPDs within data validation or laboratory quality control (QC) limits?

Yes

Yes

Comments: The percent recoveries and RPDs for MS/MSDs prepared from project samples were within data validation and laboratory QC limits.

The percent recoveries and RPD values for MS/MSDs prepared from non-project samples were evaluated and considered but data were not qualified based on those results since matrix similarity to project samples could not be guaranteed.

15. Was the total number of LCSs analyzed equal to at least 5% of the total number of samples or analyzed as required by the method?

Comments: The total number of LCS samples analyzed was equal to at least 5% of the total number of samples.



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## VALIDATION CRITERIA CHECKLIST

# 16. Were LCS/LCSD percent recoveries and LCS/LCSD RPDs within data validation or laboratory QC limits?

Comments: The LCS and LCSD percent recoveries and LCS/LCSD RPDs were within data validation and laboratory QC limits, with the following exceptions.

<u>Method</u>	Analyte	<u>Batch</u>	<u>LCS</u> <u>Recovery</u>	<u>LCSD</u> <u>Recovery</u>	LCS/LCSD QC Limits	LCS/LCSD RPD	<u>RPD</u> <u>QC</u> <u>Limits</u>
200.7	Total Barium	72026	135%		70-130%		
200.7	Total Chromium	72026	142%		70-130%		
200.7	Total Zinc	72026	146%		70-130%		
200.7	Total Cadmium	72026	484%		70-130%		
200.7	Dissolved Chromium	B93558	65.3%		70-130%		
200.8	Total Antimony	72026	51.2%		70-130%		
200.8	Total Selenium	72026	135%		70-130%		
245.1	Mercury	72201	131%		70-130%		
8015D	TPH DRO	72049	Acceptable	Acceptable	31.2-125%	22.7%	20%
8270C	Pyrene	72036	Acceptable	Acceptable	61-123%	17.9%	11.8%
8270C SIM	Naphthalene	72036	Acceptable	Acceptable	15-78.3%	33.3%	31.7%
8270C SIM	1-Methylnaphthalene	72036	Acceptable	Acceptable	15-79.6%	40.0%	31.4%
8270C SIM	2-Methylnaphthalene	72036	Acceptable	Acceptable	15-78.6%	39.1%	30.5%
8270C SIM	Acenaphthene	72036	Acceptable	Acceptable	15-92%	37.8%	30.5%
8270C SIM	Fluorene	72036	Acceptable	Acceptable	15-96%	31.4%	25.1%

Detections of the identified analytes with LCS recoveries above the QC limits were qualified as J+ in the associated samples due to evidence of potential high bias. Non-detection of these analytes in the associated samples did not require qualification.

Dissolved chromium and total antimony were not detected in the associated samples and the results were qualified as UJ due to evidence of potential low bias,

The results for analytes with LCS/LCSD RPD values that exceeded the QC limits were qualified as J for detections and UJ for non-detections for the associated samples due to evidence of poor precision.

17. Were surrogate recoveries within laboratory QC limits?

No

No

Comments: Surrogate recoveries were within laboratory QC limits, with the following exceptions.

			0 1	
<u>Method</u>	<u>Surrogate</u>	<u>Sample</u>	Surrogate Recovery	QC Limits
8270C	2-Fluorophenol	MKTF-29	1.92%	15-84.5%
8270C	Phenol-d₅	MKTF-29	9.84%	15-67%
8270C	2,4,6-Tribromophenol	MKTF-29	1.62%	15-108%
8270C	2-Fluorophenol	DUP 12-8-22	9.97%	15-84.5%
8270C	2,4,6-Tribromophenol	DUP 12-8-22	2.06%	15-108%

Since Method 8270C surrogate associations were not available from the laboratory, qualification was assigned to all of the target analytes in a given fraction (acid or base/neutral) when two or more surrogates from the same fraction (acid or base/neutral) were outside the acceptance range.

The analytes in the acid fraction of samples MKTF-29 and DUP 12-8-22 were not detected. Since the recoveries for at least 2 of 3 surrogates in samples MKTF-29 and DUP 12-8-22 were less than 10%, these results were qualified as R to indicate rejected (not usable) data based on evidence of extreme low bias.



VALIDATION CRITERIA CHECKLIST							
Qualification of sample data was not required based on surrogate non-conformances in QC samples as the environmental samples were evaluated based on their specific surrogate recoveries.							
18. Were the number of trip blank, field blank, and/or equipment blank samplesYescollected equal to at least 10% of the total number of samples or as required by the project guidelines, QAPP, SAP, or permit?Yes							
Comments: The number of trip, field, and equipment blanks collected was equal to at least 10% of the number of samples One trip blank sample, Trip Blank, one field blank sample, FB-12-8-22, and one equipment blank sample, EB-12-8-22, wer collected as part of this sample set.							
19. Were target analytes reported as not detected in the trip blank, field blank, and/or No equipment blank samples?							
Comments: Target analytes were not detected in the trip blank, field blank, and equipment blank samples with the following exception.							
TPH DRO was detected in the Method 8015D analysis of equipment blank sample EB-12-8-22 at 0.045 mg/L. The TPH DRO results in Method 8015D batch 72049 were previously qualified due to a laboratory blank detection; therefore, additional qualification due to the equipment blank contamination was not required.							
20. Was the number of field duplicates collected equal to at least 10% of the total Yes number of samples or as required by the project guidelines, QAPP, SAP, or permit?							
Comments: The number of field duplicates collected was equal to at least 10% of the number of samples.							
Sample DUP 12-8-22 was collected as a field duplicate of sample MKTF-40.							
21. Were field duplicate RPD values within data validation QC limits (soil 0-50%, water       No         0-30%, or air 0-25%)?       No							
Comments: As indicated in the Field Duplicate Summary Table at the end of this report, field duplicate RPD values were within data validation QC limits of 0-30% for water samples, with the following exceptions.							
RPD values for dissolved barium and total cyanide exceeded the data validation limit of 30% at 30.8% and 34.9%, respectively. The dissolved barium and total cyanide results for samples MKTF-40 and DUP-12-8-22 were assigned J qualifiers due to evidence of poor precision.							
22. For laboratory duplicates prepared from project samples, were RPDs within data N/A validation or laboratory QC limits?							
Comments: Laboratory duplicates were prepared for the analysis of cyanide in batch WG1974296 from samples not associated with this data set.							
The RPD values for the laboratory duplicate samples prepared from non-project samples were evaluated and considered.							

but data were not qualified based on these results since matrix similarity to project samples could not be guaranteed.



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VALIDATION CRITERIA CHECKLIST											
23. Were the following data relationships realistic?											
Target ar EPH/827		Yes									
Comments: Target analytes were not reported by more than one method.											
Both total and dissolved metals analyses were performed, and the total metals     No											
results were greater than or equal to the dissolved metals results?											
Comments: The following table contains the exceptions in which the dissolved metals results exceeded the total metals											
results.											
	Sample ID	Analyte	Total Result	Dissolved Result							
			<u>(mg/L)</u>	<u>(mg/L)</u>							
	MKTF-40	Arsenic	ND	0.0010							
	MKTF-28	Arsenic	0.0034	0.055							
	MKTF-27	Selenium	ND	0.0031							
	MKTF-29	Selenium	ND	0.0027							
	DUP 12-8-22	Selenium	ND	0.0026							
		Silver		0.0016	1						

The EPA has not provided guidance or requirements for the evaluation, validation, and qualification of dissolved metals results that exceed the corresponding total metals results. Therefore, qualification of results was not performed based on these data.

ND

0.0051

0.0020

0.011

Silver

Zinc

MKTF-28

MKTF-40


	CI Field Du	ient Sample ID: MKTF- plicate Sample ID: DUF	40 P-12-8-22	
Analyte	Method	Laboratory Result	Duplicate Result	Relative Percent Difference (RPD)
Barium, Dissolved	E 200.7	0.045 mg/L	0.033 mg/L	30.8%
Barium, Total	E 200.7	0.10 mg/L	0.098 mg/L	2.0%
Beryllium, Total	E 200.7	0.0010 mg/L	ND (0.0020 mg/L)	DL
Chromium, Total	E 200.7	0.0034 mg/L	ND (0.0060 mg/L)	DL
Nickel, Dissolved	E 200.7	0.0096 mg/L	0.0078 mg/L	20.7% +/-RL
Nickel, Total	E 200.7	0.011 mg/L	0.012 mg/L	8.7% +/-RL
Silver, Dissolved	E 200.7	0.0070 mg/L	0.0031 mg/L	77.2% +/-RL
Silver, Total	E 200.7	0.0082 mg/L	0.0083 mg/L	1.2% +/-RL
Vanadium, Dissolved	E 200.7	0.0097 mg/L	0.0075 mg/L	25.6% +/-RL
Vanadium, Total	E 200.7	0.016 mg/L	0.015 mg/L	6.5% +/-RL
Zinc, Dissolved	E 200.7	0.011 mg/L	ND (0.010 mg/L)	DL
Zinc, Total	E 200.7	0.0051 mg/L	ND (0.010 mg/L)	DL
Arsenic, Dissolved	E200.8	0.0010 mg/L	0.00069 mg/L	36.7% +/-RL
Arsenic, Total	E200.8	ND (0.0050 mg/L)	0.0014 mg/L	DL
Lead, Total	E200.8	0.0019 mg/L	0.0018 mg/L	5.4% +/-RL
Selenium, Dissolved	E200.8	ND (0.0050 mg/L)	0.0026 mg/L	DL
Selenium, Total	E200.8	0.0052 mg/L	ND (0.0050 mg/L)	DL
Cyanide, Total	E335.4	0.0115 mg/L	0.00808 mg/L	34.9%
TPH DRO	SW8015D	0.067 mg/L	0.044 mg/L	41.4% +/-RL
1,1-Dichloroethane	SW8260B	1.0 µg/L	1.0 µg/L	0.0% +/-RL
1,4-Dioxane	SW8270C	12 µg/L	11 µg/L	8.7%

#### FIELD DUPLICATE SUMMARY

Field duplicate RPD control limits are not to exceed 30% for water as established by USEPA Region I - New England Environmental Data Review Supplement for Region 1 Data Review Elements and Superfund Specific Guidance/Procedures, EQADR-Supplement2, September 2020.

DL – Indicates that the analyte was detected in one of the duplicate samples and was undetected in the other sample, and therefore an RPD could not be calculated. Data were not qualified since the detection was within two times the reporting limit. Non-detected results are indicated above with the applicable reporting limit as ND (RL).

+/-RL – Indicates that the detections in both of the samples were within two times the reporting limit. Qualification of data was not required.

RPD values for dissolved barium and total cyanide exceeded the data validation limit of 30% at 30.8% and 34.9%, respectively, which was evidence of poor precision. The dissolved barium and total cyanide results were qualified as J for samples MKTF-40 and DUP-12-8-22.



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#### DATA QUALIFICATION SUMMARY

Abbreviation	Reason
ERPD-FD	High field duplicate RPD.
ERPD-LCS	The LCS/LCSD RPD exceeded the upper acceptable limit indicating poor precision.
HR-LCS	The LCS and/or LCSD percent recovery was greater than the upper acceptable limit indicating a possible high bias.
LR-LCS	The LCS and/or LCSD percent recovery was less than the lower acceptable limit indicating a possible low bias.
LR-SUR	The surrogate percent recovery was less than the lower acceptable limit indicating a possible low bias.
MBD	Method blank detection
MDLRL	Flagged by the laboratory: The result was greater than the MDL but less than the RL.

Analyte	Method	Field Sample ID	Lab Sample ID	Result	Limit	Units	Reviewer Qualifier	DV Flag Reasons
1,1-Dichloroethane	SW8260B	MKTF-29	2212630-006a	0.76	1.0	µg/L	J	MDLRL
1,4-Dioxane	SW8270C	MKTF-28	2212630-005c	0.66	1.0	µg/L	J	MDLRL
1-Methylnaphthalene	SW8270C	EB-12-8-22	2212630-001c	ND	0.30	µg/L	UJ	ERPD-LCS
1-Methylnaphthalene	SW8270C	MKTF-40	2212630-002c	ND	0.30	µg/L	UJ	ERPD-LCS
1-Methylnaphthalene	SW8270C	MKTF-27	2212630-004c	ND	0.30	µg/L	UJ	ERPD-LCS
1-Methylnaphthalene	SW8270C	MKTF-28	2212630-005c	ND	0.30	µg/L	UJ	ERPD-LCS
1-Methylnaphthalene	SW8270C	MKTF-29	2212630-006c	ND	0.30	µg/L	UJ	ERPD-LCS
1-Methylnaphthalene	SW8270C	DUP 12-8-22	2212630-007c	ND	0.30	µg/L	UJ	ERPD-LCS
1-Methylnaphthalene	SW8270C	MKTF-31	2212630-003c	0.16	0.30	µg/L	J	ERPD-LCS, MDLRL
2,4,6-Trichlorophenol	SW8270C	MKTF-29	2212630-006c	ND	10	µg/L	R	LR-SUR
2,4,6-Trichlorophenol	SW8270C	DUP 12-8-22	2212630-007c	ND	10	µg/L	R	LR-SUR
2,4-Dimethylphenol	SW8270C	MKTF-29	2212630-006c	ND	10	µg/L	R	LR-SUR
2,4-Dimethylphenol	SW8270C	DUP 12-8-22	2212630-007c	ND	10	µg/L	R	LR-SUR
2,4-Dinitrophenol	SW8270C	MKTF-29	2212630-006c	ND	20	µg/L	R	LR-SUR
2,4-Dinitrophenol	SW8270C	DUP 12-8-22	2212630-007c	ND	20	µg/L	R	LR-SUR



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Analyte	Method	Field Sample ID	Lab Sample ID	Result	Limit	Units	Reviewer Qualifier	DV Flag Reasons
2-Methylnaphthalene	SW8270C	EB-12-8-22	2212630-001c	ND	0.30	µg/L	UJ	ERPD-LCS
2-Methylnaphthalene	SW8270C	MKTF-40	2212630-002c	ND	0.30	µg/L	UJ	ERPD-LCS
2-Methylnaphthalene	SW8270C	MKTF-27	2212630-004c	ND	0.30	µg/L	UJ	ERPD-LCS
2-Methylnaphthalene	SW8270C	MKTF-28	2212630-005c	ND	0.30	µg/L	UJ	ERPD-LCS
2-Methylnaphthalene	SW8270C	MKTF-29	2212630-006c	ND	0.30	µg/L	UJ	ERPD-LCS
2-Methylnaphthalene	SW8270C	DUP 12-8-22	2212630-007c	ND	0.30	µg/L	UJ	ERPD-LCS
2-Methylnaphthalene	SW8270C	MKTF-31	2212630-003c	0.22	0.30	µg/L	J	ERPD-LCS, MDLRL
2-Methylphenol	SW8270C	MKTF-29	2212630-006c	ND	10	µg/L	R	LR-SUR
2-Methylphenol	SW8270C	DUP 12-8-22	2212630-007c	ND	10	µg/L	R	LR-SUR
3,4-Methylphenol	SW8270C	MKTF-29	2212630-006c	ND	10	µg/L	R	LR-SUR
3,4-Methylphenol	SW8270C	DUP 12-8-22	2212630-007c	ND	10	µg/L	R	LR-SUR
Acenaphthene	SW8270C	EB-12-8-22	2212630-001c	ND	0.30	µg/L	UJ	ERPD-LCS
Acenaphthene	SW8270C	MKTF-40	2212630-002c	ND	0.30	µg/L	UJ	ERPD-LCS
Acenaphthene	SW8270C	MKTF-31	2212630-003c	ND	0.30	µg/L	UJ	ERPD-LCS
Acenaphthene	SW8270C	MKTF-27	2212630-004c	ND	0.30	µg/L	UJ	ERPD-LCS
Acenaphthene	SW8270C	MKTF-28	2212630-005c	ND	0.30	µg/L	UJ	ERPD-LCS
Acenaphthene	SW8270C	MKTF-29	2212630-006c	ND	0.30	µg/L	UJ	ERPD-LCS
Acenaphthene	SW8270C	DUP 12-8-22	2212630-007c	ND	0.30	µg/L	UJ	ERPD-LCS
Antimony, Total	E200.8	EB-12-8-22	2212630-001D	ND	0.001	mg/L	UJ	LR-LCS
Antimony, Total	E200.8	MKTF-40	2212630-002D	ND	0.005	mg/L	UJ	LR-LCS
Antimony, Total	E200.8	MKTF-31	2212630-003D	ND	0.001	mg/L	UJ	LR-LCS
Antimony, Total	E200.8	MKTF-27	2212630-004D	ND	0.005	mg/L	UJ	LR-LCS
Antimony, Total	E200.8	MKTF-28	2212630-005D	ND	0.001	mg/L	UJ	LR-LCS
Antimony, Total	E200.8	MKTF-29	2212630-006D	ND	0.001	mg/L	UJ	LR-LCS
Antimony, Total	E200.8	DUP 12-8-22	2212630-007D	ND	0.005	mg/L	UJ	LR-LCS
Arsenic, Dissolved	E200.8	MKTF-40	2212630-002E	0.0010	0.0050	mg/L	J	MDLRL
Arsenic, Dissolved	E200.8	MKTF-31	2212630-003E	0.00068	0.0010	mg/L	J	MDLRL



Analyte	Method	Field Sample ID	Lab Sample ID	Result	Limit	Units	Reviewer Qualifier	DV Flag Reasons
Arsenic, Dissolved	E200.8	DUP 12-8-22	2212630-007E	0.00069	0.0050	mg/L	J	MDLRL
Arsenic, Total	E200.8	MKTF-29	2212630-006D	0.0013	0.0050	mg/L	J	MDLRL
Arsenic, Total	E200.8	DUP 12-8-22	2212630-007D	0.0014	0.0050	mg/L	J	MDLRL
Barium, Dissolved	E 200.7	MKTF-40	2212630-002E	0.045	0.0020	mg/L	J	ERPD-FD
Barium, Dissolved	E 200.7	DUP 12-8-22	2212630-007E	0.033	0.0020	mg/L	J	ERPD-FD
Barium, Total	E 200.7	MKTF-40	2212630-002D	0.10	0.0030	mg/L	J+	HR-LCS
Barium, Total	E 200.7	MKTF-31	2212630-003D	0.73	0.0030	mg/L	J+	HR-LCS
Barium, Total	E 200.7	MKTF-27	2212630-004D	0.087	0.0030	mg/L	J+	HR-LCS
Barium, Total	E 200.7	MKTF-28	2212630-005D	0.19	0.0030	mg/L	J+	HR-LCS
Barium, Total	E 200.7	MKTF-29	2212630-006D	0.31	0.0030	mg/L	J+	HR-LCS
Barium, Total	E 200.7	DUP 12-8-22	2212630-007D	0.098	0.0030	mg/L	J+	HR-LCS
Benzene	SW8260B	MKTF-29	2212630-006a	0.59	1.0	µg/L	J	MDLRL
Benzoic Acid	SW8270C	MKTF-29	2212630-006c	ND	20	µg/L	R	LR-SUR
Benzoic Acid	SW8270C	DUP 12-8-22	2212630-007c	ND	20	µg/L	R	LR-SUR
Beryllium, Total	E 200.7	MKTF-40	2212630-002D	0.0010	0.0020	mg/L	J	MDLRL
Beryllium, Total	E 200.7	MKTF-28	2212630-005D	0.00089	0.0020	mg/L	J	MDLRL
Chromium, Dissolved	E 200.7	MKTF-29	2212630-006E	ND	0.0060	mg/L	UJ	LR-LCS
Chromium, Dissolved	E 200.7	DUP 12-8-22	2212630-007E	ND	0.0060	mg/L	UJ	LR-LCS
Chromium, Total	E 200.7	MKTF-31	2212630-003D	0.030	0.0060	mg/L	J+	HR-LCS
Chromium, Total	E 200.7	MKTF-40	2212630-002D	0.0034	0.0060	mg/L	J+	HR-LCS, MDLRL
Chromium, Total	E 200.7	MKTF-28	2212630-005D	0.0028	0.0060	mg/L	J+	HR-LCS, MDLRL
Cobalt, Total	E 200.7	MKTF-28	2212630-005D	0.0038	0.0060	mg/L	J	MDLRL
Cyanide, Total	E335.4	MKTF-40	2212630-002F	0.0115	0.0050	mg/L	J	ERPD-FD
Cyanide, Total	E335.4	DUP 12-8-22	2212630-007F	0.00808	0.0050	mg/L	J	ERPD-FD
Fluorene	SW8270C	EB-12-8-22	2212630-001c	ND	0.30	µg/L	UJ	ERPD-LCS
Fluorene	SW8270C	MKTF-40	2212630-002c	ND	0.30	µg/L	UJ	ERPD-LCS
Fluorene	SW8270C	MKTF-31	2212630-003c	ND	0.30	µg/L	UJ	ERPD-LCS



Analyte	Method	Field Sample ID	Lab Sample ID	Result	Limit	Units	Reviewer Qualifier	DV Flag Reasons
Fluorene	SW8270C	MKTF-27	2212630-004c	ND	0.30	µg/L	UJ	ERPD-LCS
Fluorene	SW8270C	MKTF-28	2212630-005c	ND	0.30	µg/L	UJ	ERPD-LCS
Fluorene	SW8270C	MKTF-29	2212630-006c	ND	0.30	µg/L	UJ	ERPD-LCS
Fluorene	SW8270C	DUP 12-8-22	2212630-007c	ND	0.30	µg/L	UJ	ERPD-LCS
Lead, Dissolved	E200.8	MKTF-31	2212630-003E	0.00009 3	0.00050	mg/L	J	MDLRL
Lead, Dissolved	E200.8	MKTF-28	2212630-005E	0.00018	0.00050	mg/L	J	MDLRL
Lead, Dissolved	E200.8	MKTF-29	2212630-006E	0.00007 3	0.00050	mg/L	J	MDLRL
Lead, Total	E200.8	MKTF-40	2212630-002D	0.0019	0.00250	mg/L	J	MDLRL
Lead, Total	E200.8	MKTF-27	2212630-004D	0.0011	0.00250	mg/L	J	MDLRL
Lead, Total	E200.8	MKTF-29	2212630-006D	0.00046	0.00050	mg/L	J	MDLRL
Lead, Total	E200.8	DUP 12-8-22	2212630-007D	0.0018	0.0025	mg/L	J	MDLRL
Naphthalene	SW8270C	MKTF-31	2212630-003c	0.52	0.30	µg/L	J	ERPD-LCS
Naphthalene	SW8270C	EB-12-8-22	2212630-001c	ND	0.30	µg/L	UJ	ERPD-LCS
Naphthalene	SW8270C	MKTF-40	2212630-002c	ND	0.30	µg/L	UJ	ERPD-LCS
Naphthalene	SW8270C	MKTF-27	2212630-004c	ND	0.30	µg/L	UJ	ERPD-LCS
Naphthalene	SW8270C	MKTF-29	2212630-006c	ND	0.30	µg/L	UJ	ERPD-LCS
Naphthalene	SW8270C	DUP 12-8-22	2212630-007c	ND	0.30	µg/L	UJ	ERPD-LCS
Naphthalene	SW8270C	MKTF-28	2212630-005c	0.24	0.30	µg/L	J	ERPD-LCS, MDLRL
Nickel, Dissolved	E 200.7	MKTF-40	2212630-002E	0.0096	0.010	mg/L	J	MDLRL
Nickel, Dissolved	E 200.7	MKTF-31	2212630-003E	0.0046	0.010	mg/L	J	MDLRL
Nickel, Dissolved	E 200.7	MKTF-28	2212630-005E	0.0062	0.010	mg/L	J	MDLRL
Nickel, Dissolved	E 200.7	DUP 12-8-22	2212630-007E	0.0078	0.010	mg/L	J	MDLRL
Nickel, Total	E 200.7	MKTF-28	2212630-005D	0.0089	0.010	mg/L	J	MDLRL
Phenol	SW8270C	MKTF-29	2212630-006c	ND	20	µg/L	R	LR-SUR
Phenol	SW8270C	DUP 12-8-22	2212630-007c	ND	20	µg/L	R	LR-SUR
Pyrene	SW8270C	EB-12-8-22	2212630-001c	ND	1.0	µg/L	UJ	ERPD-LCS



Analyte	Method	Field Sample ID	Lab Sample ID	Result	Limit	Units	Reviewer Qualifier	DV Flag Reasons
Pyrene	SW8270C	MKTF-40	2212630-002c	ND	1.0	µg/L	UJ	ERPD-LCS
Pyrene	SW8270C	MKTF-31	2212630-003c	ND	1.0	µg/L	UJ	ERPD-LCS
Pyrene	SW8270C	MKTF-27	2212630-004c	ND	1.0	µg/L	UJ	ERPD-LCS
Pyrene	SW8270C	MKTF-28	2212630-005c	ND	1.0	µg/L	UJ	ERPD-LCS
Pyrene	SW8270C	MKTF-29	2212630-006c	ND	1.0	µg/L	UJ	ERPD-LCS
Pyrene	SW8270C	DUP 12-8-22	2212630-007c	ND	1.0	µg/L	UJ	ERPD-LCS
Selenium, Dissolved	E200.8	MKTF-27	2212630-004E	0.0031	0.0050	mg/L	J	MDLRL
Selenium, Dissolved	E200.8	MKTF-29	2212630-006E	0.0027	0.0050	mg/L	J	MDLRL
Selenium, Dissolved	E200.8	DUP 12-8-22	2212630-007E	0.0026	0.0050	mg/L	J	MDLRL
Selenium, Total	E200.8	MKTF-40	2212630-002D	0.0052	0.0050	mg/L	J+	HR-LCS
Selenium, Total	E200.8	MKTF-31	2212630-003D	0.0067	0.0010	mg/L	J+	HR-LCS
Selenium, Total	E200.8	MKTF-28	2212630-005D	0.0063	0.0010	mg/L	J+	HR-LCS
Silver, Dissolved	E 200.7	MKTF-31	2212630-003E	0.0016	0.0050	mg/L	J	MDLRL
Silver, Dissolved	E 200.7	MKTF-27	2212630-004E	0.0031	0.0050	mg/L	J	MDLRL
Silver, Dissolved	E 200.7	MKTF-28	2212630-005E	0.0020	0.0050	mg/L	J	MDLRL
Silver, Dissolved	E 200.7	MKTF-29	2212630-006E	0.0044	0.0050	mg/L	J	MDLRL
Silver, Dissolved	E 200.7	DUP 12-8-22	2212630-007E	0.0031	0.0050	mg/L	J	MDLRL
TPH DRO	SW8015	MKTF-31	2212630-003C	0.23	0.064	mg/L	JB	ERPD-LCS, MBD
TPH DRO	SW8015	MKTF-27	2212630-004C	0.17	0.064	mg/L	JB	ERPD-LCS, MBD
TPH DRO	SW8015	MKTF-28	2212630-005C	0.20	0.064	mg/L	JB	ERPD-LCS, MBD
TPH DRO	SW8015	MKTF-29	2212630-006C	0.31	0.064	mg/L	JB	ERPD-LCS, MBD
TPH DRO	SW8015	EB-12-8-22	2212630-001C	0.045	0.064	mg/L	U	ERPD-LCS, MBD
TPH DRO	SW8015	MKTF-40	2212630-002C	0.067	0.064	mg/L	U	ERPD-LCS, MBD
TPH DRO	SW8015	DUP 12-8-22	2212630-007C	0.044	0.064	mg/L	U	ERPD-LCS, MBD, MDLRL
TPH GRO	SW8015	MKTF-27	2212630-004a	0.034	0.050	mg/L	J	MDLRL
TPH GRO	SW8015	MKTF-29	2212630-006a	0.023	0.050	mg/L	J	MDLRL
Vanadium, Dissolved	E 200.7	MKTF-40	2212630-002E	0.0097	0.050	mg/L	J	MDLRL



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Analyte	Method	Field Sample ID	Lab Sample ID	Result	Limit	Units	Reviewer Qualifier	DV Flag Reasons
Vanadium, Dissolved	E 200.7	MKTF-31	2212630-003E	0.0039	0.050	mg/L	J	MDLRL
Vanadium, Dissolved	E 200.7	MKTF-27	2212630-004E	0.0039	0.050	mg/L	J	MDLRL
Vanadium, Dissolved	E 200.7	MKTF-28	2212630-005E	0.0055	0.050	mg/L	J	MDLRL
Vanadium, Dissolved	E 200.7	MKTF-29	2212630-006E	0.0056	0.050	mg/L	J	MDLRL
Vanadium, Dissolved	E 200.7	DUP 12-8-22	2212630-007E	0.0075	0.050	mg/L	J	MDLRL
Vanadium, Total	E 200.7	MKTF-40	2212630-002D	0.016	0.050	mg/L	J	MDLRL
Vanadium, Total	E 200.7	MKTF-27	2212630-004D	0.0063	0.050	mg/L	J	MDLRL
Vanadium, Total	E 200.7	MKTF-28	2212630-005D	0.016	0.050	mg/L	J	MDLRL
Vanadium, Total	E 200.7	MKTF-29	2212630-006D	0.0078	0.050	mg/L	J	MDLRL
Vanadium, Total	E 200.7	DUP 12-8-22	2212630-007D	0.015	0.050	mg/L	J	MDLRL
Zinc, Dissolved	E 200.7	MKTF-31	2212630-003E	0.0048	0.010	mg/L	J	MDLRL
Zinc, Total	E 200.7	MKTF-31	2212630-003D	0.047	0.010	mg/L	J+	HR-LCS
Zinc, Total	E 200.7	MKTF-28	2212630-005D	0.020	0.010	mg/L	J+	HR-LCS
Zinc, Total	E 200.7	MKTF-29	2212630-006D	0.010	0.010	mg/L	J+	HR-LCS
Zinc, Total	E 200.7	MKTF-40	2212630-002D	0.0051	0.010	mg/L	J+	HR-LCS, MDLRL





Client: Marathon Oil	Laboratory: Hall Environmental Analysis Laboratory					
Project Name: Western Refining Southwest, Quarterly GW	Sample Matrix: Groundwater					
Project Number: 697-080-002 Task: 0006	Sample Start Date: 12/14/2022					
Date Validated: 01/31/2023	Sample End Date: 12/14/2022					
Parameters Included:						
<ul> <li>Volatile Organic Compounds (VOC) by Environmental Protection Agency (EPA) Test Methods for Evaluating Solid Waste (SW-846) Method 8260B</li> </ul>						
<ul> <li>1,2-Dibromoethane (EDB) by EPA Method 504.1</li> </ul>						
<ul> <li>Semivolatile Organic Compounds (SVOC) by SW-846 Me Monitoring (SIM)</li> </ul>	thod 8270C and Method 8270C with Selected Ion					
<ul> <li>Total Petroleum Hydrocarbons (TPH) Gasoline Range Org</li> </ul>	ganics (GRO) by SW-846 Method 8015D					
<ul> <li>TPH Diesel Range Organics (DRO) and Motor Oil Range</li> </ul>	Organics (MRO) by SW-846 Method 8015D Modified					
<ul> <li>Total and Dissolved Metals by EPA Method 200.7 and Method</li> </ul>	ethod 200.8					
<ul> <li>Total and Dissolved Mercury by EPA Method 245.1</li> </ul>						
<ul> <li>Cyanide by Standard Methods for the Examination of Wat</li> </ul>	er and Wastewater (SM) Method 4500 CN E					
Laboratory Project ID: 2212913						
Data Validator: Daran O'Hollearn, Lead Project Scientist						
Reviewer: Mike Phillips, Senior Chemist						

#### DATA EVALUATION CRITERIA SUMMARY

A Tier II Data Validation was performed by Trihydro Corporation's Chemical Data Evaluation Services Group on the analytical data report packages generated by Hall Environmental Analysis Laboratory of Albuquerque, New Mexico, with additional data from Pace Analytical National of Mount Juliet, Tennessee evaluating samples from the Marathon Oil site, located in Gallup, New Mexico.

Precision, accuracy, method compliance, and completeness of this data package were assessed during this data review. Precision was determined by evaluating the calculated relative percent difference (RPD) values from:

- Field duplicate pairs
- Laboratory duplicate pairs
- Matrix spike (MS) and matrix spike duplicate (MSD) pairs
- Laboratory control sample (LCS) and laboratory control sample duplicate (LCSD) pairs

Laboratory accuracy was established by reviewing the demonstrated percent recoveries (%R) of the following items to verify that data are not biased.

- MS/MSD samples
- LCS/LCSD samples
- Organic system monitoring compounds (surrogates)



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Field accuracy was established by collecting and analyzing the following samples to monitor for possible ambient or cross contamination during sampling and transportation.

- Field blanks
- Equipment blanks

Method compliance was established by reviewing sample integrity, holding times, detection limits, surrogate recoveries, laboratory blanks, initial and continuing calibrations (where applicable), and the LCS/LCSD percent recoveries against method-specific requirements.

Completeness was evaluated by determining the overall ratio of the number of samples and analyses planned versus the number of samples with valid analyses. Determination of completeness included a review of the chain-of-custody (CoC), laboratory analytical methods, and other laboratory and field documents associated with this analytical data set.

Client Sample ID	Laboratory Sample Number
EB-12-14-22	2212913-001
OW-58	2212913-002
OW-70	2212913-003
NAPI-2	2212913-004
NAPI-3	2212913-005
KA-3	2212913-006
FB-12-14-22	2212913-007
DUP-12-14-22	2212913-008

#### SAMPLE NUMBERS TABLE





The laboratory data were reviewed to evaluate compliance with the methods and the quality of the reported data. Assessment of CoC completeness is included in Item 3 of the Data Validation Checklist. A check mark ( $\checkmark$ ) indicates that the referenced validation criteria were deemed acceptable, whereas a crossed circle ( $\otimes$ ) indicates validation criteria for which the data have been qualified by the data validator. An empty circle (O) indicates that the specified criterion does not apply to the reviewed data. Details are noted in the tables below.

#### Validation Criteria

- ✓ Data Completeness
- ✓ CoC Documentation (Item 3)
- ✓ Holding Times and Preservation (Items 6 and 7)
- O Initial and Continuing Calibrations (Items 9 and 10)
- ⊗ Laboratory Blanks (Items 11 and 12)
- ✓ MS/MSD (Items 13 and 14)
- ⊗ LCS/LCSD (Items 15 and 16)
- System Monitoring Compounds (i.e., Surrogates) (Item 17)
- ⊗ Field and Equipment Blanks (Items 18 and 19)
- ⊗ Field Duplicates (Items 20 and 21)
- ✓ Laboratory Duplicates (Item 22)

#### **Guidance References**

Chemical data validation was conducted in accordance with the United States Environmental Protection Agency (USEPA) Contract Laboratory Program (CLP) National Functional Guidelines for the analyses listed below, or by the appropriate method if not covered in the National Functional Guidelines.

- Data for organic analyses were evaluated according to validation criteria set forth in the USEPA CLP National Functional Guidelines for Organic Superfund Methods Data Review, document number EPA-540-R-20-005, November 2020 with additional reference to the USEPA CLP National Functional Guidelines for Organic Data Review, document number EPA 540/R-99/008, October 1999.
- Data for inorganic analyses were evaluated according to validation criteria set forth in the USEPA CLP National Functional Guidelines for Inorganic Superfund Methods Data Review, document number EPA-540-R-20-006, November 2020 with additional reference to the USEPA CLP National Functional Guidelines for Inorganic Data Review, document number EPA 540-R-04-004, October 2004.
- Review of field duplicates was conducted according to the USEPA Region I New England Environmental Data Review Supplement for Region 1 Data Review Elements and Superfund Specific Guidance/Procedures, EQADR-Supplement2, September 2020.
- Trihydro Data Validation Variance Documentation, April 2022.



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#### **OVERALL DATA PACKAGE ASSESSMENT**

Based on a data validation review, the data are acceptable as delivered. Data qualified by the laboratory are discussed in Item 2 of the Validation Criteria Checklist.

The purpose of validating data and assigning qualifiers is to assist in proper data interpretation. Data that are not qualified meet the site data quality objectives. If values are assigned qualifiers other than an R (rejected, data not usable), the data may be used for site evaluation; however, consideration should be given to the reasons for qualification when interpreting sample concentrations. Data points that are assigned an R qualifier should not be used for site evaluation purposes.

If applicable, text was identified in **bold font** in the Validation Criteria Checklist to indicate that further action and/or qualification of the data were required. Data may have been qualified with J data flags by the laboratory if the result was greater than or equal to the method detection limit (MDL) but less than the reporting limit (RL). These laboratory-applied J flags were preserved, if present, and included in the Data Qualification Summary table at the end of this report. If applicable, data validation qualifiers were added for the items noted with crossed circles in the Validation Criteria section above. Please see the Data Qualification Summary table at the end of this report.

If data would be qualified with more than one flag, one qualifier was assigned based on the severity; however, all reasons for qualification were retained. Data that would be qualified with both J+ and J- flags were evaluated based on validation criteria and assigned the appropriate flag. The hierarchy of qualifiers from the most to least severe is as follows:

R > JB/U > NJ > J+/J- > J/UJ

Data qualifiers used during this validation are included in the following table.

<u>Qualifier</u>	Definition
J	Estimated concentration
J+	The result is an estimated concentration, but may be biased high
J-	The result is an estimated concentration, but may be biased low
UJ	Estimated reporting limit
U	Evaluated to be undetected at the reporting limit
JB	Estimated concentration due to blank contamination
R	Rejected, data not usable

#### **Data Completeness**

The analyses were performed as requested on the CoC records. The associated samples were received by the laboratory and analyzed properly unless otherwise noted in the Criteria Checklist below. The complete data package consisted of 540 data points. The data completeness calculation does not include any submitted blank sample results. Seven data points were rejected. The data completeness measure for this data package is calculated to be 98.70% and is acceptable.



VALIDATION CRITERIA CHECKLIST								
1. Was the report free of non-conformances identified by the laboratory? No								
Comments: The laboratory noted the following analytical non-conformances related to this data set.								
<u>Method 80156D DRO/MRO</u> : The method blank had a low-level detection for DRO. Samples with detections are flagged with a "B".								
<u>Methods 8270C and 8270C SIM</u> : 1-Methylnaphthalene, 2-methylnaphthalene, and naphthalene were reported by EPA Method 8270 instead of EPA Method 8270 SIM because of their elevated concentrations for samples OW-58 and DUP-12- 14-22.								
1-Methylnaphthalene was reported by EPA Method 8270 instead of EPA Method 8270 SIM because of its elevated concentration for sample NAPI-2.								
2. Were the data free of data qualification flags and/or notes used by the laboratory? No lf no, define.								
Comments: The laboratory used the following data qualification flags with this data set.								
B – Analyte detected in the associated method blank.								
D – Sample diluted due to matrix.								
J – Analyte detected below quantitation limits.								
J6 – The sample matrix interfered with the ability to make any accurate determination; spike value is low.								
S – % Recovery outside of range due to dilution or matrix interference.								
* – Value exceeds maximum contaminant level.								
3. Were sample CoC forms and custody procedures complete? Yes								
Comments: The CoC records from field to laboratory were complete, and custody was maintained as evidenced by field and laboratory personnel signatures, dates, and times of receipt. Custody seals were not present because the samples were transferred to a laboratory field courier service for transport from the field to the laboratory, and custody was maintained at all times.								
4. Were detection limits in accordance with the quality assurance project plan (QAPP), Yes permit, or method, or indicated as acceptable?								
Comments: The detection limits appeared to be acceptable. The following dilutions were applied.								
MethodSample(s)Analyte(s)DilutionFactor								
8260B NAPI-2 Select VOCs 2								
200.7         Multiple Samples         Total and/or Dissolved Barium         5								
200.8     Multiple Samples     Dissolved Metals     5								
8015D OW-58, DUP-12-14-22 TPH DRO and MRO 5								
200.7 OW-58, DUP-12-14-22 Total and/or Dissolved Barium 10								
8015D NAPI-2 TPH GRO 10								
8260B NAPI-2 Benzene, Ethylbenzene 20								
8015D OW-58, DUP-12-14-22 TPH GRO 50								
8260B OW-58, DUP-12-14-22 Select VOCs 50								
8260B OW-58, DUP-12-14-22 Benzene 500								

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VALIDATION CRITERIA CHECKLIST								
<ol><li>Were the reported analytical methods and constituents in compliance with the QAPP, permit, or CoC?</li></ol>	No							
Comments: The reported analytical methods were in compliance with the CoC, and the laboratory reported the requested constituents in accordance with the CoC, with the following exceptions.								
The CoC requested total and dissolved metals using only Method 200.7; however, the laboratory analyzed the samples using both Method 200.7 and Method 200.8. This substituted analytical method, Method 200.8, met similar sensitivity, accuracy, and precision goals and, therefore, was an acceptable replacement.								
The CoC requested cyanide using Method 335.4; however, the laboratory analyzed the samples This substituted analytical method met similar sensitivity, accuracy, and precision goals and, the replacement.	using Method 4500 CN E. refore, was an acceptable							
6. Were samples received in good condition within method-specified requirements?	No							
Comments: Samples were received on ice, in good condition, and with the cooler temperatures temperature range of $4^{\circ}C \pm 2^{\circ}C$ between -3.5°C and 0.7°C as noted on the CoC and Sample Lo transferred to Pace National were received in good condition with the cooler temperature within 4.6°C as noted on the CoC.	outside the recommended g-in Check List. Samples the recommended range at							
The cooler temperatures below 2.0°C were judged as acceptable since the laboratory did not repased broken or frozen.	port the sample containers							
7. Were samples extracted/digested and analyzed within method-specified or technical holding times?	Yes							
Comments: The samples were extracted/digested and analyzed within method-specific holding	times.							
8. Were reported units appropriate for the sample matrix/matrices and analytical method(s)? Specify if wet or dry units were used for soil.	Yes							
Comments: The results were reported in concentration units of micrograms per liter ( $\mu$ g/L) and r which were acceptable for the sample matrix and the analyses requested.	nilligrams per liter (mg/L),							
9. Did the laboratory provide any specific initial and/or continuing calibration results?	No							
Comments: Initial and continuing calibration data were not included as part of this data set.								
10. If initial and/or continuing calibration results were provided, were the results within acceptable limits?	N/A							
Comments: Initial and continuing calibration data were not included as part of this data set.								
11. Was the total number of laboratory blank samples prepared equal to at least 5% of the total number of samples or analyzed as required by the method?	Yes							
Comments: The total number of laboratory blank samples prepared was equal to at least 5% of samples.	the total number of							



12. Were ta	arget analytes rep	orted as no	ot detected in the laborat	ory blanks?		No	
Comments:	Target analytes	were repor	ted as not detected in th	e laboratory blanks	s, with the following	exceptions.	
Method Analyte Batch Concentration							
	20	0.7	Dissolved Antimony	D93335	0.00050 mg/L		
	80	15D	TPH DRO	72199	0.097 mg/L	I	
Detections and/or less associated were assig were above	of dissolved ant than the applica samples that we ned JB qualifiers the reporting limit	imony and ble report re greater b. Non-det t and great	d TPH DRO in the asso ting limits were assigned than the reporting lim ections of the identified a er than ten times the bla	ciated samples the ed U qualifiers. D its but less than of analytes in the asso nk concentration d	at were less than betections of TPH or equal to 10 time ociated samples an id not require qualif	the blank resu DRO in the s the blank res d detections that fication.	lts sult at
3. Was th number Comments: although Ms analytical ba	e total number of l r of samples or an The total number S samples were n atch in this sample	MS sample alyzed as r of matrix ot prepared e set has b	es prepared equal to at le required by the method? spike samples prepared d/reported for all analyse een indicated below.	east 5% of the tota was equal to at lea s and/or batches.	l ast 5% of the total r The matrix spike sa	Yes number of samp ample source fo	iles, or eac
	<u>Method</u>		<u>Analytes</u>	<u>Batch</u>	MS Sample So	urce	
	200.7		Total Metals	72141	Not Prepare	d	
	200.7	C	issolved Metals	C93558	Not Prepare	d	
	200.8		Total Metals	72141	Not Prepare	d	
	200.8	C	issolved Metals	D93335	EB-12-14-22	2	
	245.1	Total a	nd Dissolved Mercury	72202	DUP-12-14-2	22	
	504.1		EDB	72230	Not Prepare	d	
	4500CN E		Cyanide	WG1976252	OW-58		
	8015D	TP	H DRO and MRO	72199	Not Prepare	d	
	8015D		TPH GRO	R93515	Not Prepare	d	
	8260B		VOCs	R93479	Not Prepare	d	
	8260B		Benzene	R93506	Not Prepare	d	
	8270C SIM		SVOCs	72138	Not Prepare	d	
	8270C		SVOCs	72138	Not Prepare	d	
<u>lot Prepared</u> 4. For MS within o	I – <u>Matrix spikes wei</u> /MSDs prepared f data validation or l	re <i>not prepa</i> from project aboratory	red/reported for this batch. It samples, were percent quality control (QC) limits	recoveries and RI s?	PDs	No	
Comments: and laborate The MS rec	The percent reco ory QC limits, with overy for cyanide	overies and the follow in Method	I RPDs for MS/MSDs pre ing exception. 4500CN E batch WG19	epared from projec 76252 was outside	t samples were with the laboratory QC	nin data validation	on 10% ;
39.9%. Hov I5. Was th sample	wever, the recover e total number of s or analyzed as r	ry was with LCSs analy required by	in data validation limits o yzed equal to at least 5% y the method?	of 75-125%. Valida 6 of the total numb	ation action was no	t required. Yes	



#### VALIDATION CRITERIA CHECKLIST

16. Were LCS/LCSD percent recoveries and LCS/LCSD RPDs within data validation or laboratory QC limits?

Comments: The LCS and LCSD percent recoveries and LCS/LCSD RPDs were within data validation and laboratory QC limits, with the following exceptions.

<u>Method</u>	<u>Analyte</u>	<u>Batch</u>	<u>LCS</u> <u>Recovery</u>	<u>LCSD</u> <u>Recovery</u>	LCS/LCSD QC Limits
200.7	Total Zinc	72141	<b>69.7%</b>		70-130%
200.7	Dissolved Nickel	C93558	137%		70-130%
200.7	Dissolved Chromium	C93558	50.7%		70-130%

Total zinc and dissolved chromium results in the associated samples were assigned J- qualifiers if detected and UJ if not detected due to evidence of potential low bias.

**Detections of dissolved nickel in the associated samples were qualified as J+ due to evidence of potential high bias.** Non-detections of dissolved nickel in the associated samples did not require qualification.

17. Were surrogate recoveries within laboratory QC limits?

No

Yes

No

Comments: Surrogate recoveries were within laboratory QC limits, with the following exceptions.

Method	Surrogate	<u>Sample</u>	<u>Surrogate</u> <u>Recovery</u>	QC Limits
8270C	2-Fluorophenol	OW-58	0%	15-84.5%
8270C	Phenol-d₅	OW-58	0%	15-67%
8270C	2,4,6-Tribromophenol	OW-58	1.94%	15-108%
8015D	BFB	OW-70	235%	70-130%
8015D	BFB	NAPI-3	147%	70-130%

# TPH GRO was detected in the Method 8015D analyses for samples OW-70 and NAPI-3, and these results were assigned J+ qualifiers to indicate a potential high bias.

Since Method 8270C surrogate associations were not available from the laboratory, qualification was assigned to all of the target analytes in a given fraction (acid or base/neutral) when two or more surrogates from the same fraction (acid or base/neutral) were outside the acceptance range.

The analytes in the acid fraction of sample OW-58 were not detected. Since the recoveries of the surrogates in sample OW-58 were less than 10%, the results for the associated acid fraction analytes were assigned R qualifiers to indicate rejected (not usable) data based on evidence of extreme low bias.

Qualification of sample data was not required based on surrogate non-conformances in QC samples as the environmental samples were evaluated based on their specific surrogate recoveries.

18. Were the number of trip blank, field blank, and/or equipment blank samples collected equal to at least 10% of the total number of samples or as required by the project guidelines, QAPP, SAP, or permit?

Comments: The number of trip, field, and equipment blanks collected was equal to at least 10% of the number of samples. One field blank sample, FB-12-14-22, and one equipment blank sample, EB-12-14-22, were collected as part of this sample set.



VALIDATION CRITERIA CHECKLIST
19. Were target analytes reported as not detected in the trip blank, field blank, and/or No equipment blank samples?
Comments: Target analytes were not detected in the field blank and equipment blank samples, with the following exceptions.
Total beryllium was detected in the Method 200.7 analysis of equipment blank sample EB-12-14-22 at a concentration of 0.0008 mg/L. Total beryllium was detected in samples NAPI-2 and OW-70 at concentrations less than the blank level and/or the laboratory reporting limits, and the results were assigned U qualifiers. Non-detections of this analyte in the associated samples did not require qualification.
TPH DRO was detected in the Method 8015D analysis of equipment blank sample EB-12-14-22 at 0.025 mg/L. The TPH DRO results in Method 8015D batch 72199 were previously qualified due to a laboratory blank detection; therefore, additional qualification due to the equipment blank contamination was not required.
20. Was the number of field duplicates collected equal to at least 10% of the total       Yes         number of samples or as required by the project guidelines, QAPP, SAP, or permit?       Yes
Comments: The number of field duplicates collected was equal to at least 10% of the number of samples.
Sample DUP-12-14-22 was collected as a field duplicate of sample OW-58.
21. Were field duplicate RPD values within data validation QC limits (soil 0-50%, water 0-30%, or air 0-25%)?       No
Comments: As indicated in the Field Duplicate Summary Table at the end of this report, field duplicate RPD values were within data validation QC limits of 0-30% for water samples, with the following exceptions.
The RPD values for toluene, total xylenes, and naphthalene exceeded the data validation limit of 30% at 38.3%, 44.1%, and 31.0%, respectively. The toluene, total xylenes, and naphthalene results for samples OW-58 and DUP-12-14-22 were assigned J qualifiers due to evidence of poor precision
An RPD value could not be calculated for phenol for the field duplicate pair OW-58 and DUP-12-14-22 since the analyte was detected in the duplicate sample and was undetected in the parent sample. As the detection in the duplicate sample was greater than two times the reporting limit, phenol was qualified as J and UJ for the duplicate and parent samples, respectively.
22. For laboratory duplicates prepared from project samples, were RPDs within data Yes validation or laboratory QC limits?
Comments: Laboratory duplicates were prepared for the analysis of cyanide in batch WG1976252 from a sample not associated with this data set and sample NAPI-2.
The RPD for the laboratory duplicate prepared from a project sample was within laboratory acceptance limits.
The RPD value for the laboratory duplicate sample prepared from a non-project sample was evaluated and considered, but data were not qualified based on this result since matrix similarity to project samples could not be guaranteed.



VALIDATION CRITERIA CHECKLIST										
23. Were the following data relationships realistic?										
• Target anal EPH/8270)?	N/A									
Comments: Target a	analytes were not rep	ported by more than o	one method.							
<ul> <li>Both total and dissolved metals analyses were performed, and the total metals</li> <li>No results were greater than or equal to the dissolved metals results?</li> <li>Comments: The following table contains the exceptions in which the dissolved metals results exceeded the total metals results</li> </ul>										
	<u>Sample ID</u>	<u>Analyte</u>	<u>Total Result</u> <u>(mg/L)</u>	Dissolved Result (mg/L)						
	OW-58	Antimony	0.00053	0.0027						
	KA-3	Arsenic	0.00062	0.00064						
	DUP-12-14-22	Arsenic	0.0028	0.0032						
	OW-58	Lead	ND	0.00034						
	KA-3	Zinc	0.0046	0.0098						

The EPA has not provided guidance or requirements for the evaluation, validation, and qualification of dissolved metals results that exceed the corresponding total metals results. Therefore, qualification of results was not performed based on these data.



Client Sample ID: OW-58 Field Duplicate Sample ID: DUP-12-14-22										
Analyte	Method	Laboratory Result	Duplicate Result	Relative Percent Difference (RPD)						
Barium, Dissolved	E 200.7	4.7 mg/L	4.8 mg/L	2.1%						
Barium, Total	E 200.7	4.9 mg/L	5.3 mg/L	7.8%						
Nickel, Dissolved	E 200.7	0.045 mg/L	0.045 mg/L	0.0%						
Nickel, Total	E 200.7	0.048 mg/L	0.048 mg/L	0.0%						
Silver, Dissolved	E 200.7	0.0017 mg/L	ND (0.0050 mg/L)	DL						
Silver, Total	E 200.7	0.0020 mg/L	0.0020 mg/L	0.0% +/-RL						
Vanadium, Dissolved	E 200.7	0.0032 mg/L	0.0033 mg/L	3.1% +/-RL						
Vanadium, Total	E 200.7	0.0048 mg/L	0.0050 mg/L	4.1% +/-RL						
Antimony, Dissolved	E200.8	0.0027 mg/L	ND (0.0050 mg/L)	DL						
Antimony, Total	E200.8	0.00053 mg/L	ND (0.0010 mg/L)	DL						
Arsenic, Dissolved	E200.8	0.0025 mg/L	0.0032 mg/L	24.6% +/-RL						
Arsenic, Total	E200.8	0.0027 mg/L	0.0028 mg/L	3.6%						
Lead, Dissolved	E200.8	0.00034 mg/L	ND (0.0025 mg/L)	DL						
TPH DRO	SW8015	5.8 mg/L	7.7 mg/L	28.1%						
TPH GRO	SW8015	70 mg/L	68 mg/L	2.9%						
1,2,4-Trimethylbenzene	SW8260B	ND (50 μg/L)	47 μg/L	DL						
1,3,5-Trimethylbenzene	SW8260B	ND (50 μg/L)	23 µg/L	DL						
Benzene	SW8260B	31,000 µg/L	30,000 µg/L	3.3%						
Ethylbenzene	SW8260B	1,400 µg/L	1,400 µg/L	0.0%						
Isopropylbenzene	SW8260B	33 µg/L	34 µg/L	3.0% +/-RL						
MTBE	SW8260B	1,200 µg/L	1,100 µg/L	8.7%						
n-Propylbenzene	SW8260B	110 μg/L	110 µg/L	0.0%						
Toluene	SW8260B	190 µg/L	280 µg/L	38.3%						
Xylenes, Total	SW8260B	230 µg/L	360 µg/L	44.1%						
1,4-Dioxane	SW8270C	0.84 µg/L	0.94 µg/L	11.2% +/-RL						
1-Methylnaphthalene	SW8270C	38 µg/L	49 µg/L	25.3%						
2-Methylnaphthalene	SW8270C	42 µg/L	55 µg/L	26.8%						
Acenaphthene	SW8270C	1.8 μg/L	2.0 µg/L	10.5%						
Anthracene	SW8270C	0.36 µg/L	0.32 µg/L	11.8% +/-RL						
Fluoranthene	SW8270C	0.22 µg/L	0.18 µg/L	20.0% +/-RL						
Fluorene	SW8270C	3.0 µg/L	2.9 µg/L	3.4%						
Naphthalene	SW8270C	71 µg/L	97 µg/L	31.0%						
Phenanthrene	SW8270C	3.5 μg/L	2.9 µg/L	18.8%						
Phenol	SW8270C	ND (20 μg/L)	50 µg/L	DL						

#### FIELD DUPLICATE SUMMARY



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Field duplicate RPD control limits are not to exceed 30% for water as established by USEPA Region I - New England Environmental Data Review Supplement for Region 1 Data Review Elements and Superfund Specific Guidance/Procedures, EQADR-Supplement2, September 2020.

DL – Indicates that the analyte was detected in one of the duplicate samples and was undetected in the other sample, and therefore an RPD could not be calculated. Data were not qualified since the detection was within two times the reporting limit. Non-detected results are indicated above with the applicable reporting limit as ND (RL).

+/-RL – Indicates that the detections in both of the samples were within two times the reporting limit. Qualification of data was not required.

The RPD values for toluene, total xylenes, and naphthalene exceeded the data validation limit of 30% at 38.3%, 44.1%. and 31.0%, respectively, which was evidence of poor precision. The toluene, total xylenes, and naphthalene results were qualified as J for samples OW-58 and DUP-12-14-22.

An RPD value could not be calculated for phenol for the field duplicate pair OW-58 and DUP-12-14-22 since the analyte was detected in the duplicate sample and was undetected in the parent sample. As the detection in the duplicate sample was greater than two times the reporting limit, phenol was qualified as J and UJ for the duplicate and parent samples, respectively.



#### DATA QUALIFICATION SUMMARY

Abbreviation	Reason
EBD	Equipment blank detection
ERPD-FD	High field duplicate RPD.
HR-LCS	The LCS and/or LCSD percent recovery was greater than the upper acceptable limit indicating a possible high bias.
HR-SUR	The surrogate percent recovery was greater than the upper acceptable limit indicating a possible high bias.
LR-LCS	The LCS and/or LCSD percent recovery was less than the lower acceptable limit indicating a possible low bias.
LR-SUR	The surrogate percent recovery was less than the lower acceptable limit indicating a possible low bias.
MBD	Method blank detection
MDLRL	Flagged by the laboratory: The result was greater than the MDL but less than the RL.

Analyte	Method	Field Sample ID	Lab Sample ID	Result	Limit	Units	Reviewer Qualifier	DV Flag Reasons
1,2,4-Trimethylbenzene	SW8260B	NAPI-2	2212913-004a	1.4	2.0	µg/L	J	MDLRL
1,2,4-Trimethylbenzene	SW8260B	DUP-12-14-22	2212913-008a	47	50	µg/L	J	MDLRL
1,3,5-Trimethylbenzene	SW8260B	DUP-12-14-22	2212913-008a	23	50	µg/L	J	MDLRL
1,4-Dioxane	SW8270C	OW-58	2212913-002C	0.84	1.0	µg/L	J	MDLRL
1,4-Dioxane	SW8270C	OW-70	2212913-003c	0.36	1.0	µg/L	J	MDLRL
1,4-Dioxane	SW8270C	NAPI-3	2212913-005c	0.42	1.0	µg/L	J	MDLRL
1,4-Dioxane	SW8270C	KA-3	2212913-006c	0.42	1.0	µg/L	J	MDLRL
1,4-Dioxane	SW8270C	DUP-12-14-22	2212913-008C	0.94	1.0	µg/L	J	MDLRL
2,4,6-Trichlorophenol	SW8270C	OW-58	2212913-002c	ND	10	µg/L	R	LR-SUR
2,4-Dimethylphenol	SW8270C	OW-58	2212913-002c	ND	10	µg/L	R	LR-SUR
2,4-Dinitrophenol	SW8270C	OW-58	2212913-002c	ND	20	µg/L	R	LR-SUR
2-Methylphenol	SW8270C	OW-58	2212913-002c	ND	10	µg/L	R	LR-SUR
3,4-Methylphenol	SW8270C	OW-58	2212913-002c	ND	10	µg/L	R	LR-SUR
Anthracene	SW8270C	NAPI-2	2212913-004C	0.20	0.30	µg/L	J	MDLRL



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Analyte	Method	Field Sample ID	Lab Sample ID	Result	Limit	Units	Reviewer Qualifier	DV Flag Reasons
Antimony, Dissolved	E200.8	OW-58	2212913-002E	0.0027	0.0050	mg/L	U	MBD, MDLRL
Antimony, Total	E200.8	OW-58	2212913-002D	0.00053	0.0010	mg/L	J	MDLRL
Arsenic, Dissolved	E200.8	OW-58	2212913-002E	0.0025	0.0050	mg/L	J	MDLRL
Arsenic, Dissolved	E200.8	OW-70	2212913-003E	0.0015	0.0050	mg/L	J	MDLRL
Arsenic, Dissolved	E200.8	NAPI-2	2212913-004E	0.0015	0.0050	mg/L	J	MDLRL
Arsenic, Dissolved	E200.8	NAPI-3	2212913-005E	0.0021	0.0050	mg/L	J	MDLRL
Arsenic, Dissolved	E200.8	KA-3	2212913-006E	0.00064	0.0050	mg/L	J	MDLRL
Arsenic, Dissolved	E200.8	DUP-12-14-22	2212913-008E	0.0032	0.0050	mg/L	J	MDLRL
Arsenic, Total	E200.8	KA-3	2212913-006D	0.00062	0.0010	mg/L	J	MDLRL
Benzoic Acid	SW8270C	OW-58	2212913-002c	ND	20	µg/L	R	LR-SUR
Beryllium, Total	E 200.7	OW-70	2212913-003D	0.0013	0.0020	mg/L	U	EBD, MDLRL
Beryllium, Total	E 200.7	NAPI-2	2212913-004D	0.0006	0.0020	mg/L	U	EBD, MDLRL
Beryllium, Total	E 200.7	EB-12-14-22	2212913-001D	0.0008	0.0020	mg/L	J	MDLRL
Chromium, Dissolved	E 200.7	EB-12-14-22	2212913-001E	ND	0.0060	mg/L	UJ	LR-LCS
Chromium, Dissolved	E 200.7	OW-58	2212913-002E	ND	0.0060	mg/L	UJ	LR-LCS
Chromium, Dissolved	E 200.7	OW-70	2212913-003E	ND	0.0060	mg/L	UJ	LR-LCS
Chromium, Dissolved	E 200.7	NAPI-2	2212913-004E	ND	0.0060	mg/L	UJ	LR-LCS
Chromium, Dissolved	E 200.7	NAPI-3	2212913-005E	ND	0.0060	mg/L	UJ	LR-LCS
Chromium, Dissolved	E 200.7	KA-3	2212913-006E	ND	0.0060	mg/L	UJ	LR-LCS
Chromium, Dissolved	E 200.7	DUP-12-14-22	2212913-008E	ND	0.0060	mg/L	UJ	LR-LCS
Cobalt, Dissolved	E 200.7	OW-70	2212913-003E	0.0056	0.0060	mg/L	J	MDLRL
Fluoranthene	SW8270C	OW-58	2212913-002C	0.22	0.30	µg/L	J	MDLRL
Fluoranthene	SW8270C	DUP-12-14-22	2212913-008C	0.18	0.30	µg/L	J	MDLRL
Isopropylbenzene	SW8260B	OW-58	2212913-002a	33	50	µg/L	J	MDLRL
Isopropylbenzene	SW8260B	DUP-12-14-22	2212913-008a	34	50	µg/L	J	MDLRL
Lead, Dissolved	E200.8	OW-58	2212913-002E	0.00034	0.0025	mg/L	J	MDLRL
Lead, Dissolved	E200.8	OW-70	2212913-003E	0.00031	0.0025	mg/L	J	MDLRL



-

Analyte	Method	Field Sample ID	Lab Sample ID	Result	Limit	Units	Reviewer Qualifier	DV Flag Reasons
Lead, Total	E200.8	NAPI-3	2212913-005D	0.00043	0.0005	mg/L	J	MDLRL
Naphthalene	SW8270C	OW-58	2212913-002c	71	5.0	µg/L	J	ERPD-FD
Naphthalene	SW8270C	DUP-12-14-22	2212913-008c	97	5.0	µg/L	J	ERPD-FD
n-Butylbenzene	SW8260B	OW-70	2212913-003a	0.45	3.0	µg/L	J	MDLRL
n-Butylbenzene	SW8260B	NAPI-2	2212913-004a	1.5	6.0	µg/L	J	MDLRL
Nickel, Dissolved	E 200.7	OW-58	2212913-002E	0.045	0.010	mg/L	J+	HR-LCS
Nickel, Dissolved	E 200.7	OW-70	2212913-003E	0.037	0.010	mg/L	J+	HR-LCS
Nickel, Dissolved	E 200.7	NAPI-2	2212913-004E	0.094	0.010	mg/L	J+	HR-LCS
Nickel, Dissolved	E 200.7	NAPI-3	2212913-005E	0.019	0.010	mg/L	J+	HR-LCS
Nickel, Dissolved	E 200.7	KA-3	2212913-006E	0.019	0.010	mg/L	J+	HR-LCS
Nickel, Dissolved	E 200.7	DUP-12-14-22	2212913-008E	0.045	0.010	mg/L	J+	HR-LCS
n-Propylbenzene	SW8260B	NAPI-3	2212913-005a	0.83	1.0	µg/L	J	MDLRL
Phenol	SW8270C	DUP-12-14-22	2212913-008c	50	20	µg/L	J	ERPD-FD
Phenol	SW8270C	OW-58	2212913-002c	ND	20	µg/L	R	ERPD-FD, LR-SUR
sec-Butylbenzene	SW8260B	NAPI-3	2212913-005a	0.93	1.0	µg/L	J	MDLRL
Silver, Dissolved	E 200.7	OW-58	2212913-002E	0.0017	0.0050	mg/L	J	MDLRL
Silver, Dissolved	E 200.7	NAPI-3	2212913-005E	0.0015	0.0050	mg/L	J	MDLRL
Silver, Total	E 200.7	OW-58	2212913-002D	0.0020	0.0050	mg/L	J	MDLRL
Silver, Total	E 200.7	NAPI-3	2212913-005D	0.0021	0.0050	mg/L	J	MDLRL
Silver, Total	E 200.7	DUP-12-14-22	2212913-008D	0.0020	0.0050	mg/L	J	MDLRL
Toluene	SW8260B	OW-58	2212913-002a	190	50	µg/L	J	ERPD-FD
Toluene	SW8260B	DUP-12-14-22	2212913-008a	280	50	µg/L	J	ERPD-FD
Toluene	SW8260B	NAPI-2	2212913-004a	1.1	2.0	µg/L	J	MDLRL
TPH DRO	SW8015	OW-70	2212913-003C	0.95	0.064	mg/L	JB	MBD
TPH DRO	SW8015	NAPI-3	2212913-005C	0.79	0.064	mg/L	JB	MBD
TPH DRO	SW8015	KA-3	2212913-006C	0.57	0.064	mg/L	JB	MBD
TPH DRO	SW8015	EB-12-14-22	2212913-001C	0.025	0.064	mg/L	U	MBD, MDLRL



Analyte	Method	Field Sample ID	Lab Sample ID	Result	Limit	Units	Reviewer Qualifier	DV Flag Reasons
TPH GRO	SW8015	OW-70	2212913-003a	0.20	0.050	mg/L	J+	HR-SUR
TPH GRO	SW8015	NAPI-3	2212913-005a	0.20	0.050	mg/L	J+	HR-SUR
TPH ORO	SW8015	NAPI-3	2212913-005C	0.070	0.080	mg/L	J	MDLRL
TPH ORO	SW8015	KA-3	2212913-006C	0.078	0.080	mg/L	J	MDLRL
Vanadium, Dissolved	E 200.7	OW-58	2212913-002E	0.0032	0.050	mg/L	J	MDLRL
Vanadium, Dissolved	E 200.7	OW-70	2212913-003E	0.0018	0.050	mg/L	J	MDLRL
Vanadium, Dissolved	E 200.7	NAPI-2	2212913-004E	0.0026	0.050	mg/L	J	MDLRL
Vanadium, Dissolved	E 200.7	KA-3	2212913-006E	0.017	0.050	mg/L	J	MDLRL
Vanadium, Dissolved	E 200.7	DUP-12-14-22	2212913-008E	0.0033	0.050	mg/L	J	MDLRL
Vanadium, Total	E 200.7	OW-58	2212913-002D	0.0048	0.050	mg/L	J	MDLRL
Vanadium, Total	E 200.7	OW-70	2212913-003D	0.021	0.050	mg/L	J	MDLRL
Vanadium, Total	E 200.7	NAPI-2	2212913-004D	0.0076	0.050	mg/L	J	MDLRL
Vanadium, Total	E 200.7	NAPI-3	2212913-005D	0.0038	0.050	mg/L	J	MDLRL
Vanadium, Total	E 200.7	KA-3	2212913-006D	0.023	0.050	mg/L	J	MDLRL
Vanadium, Total	E 200.7	DUP-12-14-22	2212913-008D	0.0050	0.050	mg/L	J	MDLRL
Xylenes, Total	SW8260B	OW-58	2212913-002a	230	75	µg/L	J	ERPD-FD
Xylenes, Total	SW8260B	DUP-12-14-22	2212913-008a	360	75	µg/L	J	ERPD-FD
Zinc, Dissolved	E 200.7	KA-3	2212913-006E	0.0098	0.010	mg/L	J	MDLRL
Zinc, Total	E 200.7	OW-70	2212913-003D	0.014	0.010	mg/L	J-	LR-LCS
Zinc, Total	E 200.7	EB-12-14-22	2212913-001D	ND	0.010	mg/L	UJ	LR-LCS
Zinc, Total	E 200.7	OW-58	2212913-002D	ND	0.010	mg/L	UJ	LR-LCS
Zinc, Total	E 200.7	NAPI-3	2212913-005D	ND	0.010	mg/L	UJ	LR-LCS
Zinc, Total	E 200.7	DUP-12-14-22	2212913-008D	ND	0.010	mg/L	UJ	LR-LCS
Zinc, Total	E 200.7	NAPI-2	2212913-004D	0.0073	0.010	mg/L	J-	LR-LCS, MDLRL
Zinc, Total	E 200.7	KA-3	2212913-006D	0.0046	0.010	mg/L	J-	LR-LCS, MDLRL





Client: Marathon Oil	Laboratory: Hall Environmental Analysis Laboratory				
Project Name: Western Refining Southwest, Quarterly GW	Sample Matrix: Groundwater				
Project Number: 697-082-003 Task: 0002	Sample Start Date: 01/12/2023				
Date Validated: 02/15/2023	Sample End Date: 01/12/2023				
Parameters Included:					
<ul> <li>E. Coli by Standard Methods for the Examination of Water and Wastewater (SM) Method 9223B</li> </ul>					
Laboratory Project ID: 2301520					
Data Validator: Daran O'Hollearn, Lead Project Scientist					
Reviewer: Mike Phillips, Senior Chemist					

#### DATA EVALUATION CRITERIA SUMMARY

A Tier II Data Validation was performed by Trihydro Corporation's Chemical Data Evaluation Services Group on the analytical data report packages generated by Hall Environmental Analysis Laboratory of Albuquerque, New Mexico, evaluating samples from the Marathon Oil site, located in Gallup, New Mexico.

Method compliance was established by reviewing sample integrity, holding times, detection limits, and initial and continuing calibrations (where applicable), against method-specific requirements.

Completeness was evaluated by determining the overall ratio of the number of samples and analyses planned versus the number of samples with valid analyses. Determination of completeness included a review of the chain-of-custody (CoC), laboratory analytical methods, and other laboratory and field documents associated with this analytical data set.

#### SAMPLE NUMBERS TABLE

Client Sample ID	Laboratory Sample Number				
STP-1 to EP-2	2301520-001				

Due to limitations of the Project Direct database, the E. Coli result of >24196 most probable number (MPN) per 100 milliliters could not be reported in the database.



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The laboratory data were reviewed to evaluate compliance with the methods and the quality of the reported data. Assessment of CoC completeness is included in Item 3 of the Data Validation Checklist. A check mark ( $\checkmark$ ) indicates that the referenced validation criteria were deemed acceptable, whereas a crossed circle ( $\otimes$ ) indicates validation criteria for which the data have been qualified by the data validator. An empty circle (O) indicates that the specified criterion does not apply to the reviewed data. Details are noted in the tables below.

#### Validation Criteria

- ✓ Data Completeness
- ✓ CoC Documentation (Item 3)
- ⊗ Holding Times and Preservation (Items 6 and 7)
- O Initial and Continuing Calibrations (Items 9 and 10)
- O Laboratory Blanks (Items 11 and 12)
- O Matrix Spikes (MS) and Matrix Spike Duplicates (MSD) (Items 13 and 14)
- O Laboratory Control Spikes (LCS) and Laboratory Control Spike Duplicates (LCSD) (Items 15 and 16)
- O System Monitoring Compounds (i.e., Surrogates) (Item 17)
- O Field, Equipment, and Trip Blanks (Items 18 and 19)
- O Field Duplicates (Items 20 and 21)
- O Laboratory Duplicates (Item 22)

#### **Guidance References**

Chemical data validation was conducted in accordance with the United States Environmental Protection Agency (USEPA) Contract Laboratory Program (CLP) National Functional Guidelines for the analyses listed below, or by the appropriate method if not covered in the National Functional Guidelines.

- Data for organic analyses were evaluated according to validation criteria set forth in the USEPA CLP National Functional Guidelines for Organic Superfund Methods Data Review, document number EPA-540-R-20-005, November 2020 with additional reference to the USEPA CLP National Functional Guidelines for Organic Data Review, document number EPA 540/R-99/008, October 1999.
- Trihydro Data Validation Variance Documentation, April 2022.





#### **OVERALL DATA PACKAGE ASSESSMENT**

Based on a data validation review, the data are acceptable as delivered. Data qualified by the laboratory are discussed in Item 2 of the Validation Criteria Checklist.

The purpose of validating data and assigning qualifiers is to assist in proper data interpretation. Data that are not qualified meet the site data quality objectives. If values are assigned qualifiers other than an R (rejected, data not usable), the data may be used for site evaluation; however, consideration should be given to the reasons for qualification when interpreting sample concentrations. Data points that are assigned an R qualifier should not be used for site evaluation purposes.

If applicable, text was identified in **bold font** in the Validation Criteria Checklist to indicate that further action and/or qualification of the data were required. Data may have been qualified with J data flags by the laboratory if the result was greater than or equal to the method detection limit (MDL) but less than the reporting limit (RL). These laboratory-applied J flags were preserved, if present, and included in the Data Qualification Summary table at the end of this report. If applicable, data validation qualifiers were added for the items noted with crossed circles in the Validation Criteria section above. Please see the Data Qualification Summary table at the end of this report.

If data would be qualified with more than one flag, one qualifier was assigned based on the severity; however, all reasons for qualification were retained. Data that would be qualified with both J+ and J- flags were evaluated based on validation criteria and assigned the appropriate flag. The hierarchy of qualifiers from the most to least severe is as follows:

R > JB/U > NJ > J+/J- > J/UJ

Data qualifiers used during this validation are included in the following table.

<u>Qualifier</u>	<u>Definition</u>	
J	Estimated concentration	

#### **Data Completeness**

The analysis was performed as requested on the CoC records. The associated sample was received by the laboratory and analyzed properly unless otherwise noted in the Criteria Checklist below. The complete data package consisted of 1 data point. The data point was not rejected. The data completeness measure for this data package is calculated to be 100% and is acceptable.



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VALIDATION CRITERIA CHECKLIST					
1. Was the report free of non-conformances identified by the laboratory? Yes					
Comments: The laboratory did not report non-conformances related to the analytical data for this sample	e set.				
<ol> <li>Were the data free of data qualification flags and/or notes used by the laboratory?</li> <li>If no, define.</li> </ol>	No				
Comments: The laboratory used the following data qualification flag with this data set.					
H – Holding times for preparation or analysis exceeded.					
3. Were sample CoC forms and custody procedures complete?	Yes				
Comments: The CoC records from field to laboratory were complete, and custody was maintained as evidenced by field and laboratory personnel signatures, dates, and times of receipt. Custody seals were not present because the sample was transferred to a laboratory field courier service for transport from the field to the laboratory, and custody was maintained at all times.					
4. Were detection limits in accordance with the quality assurance project plan (QAPP), permit, or method, or indicated as acceptable?	Yes				
Comments: The detection limits appeared to be acceptable. The following dilution was applied.					
Method 9223B: Sample STP-1 to EP-2 was diluted by a factor of 10 times for the analysis of E Coli.					
<ol><li>Were the reported analytical methods and constituents in compliance with the QAPP, permit, or CoC?</li></ol>	Yes				
Comments: The reported analytical method was in compliance with the CoC, and the laboratory reporter constituent in accordance with the CoC.	d the requested				
6. Were samples received in good condition within method-specified requirements?	No				
Comments: The sample was received on ice, in good condition, and with the cooler temperature outside temperature range of $4^{\circ}C \pm 2^{\circ}C$ at 0.9°C as noted on the CoC and Sample Log-in Check List.	the recommended				
The cooler temperature below 2.0°C was judged as acceptable since the laboratory did not report the sa broken or frozen.	mple container as				
7. Were samples extracted/digested and analyzed within method-specified or technical holding times?	No				
Comments: The sample was not analyzed within method-specific holding times.					
<u>Method 9223B</u> : Sample STP-1 to EP-2 was analyzed for E. Coli outside the defined holding time of 24 hours to 48 hours by approximately 2 days. E. Coli was detected in sample STP-1 to EP-2, and this result was assigned a J qualifier based on the holding time exceedance.					
<ol> <li>Were reported units appropriate for the sample matrix/matrices and analytical method(s)? Specify if wet or dry units were used for soil.</li> </ol>	Yes				
Comments: The result was reported in concentration units of most probable number per 100 milliliters (New Milling which was acceptable for the sample matrix and the analysis requested.	MPN/ 100mL),				
9. Did the laboratory provide any specific initial and/or continuing calibration results?	No				
Comments: Initial and continuing calibration data were not included as part of this data set.					
10. If initial and/or continuing calibration results were provided, were the results within acceptable limits?	N/A				
Comments: Initial and continuing calibration data were not included as part of this data set.					



VALIDATION CRITERIA CHECKLIST				
11. Was the total number of laboratory blank samples prepared equal to at least 5% ofNothe total number of samples or analyzed as required by the method?No				
Comments: The total number of laboratory blank samples prepared was not equal to at least 5% of the total number of samples.				
12. Were target analytes reported as not detected in the laboratory blanks?	N/A			
Comments: Laboratory blanks were not reported for this data set.				
13. Was the total number of MS samples prepared equal to at least 5% of the total number of samples or analyzed as required by the method?	No			
Comments: The total number of matrix spike samples prepared was not equal to at least 5% of the total samples. Matrix spikes were not prepared for the analyses in this data set.	number of			
14. For MS/MSDs prepared from project samples, were percent recoveries and RPDs within data validation or laboratory quality control (QC) limits?	N/A			
Comments: MS/MSD samples were not prepared using project samples as the sample source.				
15. Was the total number of LCSs analyzed equal to at least 5% of the total number of samples or analyzed as required by the method?	No			
Comments: The total number of LCS analyzed was not equal to at least 5% of the total number of samp reported in this data set.	les. LCS were not			
16. Were LCS/LCSD percent recoveries and LCS/LCSD RPDs within data validation or laboratory QC limits?	N/A			
Comments: LCS and LCSDs were not analyzed as part of this sample set.				
17. Were surrogate recoveries within laboratory QC limits?	N/A			
Comments: Surrogates were not required for the analysis included in this data set.				
18. Were the number of trip blank, field blank, and/or equipment blank samples collected equal to at least 10% of the total number of samples or as required by the project guidelines, QAPP, SAP, or permit?	No			
Comments: Trip, field, and equipment blank samples were not collected for this sample set.				
19. Were target analytes reported as not detected in the trip blank, field blank, and/or equipment blank samples?	N/A			
Comments: Trip, field, and equipment blank samples were not collected for this sample set.				
20. Was the number of field duplicates collected equal to at least 10% of the total number of samples or as required by the project guidelines, QAPP, SAP, or permit?	No			
Comments: Field duplicates were not collected as part of this sample set.				
21. Were field duplicate RPD values within data validation QC limits (soil 0-50%, water 0-30%, or air 0-25%)?	N/A			
Comments: Field duplicates were not collected as part of this sample set.				
22. For laboratory duplicates prepared from project samples, were RPDs within data validation or laboratory QC limits?	N/A			
Comments: Laboratory duplicate samples were not prepared for this sample set.				



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VALIDATION CRITERIA CHECKLIST					
23. Were the following data relationships realistic?					
<ul> <li>Target analytes were reported by more than one method (e.g., 8260/8270, EPH/8270)?</li> </ul>	N/A				
Comments: Target analytes were not reported by more than one method.					
• Both total and dissolved metals analyses were performed, and the total metals results were greater than or equal to the dissolved metals results?	N/A				
Comments: Total and dissolved metals analyses were not performed for this data set.					



#### DATA QUALIFICATION SUMMARY

Abbreviation	Reason			
HT-AN	Sample was analyzed outside of the method holding time.			

Analyte	Method	Field Sample ID	Lab Sample ID	Result	Limit	Units	Reviewer Qualifier	DV Flag Reasons
Coliform, E-Coli	EPA 9223	STP-1 to EP-2	2301520-001A	>24196	10	MPN/100ml	J	HT-AN



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## **State of New Mexico Energy, Minerals and Natural Resources Oil Conservation Division** 1220 S. St Francis Dr. Santa Fe, NM 87505

CONDITIONS

OGRID:			
267595			
Action Number:			
209620			
Action Type:			
[UF-DP] Discharge Permit (DISCHARGE PERMIT)			

#### CONDITIONS

Created By Condition

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Action 209620

Condition Date 4/21/2023