

1 July 2022

Mr. Kenneth Thiessen RG/CEG
Oregon Department of Environmental Quality
Northwest Region
700 NE Multnomah Street, Suite 600
Portland, OR 97232

Subject: 1,4-Dioxane Resampling Request
East Multnomah County, Troutdale Sandstone Aquifer Remedy
Fairview, Oregon
ECSI No. 1479

Dear Ken:

Geosyntec Consultants (Geosyntec) prepared this letter for the East Multnomah County Troutdale Sandstone Aquifer (TSA) remedy that is being conducted jointly by Cascade Corporation (Cascade) and The Boeing Company (Boeing). The TSA remedy is being implemented under the Department of Environmental Quality (DEQ) Consent Order No. WMCSR-NWR-96-08 (DEQ, 1997).

DEQ requested testing of 1,4-dioxane from six EMC TSA monitoring wells (DEQ, 2021), and groundwater monitoring was completed in August 2021. The results were provided to DEQ in November 2021 (Landau and Geosyntec, 2021). Based on the results, DEQ requested additional confirmation groundwater sampling for wells BOP-44(ds) and CMW-17(ds), where 1,4-dioxane was detected at estimated concentrations (DEQ, 2022).

However, the 1,4-dioxane results for these two wells were reported to the Method Detection Limit (MDL) rather than the Reporting Limit (RL). If the data were consistently reported to the RL, results from the six wells would be non-detect. We requested a revised analytical laboratory report from the laboratory (Pace National Laboratory) that reports the results relative to the RL than the MDL (Attachment 1). The 1,4-dioxane reporting limit is below the DEQ residential risk-based concentration (RBC) for groundwater ingestion and inhalation from tap water (0.46 µg/L). A summary table of the 1,4-dioxane results and reporting limits is provided in Attachment 2.

Based on this revised laboratory report, 1,4-dioxane was not detected in the groundwater samples above the reporting limit. Cascade and Boeing request that DEQ reconsider its requirement for resampling of wells.

Mr. Kenneth Thiessen
1 July 2022
Page 2

CLOSURE

Please don't hesitate to contact us at (503) 222-9518 with questions regarding this letter or if you need additional information.

Sincerely,

Geosyntec Consultants, Inc.



Cindy Bartlett, R.G.
Principal Geologist/Project Manager



Brent Miller, P.E.
Senior Principal Engineer

Copies To: Jason Hegdahl, Brian Fischer, Cascade Corporation
Evelyn Ives, Landau Associates
Deborah Taege, The Boeing Company

Mr. Kenneth Thiessen
1 July 2022
Page 3

References:

Landau Associates and Geosyntec Consultants, 2021. 1,4-Dioxane Reconnaissance-Level Investigation, Summary Technical Memorandum, East Multnomah County Cleanup Project, Portland, Oregon, ECSI #1479. 3 November 2021.

Oregon Department of Environmental Quality (DEQ), 1997. TSA Remedy Order on Consent, WMCSR-NWR-96-08, 14 February 1997.

Oregon Department of Environmental Quality (DEQ), 2021. Letter to Cascade Corporation RE: Request for Reconnaissance-level groundwater sampling for 1, 4-Dioxane at Corporation Fairview, Oregon facility. ECSI #1479. 17 March 2021.

Oregon Department of Environmental Quality (DEQ), 2022. 1,4-Dioxane Reconnaissance-Level Investigation, Summary Technical Memorandum East Multnomah County Cleanup Project, Portland, Oregon. ECSI #1479. 24 January 2022.

Attachments:

Attachment 1	Revised Analytical Laboratory Report (L1387227)
Attachment 2	Table E-4 from 2021 EMC TSA Annual Report

ATTACHMENT 1

Revised Analytical Laboratory Report
(L1387227)



ANALYTICAL REPORT

April 06, 2022

Revised Report

- 1 Cp
- 2 Tc
- 3 Ss
- 4 Cn
- 5 Sr
- 6 Qc
- 7 Gl
- 8 Al
- 9 Sc

Cascade Corporation- Fairview, OR

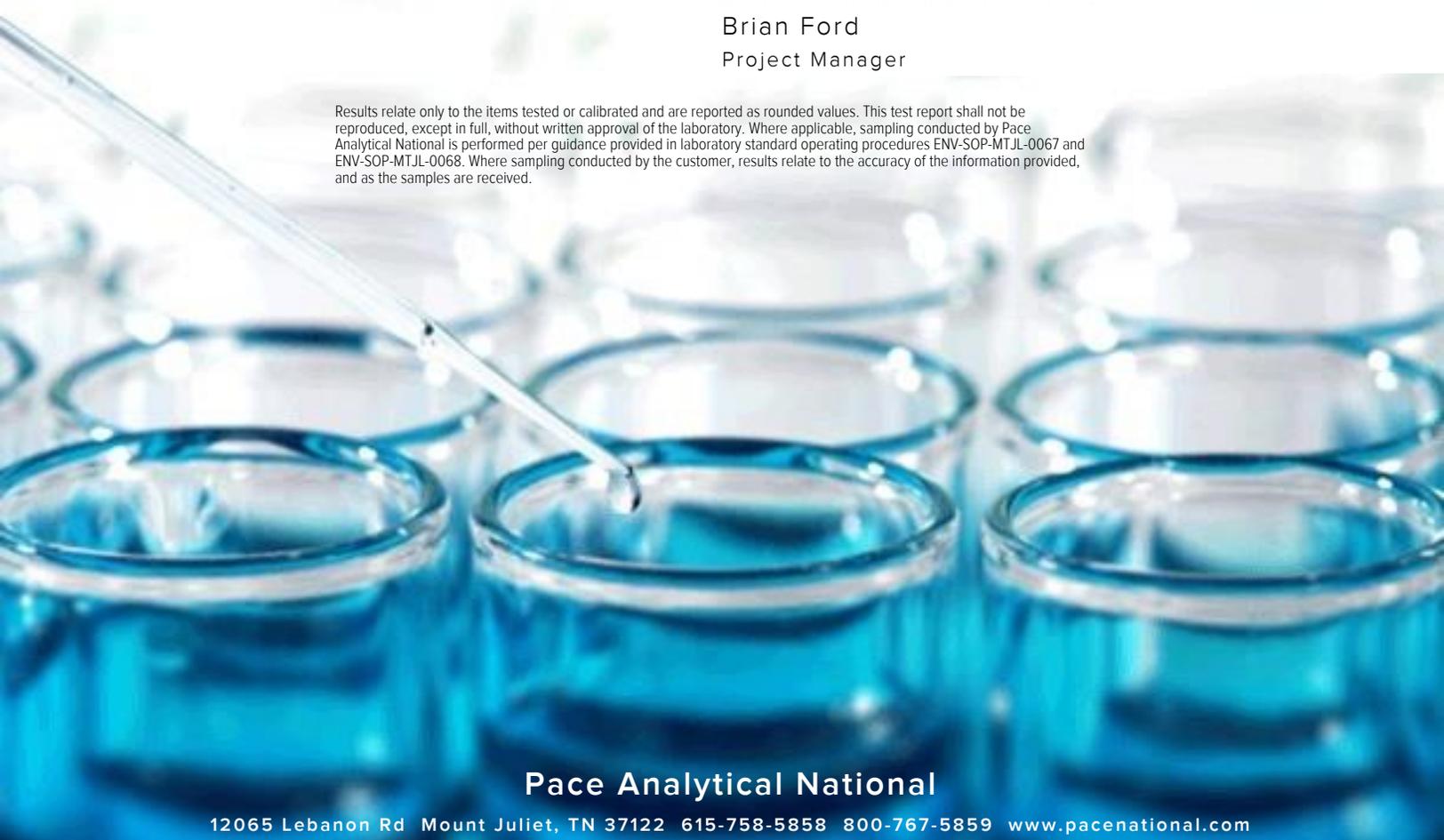
Sample Delivery Group: L1387227
 Samples Received: 08/05/2021
 Project Number: PNG0564S21
 Description: Cascade

Report To: Cindy Bartlett
 2201 NE 201st Avenue
 Fairview, OR 97024-9718

Entire Report Reviewed By:

Brian Ford
Project Manager

Results relate only to the items tested or calibrated and are reported as rounded values. This test report shall not be reproduced, except in full, without written approval of the laboratory. Where applicable, sampling conducted by Pace Analytical National is performed per guidance provided in laboratory standard operating procedures ENV-SOP-MTJL-0067 and ENV-SOP-MTJL-0068. Where sampling conducted by the customer, results relate to the accuracy of the information provided, and as the samples are received.



Pace Analytical National

12065 Lebanon Rd Mount Juliet, TN 37122 615-758-5858 800-767-5859 www.pacenational.com

TABLE OF CONTENTS

Cp: Cover Page	1	
Tc: Table of Contents	2	
Ss: Sample Summary	3	
Cn: Case Narrative	4	
Sr: Sample Results	5	
CMW17DS-080421 L1387227-01	5	
CMW18DS-080421 L1387227-02	6	
CMW36DG-080421 L1387227-03	7	
CMW36DG-080421-DUP L1387227-04	8	
BOP-44DS-080421 L1387227-05	9	
BOP44DG-080421 L1387227-06	10	
Qc: Quality Control Summary	11	
Semi Volatile Organic Compounds (GC/MS) by Method 8270E-SIM	11	
Gl: Glossary of Terms	12	
Al: Accreditations & Locations	13	
Sc: Sample Chain of Custody	14	

SAMPLE SUMMARY

CMW17DS-080421 L1387227-01 GW

Collected by Pat Yadon
 Collected date/time 08/04/21 11:10
 Received date/time 08/05/21 13:30

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Semi Volatile Organic Compounds (GC/MS) by Method 8270E-SIM	WG1719593	1	08/09/21 00:43	08/09/21 09:41	AMG	Mt. Juliet, TN

1 Cp

2 Tc

3 Ss

CMW18DS-080421 L1387227-02 GW

Collected by Pat Yadon
 Collected date/time 08/04/21 12:15
 Received date/time 08/05/21 13:30

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Semi Volatile Organic Compounds (GC/MS) by Method 8270E-SIM	WG1719593	1	08/09/21 00:43	08/09/21 10:00	AMG	Mt. Juliet, TN

4 Cn

5 Sr

CMW36DG-080421 L1387227-03 GW

Collected by Pat Yadon
 Collected date/time 08/04/21 13:00
 Received date/time 08/05/21 13:30

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Semi Volatile Organic Compounds (GC/MS) by Method 8270E-SIM	WG1719593	1	08/09/21 00:43	08/09/21 10:19	AMG	Mt. Juliet, TN

6 Qc

7 Gl

CMW36DG-080421-DUP L1387227-04 GW

Collected by Pat Yadon
 Collected date/time 08/04/21 13:07
 Received date/time 08/05/21 13:30

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Semi Volatile Organic Compounds (GC/MS) by Method 8270E-SIM	WG1719593	1	08/09/21 00:43	08/09/21 10:39	AMG	Mt. Juliet, TN

8 Al

9 Sc

BOP-44DS-080421 L1387227-05 GW

Collected by Pat Yadon
 Collected date/time 08/04/21 13:40
 Received date/time 08/05/21 13:30

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Semi Volatile Organic Compounds (GC/MS) by Method 8270E-SIM	WG1719593	1	08/09/21 00:43	08/09/21 10:58	AMG	Mt. Juliet, TN

BOP44DG-080421 L1387227-06 GW

Collected by Pat Yadon
 Collected date/time 08/04/21 14:12
 Received date/time 08/05/21 13:30

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Semi Volatile Organic Compounds (GC/MS) by Method 8270E-SIM	WG1719593	1	08/09/21 00:43	08/09/21 11:17	AMG	Mt. Juliet, TN

CASE NARRATIVE

All sample aliquots were received at the correct temperature, in the proper containers, with the appropriate preservatives, and within method specified holding times, unless qualified or notated within the report. Where applicable, all MDL (LOD) and RDL (LOQ) values reported for environmental samples have been corrected for the dilution factor used in the analysis. All Method and Batch Quality Control are within established criteria except where addressed in this case narrative, a non-conformance form or properly qualified within the sample results. By my digital signature below, I affirm to the best of my knowledge, all problems/anomalies observed by the laboratory as having the potential to affect the quality of the data have been identified by the laboratory, and no information or data have been knowingly withheld that would affect the quality of the data.



Brian Ford
Project Manager

Report Revision History

Level II Report - Version 1: 08/11/21 10:21

Project Narrative

updated to RL reporting.

¹ Cp

² Tc

³ Ss

⁴ Cn

⁵ Sr

⁶ Qc

⁷ Gl

⁸ Al

⁹ Sc

Semi Volatile Organic Compounds (GC/MS) by Method 8270E-SIM

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
1,4-Dioxane	ND		0.400	1	08/09/2021 09:41	WG1719593
(S) Nitrobenzene-d5	72.3		10.0-120		08/09/2021 09:41	WG1719593

- 1 Cp
- 2 Tc
- 3 Ss
- 4 Cn
- 5 Sr
- 6 Qc
- 7 Gl
- 8 Al
- 9 Sc

Semi Volatile Organic Compounds (GC/MS) by Method 8270E-SIM

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
1,4-Dioxane	ND		0.400	1	08/09/2021 10:00	WG1719593
(S) Nitrobenzene-d5	68.9		10.0-120		08/09/2021 10:00	WG1719593

- 1 Cp
- 2 Tc
- 3 Ss
- 4 Cn
- 5 Sr
- 6 Qc
- 7 Gl
- 8 Al
- 9 Sc

Semi Volatile Organic Compounds (GC/MS) by Method 8270E-SIM

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
1,4-Dioxane	ND		0.400	1	08/09/2021 10:19	WG1719593
(S) Nitrobenzene-d5	67.0		10.0-120		08/09/2021 10:19	WG1719593

- 1 Cp
- 2 Tc
- 3 Ss
- 4 Cn
- 5 Sr
- 6 Qc
- 7 Gl
- 8 Al
- 9 Sc

Semi Volatile Organic Compounds (GC/MS) by Method 8270E-SIM

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
1,4-Dioxane	ND		0.400	1	08/09/2021 10:39	WG1719593
(S) Nitrobenzene-d5	70.5		10.0-120		08/09/2021 10:39	WG1719593

- 1 Cp
- 2 Tc
- 3 Ss
- 4 Cn
- 5 Sr
- 6 Qc
- 7 Gl
- 8 Al
- 9 Sc

Semi Volatile Organic Compounds (GC/MS) by Method 8270E-SIM

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
1,4-Dioxane	ND		0.400	1	08/09/2021 10:58	WG1719593
(S) Nitrobenzene-d5	72.0		10.0-120		08/09/2021 10:58	WG1719593

- ¹ Cp
- ² Tc
- ³ Ss
- ⁴ Cn
- ⁵ Sr
- ⁶ Qc
- ⁷ Gl
- ⁸ Al
- ⁹ Sc

Semi Volatile Organic Compounds (GC/MS) by Method 8270E-SIM

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
1,4-Dioxane	ND		0.400	1	08/09/2021 11:17	WG1719593
(S) Nitrobenzene-d5	71.3		10.0-120		08/09/2021 11:17	WG1719593

- 1 Cp
- 2 Tc
- 3 Ss
- 4 Cn
- 5 Sr
- 6 Qc
- 7 Gl
- 8 Al
- 9 Sc

Method Blank (MB)

(MB) R3689626-3 08/09/21 09:21

Analyte	MB Result	MB Qualifier	MB MDL	MB RDL
	ug/l		ug/l	ug/l
1,4-Dioxane	U		0.0447	0.400
<i>(S) Nitrobenzene-d5</i>	74.0			10.0-120

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3689626-1 08/09/21 08:43 • (LCSD) R3689626-2 08/09/21 09:02

Analyte	Spike Amount	LCS Result	LCSD Result	LCS Rec.	LCSD Rec.	Rec. Limits	LCS Qualifier	LCSD Qualifier	RPD	RPD Limits
	ug/l	ug/l	ug/l	%	%	%			%	%
1,4-Dioxane	50.0	48.3	48.4	96.6	96.8	73.0-146			0.207	20
<i>(S) Nitrobenzene-d5</i>				74.3	77.8	10.0-120				

1 Cp

2 Tc

3 Ss

4 Cn

5 Sr

6 Qc

7 Gl

8 Al

9 Sc

GLOSSARY OF TERMS

Guide to Reading and Understanding Your Laboratory Report

The information below is designed to better explain the various terms used in your report of analytical results from the Laboratory. This is not intended as a comprehensive explanation, and if you have additional questions please contact your project representative.

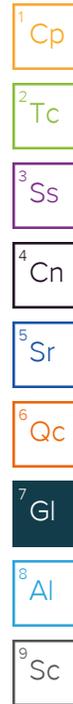
Results Disclaimer - Information that may be provided by the customer, and contained within this report, include Permit Limits, Project Name, Sample ID, Sample Matrix, Sample Preservation, Field Blanks, Field Spikes, Field Duplicates, On-Site Data, Sampling Collection Dates/Times, and Sampling Location. Results relate to the accuracy of this information provided, and as the samples are received.

Abbreviations and Definitions

MDL	Method Detection Limit.
ND	Not detected at the Reporting Limit (or MDL where applicable).
RDL	Reported Detection Limit.
Rec.	Recovery.
RPD	Relative Percent Difference.
SDG	Sample Delivery Group.
(S)	Surrogate (Surrogate Standard) - Analytes added to every blank, sample, Laboratory Control Sample/Duplicate and Matrix Spike/Duplicate; used to evaluate analytical efficiency by measuring recovery. Surrogates are not expected to be detected in all environmental media.
U	Not detected at the Reporting Limit (or MDL where applicable).
Analyte	The name of the particular compound or analysis performed. Some Analyses and Methods will have multiple analytes reported.
Dilution	If the sample matrix contains an interfering material, the sample preparation volume or weight values differ from the standard, or if concentrations of analytes in the sample are higher than the highest limit of concentration that the laboratory can accurately report, the sample may be diluted for analysis. If a value different than 1 is used in this field, the result reported has already been corrected for this factor.
Limits	These are the target % recovery ranges or % difference value that the laboratory has historically determined as normal for the method and analyte being reported. Successful QC Sample analysis will target all analytes recovered or duplicated within these ranges.
Qualifier	This column provides a letter and/or number designation that corresponds to additional information concerning the result reported. If a Qualifier is present, a definition per Qualifier is provided within the Glossary and Definitions page and potentially a discussion of possible implications of the Qualifier in the Case Narrative if applicable.
Result	The actual analytical final result (corrected for any sample specific characteristics) reported for your sample. If there was no measurable result returned for a specific analyte, the result in this column may state "ND" (Not Detected) or "BDL" (Below Detectable Levels). The information in the results column should always be accompanied by either an MDL (Method Detection Limit) or RDL (Reporting Detection Limit) that defines the lowest value that the laboratory could detect or report for this analyte.
Uncertainty (Radiochemistry)	Confidence level of 2 sigma.
Case Narrative (Cn)	A brief discussion about the included sample results, including a discussion of any non-conformances to protocol observed either at sample receipt by the laboratory from the field or during the analytical process. If present, there will be a section in the Case Narrative to discuss the meaning of any data qualifiers used in the report.
Quality Control Summary (Qc)	This section of the report includes the results of the laboratory quality control analyses required by procedure or analytical methods to assist in evaluating the validity of the results reported for your samples. These analyses are not being performed on your samples typically, but on laboratory generated material.
Sample Chain of Custody (Sc)	This is the document created in the field when your samples were initially collected. This is used to verify the time and date of collection, the person collecting the samples, and the analyses that the laboratory is requested to perform. This chain of custody also documents all persons (excluding commercial shippers) that have had control or possession of the samples from the time of collection until delivery to the laboratory for analysis.
Sample Results (Sr)	This section of your report will provide the results of all testing performed on your samples. These results are provided by sample ID and are separated by the analyses performed on each sample. The header line of each analysis section for each sample will provide the name and method number for the analysis reported.
Sample Summary (Ss)	This section of the Analytical Report defines the specific analyses performed for each sample ID, including the dates and times of preparation and/or analysis.

Qualifier Description

The remainder of this page intentionally left blank, there are no qualifiers applied to this SDG.



ACCREDITATIONS & LOCATIONS

Pace Analytical National 12065 Lebanon Rd Mount Juliet, TN 37122

Alabama	40660	Nebraska	NE-OS-15-05
Alaska	17-026	Nevada	TN000032021-1
Arizona	AZ0612	New Hampshire	2975
Arkansas	88-0469	New Jersey–NELAP	TN002
California	2932	New Mexico ¹	TN00003
Colorado	TN00003	New York	11742
Connecticut	PH-0197	North Carolina	Env375
Florida	E87487	North Carolina ¹	DW21704
Georgia	NELAP	North Carolina ³	41
Georgia ¹	923	North Dakota	R-140
Idaho	TN00003	Ohio–VAP	CL0069
Illinois	200008	Oklahoma	9915
Indiana	C-TN-01	Oregon	TN200002
Iowa	364	Pennsylvania	68-02979
Kansas	E-10277	Rhode Island	LA000356
Kentucky ^{1,6}	KY90010	South Carolina	84004002
Kentucky ²	16	South Dakota	n/a
Louisiana	AI30792	Tennessee ^{1,4}	2006
Louisiana	LA018	Texas	T104704245-20-18
Maine	TN00003	Texas ⁵	LAB0152
Maryland	324	Utah	TN000032021-11
Massachusetts	M-TN003	Vermont	VT2006
Michigan	9958	Virginia	110033
Minnesota	047-999-395	Washington	C847
Mississippi	TN00003	West Virginia	233
Missouri	340	Wisconsin	998093910
Montana	CERT0086	Wyoming	A2LA
A2LA – ISO 17025	1461.01	AIHA-LAP,LLC EMLAP	100789
A2LA – ISO 17025 ⁵	1461.02	DOD	1461.01
Canada	1461.01	USDA	P330-15-00234
EPA–Crypto	TN00003		

¹ Drinking Water ² Underground Storage Tanks ³ Aquatic Toxicity ⁴ Chemical/Microbiological ⁵ Mold ⁶ Wastewater n/a Accreditation not applicable

* Not all certifications held by the laboratory are applicable to the results reported in the attached report.

* Accreditation is only applicable to the test methods specified on each scope of accreditation held by Pace Analytical.

¹ Cp

² Tc

³ Ss

⁴ Cn

⁵ Sr

⁶ Qc

⁷ Gl

⁸ Al

⁹ Sc

Co./Address: **Cascade Corporation- Fairview, OR**
 2201 NE 201st Avenue
 Fairview, OR 97024-9718

Billing Information:
 Accounts Payable
 P.O. Box 20187
 Portland, OR 97294-0187

Pres Chk

Analysis / Container / Preservative

Chain of Custody Page 1 of 1



12065 Lebanon Rd Mount Juliet, TN 37122
 Submitting a sample via this chain of custody constitutes acknowledgment and acceptance of the Pace Terms and Conditions found at: <https://info.pacelabs.com/hubfs/pas-standard-terms.pdf>

Report to: **Cindy Bartlett**
 Email To: **CBartlett@Geosyntec.com; JLaurance@Geosyntec.com**

Project Description: **Cascade** City/State Collected: **Fairview OR** Please Circle: PT MT CT ET

Phone: **503-669-6286** Client Project # **PNG0564S21** Lab Project # **CASCORFOR-PNG0564**

Collected by (print): **PAT YADON** Site/Facility ID # P.O. #

Collected by (signature): **Patricia Yodon** **Rush?** (Lab MUST Be Notified)
 Same Day Five Day
 Next Day 5 Day (Rad Only)
 Two Day 10 Day (Rad Only)
 Three Day

Immediately Packed on Ice N Y X Date Results Needed No. of Cntrs

Sample ID	Comp/Grab	Matrix *	Depth	Date	Time	No. of Cntrs	Remarks	Sample # (lab only)
CMW17ds-080421		GW		8/4/21	11:10	2		-01
CMW18ds-080421		GW		8/4/21	12:15	2		-02
CMW36dg-080421		GW		8/4/21	13:00	2		-03
CMW36dg-080421-DUP		GW		8/4/21	13:07	2		-04
BOP-44ds-080421		GW		8/4/21	13:40	2		-05
BOP44 dg-080421		GW		8/4/21	14:12	2		-06
		GW						
		GW						
		GW						
		GW						

* Matrix: SS - Soil AIR - Air F - Filter GW - Groundwater B - Bioassay WW - WasteWater DW - Drinking Water OT - Other

Remarks: *** Called Lab Confirmed only 2 100 mL Ambers required**

Samples returned via: UPS FedEx Courier Tracking #

Flow _____ Other _____

Sample Receipt Checklist

COC Seal Present/Intact: Y N
 COC Signed/Accurate: Y N
 Bottles arrive intact: Y N
 Correct bottles used: Y N
 Sufficient volume sent: Y N
 IF Applicable
 VOA Zero Headspace: Y N
 Preservation Correct/Checked: Y N
 RAD Screen <0.5 mR/hr: Y N

Relinquished by: (Signature) **Patricia Yodon** Date: **8/4/21** Time: **17:30** Received by: (Signature) **FCO EX** Trip Blank Received: Yes No
 HCL / MeOH TBR

Temp: **16.0°C** Bottles Received: **0.2100.2 12** If preservation required by Login: Date/Time

Relinquished by: (Signature) Date: Time: Received for lab by: (Signature) Date: **8/5/21** Time: **1330** Hold: Condition: **NCF / OK**

VOCs 8260D LL 40ml Amb-HCl
 1,4-DIOXANE BY 8270SiM

ATTACHMENT 2

Table E-4 from 2021 EMC TSA Annual Report

Table E-4
1,4-dioxane Groundwater Analytical Results
August 2021
East Multnomah County TSA Remedy

Company Responsible for Sample Collection (a)	Sample Location	Sample Date	Sample Type	Field Sample ID	SW-846 8270E SIM 1,4-dioxane	
					Result (b)	Qualifier
					µg/L	
RBC Ingestion and Inhalation from Tap Water:					0.46	
Cascade	BOP-44(dg)	8/4/2021	N	BOP44DG-080421	0.400	U
Cascade	BOP-44(ds)	8/4/2021	N	BOP-44DS-080421	0.400	U
Boeing	BOP-61(ds)	8/4/2021	N	BOP-61ds-0821	0.333	U
Boeing	BOP-61(ds)	8/4/2021	FD	BOP-Dup-0821	0.333	U
Cascade	CMW-17(ds)	8/4/2021	N	CMW17DS-080421	0.400	U
Cascade	CMW-18(ds)	8/4/2021	N	CMW18DS-080421	0.400	U
Cascade	CMW-36(dg)	8/4/2021	N	CMW36DG-080421	0.400	U
Cascade	CMW-36(dg)	8/4/2021	FD	CMW36DG-080421-DUP	0.400	U

Notes

- (a) Cascade-collected samples are reported to the method detection limit, Boeing-collected samples are reported to the reporting limit. All non-detect results are reported as the reporting limit.
 (b) Result is reported relative to the reporting limit.
 U = The analyte was analyzed for but was not detected above the reported sample quantitation limit.

Abbreviations and Acronyms:

- µg/L = micrograms per liter
 FD = field duplicate
 ID = identification
 N = primary sample
 RBC = risk-based concentration
 SIM = selected ion monitoring