GelmanSciences

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CASE NARRATIVE

Monthly Data Gelman Sciences
Project: 1,4-Dioxane Remediation
Date: June 2022

With the exceptions noted as flags or footnotes, standard analytical protocols were followed in the analysis of the samples and no problems were encountered or anomalies observed. In addition, all laboratory quality control samples were within established control limits, with any exceptions noted below. Each sample was analyzed to achieve the lowest possible reporting limit within the constraints of the method. In some cases, due to interference or analytes present at high concentrations, samples were diluted. For diluted samples, the reporting limits are adjusted relative to the dilution required.

Gelman Sciences Inc. attests to the validity of the laboratory data generated by Gelman Sciences Ann Arbor, Michigan Environmental Laboratory facilities reported herein. All analyses performed by Gelman Science's Environmental Laboratory facilities were done using established laboratory SOPs that incorporate QA/QC procedures described in the application methods. Gelman Science's Environmental group has reviewed the data for compliance with the laboratory QA/QC plan, and data have been found to be compliant with laboratory protocols unless otherwise noted below.

At the end of the month some of the 1,4-dioxane samples were sent to Ann Arbor Technical Services for analysis due to a reproducibility problem. The balance of the samples was analyzed for 1,4-dioxane at Gelman Science's Environmental Laboratory. All bromate samples were analyzed by Gelman Science's Environmental Laboratory. The test results in this report meet all NELAP requirements for parameters for which accreditation are required or available. Any exceptions to NELAP requirements are noted in this report. All exceptions are noted per laboratory standard operating procedure based on EPA Method 1624c. Pursuant to NELAP, this report may not be reproduced, except in full, without the written approval of the laboratory.

Calculations are performed before rounding to avoid round-off errors in calculated results. The odd even rule is used for rounding. Holding times were met for all samples analyzed. Proper preservation was observed on all samples unless otherwise detailed in the individual sections below. Samples MW-54d, 72d, and 71 were recollected due to questionable results.

RECEIPT/ STORAGE

The samples were received on the days noted in the report for the Month; the samples arrived in good condition, properly preserved and on ice when necessary. Samples that require 1,4-dioxane analysis are collected in hydrochloric HCl acid-preserved vials to a pH of ≤2, except for the Pall ozone treatment samples. These samples have chemicals that, when mixed with the HCl acid, cause interferences and trap damage. Every attempt is made to analyze these samples within 24 hours of receipt.

Samples that require Bromate analysis are collected and preserved in the laboratory with ethylene di-amine and refrigerated.

Samples that are delivered to the laboratory the same day as they are collected are likely not to have reached a fully chilled temperature. This is acceptable as long as there is evidence that chilling has begun. All samples are iced or refrigerated at 4°C (±2°C) from the time of collection until sample preparation or analysis.

1,4-Dioxane (GC-MS)

All ground water and treated water samples were analyzed for 1,4-Dioxane (GC-MS) in accordance with EPA 1624C, which has been modified to enhance detection limits. Samples that were diluted to bring them within the calibrated range of the instrument are noted with a "D" under the Qualifier Code section of the data report. Reporting limits were adjusted based on each dilution.

Reporting limit for undiluted samples is 1ppb (part per billion, micrograms per liter, µg/L). All quality control parameters were within the acceptance limits for reported samples unless indicated.

Bromate (Ion Chromatography)

All surface water and treated samples were analyzed for Bromate (Ion Chromatography) in accordance with EPA 300.1. Surrogates are added to all samples. All quality control parameters were within the acceptance limits with the balance of sample analyzed.

The reporting limit for treated samples is 5.0ppb and for surface samples is 2.0ppb.

Qualifiers

1,4-Dioxane Qualifier Codes:

Qualifier Code	*Description*
nd:	The compound was analyzed for, but not detected at or above the detection limit indicated.
D:	Analyte value quantified from a dilution; reporting limit is raised to reflect dilution.
E:	The compound result is greater than the upper quantitation limit in the associated calibration curve, reported as estimate.
B:	The sample vials contained air bubbles larger than 5mm, which may affect compound results.
J:	The compound was positively identified; the associated numerical value is the approximate concentration.
M:	Matrix effects, sample required dilution.
R:	The reported value is unusable and rejected due to variance from quality control criteria.
V:	The reported value is considered estimated due to variance from quality control criteria.
H:	Sample was analyzed past 14-day hold time, but within 45 days.
O:	Samples analyzed in outside laboratory.
S:	Samples split with DEQ.

Bromate Qualifier Codes:

Qualifier Code	*Description*
nd:	The compound was analyzed but was not detected at or above the detection limit indicated.
E:	The compound result is greater than the upper quantitation limit in the associated calibration curve.
J:	The compound was positively identified; the associated numerical value is the approximate concentration.
R:	The reported value is unusable and rejected due to variance from quality control criteria.
V:	The reported value is considered estimated due to variance from quality control criteria.
H:	Sample was analyzed past 28-day hold time

Analyst: *Gage M. Trendel* _____ Date: 7/11/22

Report Checked by: Mitchell *Dominiski* _____ Date: 7/11/22

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Sample Analysis Report

June, 2022

Analyst Initials: GKT
Date: 7/11/22

Sample Name - Date/Time Sampled	1,4-Dioxane Results (ppb)	R.L. (ppb)	Bromate Results (ppb)	R.L. (ppb)	Bromide Results (ppb)	R.L. (ppb)	Comments	Qualifier(s)
Residential Wells								
D0								
4601 Park 4 inch-06-17-22-11:11-1	1.5	1.0						
4601 Park 6 inch-06-17-22-09:52-1	1.7	1.0						
5005 Jackson Rd-06-13-22-11:32-1	12	1.0						
Not Determined								
697 South Wagner Rd-06-20-22-10:25-1	nd	1.0						O
Miscellaneous Wells								
Bethlehem Cemetery-06-20-22-10:42-1	nd	1.0						
Extraction Wells								
C3								
DOLPH-06-15-22-14:15-1	120	10						D
TW-1-06-15-22-13:30-1	58	1.0						
TW-10-06-15-22-13:55-1	790	10						D
TW-20-06-01-22-07:45-1	590	10						D
TW-20-06-15-22-13:50-1	590	10.0						D
TW-24-06-15-22-14:05-1	1900	100.0						D
TW-25-06-15-22-13:45-1	3900	100						D
TW-3-06-15-22-13:35-1	40	1.0						
D2								

Sample Name - Date/Time Sampled	1,4-Dioxane Results (ppb)	R.L. (ppb)	Bromate Results (ppb)	R.L. (ppb)	Bromide Results (ppb)	R.L. (ppb)	Comments	Qualifier(s)
LB-1-06-17-22-11:15-1	310	10.0						D
LB-4-06-17-22-14:50-1	380	10.0						D
TW-21-06-15-22-14:20-1	210	10						D
TW-5-06-15-22-13:05-1	660	10						D
TW-9-06-01-22-07:55-1	380	1.0						D
TW-9-06-01-22-07:55-1	380	10						D
TW-9-06-15-22-13:10-1	470	10						D
E								
TW-11-06-16-22-07:50-1	140	10						D
TW-17-06-15-22-13:40-1	56	10						D
TW-18-06-15-22-14:25-1	230	10						D
Marshy								
PW-1-06-15-22-14:10-1	690	10						D
SW								
TW-28-06-15-22-14:00-1	580	10						D
Monitoring Wells								
C3								
MW-125-06-27-22-14:40-1	220	5.0						D
MW-127s-06-28-22-10:20-1	nd	1.0						
MW-128s-06-28-22-15:06-1	1.6	1.0						
MW-22-06-21-22-11:28-1	1200	10						D
MW-28-06-23-22-14:45-1	nd	1.0						
MW-2d-06-01-22-10:27-1	31	1.0						
D0								
MW-136i-06-10-22-11:11-1	nd	1.0						
MW-136s-06-10-22-10:05-1	nd	1.0						

Sample Name - Date/Time Sampled	1,4-Dioxane Results (ppb)	R.L. (ppb)	Bromate Results (ppb)	R.L. (ppb)	Bromide Results (ppb)	R.L. (ppb)	Comments	Qualifier(s)
MW-140s-06-13-22-13:18-1	nd	1.0						
MW-141s-06-17-22-11:30-1	3.0	1.0						
MW-145s-06-08-22-10:31-1	nd	1.0						
MW-146-06-13-22-10:15-1	nd	1.0						
MW-41d-06-20-22-11:11-1	16	1.0						
MW-41s-06-20-22-11:01-1	15	1.0						
MW-51-06-27-22-08:10-1	nd	1.0						
MW-53d-06-03-22-09:22-1	nd	1.0						
MW-53i-06-03-22-11:38-1	21	1.0						
MW-53s-06-03-22-10:30-1	nd	1.0						
MW-61d-06-21-22-12:07-1	9.9	1.0						
MW-61s-06-22-22-10:58-1	2.2	1.0						
MW-93-06-03-22-13:05-1	nd	1.0						
D2								
456 Clarendon-06-06-22-13:31-1	450	10						D
465 Dupont-06-22-22-09:28-1	610	10.0						D
MW-117-06-08-22-08:55-1	nd	1.0						
MW-129s-06-29-22-08:42-1	nd	1.0						
MW-131s-06-27-22-09:27-1	nd	1.0						
MW-56s-06-23-22-14:02-1	43	1.0						
MW-62i-06-23-22-10:10-1	nd	1.0						
MW-62s-06-23-22-09:02-1	nd	1.0						
MW-77-06-06-22-14:50-1	750	10						D
MW-94s-06-02-22-12:08-1	720	10						D
E								
IW-2-06-15-22-09:40-1	1600	100						D
MW-103s-06-14-22-11:26-1	72	1.0						

Sample Name - Date/Time Sampled	1,4-Dioxane Results (ppb)	R.L. (ppb)	Bromate Results (ppb)	R.L. (ppb)	Bromide Results (ppb)	R.L. (ppb)	Comments	Qualifier(s)
MW-112i-06-07-22-10:53-1	8.3	1.0						
MW-112s-06-07-22-09:43-1	2.8	1.0						
MW-127d-06-28-22-09:02-1	nd	1.0						
MW-128d-06-28-22-13:56-1	nd	1.0						
MW-131d-06-27-22-10:38-1	nd	1.0						
MW-135-06-14-22-09:55-1	nd	1.0						
MW-135-06-14-22-09:55-1	nd	1.0						
MW-135-06-14-22-09:55-1	nd	1.0						
MW-136d-06-10-22-12:20-1	nd	1.0						
MW-140d-06-13-22-14:25-1	nd	1.0						
MW-145d-06-08-22-11:50-1	nd	1.0					4.36 w/ 75" riser	
MW-145i-06-08-22-13:07-1	nd	1.0					4.50 w/ 75" riser	
MW-56d-06-23-22-12:48-1	nd	1.0						
MW-62d-06-23-22-11:21-1	nd	1.0						
MW-65d-06-06-22-12:05-1	12	1.0						
MW-65i-06-06-22-10:55-1	3.1	1.0						
MW-65s-06-06-22-09:45-1	4.5	1.0						
MW-76i-06-07-22-12:14-1	100	10						D
MW-76s-06-07-22-13:22-1	280	10						D
MW-83s-06-01-22-11:58-1	420	10						D
MW-84s-06-14-22-13:45-1	500	10						D
MW-91-06-15-22-11:52-1	140	10						D
MW-94d-06-02-22-13:18-1	3.3	1.0						
MW-95-06-08-22-14:35-1	19	1.0						
MW-96-06-07-22-14:52-1	120	10						D
Saginaw Forest Cabin #1-06-27-22-13:30-1	nd	1.0						
Saginaw Forest Cabin #2-06-27-22-12:21-1	nd	1.0						

Sample Name - Date/Time Sampled	1,4-Dioxane Results (ppb)	R.L. (ppb)	Bromate Results (ppb)	R.L. (ppb)	Bromide Results (ppb)	R.L. (ppb)	Comments	Qualifier(s)
Marshy								
NMW-1s-06-30-22-11:30-1		100.						D
NMW-1s-06-30-22-11:30-1	1400	100.0						D
NMW-2s-06-29-22-11:45-01	1600	100.0						D
SH								
MW-25s-06-21-22-12:10-1	390	10						D
MW-2s-06-01-22-10:25-1	1.5	1.0						
MW-5d-06-20-22-12:35-1	3200	100						D
SW								
MW-48-06-01-22-09:07-1	12	1.0						
MW-58d-06-29-22-10:11-1	15	1.0						
MW-58s-06-29-22-11:18-1	140	5.0						D
MW-78-06-28-22-12:21-1	21	1.0						
Surface Water								
Not Applicable								
HC/HR-06-01-22-09:30-1			nd	2.0				
HC/HR-06-02-22-10:45-1			nd	2.0				
HC/HR-06-03-22-12:30-1			nd	2.0				
HC/HR-06-06-22-08:15-1			nd	2.0				
HC/HR-06-09-22-09:30-1			nd	2.0				
HC/HR-06-10-22-13:00-1			nd	2.0				
HC/HR-06-13-22-11:00-1			nd	2.0				
HC/HR-06-14-22-14:30-1			nd	2.0				
HC/HR-06-15-22-09:15-1			nd	2.0				
HC/HR-06-16-22-10:00-1			nd	2.0				
HC/HR-06-17-22-10:55-1			nd	2.0				

Sample Name - Date/Time Sampled	1,4-Dioxane Results (ppb)	R.L. (ppb)	Bromate Results (ppb)	R.L. (ppb)	Bromide Results (ppb)	R.L. (ppb)	Comments	Qualifier(s)
HC/HR-06-20-22-11:00-1			nd	2.0				
HC/HR-06-21-22-11:30-1			nd	2.0				
HC/HR-06-22-22-09:50-1			nd	2.0				
HC/HR-06-23-22-10:30-1			nd	2.0				
HC/HR-06-24-22-10:40-1			nd	2.0				
HC/HR-06-27-22-13:15-1			nd	2.0				
HC/HR-06-28-22-11:10-1			nd	2.0				
HC/HR-06-29-22-13:15-1			nd	2.0				
HC/HR-06-30-22-11:15-1			nd	2.0				
Treatment System								
OUTFALL-06-01-22-1	4.7	1.0						
OUTFALL-06-01-22-2			6.0	5.0				
OUTFALL-06-02-22-1	4.6	1.0						
OUTFALL-06-02-22-2			8.8	5.0				
OUTFALL-06-05-22-1	4.6	1.0						
OUTFALL-06-05-22-2			7.6	5.0				
OUTFALL-06-08-22-1	5.0	1.0						
OUTFALL-06-08-22-2			7.1	5.0				
OUTFALL-06-09-22-1	4.5	1.0						
OUTFALL-06-09-22-2			6.0	5.0				
OUTFALL-06-12-22-1	5.2	1.0						
OUTFALL-06-12-22-2			8.9	5.0				
OUTFALL-06-13-22-1	5.4	1.0						
OUTFALL-06-13-22-2			8.2	5.0				
OUTFALL-06-14-22-1	5.0	1.0						
OUTFALL-06-14-22-2			7.8	5.0				
OUTFALL-06-15-22-1	5.0	1.0						

Sample Name - Date/Time Sampled	1,4-Dioxane Results (ppb)	R.L. (ppb)	Bromate Results (ppb)	R.L. (ppb)	Bromide Results (ppb)	R.L. (ppb)	Comments	Qualifier(s)
OUTFALL-06-15-22-2			9.6	5.0				
OUTFALL-06-16-22-1	5.7	1.0						
OUTFALL-06-16-22-2			5.8	5.0				
OUTFALL-06-19-22-1	5.3	1.0						
OUTFALL-06-19-22-2			7.4	5.0				
OUTFALL-06-20-22-1	5.8	1.0						
OUTFALL-06-20-22-2			7.4	5.0				
OUTFALL-06-21-22-1	5.3	1.0						
OUTFALL-06-21-22-2			7.6	5.0				
OUTFALL-06-22-22-1	5.7	1.0						
OUTFALL-06-22-22-2			6.2	5.0				
OUTFALL-06-23-22-1	5.1	1.0						
OUTFALL-06-23-22-02			8.0	5.0				
OUTFALL-06-26-22-1	4.7	1.0						
OUTFALL-06-26-22-2			9.6	5.0				
OUTFALL-06-27-22-1	4.4	1.0						
OUTFALL-06-27-22-2			9.4	5.0				
OUTFALL-06-28-22-1	4.8	1.0						
OUTFALL-06-28-22-2			8.0	5.0				
OUTFALL-06-29-22-1	4.7	1.0						
OUTFALL-06-29-22-2			8.0	5.0				
OUTFALL-06-30-22-1	4.8	1.0						
OUTFALL-06-30-22-2			8.2	5.0				
Red Pond-06-02-22-07:50-1	360	10						D
Red Pond-06-03-22-07:45-1	380	10						d
Red Pond-06-09-22-07:35-1	390	10						D
Red Pond-06-10-22-07:40-1	390	10						D

Sample Name - Date/Time Sampled	1,4-Dioxane Results (ppb)	R.L. (ppb)	Bromate Results (ppb)	R.L. (ppb)	Bromide Results (ppb)	R.L. (ppb)	Comments	Qualifier(s)
Red Pond-06-13-22-07:30-1	410	10						D
Red Pond-06-14-22-07:40-1	360	10						D
Red Pond-06-15-22-07:10-1	390	10						D
Red Pond-06-16-22-07:45-1	370	10						D
Red Pond-06-20-22-07:40-1	370	10						D
Red Pond-06-27-22-09:30-1	340	10						D

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Data Transmittal Cover Page

Project Name: Pall Corporation
ATS Project Number: G001-002
ATS Report Number(s): Org_SRF_0627221
Client PO Number: 4505179649

Project Description: This data report contains the results of 3 water samples, received by ATS on June 27, 2022 to be analyzed for 1,4 Dioxane.

We certify that the sample analyses for this report have been conducted in accordance with guidelines provided in the referenced standard test method, and are consistent with detailed procedures described in a written Standard Operating Procedure specific to the ATS Laboratories, as required by USEPA. Laboratory data sheets, SOPs, and QA/QC information are available for inspection and audit at the laboratory upon request. Unless specifically noted on the data report, all applicable sample preservation and holding time requirements have been met.

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No. of Pages (including cover pg.): 15

From: Sarah Stubblefield, Senior Chemist / Lab Manager **Email:** Sarah.Stubblefield@AnnArborTechnicalServices.com
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Date: 7/7/22 **Signed:**

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ORGANIC ANALYSIS

1,4-Dioxane by GC/MS
USEPA 1624

ATS Project Number: G001-002.22

ATS SDG: 0627221

Prepared By:
Ann Arbor Technical Services, Inc.
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Ann Arbor, MI 48103

LABORATORY OPERATIONS
CASE NARRATIVE

ATS Project Number: G001-002
Report Date: 7/7/22
Sample Matrix: Water
ATS SDG/SRF Numbers: 0627221
Client PO Number: 4505179649

CASE NARRATIVE SUMMARY

This case narrative applies to the following 3 samples that were received at Ann Arbor Technical Services, Inc. (ATS) on 6/27/22, and associated matrix-specific QA/QC:

Samples

Client Sample Identification	Sample Date	Requested Turn Around Time	Analysis	Matrix
Received 6/27/22				
Outfall 001	6/26/22	Urgent	1,4-Dioxane	Water
Red Pond	6/27/22	Urgent	1,4-Dioxane	Water
697 Wagner	6/20/22	Standard	1,4-Dioxane	Drinking Water

Upon receipt samples were scheduled for the following analyses.

Analysis	Number of Samples
1,4-Dioxane (USEPA 1624) – Urgent TAT	2 Samples + 1 Matrix Spike + 1 Matrix Spike Duplicate
1,4-Dioxane (USEPA 1624) – Standard TAT	1 Sample

Sample Receipt, Chain of Custody Records, and Holding Times

Samples were delivered directly to ATS by Pall Corporation staff. Samples were received with proper chain of custody records included. Sample condition and anomalies, if any, are either presented in the "Sample Receipt" section of this report or in the comments on individual data sheets. All samples were prepared and analyzed within 45 days with the following exceptions:

- None

QC Batch Size & Matrix QC

USEPA defines a single QA/QC batch as no more than 20 samples, excluding method blanks (MB, LRB), fortified blanks (BS, LFB, LCS), matrix spikes (LFM, MS, SPK), and duplicates whether spiked or native (LFMD, MSD, SPK DUP, DUP, LR).

Data Review and Approval

All data contained in this report have been generated in accordance with guidelines provided in the referenced standard test method and are consistent with detailed procedures described in a written standard operating procedure (SOP) specific to the ATS Laboratory, as required by USEPA. All data are peer and management reviewed to ensure compliance with the above referenced SOP's and project specifications. In addition, all data conform to the laboratory's Quality Assurance / Quality Control Manuals.

Data Deliverables

This data package constitutes a Level II package; other data report packages (Level I, Level IV DVP, EPA R5 EDD) are available upon request. There were no hardcopy data summary sheets generated for this project.

Data Qualification Definitions

The following are qualifier definitions that may be used throughout this SDG and are presented with their associated samples in each SDG section as appropriate.

- "B" – analyte concentration in method blank exceeds reporting limit (RL)
- "D" – result taken from sample dilution
- "E" – estimated result exceeding calibration range of the method
- "IR" –estimated result due to ion ration outside 30% acceptance window
- "J" – concentration reported between the project specific Reporting Limit (RL) and the laboratory determined Method Detection Limit/Limit Of Detection (MDL/LOD)
- "JMDL" – concentration reported below the laboratory/instrument Method Detection Limit/Limit Of Quantitation (MDL/LOQ), and above a specified instrument Signal-To-Noise Ratio (SNR)
- "M" – elevated reporting level due to analyte concentration or matrix interference requiring dilution, limited sample mass/volume, or excess moisture content
- "N" – tentatively identified compound based on mass spectral library search
- "NJ" -tentatively identified compound based on mass spectral data with estimated concentration
- "U" – analyte not detected above the project specific Reporting Limit (RL)
- "*" – indicates analyte has exceeded batch or sample specific QA/QC control limits

TECHNICAL NARRATION: Analysis Method - USEPA 1624

Sample Analysis

1,4-Dioxane Analysis (GC/MS): Samples were analyzed by purge and trap GC/MS in accordance with USEPA method 1624 (Volatile Organic Compounds by Isotope Dilution Gas Chromatography – Mass Spectrometry). An initial calibration with at least five levels was used to quantitate 1,4-Dioxane. Samples were reported to project specific reporting limits. Samples were reported as mg/L.

Anomalies Noted:

- None

Sample Dilutions

Samples containing compounds at concentrations above the initial calibration curve were diluted and reanalyzed for those compounds. The following samples were diluted for 1,4-Dioxane:

- Red Pond 6/26/22

Calibration Verification

Method calibration was verified through the analysis of a mid-level calibration verification standard at a minimum of every 12 hours. All verification standards met the acceptance criteria with the following exceptions:

- None

Low system background was demonstrated through the analysis of instrument blanks at a minimum of every 12 hours. All instrument blanks met the acceptance criteria with the following exceptions:

- None

Laboratory Reagent Blanks

A laboratory reagent blank (LRB) was analyzed as part of the QA/QC batch. The LRB met the acceptance criteria with the following exceptions:

- None

Labelled Internal Standards and Surrogates - Quantitation

This method utilizes Internal Standards only, not Surrogates. Internal standards areas and retention times met the acceptance criteria with the following exceptions:

- None

ASSESSMENT OF ACCURACY

Laboratory Fortified Blanks/Matrix Spikes/OPRs Laboratory Control Samples - Accuracy

A laboratory fortified blank (LFB) and Matrix Spike (MS) was analyzed as part of the QA/QC batch. The LFB / MS met the acceptance criteria with the following exceptions:

- None

Laboratory Fortified Blank Duplicates/Matrix Spike Duplicates/OPR Duplicates - Accuracy

A matrix spike duplicate (MSD) was analyzed as part of the QA/QC batch. The MSD met the accuracy acceptance criteria with the following exceptions:

- None

ASSESSMENT OF PRECISION

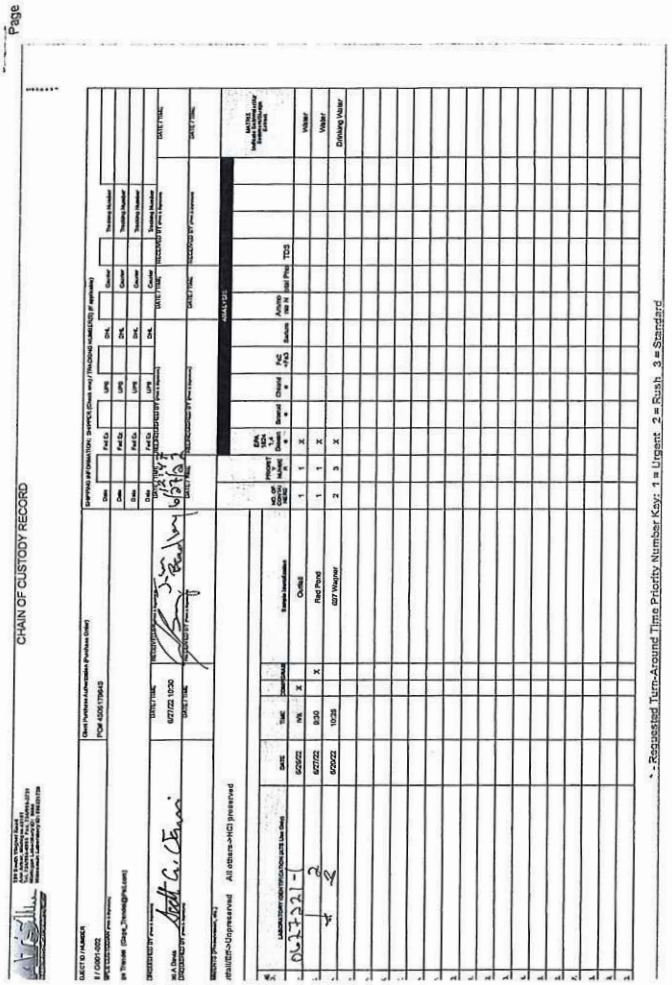
Laboratory Fortified Blanks/Matrix Spikes and Duplicates - Precision

A matrix spike duplicate (MSD) was analyzed as part of the QA/QC batch. The MSD met the precision acceptance criteria with the following exceptions:

- None

Mark T. DeLong / July 7, 2022
Mark T. DeLong (Quality Assurance Coordinator)

Philip B. Simon / July 7, 2022
Philip B. Simon (Laboratory Director)



1,4-Dioxane by GC/MS
Data Summary Sheet

ATS Project Number	G001-002.22	Percent Moisture	100.0
ATS SDG Number	0627221	Instrument	2100V
Client Sample ID	Outfall	Subsample (mL)	5.000
Laboratory Sample ID	0627221-1	Final Volume (mL)	5.000
Matrix	Water	Dilution Factor	1
Sample Date	06/26/2022 n/a	Basis	Wet
Analytical Method (USEPA)	USEPA 1624	Units	mg/L
Preparation Method (USEPA)	USEPA 1624	Preparation Date	06/27/2022
QC Batch Number	QCORG0627221	Analysis Date	06/27/2022 15:10:19

Parameter	CAS#	Result	MDL	PQL	Qual
1,4-Dioxane	123-91-1	0.006	0.001		

Comments
All methods reference US EPA methods unless otherwise noted.
Calculations performed prior to rounding.
Project specific reporting limit (MDL) based upon lowest calibration standard.
M - Indicates elevated reporting limit based upon sample dilution.
Sample analyzed at native pH.

Ann Arbor Technical Services, Inc.
290 South Wagner Road
Ann Arbor, Michigan 48103

Office: 734-995-0995
Fax: 734-995-3731

1,4-Dioxane by GC/MS
Data Summary Sheet

ATS Project Number	G001-002.22	Percent Moisture	100.0
ATS SDG Number	0627221	Instrument	2100V
Client Sample ID	Red Pond	Subsample (mL)	5.000
Laboratory Sample ID	0627221-2	Final Volume (mL)	5.000
Matrix	Water	Dilution Factor	10
Sample Date	06/27/2022 9:30	Basis	Wet
Analytical Method (USEPA)	USEPA 1624	Units	mg/L
Preparation Method (USEPA)	USEPA 1624	Preparation Date	06/27/2022
QC Batch Number	QCORG0627221	Analysis Date	06/27/2022 15:54:18

Parameter	CAS#	Result	MDL	PQL	Qual
1,4-Dioxane	123-91-1	0.44	0.01		M

Comments
All methods reference US EPA methods unless otherwise noted.
Calculations performed prior to rounding.
Project specific reporting limit (MDL) based upon lowest calibration standard.
M - Indicates elevated reporting limit based upon sample dilution.

Ann Arbor Technical Services, Inc.
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1,4-Dioxane by GC/MS
Data Summary Sheet

ATS Project Number	G001-002.22	Percent Moisture	100.0
ATS SDG Number	0627221	Instrument	2100V
Client Sample ID	697 Wagner	Subsample (mL)	5.000
Laboratory Sample ID	0627221-3	Final Volume (mL)	5.000
Matrix	Drinking Water	Dilution Factor	1
Sample Date	06/20/2022 10:25	Basis	Wet
Analytical Method (USEPA)	USEPA 1624	Units	mg/L
Preparation Method (USEPA)	USEPA 1624	Preparation Date	06/27/2022
QC Batch Number	QCORG0627221	Analysis Date	06/27/2022 16:38:09

Parameter	CAS#	Result	MDL	PQL	Qual
1,4-Dioxane	123-91-1	ND	0.001		U

Comments
All methods reference US EPA methods unless otherwise noted.
Calculations performed prior to rounding.
Project specific reporting limit (MDL) based upon lowest calibration standard.
M - Indicates elevated reporting limit based upon sample dilution.

Ann Arbor Technical Services, Inc.
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ANN ARBOR TECHNICAL SERVICES, INC.
QUALITY ASSURANCE / QUALITY CONTROL SUMMARY
LABORATORY BLANK SUMMARY

Method: USEPA 1624
QA/QC Batch Number: QCORG0627221
SDG 0627221
Project Number: G001-002.22
Report Date: 7/5/2022

Laboratory Reagent Blank (LRB) / Method Blank (MB)

Lab Sample ID	Analysis Date	Analysis Time	Chemical Name	CAS	Result	Units	Basis	Method Detection Limit	Reporting Detection Limit	Qualifier
LRB-1 6/27/22	06/27/2022	14:28:21	1,4-Dioxane	123-91-1		mg/L	Wet	0.001		

Comments
All methods reference US EPA methods unless otherwise noted.
Calculations performed prior to rounding.
Project specific reporting limit (MDL) based upon lowest calibration standard.
M - Indicates elevated reporting limit based upon sample dilution.

ANN ARBOR TECHNICAL SERVICES, INC.
QUALITY ASSURANCE / QUALITY CONTROL SUMMARY
LABORATORY ACCURACY SUMMARY

Method: USEPA 1624
QA/QC Batch Number: QCORG0627221
SDG 0627221
Project Number: G001-002.22
Report Date: 7/5/2022

Laboratory Fortified Blank (LFB) / Laboratory Control Sample (LCS) / On-Going Precision and Accuracy (OPR)

Lab Sample ID	Analysis Date	Analysis Time	Chemical Name	CAS	Sample Concentration	Spike Added	Measured Concentration	Units	Basis	Percent Recovery	LCL	UCL	Qualifier
LFB-1 6/27/22	06/27/2022	13:27:04	1,4-Dioxane	123-91-1		0.0100	0.01041	mg/L	Wet	104.1	85	115	

Comments
All methods reference US EPA methods unless otherwise noted.
Calculations performed prior to rounding.
Project specific reporting limit (MDL) based upon lowest calibration standard.
M - Indicates elevated reporting limit based upon sample dilution.

ANN ARBOR TECHNICAL SERVICES, INC.

QUALITY ASSURANCE / QUALITY CONTROL SUMMARY

LABORATORY PRECISION SUMMARY

Method: USEPA 1624
QA/QC Batch Number: QCORG0627221
SDG 0627221
Project Number: G001-002.22
Report Date: 7/5/2022

Matrix Spike (MS) / Matrix Spike Duplicate (MSD)

Lab Sample ID	Analysis Date	Analysis Time	Chemical Name	CAS	Result	Mean	Units	Basis	RPD	Control Limit	Qualifier
0627221-3 MS	06/27/2022	17:22:07	1,4-Dioxane	123-91-1	0.00968		mg/L	Wet			
0627221-3 MSD	06/27/2022	18:05:58	1,4-Dioxane	123-91-1	0.00968	0.00968	mg/L	Wet	0.0517	20	

Comments:
All analysis references US EPA methods unless otherwise noted.
Calculations performed prior to rounding.
Project specific reporting limit (MDL) based upon lowest calibration standard.
M = Indicates elevated reporting limit based upon sample dilution.

ANN ARBOR TECHNICAL SERVICES, INC.

QUALITY ASSURANCE / QUALITY CONTROL SUMMARY

LABORATORY ACCURACY SUMMARY

Method: USEPA 1624
QA/QC Batch Number: QCORG0627221
SDG 0627221
Project Number: G001-002.22
Report Date: 7/5/2022

Matrix Spike (MS)

Lab Sample ID	Analysis Date	Analysis Time	Chemical Name	CAS	Sample Concentration	Spike Added	Measured Concentration	Units	Basis	Percent Recovery	LCL	UCL	Qualifier
0627221-3 MS	06/27/2022	17:22:07	1,4-Dioxane	123-91-1		0.0100	0.00968	mg/L	Wet	96.8	80	120	

Comments:
All analysis references US EPA methods unless otherwise noted.
Calculations performed prior to rounding.
Project specific reporting limit (MDL) based upon lowest calibration standard.
M = Indicates elevated reporting limit based upon sample dilution.

ANN ARBOR TECHNICAL SERVICES, INC.

QUALITY ASSURANCE / QUALITY CONTROL SUMMARY

LABORATORY ACCURACY SUMMARY

Method: USEPA 1624
QA/QC Batch Number: QCORG0627221
SDG 0627221
Project Number: G001-002.22
Report Date: 7/5/2022

Matrix Spike Duplicate (MSD)

Lab Sample ID	Analysis Date	Analysis Time	Chemical Name	CAS	Sample Concentration	Spike Added	Measured Concentration	Units	Basis	Percent Recovery	LCL	UCL	Qualifier
0627221-3 MSD	06/27/2022	18:05:58	1,4-Dioxane	123-91-1		0.0100	0.00968	mg/L	Wet	96.8	80	120	

Comments:
All analysis references US EPA methods unless otherwise noted.
Calculations performed prior to rounding.
Project specific reporting limit (MDL) based upon lowest calibration standard.
M = Indicates elevated reporting limit based upon sample dilution.

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Michigan Laboratory ID: 9804
Wisconsin Laboratory ID: 998321720

Data Transmittal Cover Page

Project Name: Pall Corporation
ATS Project Number: G001-002
ATS Report Number(s): Org_SRF_0628221
Client PO Number: 4505179649

Project Description: This data report contains the results of 1 water sample, received by ATS on June 28, 2022 to be analyzed for 1,4 Dioxane.

We certify that the sample analyses for this report have been conducted in accordance with guidelines provided in the referenced standard test method, and are consistent with detailed procedures described in a written Standard Operating Procedure specific to the ATS Laboratories, as required by USEPA. Laboratory data sheets, SOPs, and QA/QC information are available for inspection and audit at the laboratory upon request. Unless specifically noted on the data report, all applicable sample preservation and holding time requirements have been met.

Recipient: Mr. Gage Trendel **Email:** gage_trendel@pall.com
FAX Number:

No. of Pages (including cover pg.): 13

From: Sarah Stubblefield, Senior Chemist / Lab Manager **Email:** Sarah.Stubblefield@AnnArborTechnicalServices.com
FAX Number: 734-995-3731

Additional Message: Copy report to: Patterson, Keith (keith_patterson@pall.com), Brode, Jim (jim_brode@pall.com) Katie Strohauer (kstrohauer@fveng.com), Ray Woods (rwoods@fv-operations.com), Amanda Isabella (amanda_isabella@pall.com), Sue Peters (sue_peters@pall.com), Scott Davis (sdavis@fv.operations.com)

Date: 7/7/22 **Signed:**

IF YOU DO NOT RECEIVE ALL PAGES OF THIS TRANSMITTAL, PLEASE CALL 734-995-0995.

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ORGANIC ANALYSIS

1,4-Dioxane by GC/MS
USEPA 1624

ATS Project Number: G001-002.22

ATS SDG: 0628221

Prepared By:
Ann Arbor Technical Services, Inc.
290 South Wagner Road
Ann Arbor, MI 48103

LABORATORY OPERATIONS
CASE NARRATIVE

ATS Project Number: G001-002
Report Date: 7/7/22
Sample Matrix: Water
ATS SDG/SRF Numbers: 0628221
Client PO Number: 4505179649

CASE NARRATIVE SUMMARY

This case narrative applies to the following sample that was received at Ann Arbor Technical Services, Inc. (ATS) on 6/28/22, and associated matrix-specific QA/QC:

Samples

Client Sample Identification	Sample Date	Requested Turn Around Time	Analysis	Matrix
Received 6/28/22				
Outfall 001	6/27/22	Urgent	1,4-Dioxane	Water

Upon receipt samples were scheduled for the following analyses.

Analysis	Number of Samples
• 1,4-Dioxane (USEPA 1624) – Urgent TAT	• 1 Samples + 1 Matrix Spike + 1 Matrix Spike Duplicate

Sample Receipt, Chain of Custody Records, and Holding Times

Samples were delivered directly to ATS by Pall Corporation staff. Samples were received with proper chain of custody records included. Sample condition and anomalies, if any, are either presented in the "Sample Receipt" section of this report or in the comments on individual data sheets. All samples were prepared and analyzed within 45 days with the following exceptions:

- None

Consultants in Chemistry & Environmental Science
290 South Wagner Road, Ann Arbor, Michigan 48103 Tel 734/995-0995 Fax 734/995-3731

QC Batch Size & Matrix QC

USEPA defines a single QA/QC batch as no more than 20 samples, excluding method blanks (MB, LRB), fortified blanks (BS, LFB, LCS), matrix spikes (LFM, MS, SPK), and duplicates whether spiked or native (LFMD, MSD, SPK DUP, DUP, LR).

Data Review and Approval

All data contained in this report have been generated in accordance with guidelines provided in the referenced standard test method and are consistent with detailed procedures described in a written standard operating procedure (SOP) specific to the ATS Laboratory, as required by USEPA. All data are peer and management reviewed to ensure compliance with the above referenced SOP's and project specifications. In addition, all data conform to the laboratory's Quality Assurance / Quality Control Manuals.

Data Deliverables

This data package constitutes a Level II package; other data report packages (Level I, Level IV DVP, EPA R5 EDD) are available upon request. There were no hardcopy data summary sheets generated for this project.

Data Qualification Definitions

The following are qualifier definitions that may be used throughout this SDG and are presented with their associated samples in each SDG section as appropriate.

- "B" – analyte concentration in method blank exceeds reporting limit (RL)
- "D" – result taken from sample dilution
- "E" – estimated result exceeding calibration range of the method
- "IR" –estimated result due to ion ration outside 30% acceptance window
- "J" – concentration reported between the project specific Reporting Limit (RL) and the laboratory determined Method Detection Limit/Limit Of Detection (MDL/LOD)
- "JMDL" – concentration reported below the laboratory/instrument Method Detection Limit/Limit Of Quantitation (MDL/LOQ), and above a specified instrument Signal-To-Noise Ratio (SNR)
- "M" – elevated reporting level due to analyte concentration or matrix interference requiring dilution, limited sample mass/volume, or excess moisture content
- "N" – tentatively identified compound based on mass spectral library search
- "NJ" -tentatively identified compound based on mass spectral data with estimated concentration
- "U" – analyte not detected above the project specific Reporting Limit (RL)
- "*" – indicates analyte has exceeded batch or sample specific QA/QC control limits

TECHNICAL NARRATION: Analysis Method - USEPA 1624

Sample Analysis

1,4-Dioxane Analysis (GC/MS): Samples were analyzed by purge and trap GC/MS in accordance with USEPA method 1624 (Volatile Organic Compounds by Isotope Dilution Gas Chromatography – Mass Spectrometry). An initial calibration with at least five levels was used to quantitate 1,4-Dioxane. Samples were reported to project specific reporting limits. Samples were reported as mg/L.

Anomalies Noted:

- None

Sample Dilutions

Samples containing compounds at concentrations above the initial calibration curve were diluted and reanalyzed for those compounds. The following samples were diluted for 1,4-Dioxane:

- None

Calibration Verification

Method calibration was verified through the analysis of a mid-level calibration verification standard at a minimum of every 12 hours. All verification standards met the acceptance criteria with the following exceptions:

- None

Low system background was demonstrated through the analysis of instrument blanks at a minimum of every 12 hours. All instrument blanks met the acceptance criteria with the following exceptions:

- None

Laboratory Reagent Blanks

A laboratory reagent blank (LRB) was analyzed as part of the QA/QC batch. The LRB met the acceptance criteria with the following exceptions:

- None

Labelled Internal Standards and Surrogates - Quantitation

This method utilizes Internal Standards only, not Surrogates. Internal standards areas and retention times met the acceptance criteria with the following exceptions:

- None

ASSESSMENT OF ACCURACY

Laboratory Fortified Blanks/Matrix Spikes/OPRs Laboratory Control Samples - Accuracy

A laboratory fortified blank (LFB) and Matrix Spike (MS) was analyzed as part of the QA/QC batch. The LFB / MS met the acceptance criteria with the following exceptions:

- None

Laboratory Fortified Blank Duplicates/Matrix Spike Duplicates/OPR Duplicates - Accuracy

A matrix spike duplicate (MSD) was analyzed as part of the QA/QC batch. The MSD met the accuracy acceptance criteria with the following exceptions:

- None

ASSESSMENT OF PRECISION

Laboratory Fortified Blanks/Matrix Spikes and Duplicates - Precision

A matrix spike duplicate (MSD) was analyzed as part of the QA/QC batch. The MSD met the precision acceptance criteria with the following exceptions:

- None

Mark A DeLong

/ July 7, 2022
Mark T. DeLong (Quality Assurance Coordinator)

/ July 7, 2022
Philip B. Simon (Laboratory Director)

G001-002.22/CN_0628221.doc

CHAIN OF CUSTODY RECORD

Page 1

ATS
290 South Wagner Road
Ann Arbor, Michigan 48103
Tel: 734-995-0995 Fax: 734-995-3731
Michigan Laboratory ID: 9964
Wisconsin Laboratory ID: 998267720

PROJECT ID / NUMBER: Pall / G001-002
SAMPLE COLLECTOR (Print & Signature): Gage Theriot (Gage_Theriot@Pall.com)
RELINQUISHED BY (Print & Signature): Gage Theriot — DATE/TIME: 6/27/2022 0:00
RELINQUISHED BY (Print & Signature): — DATE/TIME:
COMMENTS (Preservation, etc.): Outfall/Eff->Unpreserved All others->HCl preserved

Client Purchase Authorization (Purchase Order): PO# 4505179649
RECEIVED BY (Print & Signature): — DATE/TIME:
RECEIVED BY (Print & Signature): — DATE/TIME:

SHIPPED INFORMATION: SHIPPER (Check one) / TRACKING NUMBER(S) (If applicable)

Date	Fed Ex	UPS	Del.	Courier	Tracking Number
Date	Fed Ex	UPS	Del.	Courier	Tracking Number
Date	Fed Ex	UPS	Del.	Courier	Tracking Number
Date	Fed Ex	UPS	Del.	Courier	Tracking Number

RECEIVED BY (Print & Signature): — DATE/TIME:
RECEIVED BY (Print & Signature): — DATE/TIME:
RECEIVED BY (Print & Signature): — DATE/TIME:

SAMPLE NO.	LABORATORY IDENTIFICATION (ATS Use Only)	DATE	TIME	DWMS	SOMS	Sample Identification	NO. OF CONTAINERS	ANALYSIS NUMBER	EPA 1624 1,4 Dioxane	Bromide	Chloride	Fe2 +Fe3	Sulfate	Ammonia N	Total P(ug)	TDS			MATRIX Indicate Soil/Water/Air Sediment/Sludge/Solid Dried	
1.	0628221-1	6/27/2022	n/a		X	Outfall	1	1	X										Water	
2.																				
3.																				
4.																				
5.																				
6.																				
7.																				
8.																				
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15.																				
16.																				
17.																				
18.																				
19.																				
20.																				

* - Requested Turn-Around Time Priority Number Key: 1 = Urgent 2 = Rush 3 = Standard

ATS

1,4-Dioxane by GC/MS
Data Summary Sheet

ATS Project Number	G001-002.22	Percent Moisture	100.0
ATS SDG Number	0628221	Instrument	2100V
Client Sample ID	Outfall	Subsample (mL)	5.000
Laboratory Sample ID	0628221-1	Final Volume (mL)	5.000
Matrix	Water	Dilution Factor	1
Sample Date	06/27/2022 n/a	Basis	Wet
Analytical Method (USEPA)	USEPA 1624	Units	mg/L
Preparation Method (USEPA)	USEPA 1624	Preparation Date	06/28/2022
QC Batch Number	QCORG0628221	Analysis Date	06/28/2022 11:59:10

Parameter	CAS#	Result	MDL	PQL	Qual
1,4-Dioxane	123-91-1	0.006	0.001		

Comments
All methods reference US EPA methods unless otherwise noted.
Calculations performed prior to rounding.
Project specific reporting limit (MDL) based upon lowest calibration standard.
M - Indicates elevated reporting limit based upon sample dilution.
Sample analyzed at native pH.

ATS

ANN ARBOR TECHNICAL SERVICES, INC.
QUALITY ASSURANCE / QUALITY CONTROL SUMMARY
LABORATORY BLANK SUMMARY

Method: USEPA 1624
QA/QC Batch Number: QCORG0628221
SDG: 0628221
Project Number: G001-002.22
Report Date: 7/5/2022

Laboratory Reagent Blank (LRB) / Method Blank (MB)

Lab Sample ID	Analysis Date	Analysis Time	Chemical Name	CAS	Result	Units	Basis	Method Detection Limit	Reporting Detection Limit	Qualifier
LRB-1 6/28/22	06/28/2022	10:55:37	1,4-Dioxane	123-91-1		mg/L	Wet	0.001		

Comments
All methods reference US EPA methods unless otherwise noted.
Calculations performed prior to rounding.
Project specific reporting limit (MDL) based upon lowest calibration standard.
M - Indicates elevated reporting limit based upon sample dilution.

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ANN ARBOR TECHNICAL SERVICES, INC.

QUALITY ASSURANCE / QUALITY CONTROL SUMMARY

LABORATORY ACCURACY SUMMARY

Method: USEPA 1624
QA/QC Batch Number: QCORG0628221
SDG 0628221
Project Number: G001-002.22
Report Date: 7/5/2022

Matrix Spike Duplicate (MSD)

Lab Sample ID	Analysis Date	Analysis Time	Chemical Name	CAS	Sample Concentration	Spike Added	Measured Concentration	Units	Basis	Percent Recovery	LCL	UCL	Qualifier
0628221-2 MSD	06/28/2022	14:10:50	1,4-Dioxane	123-91-1		0.0100	0.00938	mg/L	Wet	93.8	80	120	

Comments
All methods reference US EPA methods unless otherwise noted.
Calculations performed prior to rounding.
Project specific reporting limit (MDL) based upon lowest calibration standard.
M - Indicates elevated reporting limit based upon sample dilution.

ANN ARBOR TECHNICAL SERVICES, INC.

QUALITY ASSURANCE / QUALITY CONTROL SUMMARY

LABORATORY ACCURACY SUMMARY

Method: USEPA 1624
QA/QC Batch Number: QCORG0628221
SDG 0628221
Project Number: G001-002.22
Report Date: 7/5/2022

Laboratory Fortified Blank (LFB) / Laboratory Control Sample (LCS) / On-Going Precision and Accuracy (OPR)

Lab Sample ID	Analysis Date	Analysis Time	Chemical Name	CAS	Sample Concentration	Spike Added	Measured Concentration	Units	Basis	Percent Recovery	LCL	UCL	Qualifier
LFB-1 6/28/22	06/28/2022	09:53:06	1,4-Dioxane	123-91-1		0.0100	0.00966	mg/L	Wet	96.6	85	115	

Comments
All methods reference US EPA methods unless otherwise noted.
Calculations performed prior to rounding.
Project specific reporting limit (MDL) based upon lowest calibration standard.
M - Indicates elevated reporting limit based upon sample dilution.

ANN ARBOR TECHNICAL SERVICES, INC.

QUALITY ASSURANCE / QUALITY CONTROL SUMMARY

LABORATORY PRECISION SUMMARY

Method: USEPA 1624
QA/QC Batch Number: QCORG0628221
SDG 0628221
Project Number: G001-002.22
Report Date: 7/5/2022

Matrix Spike (MS) / Matrix Spike Duplicate (MSD)

Lab Sample ID	Analysis Date	Analysis Time	Chemical Name	CAS	Result	Mean	Units	Basis	RPD	Control Limit	Qualifier
0628221-2 MS	06/28/2022	13:26:57	1,4-Dioxane	123-91-1	0.00927		mg/L	Wet			
0628221-2 MSD	06/28/2022	14:10:50	1,4-Dioxane	123-91-1	0.00938	0.00933	mg/L	Wet	1.16	20	

Comments
All methods reference US EPA methods unless otherwise noted.
Calculations performed prior to rounding.
Project specific reporting limit (MDL) based upon lowest calibration standard.
M - Indicates elevated reporting limit based upon sample dilution.

ANN ARBOR TECHNICAL SERVICES, INC.

QUALITY ASSURANCE / QUALITY CONTROL SUMMARY

LABORATORY ACCURACY SUMMARY

Method: USEPA 1624
QA/QC Batch Number: QCORG0628221
SDG 0628221
Project Number: G001-002.22
Report Date: 7/5/2022

Matrix Spike (MS)

Lab Sample ID	Analysis Date	Analysis Time	Chemical Name	CAS	Sample Concentration	Spike Added	Measured Concentration	Units	Basis	Percent Recovery	LCL	UCL	Qualifier
0628221-2 MS	06/28/2022	13:26:57	1,4-Dioxane	123-91-1		0.0100	0.00927	mg/L	Wet	92.7	80	120	

Comments
All methods reference US EPA methods unless otherwise noted.
Calculations performed prior to rounding.
Project specific reporting limit (MDL) based upon lowest calibration standard.
M - Indicates elevated reporting limit based upon sample dilution.