

CASE NARRATIVE

Monthly Data Pall Life Sciences
Project: 1,4-Dioxane Remediation
Date: June 2020

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. d/b/a Pall Life Sciences (PLS) attests to the validity of the laboratory data generated by PLS's Ann Arbor, Michigan Environmental Laboratory facilities reported herein. All analyses performed by PLS's Environmental Laboratory facilities were done using established laboratory SOPs that incorporate QA/QC procedures described in the application methods. PLS'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.

All samples were analyzed at Pall Corporation's Environmental Laboratory except for one drinking water sample. The drinking water sample was analyzed by Ann Arbor Technical Services (ATS). All 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.

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 acid-preserved vials to a pH of ≤ 2 , with the exception of the Pall ozone treatment samples. These samples have compounds that, when mixed with the hydrochloric acid (HCl), cause interferences in the analysis of 1,4-dioxane. 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 if there is evidence that chilling has begun. All samples are iced or refrigerated at 4°C ($\pm 2^\circ\text{C}$) 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 1.0ppb (part per billion, micrograms per liter, $\mu\text{g/L}$). All quality control parameters were within the acceptance limits. All data is reported with two significant figures.

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. All data is reported with 2 significant figures.

Qualifiers

1,4-Dioxane Qualifier Codes:

<u>Qualifier Code</u>	<u>Description</u>
nd:	The compound was analyzed for, but was 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:

<u>Qualifier Code</u>	<u>Description</u>
nd:	The compound was analyzed for, 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: Susan E.O. Peters Susan E.O. Peters Date: 07-02-20

Report Checked by: Laurel Beyer La Beyer Date: 7/2/20

Sample Analysis Report

June, 2020

642 South Wagner Road
Ann Arbor, MI 48103-9019 US
734.436.4025 phone

Analyst Initials: SEOP
Date: 07-02-20

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								
Not Determined								
697 South Wagner Rd-06-12-20-10:45-1	nd	1.0						O
Miscellaneous Wells								
Bethlehem Cemetery-06-12-20-11:13-1	nd	1.0						
Extraction Wells								
C3								
DOLPH-06-08-20-09:55-1	130	1.0						
TW-20-06-08-20-10:05-1	810	25.0						D
D2								
LB-4-06-08-20-09:40-1	470	10.0						D
TW-21-06-08-20-09:45-1	260	5.0						D
E								
TW-18-06-08-20-09:50-1	240	5.0						D
TW-19-06-08-20-09:30-1	580	10.0						D
TW-23-06-08-20-09:35-1	370	10.0						D
Marshy								
PW-1-06-08-20-10:00-1	440	5.0						D
SW								
TW-22-06-08-20-10:10-1	480	10.0						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)
TV-28-06-08-20-10:15-1	610	25.0						D
Monitoring Wells								
C3								
MW-1 Replacement-06-08-20-14:14-1	1800	50.0						D
MW-105s-06-10-20-13:30-1	410	10.0						D
MW-22-06-09-20-10:52-1	500	10.0						D
MW-38s-06-08-20-12:38-1	nd	1.0						
MW-75-06-09-20-12:35-1	210	10.0						D
D0								
A2 Cleaning Supply-06-04-20-13:46-1	61	1.0						
MW-139i-06-16-20-10:59-1	nd	1.0						
MW-139s-06-16-20-12:37-1	1.0	1.0						
MW-140s-06-15-20-12:31-1	nd	1.0						
MW-141s-06-12-20-11:35-1	2.1	1.0						
MW-53d-06-01-20-10:48-1	nd	1.0						
MW-53i-06-01-20-11:58-1	54	1.0						
MW-53s-06-01-20-10:40-1	nd	1.0						
MW-61d-06-11-20-12:54-1	8.5	1.0						
MW-61s-06-11-20-11:44-1	3.8	1.0						
D2								
175 Jackson Plaza-06-09-20-14:44-1	920	10.0						D
373 Pinewood Shallow-06-10-20-10:48-1	200	5.0						D
465 Dupont-06-15-20-09:56-1	850	50.0						D
MW-38d-06-08-20-12:48-1	44	1.0						
MW-4d-06-09-20-09:52-1	320	10.0						D
MW-77-06-04-20-13:31-1	1100	25.0						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)
E								
373 Pinewood Deep-06-10-20-09:34-1	nd	1.0						
IW-2-06-24-20-08:50-1	1800	10.0					3000gal	D
IW-2-06-24-20-09:10-1	1800	10.0					5000gal	D
MW-103s-06-02-20-08:36-1	72	1.0						
MW-105d-06-10-20-13:42-1	180	2.0						D
MW-112i-06-01-20-13:28-1	9.4	1.0						
MW-112s-06-01-20-12:58-1	nd	1.0						
MW-115-06-04-20-12:08-1	520	10.0						D
MW-116-06-04-20-10:45-1	480	10.0						D
MW-135-06-04-20-09:17-1	nd	1.0						
MW-139d-06-16-20-12:09-1	1.4	1.0						
MW-140d-06-15-20-11:22-1	nd	1.0						
MW-141d-06-11-20-14:18-1	3.7	1.0						
MW-76i-06-02-20-09:52-1	86	1.0						
MW-76s-06-02-20-11:03-1	240	5.0						D
MW-83s-06-02-20-13:47-1	430	10.0						D
MW-84s-06-02-20-12:24-1	320	10.0						D
MW-95-06-10-20-12:16-1	20	1.0						
Marshy								
NMW-1s-06-12-20-10:09-1	1500	50.0						D
NMW-2s-06-12-20-10:22-1	2000	50.0						D
SH								
MW-5d-06-08-20-13:30-1	2700	100.0						D
SW								
MW-50-06-09-20-12:25-1	830	10.0						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)
TW-4-06-09-20-09:08-1	38	1.0						

Surface Water

Not Applicable

HC/HR-06-01-20-08:12-1				nd	2.0			
HC/HR-06-02-20-08:00-1				nd	2.0			
HC/HR-06-03-20-06:40-1				nd	2.0			
HC/HR-06-04-20-07:10-1				nd	2.0			
HC/HR-06-05-20-07:50-1				nd	2.0			
HC/HR-06-08-20-08:00-1				nd	2.0			
HC/HR-06-09-20-07:50-1				nd	2.0			
HC/HR-06-10-20-08:10-1				nd	2.0			
HC/HR-06-11-20-10:40-1				nd	2.0			
HC/HR-06-12-20-08:28-1				nd	2.0			
HC/HR-06-15-20-08:05-1				nd	2.0			
HC/HR-06-16-20-08:15-1				nd	2.0			
HC/HR-06-17-20-09:20-1				nd	2.0			
HC/HR-06-18-20-07:40-1				nd	2.0			
HC/HR-06-19-20-07:40-1				nd	2.0			
HC/HR-06-22-20-09:20-1				nd	2.0			
HC/HR-06-23-20-07:40-1				nd	2.0			
HC/HR-06-24-20-07:10-1				nd	2.0			
HC/HR-06-25-20-08:20-1				nd	2.0			
HC/HR-06-26-20-07:55-1				nd	2.0			
HC/HR-06-29-20-07:57-1				nd	2.0			
HC/HR-06-30-20-08:10-1				nd	2.0			

Treatment System

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-06-01-20-2			7.0	5.0				
OUTFALL-06-01-20-1	4.8	1.0						
OUTFALL-06-02-20-2			6.8	5.0				
OUTFALL-06-02-20-1	5.0	1.0						
OUTFALL-06-03-20-02			7.2	5.0				
OUTFALL-06-03-20-01	5.2	1.0						
OUTFALL-06-04-20-2			6.4	5.0				
OUTFALL-06-04-20-1	5.2	1.0						
OUTFALL-06-07-20-2			7.6	5.0				
OUTFALL-06-07-20-1	4.6	1.0						
OUTFALL-06-08-20-1	5.2	1.0						
OUTFALL-06-08-20-2			7.6	5.0				
OUTFALL-06-09-20-1	5.0	1.0						
OUTFALL-06-09-20-2			9.1	5.0				
OUTFALL-06-10-20-1	4.9	1.0						
OUTFALL-06-10-20-2			7.3	5.0				
OUTFALL-06-11-20-1	4.7	1.0						
OUTFALL-06-11-20-2			8.4	5.0				
OUTFALL-06-14-20-1	5.2	1.0						
OUTFALL-06-14-20-2			7.8	5.0				
OUTFALL-06-15-20-1	5.2	1.0						
OUTFALL-06-15-20-2			8.1	5.0				
OUTFALL-06-16-20-1	4.9	1.0						
OUTFALL-06-16-20-2			8.5	5.0				
OUTFALL-06-17-20-1	6.3	1.0						
OUTFALL-06-17-20-2			8.3	5.0				
OUTFALL-06-18-20-1	5.5	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-06-18-20-2			7.6	5.0				
OUTFALL-06-21-20-1	4.7	1.0						
OUTFALL-06-21-20-2			8.1	5.0				
OUTFALL-06-22-20-1	4.9	1.0						
OUTFALL-06-22-20-2			9.2	5.0				
OUTFALL-06-23-20-01	4.8	1.0						
OUTFALL-06-23-20-02			9.2	5.0				
OUTFALL-06-24-20-2			8.2	5.0				
OUTFALL-06-24-20-1	4.8	1.0						
OUTFALL-06-25-20-2			9.2	5.0				
OUTFALL-06-25-20-1	4.8	1.0						
OUTFALL-06-28-20-2			8.1	5.0				
OUTFALL-06-28-20-1	5.3	1.0						
OUTFALL-06-29-20-1	6.0	1.0						
OUTFALL-06-29-20-2			8.5	5.0				
OUTFALL-06-30-20-2			7.5	5.0				
OUTFALL-06-30-20-1	5.1	1.0						
Red Pond-06-01-20-08:32-1	360	10.0						D
Red Pond-06-08-20-08:22-1	380	10.0						D
Red Pond-06-15-20-08:45-1	370	10.0						D
Red Pond-06-22-20-09:45-1	370	10.0						D
Red Pond-06-29-20-10:29-1	370	10.0						D

PLS Qualifier Codes:

- nd: The compound was analyzed for, but was not detected at or above the detection limit indicated.
- D: Analyte value quantified from a dilution, reporting limit is raised to reflect dilution.
- H: Sample was analyzed past 45 day hold time, but within 45 days used by ATS for same method with EPA approval.
- O: Samples analyzed in outside laboratory, Ann Arbor Technical Services (ATS).



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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_0623201

Project Description: This data report contains the results of one water sample, received by ATS on 6/23/20, 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: Ms. Sue Peters **Email:** Sue_Peters@Pall.com
FAX Number: _____

No. of Pages (including cover pg.): 8

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

Additional Message: _____

Date: 6/29/20 **Signed:** _____

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

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LABORATORY OPERATIONS CASE NARRATIVE

ATS Project Number: G001-002

Report Date: 6/29/20

SRF / SDG Numbers: 0623201

Case Narrative Summary

This case narrative applies to the following sample that was received at Ann Arbor Technical Services, Inc. (ATS) on 6/23/20, and associated matrix-specific QA/QC:

Samples

Client Sample Identification	Sample Date	Requested Turn Around Time	Analysis	Matrix
Received 6/23/20				
697 South Wagner Road	6/12/20	Standard	1,4-Dioxane	Drinking Water

Upon receipt, samples were scheduled for the following analyses:

Analysis

- 1,4-Dioxane (US EPA 1624) (Standard Turn)

Number of Samples

- 1 + 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 presented in the "Chain of Custody and Sample Receipt Documentation" section of this report.

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 procedures (SOPs) specific to the ATS Laboratory, as required by US EPA. 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.

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

G001-002.20/CN_0623201.doc

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.

Sample Analysis

1,4-Dioxane Analysis (GC/MS): Samples were analyzed in accordance with US EPA 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.

Anomalies Noted:

- None

Analytical QA/QC Summary

Calibration Verification

Method calibration was verified through the running of a mid-level initial calibration verification (CV) standard at a frequency of every 24 hours. All verification standards met the acceptance criteria with the following exceptions:

- None

Instrument Blanks

Instrument blanks were analyzed at a frequency of every 24 hours. All blanks met the acceptance criteria with the following exceptions:

- None

QA/QC Batch Summary

Laboratory Reagent Blanks

A laboratory reagent blank (LRB) was analyzed with each QA/QC batch. The LRB's met the acceptance criteria with the following exceptions:

- None

Laboratory Fortified Blanks and Matrix Spikes

A laboratory fortified blank (LFB) / laboratory control sample (LCS) was analyzed with each QA/QC batch. The LCS/LFB's met the acceptance criteria with the following exceptions:

- None

A matrix spike (MS) and matrix spike duplicate (MSD) was analyzed with each QA/QC batch. The MS/MSD met the acceptance criteria with the following exceptions:

- None

Matrix Duplicates

A replicate analysis was analyzed with each QA/QC batch. All replicates met the acceptance criteria with the following exceptions:

- None

Sample Dilutions

Samples containing compounds at concentrations above the initial calibration curve were diluted and reanalyzed for those compounds. The following samples were treated in this manner.

- None



_____/ June 29, 2020

Mark T. DeLong (Quality Assurance Coordinator)



_____/ June 29, 2020

Philip B. Simon (Laboratory Director)



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Michigan Laboratory ID: 9604
Wisconsin Laboratory ID: 998321720

Organic Analysis Data Summary Sheet

For: Ms. Sue Peters
Pall Corporation
642 South Wagner Road
Ann Arbor, MI 48103

ATS Project: Pall Corporation #G001-002
Report Date: 6/29/20
ATS SRF: 0623201

Sample Identification: 697 South Wagner

Sample Date: 6/12/20
Sample Time: 10:45 AM
Sampled By: Client
Laboratory Receipt Date: 6/23/20
Sample Matrix: Drinking Water

<u>Parameter</u>	<u>Method</u>	<u>Units</u>	<u>Result</u>	<u>Reporting Limit</u>	<u>Analysis Date</u>	<u>Analysis Time</u>	<u>Analyzed By</u>
Organic Analysis							
1,4-Dioxane	EPA 1624	mg/L	<0.001	0.001	6/23/20	12:34	JEB

Comments

All methods reference USEPA methods unless otherwise noted.



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 Michigan Laboratory ID: 9604
 Wisconsin Laboratory ID: 998321720

Quality Assurance / Quality Control Data Summary

QC Batch Number: QCORG0623201
 Parameter: 1,4-Dioxane (EPA 1624)

ATS Project: Pall Corporation #G001-002
 Report Date: 6/29/20

Results of QA Samples run concurrently with project samples

REPLICATE ANALYSIS

Sample	Replicate #1	Replicate #2	Mean	Relative Range (percent)
#G001-002 697 S Wagner 6/12/20 Matrix Spike	0.009 mg/L	0.008 mg/L	0.009 mg/L	3.8

SPIKES and/or QC CHECK SAMPLES

Sample/Analyte	Known Concentration	Spike Concentration	Analyzed Concentration	Recovery (percent)
#G001-002 Laboratory Fortified Blank 6/23/20	<0.001 mg/L	0.010 mg/L	0.009 mg/L	92.9
697 S Wagner 6/12/20 Matrix Spike	<0.001 mg/L	0.010 mg/L	0.009 mg/L	87.6
697 S Wagner 6/12/20 Matrix Spike Duplicate	<0.001 mg/L	0.010 mg/L	0.008 mg/L	84.7

BLANK ANALYSIS

Sample	Analyzed Concentration	QC Decision
#G001-002 Laboratory Reagent Blank 6/23/20	<0.001 mg/L	Acceptable

Comments:

Calculations performed prior to rounding.

Control Limits:

Recoveries

Laboratory Control Sample Recovery (85 - 115%)

Matrix Spike Recovery (80 - 120%)

Relative Range

Replicates (<20%)

