

CASE NARRATIVE

Monthly Data Pall Life Sciences

Project: 1,4-Dioxane Remediation

Date: March 2021

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.

One drinking water sample was sent a certified drinking water laboratory, Ann Arbor Technical Services (ATS) for 1,4-dioxane determination. The balance of samples were analyzed at Pall Corporation's Environmental Laboratory for 1,4-dioxane and bromate. 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 and EPA Method 300.01. Pursuant to NELAP, this report may not be reproduced, except in full, without the written approval of the laboratory.

Experimentation was done in March to identify the source of the increasing bromate concentration and increasing iron concentration. Excessive flock like iron sediment has been observed over the month. To help identify if this flock was causing problems with the 24hour Outfall samples a sediment filter was installed before the collection vessel. This sediment filter was intended to remove only the particulates. After the 1,4-dioxane concentrations fell it was discovered that the filter contained a thin activated carbon jacket. Optimization samples had been taken as grab samples for the Outfall001 daily as part of the testing that was done to determine the cause of increasing bromate. These data have been included in this report to reflect the actual concentrations discharged.

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 (HCl)-preserved vials to a pH of ≤ 2 , with the exception of the Pall ozone treatment samples. These samples have chemicals that, when mixed with the HCl, 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 ($\pm 2^\circ\text{C}$) 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 1,4-dioxane, micrograms per liter, µg/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:

<i>Qualifier Code</i>	<i>Description</i>
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 45day hold time.
O:	Samples analyzed in outside laboratory.
S:	Samples split with DEQ.

Bromate Qualifier Codes:

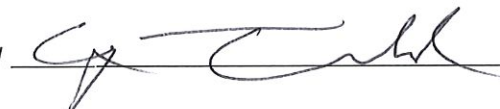
<i>Qualifier Code</i>	<i>Description</i>
nd:	The compound was analyzed for, but was not detected at or above the detection limit indicated.
E:	The compound result is greater than the upper quantitation limit in the associated calibration curve.
J:	The compound was positively identified; the associated 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 28day hold time

Analyst: Susan E.O. Peters



Date: 040821

Report Checked by: Gage Trendel



Date: 4/8/21



Life Sciences

Sample Analysis Report

March, 2021

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

Analyst Initials: SGP
Date: 04-08-21

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								
5005 Jackson Rd-03-23-21-13:19-1	15	1.0						
Not Determined								
697 South Wagner Rd-03-23-21-13:40-1	nd	1.0						
697 South Wagner Rd-03-23-21-13:40-01	nd	1.0					ATS	O
Extraction Wells								
C3								
DOLPH-03-02-21-14:10-1	150	1.0						
TW-20-03-01-21-10:55-1	790	10.0						D
TW-20-03-16-21-14:00-1	870	10.0						D
D2								
LB-1-03-24-21-09:40-1	340	10.0						D
LB-4-03-01-21-10:20-1	440	10.0						D
TW-21-03-01-21-10:35-1	250	10.0						D
E								
TW-18-03-01-21-10:40-1	220	10.0						D
TW-19-03-02-21-14:10-1	390	10.0						D
TW-23-03-01-21-10:25-1	350	10.0						D
Marshy								

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)
PW-1-03-01-21-10:45-1	680	10.0						D
PW-1-03-18-21-07:55-1	330	10.0						D
SW								
TW-22-03-01-21-11:00-1	370	10.0						D
TW-22-03-05-21-12:30-1	360	10.0						D
TW-28-03-01-21-11:05-1	700	10.0						D
TW-28-03-11-21-07:30-1	740	10.0						D
Monitoring Wells								
C3								
MW-125-03-22-21-15:23-1	220	10.0						D
MW-127s-03-22-21-14:07-1	nd	1.0						
MW-128s-03-22-21-10:17-1	1.3	1.0						
MW-37-03-22-21-11:33-1	240	10.0						D
D0								
A2 Cleaning Supply-03-04-21-09:30-1	46	1.0						
MW-51-03-03-21-09:00-1	nd	1.0						
MW-53d-03-03-21-12:51-1	nd	1.0						
MW-53i-03-04-21-09:13-1	50	1.0						
MW-53s-03-03-21-14:05-1	nd	1.0						
MW-93-03-05-21-08:42-1	nd	1.0						
D2								
MW-122s-03-09-21-12:36-1	300	10.0						D
MW-131s-03-03-21-11:31-1	nd	1.0						
MW-133i-03-04-21-12:11-1	1.2	1.0						
MW-133s-03-03-21-13:22-1	1.4	1.0						

[illegible]

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)
Not Applicable								
HC/HR-03-01-21-09:20-1			nd	2.0				
HC/HR-03-02-21-09:20-1			nd	2.0				
HC/HR-03-03-21-10:05-1			nd	2.0				
HC/HR-03-04-21-09:20-1			nd	2.0				
HC/HR-03-05-21-09:50-1			nd	2.0				
HC/HR-03-08-21-09:30-1			nd	2.0				
HC/HR-03-09-21-09:15-1			nd	2.0				
HC/HR-03-10-21-09:50-1			nd	2.0				
HC/HR-03-11-21-09:20-			nd	2.0				
HC/HR-03-12-21-09:00-1			nd	2.0				
HC/HR-03-15-21-09:40-1			nd	2.0				
HC/HR-03-16-21-09:35-1			nd	2.0				
HC/HR-03-17-21-09:35-1			nd	2.0				
HC/HR-03-18-21-11:00-1			nd	2.0				
HC/HR-03-19-21-10:00-1			nd	2.0				
HC/HR-03-22-21-09:45-1			nd	2.0				
HC/HR-03-23-21-10:45-1			nd	2.0				
HC/HR-03-24-21-08:40-1			nd	2.0				
HC/HR-03-25-21-09:25-1			nd	2.0				
HC/HR-03-26-21-07:45-1			nd	2.0				
HC/HR-03-29-21-08:30-1			nd	2.0				
HC/HR-03-30-21-08:40-1			nd	2.0				
HC/HR-03-31-21-08:25-1			nd	2.0				
Treatment System								
OUTFALL-03-01-21-1	6.3	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-03-01-21-2			9.9	5.0				
OUTFALL-03-02-21-1	7.2	1.0						
OUTFALL-03-02-21-2			9.4	5.0				
OUTFALL-03-03-21-1	6.1	1.0						
OUTFALL-03-03-21-2			9.4	5.0				
OUTFALL-03-04-21-1	6.4	1.0						
OUTFALL-03-04-21-2			10	5.0				
OUTFALL-03-07-21-2	6.6	1.0						
OUTFALL-03-07-21-1			9.0	5.0				
OUTFALL-03-08-21-1	6.1	1.0						
OUTFALL-03-08-21-2			11	5.0				
OUTFALL-03-09-21-1	5.8	1.0						
OUTFALL-03-09-21-2			9.4	5.0				
OUTFALL-03-10-21-1	6.2	1.0						
OUTFALL-03-10-21-2			11	5.0				
OUTFALL-03-11-21-1	6.9	1.0						
OUTFALL-03-11-21-2			9.6	5.0				
OUTFALL-03-14-21-1	6.1	1.0						
OUTFALL-03-14-21-2			12	5.0				
OUTFALL-03-15-21-1	6.0	1.0						
OUTFALL-03-15-21-2			9.4	5.0				
OUTFALL-03-16-21-1	6.3	1.0						
OUTFALL-03-16-21-2			9.2	5.0				
OUTFALL-03-17-21-1	6.3	1.0						
OUTFALL-03-17-21-2			11	5.0				
OUTFALL-03-18-21-2	7.1	1.0						
OUTFALL-03-18-21-1			12	5.0				

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-03-21-21-1	6.7	1.0						
OUTFALL-03-21-21-2			10	5.0				
OUTFALL-03-22-21-1	7.0	1.0						
OUTFALL-03-22-21-2			9.4	5.0				
OUTFALL-03-23-21-1	6.7	1.0						
OUTFALL-03-23-21-2			9.6	5.0				
OUTFALL-03-24-21-1	6.7	1.0						V
OUTFALL-03-24-21-2			10	5.0				
OUTFALL-03-25-21-1	3.9	1.0						
OUTFALL-03-25-21-08:00-1	6.3	1.0					system optimization	see Narrative
OUTFALL-03-25-21-2			7.4	5.0				
OUTFALL-03-25-21-08:00-2			7.3	5.0			system optimization	J, see Narrative
OUTFALL-03-26-21-07:27-1	6.3	1.0					system optimization	see Narrative
OUTFALL-03-26-21-07:27-2			7.3	5.0			system optimization	J, see Narrative
OUTFALL-03-28-21-1	nd	1.0						
OUTFALL-03-28-21-2			5.4	5.0				
OUTFALL-03-29-21-1	1.2	1.0						
OUTFALL-03-29-21-08:10-1	7.2	1.0					system optimization	see Narrative
OUTFALL-03-29-21-2			7.1	5.0				
OUTFALL-03-29-21-08:10-2			8.4	5.0			system optimization	J, see Narrative
OUTFALL-03-30-21-1	1.1	1.0						
OUTFALL-03-30-21-08:30-1	5.9	1.0					system optimization	see Narrative
OUTFALL-03-30-21-2			8.4	5.0				
OUTFALL-03-30-21-08:30-2			6.6	5.0			system optimization	J, see Narrative
OUTFALL-03-31-21-1	1.6	1.0						
OUTFALL-03-31-21-08:15-1	6.6	1.0					system optimization	see Narrative
OUTFALL-03-31-21-2			5.4	5.0				

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-03-31-21-08:15-2			3.5	5.0			system optimization	J, see Narrative
Red Pond-03-01-21-07:25-1	350	10.0						D
Red Pond-03-08-21-07:30-1	400	10.0						D
Red Pond-03-15-21-08:15-1	370	10.0						D
Red Pond-03-22-21-07:25-1	380	10.0						D
Red Pond-03-25-21-10:00-1	320	10.0						D, V
Red Pond-03-30-21-15:30-1	370	10.0						D
Red Pond-03-31-21-07:45-1	370	10.0						D



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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_0330211
Client PO Number: 4503886817

Project Description: This data report contains the results of one water sample, received by ATS on 3/30/21, 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.): 7

From: Sarah Stubblefield
Senior Chemist / Lab Manager

Email: Sarah.Stubblefield@AnnArborTechnicalServices.com

FAX Number: 734-995-3731

Additional Message:

Date: 4/5/21

Signed:

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LABORATORY OPERATIONS CASE NARRATIVE

ATS Project Number: G001-002

Report Date: 4/5/21

SRF / SDG Number(s): 0330211

Client PO Number: 4503886817

Case Narrative Summary

This case narrative applies to the following sample that was received at Ann Arbor Technical Services, Inc. (ATS) on 3/30/21, and associated matrix-specific QA/QC:

Samples

Client Sample Identification	Sample Date	Requested Turn Around Time	Analysis	Matrix
Received 3/30/21				
697 South Wagner Road	3/23/21	Standard	1,4-Dioxane	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 "Sample Receipt" section of this report. All samples were prepared and analyzed within the holding times cited in the corresponding analytical methods with the following exceptions:

- None

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).

G001-002.21/CN_0330211.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 by purge and trap GC/MS 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. Samples were reported as mg/L.

Anomalies Noted:

- None

Analytical QA/QC Summary

Calibration Verification

Method calibration was verified through the analysis 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

Low system background was demonstrated through the analysis of instrument blanks at a minimum of every 24 hours. All instrument blanks met the acceptance criteria with the following exceptions:

- None

QA/QC Batch Summary

Internal Standards and Surrogates

Internal standards areas and retention times met the acceptance criteria with the following exceptions:

- None

Surrogate recoveries met the acceptance criteria with the following exceptions:

- None

Laboratory Reagent Blanks

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

- None

Laboratory Fortified Blanks / Laboratory Control Samples

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

- None

Matrix Spikes and Spike Duplicates

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

- None

Matrix Replicates

A matrix spike (MS) and matrix spike duplicate (MSD) was analyzed as part of the QA/QC batch. The 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 diluted for 1,4-Dioxane:

- None



/ April 5, 2021

Mark T. DeLong (Quality Assurance Coordinator)



/ April 5, 2021

Philip B. Simon (Laboratory Director)



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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: 4/5/21
ATS SRF: 0330211

Sample Identification: 697 South Wagner Road

Sample Date: 3/23/21
Sample Time: 1:40 PM
Sampled By: Client
Laboratory Receipt Date: 3/30/21
Sample Matrix: Water

Parameter	Method	Units	Result	Reporting Limit	Analysis Date	Analysis Time	Analyzed By
Organic Analysis							
1,4-Dioxane	US EPA 1624	mg/L	<0.001	0.001	4/5/21	12:46	JEB

Comments

All methods reference US EPA methods unless otherwise noted.
na - Indicates not available / applicable.



290 South Wagner Road
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Tel. 734/995-0995 Fax. 734/995-3731
Michigan Laboratory ID: 9604
Wisconsin Laboratory ID: 998321720

Quality Assurance / Quality Control Data Summary

QC Batch Number: QCORG0405211

Parameter: 1,4-Dioxane (EPA 1624)

ATS Project: Pall Corporation

#G001-002

Report Date: 4/5/21

Results of QA Samples run concurrently with project samples

REPLICATE ANALYSIS

Sample	Replicate #1	Replicate #2	Mean	Relative Range (percent)
#G001-002 697 South Wagner Road 3/23/21 Matrix Spike	0.010 mg/L	0.009 mg/L	0.009 mg/L	5.2

SPIKES and/or QC CHECK SAMPLES

Sample/Analyte	Known Concentration	Spike Concentration	Analyzed Concentration	Recovery (percent)
#G001-002 Laboratory Fortified Blank	<0.001 mg/L	0.010 mg/L	0.011 mg/L	107.3
697 South Wagner Road 3/23/21 Matrix Spike	<0.001 mg/L	0.010 mg/L	0.010 mg/L	95.6
697 South Wagner Road 3/23/21 Matrix Spike Duplicate	<0.001 mg/L	0.010 mg/L	0.009 mg/L	90.7

BLANK ANALYSIS

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

Comments:

Calculations performed prior to rounding.

Control Limits:

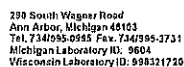
Recoveries

Laboratory Control Sample Recovery (85 - 115%)

Matrix Spike Recovery (80 - 120%)

Relative Range

Replicates (<20%)



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