Gelman Sciences, Inc. d/b/a
Pall Life Sciences
642 South Wagner Road
Ann Arbor, MI 48103
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CASE NARRATIVE

Monthly Data Pall Life Sciences
Project: 1,4-Dioxane Remediation
Date: April 2017

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 instrumentation. 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 by Pall Corporation's Environmental Laboratory with the exception of one drinking water sample (697 S. Wagner Road). The drinking water sample was sent to Ann Arbor Technical Services (ATS) for analysis. 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 at PLS 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 HCl acid-preserved vials to a pH of ≤2, with the exception of the PLS 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 then 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.

PLS 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.

PLS 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 PLS 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 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 28 days.
O:	Samples analyzed in outside laboratory.
S:	Samples split with DEQ.

Bromate Qualifier Codes:

Qualifier Code	*Description*
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
O:	Samples analyzed in outside laboratory.

Analyst: *Susan E.O. Peters* Susan E O Peters Date: 05-10-17

Report Checked by: *Laurel Beyer* Date: 5-10-17

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

Sample Analysis Report

April, 2017

Analyst Initials: _____
Date: _____

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-04-14-17-08:55-1	nd	1.0						
4601 Park 6 inch-04-14-17-10:22-1	1.6	1.0						
5005 Jackson Rd-04-18-17-13:15-1	15	1.0						
Not Determined								
697 South Wagner Rd-04-17-17-11:20-1	nd	1.0						
697 South Wagner Rd-04-17-17-11:20-2	nd	1.0						O-ATS
Miscellaneous Wells								
Bethlehem Cemetery-04-17-17-11:40-1	nd	1.0						
Extraction Wells								
C3								
DOLPH-04-10-17-13:30-1	92	1.0						
TW-1-04-17-17-13:44-1	71	1.0						
TW-10-04-10-17-13:05-1	320	5.0						D
TW-14-04-10-17-13:15-1	44	1.0					confirmed at 41ppb, (05/01/17)	
TW-20-04-10-17-13:23-1	820	10.0						D
TW-3-04-17-17-13:50-1	nd	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-4-04-10-17-13:45-1	480	10.0						D
TW-21-04-10-17-13:38-1	170	5.0						D
TW-9-04-10-17-13:18-1	590	10.0						D
E								
TW-12-04-17-17-11:56-1	22	1.0						
TW-17-04-10-17-13:10-1	190	10.0					confirmed at 170ppb (05/01/17)	D
TW-18-04-10-17-13:29-1	290	5.0						D
TW-19-04-10-17-13:48-1	610	10.0						D
Marshy								
PW-1-04-10-17-13:33-1	890	25.0						D
SW								
TW-22-04-11-17-13:14-1	460	10.0						D
TW-8-04-11-17-13:15-1	720	25.0						D
Monitoring Wells								
C3								
MW-20-04-18-17-14:32-1	nd	1.0						
MW-22-04-12-17-15:17-1	280	10.0						D
MW-2d-04-18-17-10:42-1	37	1.0						
MW-39s-04-20-17-12:03-1	1.6	1.0						
D0								
A2 Cleaning Supply-04-13-17-15:40-1	46	1.0						
MW-136i-04-18-17-10:15-1	nd	1.0						
MW-136s-04-18-17-11:40-1	nd	1.0						
MW-137s-04-18-17-16:52-1	nd	1.0						
MW-138i-04-19-17-11:18-1	7.6	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-138s-04-19-17-10:00-1	nd	1.0						
MW-139i-04-19-17-16:00-1	nd	1.0					artesian	
MW-139s-04-19-17-14:50-1	nd	1.0						
MW-140s-04-19-17-18:52-1	nd	1.0						
MW-41d-04-18-17-11:30-1	26	1.0						
MW-41s-04-18-17-11:34-1	16	1.0						
MW-53d-04-10-17-10:50-1	nd	1.0						
MW-53i-04-10-17-12:15-1	25	1.0						
MW-53i-04-20-17-10:28-1	40	1.0					confirmed at 39ppb (05/01/17)	
MW-53s-04-10-17-09:36-1	nd	1.0						
MW-61d-04-14-17-11:58-1	3.8	1.0						
MW-61s-04-14-17-13:22-1	11	1.0						
MW-93-04-20-17-08:57-1	8.8	1.0						
D2								
HZ-S-04-17-17-14:35-1	1100	50.0						D
MW-120s-04-11-17-19:58-1	nd	1.0						
MW-121s-04-11-17-10:52-1	nd	1.0						
MW-123s-04-11-17-14:25-1	nd	1.0						
MW-124s-04-20-17-15:50-1	nd	1.0						
MW-126s-04-13-17-17:10-1	nd	1.0						
MW-129i-04-11-17-17:15-1	nd	1.0						
MW-129s-04-11-17-15:55-1	nd	1.0						
MW-130i-04-21-17-09:55-1	4.2	1.0						
MW-130s-04-21-17-08:36-1	nd	1.0						
MW-131s-04-13-17-14:10-1	nd	1.0						
MW-133i-04-13-17-10:40-1	1.8	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-133s-04-13-17-08:28-1	1.5	1.0						
MW-134i-04-12-17-18:18-1	9.0	1.0						
MW-134s-04-12-17-17:10-1	9.0	1.0						
MW-39d-04-20-17-13:30-1	30	1.0						
MW-54d-04-21-17-12:58-1	1.4	1.0						
MW-54s-04-21-17-11:33-1	nd	1.0						
E								
MW-103s-04-10-17-16:50-1	62	1.0						
MW-112i-04-10-17-15:05-1	9.2	1.0						
MW-112s-04-10-17-13:55-1	nd	1.0						
MW-115-04-12-17-08:55-1	290	10.0						D
MW-116-04-12-17-11:10-1	420	10.0						D
MW-120d-04-13-17-10:45-1	nd	1.0						
MW-121d-04-11-17-12:15-1	1.5	1.0						
MW-123d-04-13-17-12:02-1	nd	1.0						
MW-124d-04-20-17-17:08-1	nd	1.0						
MW-126d-04-13-17-15:48-1	nd	1.0						
MW-129d-04-11-17-18:05-1	1.2	1.0						
MW-131d-04-13-17-12:50-1	nd	1.0						
MW-133d-04-13-17-09:50-1	4.1	1.0						
MW-134d-04-12-17-15:50-1	5.5	1.0						
MW-136d-04-18-17-08:55-1	nd	1.0						
MW-137d-04-18-17-15:25-1	nd	1.0						
MW-138d-04-19-17-08:45-1	nd	1.0						
MW-139d-04-19-17-13:30-1	nd	1.0						
MW-140d-04-19-17-17:38-1	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-139d-04-19-17-13:30-1	nd	1.0						
MW-140d-04-19-17-17:38-1	nd	1.0						
MW-76i-04-10-17-18:20-1	110	1.0						
MW-76s-04-10-17-19:40-1	270	5.0						D
MW-84s-04-11-17-08:22-1	57	25.0					confirmed at 52ppb (05/01/17)	D
Marshy								
NMW-1s-04-12-17-14:37-1	1900	50.0						D
NMW-2s-04-12-17-14:51-1	2200	50.0						D
SH								
MW-25s-04-12-17-15:29-1	72	1.0						
MW-2s-04-18-17-10:23-1	2.7	1.0						
MW-5d-04-18-17-14:58-1	13000	100.0						D
SW								
MW-48-04-20-17-11:30-1	43	1.0						
MW-57-04-20-17-11:00-1	2.5	1.0						
Surface Water								
Not Applicable								
Allen Creek-Glendale-04-05-17-09:58-1	nd	1.0						S
First Sister Lake-04-05-17-10:35-1	nd	1.0						S
HC/HR-04-03-17-08:30-1			nd	2.0				
HC/HR-04-04-17-08:08-1			nd	2.0				
HC/HR-04-05-17-07:45-1			nd	2.0				
HC/HR-04-06-17-08:00-1			nd	2.0				
HC/HR-04-07-17-08:15-1			nd	2.0				
HC/HR-04-10-17-08:24-1			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-04-12-17-08:10-1			nd	2.0				
HC/HR-04-13-17-08:02-1			nd	2.0				
HC/HR-04-14-17-08:44-1			nd	2.0				
HC/HR-04-17-17-08:28-1			nd	2.0				
HC/HR-04-18-17-08:08-1			nd	2.0				
HC/HR-04-19-17-09:30-1			nd	2.0				
HC/HR-04-20-17-08:34-1			nd	2.0				
HC/HR-04-21-17-09:27-1			nd	2.0				
HC/HR-04-24-17-08:45-1			nd	2.0				
HC/HR-04-25-17-07:30-1			nd	2.0				
HC/HR-04-26-17-07:30-1			nd	2.0				
HC/HR-04-27-17-08:30-1			nd	2.0				
HC/HR-04-28-17-07:20-1			nd	2.0				
Treatment System								
OUTFALL-04-02-17-1	4.0	1.0						
OUTFALL-04-02-17-2			8.3	5.0				
OUTFALL-04-03-17-1	3.8	1.0						
OUTFALL-04-03-17-2			8.3	5.0				
OUTFALL-04-04-17-1	3.9	1.0						
OUTFALL-04-04-17-2			8.1	5.0				
OUTFALL-04-05-17-1	3.7	1.0						
OUTFALL-04-05-17-2			7.2	5.0				
OUTFALL-04-06-17-1	3.5	1.0						
OUTFALL-04-06-17-2			7.4	5.0				
OUTFALL-04-09-17-1	5.4	1.0						
OUTFALL-04-09-17-2			5.8	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-04-10-17-1	4.3	1.0						
OUTFALL-04-10-17-2			6.3	5.0				
OUTFALL-04-11-17-1	4.6	1.0						
OUTFALL-04-11-17-2			6.4	5.0				
OUTFALL-04-12-17-1	4.3	1.0						
OUTFALL-04-12-17-2			7.5	5.0				
OUTFALL-04-13-17-1	4.3	1.0						
OUTFALL-04-13-17-2			8.8	5.0				
OUTFALL-04-16-17-1	4.7	1.0						
OUTFALL-04-16-17-2			6.2	5.0				
OUTFALL-04-17-17-1	4.4	1.0						
OUTFALL-04-17-17-2			7.6	5.0				
OUTFALL-04-18-17-1	4.8	1.0						
OUTFALL-04-18-17-2			7.7	5.0				
OUTFALL-04-19-17-1	5.0	1.0						
OUTFALL-04-19-17-2			7.5	5.0				
OUTFALL-04-20-17-1	4.1	1.0						
OUTFALL-04-20-17-2			8.3	5.0				
OUTFALL-04-23-17-1	4.4	1.0						
OUTFALL-04-23-17-2			7.2	5.0				
OUTFALL-04-24-17-1	4.4	1.0						
OUTFALL-04-24-17-2			7.4	5.0				
OUTFALL-04-25-17-1	4.2	1.0						
OUTFALL-04-25-17-2			7.3	5.0				
OUTFALL-04-26-17-1	3.3	1.0						
OUTFALL-04-26-17-2			6.9	5.0				
OUTFALL-04-27-17-1	4.1	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-04-27-17-2			6.9	5.0				
OUTFALL-04-30-17-1	3.1	1.0						
OUTFALL-04-30-17-2			7.3	5.0				
Red Pond-04-03-17-07:05-1	420	10.0						D
Red Pond-04-10-17-06:05-1	360	10.0						D
Red Pond-04-17-17-06:05-1	410	10.0						D
Red Pond-04-24-17-13:00-1	400	10.0						D
Not Applicable								
Second Sister Lake-04-05-17-10:55-1	nd	1.0						S

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
O: Sample analyzed by and outside laboratory specified in the comment section, here Ann Arbor Technical Services
S: Samples split with the MDEQ

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Michigan Laboratory ID: 9604
Wisconsin Laboratory ID: 998321720

Data Transmittal Cover Page

Project Name: Pall Corporation
ATS Project Number: G001-002
ATS Report Number(s): ORG_SRF_0501171 (Rush)

Project Description: This data report contains the results of 1 water sample, received by ATS on 5/1/17, 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.): 5

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

Additional Message: Email Copy: Ms. Laurel Beyer (Laurel_Beyer@Pall.com)

Date: 5/3/17 **Signed:**

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

LABORATORY OPERATIONS
SAMPLE DELIVERY GROUP (SDG) CASE NARRATIVE

ATS Project Number: G001-002
ATS SRF's: 0501171

SDG Summary

This case narrative applies to the following sample that was received by Ann Arbor Technical Services, Inc. (ATS) on 5/1/17, and associated matrix-specific QA/QC:

Samples

Client Sample Identification	Laboratory Identification	Laboratory Sample ID	Matrix
697 S Wagner Road	ATS	697 Wag 4/17	Drinking Water

Matrix Specific QC

Client Sample Identification	Laboratory Identification	Laboratory Sample ID	Matrix
697 S Wagner Road MS	ATS	697 Wag 4/17 MS	Drinking Water
697 S Wagner Road MSD	ATS	697 Wag 4/17 MSD	Drinking Water

Upon receipt, samples were scheduled for the following analyses:

- 1,4-Dioxane by USEPA method 1624

Sample Receipt and Chain of Custody Records

Samples were delivered directly to ATS by Pall Corporation staff. Samples were received in coolers, on ice, with proper chain of custody records included. Sample condition and anomalies 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 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.

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).

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

Data Deliverables

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

/ May 3, 2017

Mark T. DeLong (Quality Assurance Coordinator)

/ May 3, 2017

Philip B. Simon (Laboratory Director)

290 South Wagner Road
Ann Arbor, Michigan 48103
Tel. 734/995-0995 Fax. 734/995-3731
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: 5/3/17
ATS SRF: 0501171 (Rush)

Sample Identification: 697 South Wagner Road

Sample Date: 4/17/17
Sample Time: 11:20 AM
Sampled By: Client
Laboratory Receipt Date: 5/1/17
Sample Matrix: Drinking Water

Parameter	Method	Units	Result	Reporting Limit	Analysis Date	Analysis Time	Analyzed By
Organic Analysis							
1,4-Dioxane	EPA 1624	mg/L	<0.001	0.001	5/2/17	17:01	JEB

Comments

All methods reference USEPA methods unless otherwise noted.

-3731

21720

CHAIN OF CUSTODY RECORD

LABORATORY INFORMATION

Peters

2 S. Wagner Road, Ann Arbor, Mi 48103

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

Date		Fed Ex		UPS		DHL		Courier		Tracking Number	
Date		Fed Ex		UPS		DHL		Courier		Tracking Number	
Date		Fed Ex		UPS		DHL		Courier		Tracking Number	
Date		Fed Ex		UPS		DHL		Courier		Tracking Number	

DATE / TIME	RECEIVED BY (Print & Signature)	DATE / TIME	RELINQUISHED BY (Print & Signature)	DATE / TIME	RECEIVED BY (Print & Signature)	DATE / TIME
08-0177 08K						
DATE / TIME	RECEIVED BY (Print & Signature)	DATE / TIME	RELINQUISHED BY (Print & Signature)	DATE / TIME	RECEIVED BY (Print & Signature)	DATE / TIME

DATE	TIME	COMP.	GRAB	SAMPLE IDENTIFICATION	NO. OF CONTAINERS	PRIORITY NUMBER	ANALYSIS: 1,4-dioxane, 1ppb reporting limit	MATRIX Indicate Soil/Water/Air Sediment/Sludge Extract
4/17/2017	11:20		X	697 S. Wagner Road	2		X	n.d.