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: January 2018

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 by Pall Corporation's Environmental Laboratory for 1,4-dioxane and bromate. 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.

The quarterly barium sample was sent to Ann Arbor Technical Services (ATS) for analysis. Sample data can be found in the Barium section of this narrative.

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 HCl acid-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 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.

The barium sample was taken as a composite sample, preserved with nitric acid, and refrigerated before and after being sent to ATS for analysis.

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.

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.

Barium

A composite Outfall001 sample was sent to ATS for total barium analysis in accordance with EPA200.7. Barium samples are analyzed quarterly in compliance with PLS NPDES permit. The results were less than the permitted level of 440µg/L at 230µg/L.

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

Analyst: *Susan E.O. Peters* Susan E.O. Peters Date: 02-13-18

Report Checked by: *Laurel Beyer* Laurel Beyer Date: 02-13-18

PALL Life Sciences

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Ann Arbor, MI 48103-9019 US
734.436.4025 phone

Sample Analysis Report

January, 2018

Analyst Initials: SEOP
Date: 02-13-18

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-01-31-18-09:52-1	14	1.0						
Extraction Wells								
C3								
DOLPH-01-08-18-11:40-1	100	1.0						
TW-20-01-08-18-11:57-1	890	10.0						D
D2								
LB-4-01-08-18-11:24-1	470	10.0						D
TW-21-01-08-18-11:32-1	200	10.0						D
E								
TW-18-01-08-18-11:44-1	270	10.0						D
TW-19-01-09-18-10:10-1	740	10.0						D
TW-23-01-09-18-10:12-1	470	10.0						D
Marshy								
PW-1-01-08-18-11:47-1	850	10.0						D
SW								
TW-22-01-09-18-10:55-1	430	10.0						D
TW-8-01-09-18-10:54-1	720	10.0						D
Monitoring Wells								

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)
C3								
MW-105s-01-31-18-15:39-1	540	10.0						D
MW-2d-01-30-18-11:18-1	45	1.0						
MW-32-01-26-18-14:55-1	19	1.0						
MW-34s-01-26-18-13:25-1	nd	1.0						
MW-38s-01-26-18-09:23-1	nd	1.0						
MW-39s-01-23-18-13:53-1	1.1	1.0						
D0								
A2 Cleaning Supply-01-09-18-14:18-1	87	1.0						
MW-53d-01-08-18-12:15-1	nd	1.0						
MW-53i-01-08-18-14:55-1	35	1.0						
MW-53s-01-08-18-13:37-1	nd	1.0						
D2								
2819 Dexter Rd-01-25-18-11:05-1	140	10.0						D
373 Pinewood Shallow-01-26-18-15:15-1	270	10.0						D
MW-107-01-29-18-14:49-1	740	10.0						D
MW-113-01-24-18-16:26-1	74	1.0						
MW-118-01-31-18-12:37-1	40	1.0						
MW-11d-01-25-18-16:17-1	370	10.0						D
MW-120s-01-29-18-10:24-1	nd	1.0						
MW-121s-01-18-18-11:54-1	nd	1.0						
MW-122s-01-24-18-12:35-1	170	1.0						
MW-123s-01-19-18-11:46-1	nd	1.0						
MW-124s-01-22-18-10:38-1	nd	1.0						
MW-126s-01-22-18-16:30-1	nd	1.0						
MW-129i-01-18-18-14:46-1	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-129s-01-18-18-16:05-1	nd	1.0						
MW-130i-01-19-18-14:34-1	4.4	1.0						
MW-130s-01-19-18-13:13-1	nd	1.0						
MW-131s-01-22-18-13:59-1	nd	1.0						
MW-134i-01-23-18-11:10-1	8.7	1.0						
MW-134s-01-23-18-12:25-1	9.9	1.0						
MW-17-01-25-18-14:03-1	320	10.0						D
MW-34d-01-26-18-12:03-1	nd	1.0						
MW-38d-01-26-18-10:37-1	45	1.0						
MW-39d-01-23-18-15:13-1	27	1.0						
MW-54d-01-24-18-10:25-1	nd	1.0						
MW-54s-01-24-18-09:09-1	nd	1.0						
MW-92-01-24-18-13:18-1	38	1.0						
MW-BE-1d-01-29-18-11:53-1	650	10.0						D
MW-BE-1s-01-29-18-13:13-1	660	10.0						D
E								
373 Pinewood Deep-01-26-18-14:42-1	nd	1.0						
MW-101-01-25-18-09:37-1	120	1.0						
MW-103d-01-22-18-15:05-1	7.8	1.0						
MW-103s-01-08-18-16:34-1	72	1.0						
MW-104-01-24-18-11:55-1	11	1.0						
MW-106s-01-31-18-14:12-1	200	10.0						D
MW-110-01-23-18-17:05-1	78	1.0						
MW-112d-01-24-18-15:08-1	1.2	1.0						
MW-112i-01-17-18-13:13-1	9.6	1.0						
MW-112s-01-17-18-11:55-1	nd	1.0						
MW-120d-01-31-18-11:45-1	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-121d-01-18-18-13:12-1	1.9	1.0						
MW-122d-01-25-18-11:41-1	nd	1.0						
MW-123d-01-22-18-11:45-1	nd	1.0						
MW-124d-01-22-18-09:18-1	nd	1.0						
MW-126d-01-22-18-15:14-1	nd	1.0						
MW-129d-01-19-18-10:06-1	1.1	1.0						
MW-130d-01-19-18-11:40-1	nd	1.0						
MW-131d-01-22-18-12:40-1	nd	1.0						
MW-134d-01-23-18-09:50-1	5.6	1.0						
MW-135-01-19-18-16:15-1	nd	1.0						
MW-76i-01-17-18-16:18-1	99	1.0						
MW-76s-01-18-18-10:16-1	260	10.0					static taken 01/17/18	D
MW-79d-01-30-18-12:57-1	nd	1.0						
MW-79s-01-30-18-14:17-1	460	10.0						D
MW-81-01-25-18-12:27-1	230	10.0						D
MW-84s-01-17-18-14:45-1	19	1.0						
MW-85-01-29-18-16:22-1	620	10.0						D
MW-90-01-24-18-14:50-1	37	1.0						
SW								
MW-10d-01-26-18-16:35-1	330	10.0						D
Surface Water								
Not Applicable								
HC/HR-01-02-18-08:40-1			nd	2.0				
HC/HR-01-03-18-09:20-1			nd	2.0				
HC/HR-01-04-18-09:45-1			nd	2.0				
HC/HR-01-05-18-09:43-1			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-01-08-18-11:00-1			nd	2.0				
HC/HR-01-09-18-08:59-1			nd	2.0				
HC/HR-01-10-18-10:23-1			nd	2.0				
HC/HR-01-11-18-09:00-1			nd	2.0				
HC/HR-01-12-18-09:46-1			nd	2.0				
HC/HR-01-15-18-09:52-1			nd	2.0				
HC/HR-01-16-18-09:35-1			nd	2.0				
HC/HR-01-17-18-09:36-1			nd	2.0				
HC/HR-01-18-18-08:01-1			nd	2.0				
HC/HR-01-19-18-08:53-1			nd	2.0				
HC/HR-01-22-18-09:30-1			nd	2.0				
HC/HR-01-23-18-09:45-1			nd	2.0				
HC/HR-01-24-18-11:20-1			nd	2.0				
HC/HR-01-25-18-09:08-1			nd	2.0				
HC/HR-01-26-18-10:30-1			nd	2.0				
HC/HR-01-29-18-10:13-1			nd	2.0				
HC/HR-01-30-18-09:50-1			nd	2.0				
HC/HR-01-31-18-09:53-1			nd	2.0				
Treatment System								
OUTFALL-01-01-18-1	5.8	1.0						
OUTFALL-01-01-18-2			7.5	5.0				
OUTFALL-01-02-18-1	6.1	1.0						
OUTFALL-01-02-18-2			7.9	5.0				
OUTFALL-01-03-18-1	6.0	1.0						
OUTFALL-01-03-18-2			8.1	5.0				
OUTFALL-01-04-18-1	6.3	1.0						
OUTFALL-01-04-18-2			8.5	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-01-07-18-1	5.6	1.0						
OUTFALL-01-07-18-2			8.4	5.0				
OUTFALL-01-08-18-1	5.4	1.0						
OUTFALL-01-08-18-2			8.1	5.0				
OUTFALL-01-09-18-1	5.8	1.0						
OUTFALL-01-09-18-2			8.0	5.0				
OUTFALL-01-10-18-1	5.6	1.0						
OUTFALL-01-10-18-2			8.3	5.0				
OUTFALL-01-11-18-1	5.7	1.0						
OUTFALL-01-11-18-2			8.0	5.0				
OUTFALL-01-14-18-1	6.2	1.0						
OUTFALL-01-14-18-2			7.9	5.0				
OUTFALL-01-15-18-1	6.4	1.0						
OUTFALL-01-15-18-2			8.0	5.0				
OUTFALL-01-16-18-1	5.8	1.0						
OUTFALL-01-16-18-2			8.0	5.0				
OUTFALL-01-17-18-1	5.6	1.0						
OUTFALL-01-17-18-2			8.2	5.0				
OUTFALL-01-18-18-1	6.4	1.0						
OUTFALL-01-18-18-2			7.9	5.0				
OUTFALL-01-21-18-2			8.0	5.0				
OUTFALL-01-21-18-1	5.7	1.0						
OUTFALL-01-22-18-1	5.8	1.0						
OUTFALL-01-22-18-2			7.7	5.0				
OUTFALL-01-23-18-1	5.9	1.0						
OUTFALL-01-23-18-2			7.6	5.0				
OUTFALL-01-24-18-1	6.2	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-01-24-18-2			7.5	5.0				
OUTFALL-01-25-18-1	6.3	1.0						
OUTFALL-01-25-18-2			6.1	5.0				
OUTFALL-01-28-18-1	6.2	1.0						
OUTFALL-01-28-18-2			8.4	5.0				
OUTFALL-01-29-18-1	6.0	1.0						
OUTFALL-01-29-18-2			6.0	5.0				
OUTFALL-01-30-18-1	6.1	1.0						
OUTFALL-01-30-18-2			6.9	5.0				
OUTFALL-01-31-18-1	5.8	1.0						
OUTFALL-01-31-18-2			6.5	5.0				
Red Pond-01-02-18-06:40-1	410	10.0						D
Red Pond-01-08-18-10:42-1	400	10.0						D
Red Pond-01-15-18-08:25-1	420	10.0						D
Red Pond-01-22-18-08:35-1	400	10.0						D
Red Pond-01-29-18-06:10-1	360	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 14 day hold time, but within 28 days used by ATS for same method with EPA approval.
O: Samples analyzed in outside laboratory.

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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): SRF_0129181

Project Description: This data report contains the results of one water sample, received by ATS on 1/29/18, to be analyzed for barium.

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.): 4

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: 2/2/18 **Signed:**

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

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Ann Arbor, Michigan 48103
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: QCINORG0202181-G
Parameter: Barium (EPA 200.7)
ATS Project: Pall Corporation #G001-002
Report Date: 2/2/18

Results of QA Samples run concurrently with project samples

REPLICATE ANALYSIS

Sample	Replicate #1	Replicate #2	Mean	Relative Range (percent)
#G001-002				
Outfall 001 1/26/18 Matrix Spike	2.0 mg/L	1.9 mg/L	1.9 mg/L	4.6

SPIKES and/or QC CHECK SAMPLES

Sample/Analyte	Known Concentration	Spike Concentration	Analyzed Concentration	Recovery (percent)
#G001-002				
Laboratory Fortified Blank 2/2/18	<0.001 mg/L	4.0 mg/L	4.0 mg/L	101.2
Outfall 001 1/26/18 Matrix Spike	0.23 mg/L	2.0 mg/L	2.0 mg/L	86.0
Outfall 001 1/26/18 Matrix Spike Duplicate	0.23 mg/L	2.0 mg/L	1.9 mg/L	81.6

BLANK ANALYSIS

Sample	Analyzed Concentration	QC Decision
#G001-002		
Laboratory Reagent Blank 2/2/18	<0.001 mg/L	Acceptable

Comments:

Calculations performed prior to rounding.

Control Limits:

Recoveries
- Laboratory Fortified Blank (85 - 115 %)
- Matrix Spike (75 - 125 %)

Relative Range
- Replicates (<20%)

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Michigan Laboratory ID: 9604
Wisconsin Laboratory ID: 998321720

Inorganic 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: 2/2/18
ATS SRF: 0129181

Sample Identification: Outfall 001

Sample Date: 1/26/18
Sample Time: na
Sampled By: Client
Laboratory Receipt Date: 1/29/18
Sample Matrix: Treated Water

Parameter	Method	Units	Result	Reporting Limit	Analysis Date	Analysis Time	Analyzed By
Metals Analysis							
Total Barium	EPA 200.7	mg/L	0.23	0.001	2/2/18	8:10	SLS

Comments

All methods reference USEPA methods unless otherwise noted.

ATS Ann Arbor Technical Services, Inc.
290 South Wagner Road
Ann Arbor, Michigan 48103
Tel. 734/995-0995 Fax. 734/995-3731
Michigan Laboratory ID: 9604
Wisconsin Laboratory ID: 998321730

CHAIN OF CUSTODY RECORD

PROJECT ID / NUMBER: Pall Barium Analysis

LABORATORY INFORMATION: Pall

SAMPLE CUSTODIAN (Print & Signature): Susan Peters Pall Environmental Laboratory, 642 South Wagner Rd, Ann Arbor Mi.

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	

RELINQUISHED BY (Print & Signature)	DATE / TIME	RECEIVED BY (Print & Signature)	DATE / TIME	RELINQUISHED BY (Print & Signature)	DATE / TIME	RECEIVED BY (Print & Signature)	DATE / TIME
SUSAN E O PETERS / Susan E O Peters	01-29-18 1114	[signature]					
ROBERT URSINO / [signature]	1-29-18 1149	[signature]					

COMMENTS (Preservation, etc.)

LINE NO.	BAR CODE	DATE	TIME	COMP.	GRAB	SAMPLE IDENTIFICATION	NO. OF CONTAINERS	PRIORITY NUMBER	Total Barium												MATRIX Indicate Soil/Water/Air Sediment/Sludge Extract
1.		01/26/2018	comp.	X		Outfall001	1		X												Treated water
2.																					@ HNO_3
3.																					Added
4.																					
5.																					
6.																					
7.																					
8.																					
9.																					
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