

## **CASE NARRATIVE**

### **Monthly Data Pall Life Sciences**

**Project: 1,4-Dioxane Remediation**

**Date: March 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. In addition this report contains three data points from DEQ to provide comparison for data from split sampling with the DEQ. 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  $\leq 2$ , 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 ( $\pm 2^\circ\text{C}$ ) 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,  $\mu\text{g/L}$ ). 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.

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### 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 28 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
O:	Samples analyzed in outside laboratory.

Analyst: Susan E.O. Peters Susan E.O. Peters Date: 04-07-17

Report Checked by: Laurel Beyer Laurel Beyer Date: 4-7-17



# Sample Analysis Report

March, 2017

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

Analyst Initials: SEOP  
Date: 04-07-17

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)
<b>Extraction Wells</b>								
<b>C3</b>								
TW-20-03-06-17-07:00-1	850	25.0						D
<b>D2</b>								
LB-4-03-06-17-08:24-1	460	10.0						D
TW-21-03-06-17-08:42-1	160	5.0						D
<b>E</b>								
TW-18-03-06-17-06:50-1	250	10.0						D
TW-19-03-06-17-08:27-1	610	10.0						D
<b>Marshy</b>								
PW-1-03-06-17-06:53-1	900	25.0						D
<b>SW</b>								
TW-22-03-06-17-10:27-1	420	10.0						D
TW-8-03-06-17-10:28-1	660	10.0						D
<b>Monitoring Wells</b>								
<b>D0</b>								
A2 Cleaning Supply-03-02-17-09:45-1	74	1.0						
MW-53d-03-07-17-14:48-1	nd	1.0						
MW-53i-03-07-17-15:25-1	41	1.0						
MW-53s-03-07-17-13:52-1	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)
<b>D2</b>								
465 Dupont-03-17-17-15:40-1	1100	25.0						D
<b>E</b>								
MW-103s-03-16-17-15:31-1	58	1.0						
MW-112i-03-16-17-14:39-1	8.6	1.0						
MW-112s-03-16-17-13:42-1	nd	1.0						
MW-76i-03-09-17-10:57-1	110	1.0						
MW-76i-03-09-17-10:57-1	96	5.0					DEQ Analysis	D, O, DEQ
MW-76s-03-09-17-12:00-1	270	5.0						D
MW-76s-03-09-17-12:00-1	250	10					DEQ Analysis	D, O, DEQ
MW-84s-03-09-17-12:59-1	640	10.0						D
MW-84s-03-09-17-12:59-1	600	20.0					DEQ Analysis	D, O, DEQ
<b>SW</b>								
MW-10d-03-17-17-13:45-1	720	10.0						D
<b>Surface Water</b>								
<b>Not Applicable</b>								
HC/HR-03-01-17-08:40-1			nd	2.0				
HC/HR-03-02-17-08:55-1			nd	2.0				
HC/HR-03-03-17-09:30-1			nd	2.0				
HC/HR-03-06-17-08:00-1			nd	2.0				
HC/HR-03-07-17-08:40-1			nd	2.0				
HC/HR-03-08-17-08:45-1			nd	2.0				
HC/HR-03-09-17-07:50-1			nd	2.0				
HC/HR-03-10-17-09:05-1			nd	2.0				
HC/HR-03-13-17-08:55-1			nd	2.0				
HC/HR-03-14-17-08:30-1			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-03-15-17-08:40-1			nd	2.0				
HC/HR-03-16-17-08:25-1			nd	2.0				
HC/HR-03-17-17-08:40-1			nd	2.0				
HC/HR-03-20-17-08:30-1			nd	2.0				
HC/HR-03-21-17-07:45-1			nd	2.0				
HC/HR-03-22-17-09:15-1			nd	2.0				
HC/HR-03-23-17-08:20-1			nd	2.0				
HC/HR-03-24-17-09:15-1			nd	2.0				
HC/HR-03-27-17-07:45-1			nd	2.0				
HC/HR-03-28-17-09:15-1			nd	2.0				
HC/HR-03-29-17-09:15-1			nd	2.0				
HC/HR-03-30-17-09:30-1			nd	2.0				
HC/HR-03-31-17-09:32-1			nd	2.0				

### Treatment System

OUTFALL-03-01-17-2			nd	5.0				
OUTFALL-03-01-17-1	3.8	1.0						
OUTFALL-03-02-17-2			nd	5.0				
OUTFALL-03-02-17-1	3.7	1.0						
OUTFALL-03-05-17-1	4.0	1.0						
OUTFALL-03-05-17-2			6.2	5.0				
OUTFALL-03-06-17-1	4.2	1.0						
OUTFALL-03-06-17-2			7.2	5.0				
OUTFALL-03-07-17-1	4.4	1.0						
OUTFALL-03-07-17-2			5.6	5.0				
OUTFALL-03-08-17-1	4.7	1.0						
OUTFALL-03-08-17-2			6.9	5.0				
OUTFALL-03-09-17-1	4.4	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-03-09-17-2			7.1	5.0				
OUTFALL-03-12-17-1	3.8	1.0						
OUTFALL-03-12-17-2			5.7	5.0				
OUTFALL-03-13-17-1	4.1	1.0						
OUTFALL-03-13-17-2			6.6	2.0				
OUTFALL-03-14-17-1	4.1	1.0						
OUTFALL-03-14-17-2			6.7	5.0				
OUTFALL-03-15-17-1	4.0	1.0						
OUTFALL-03-15-17-2			6.1	5.0				
OUTFALL-03-16-17-1	4.0	1.0						
OUTFALL-03-16-17-2			6.5	5.0				
OUTFALL-03-19-17-1	3.6	1.0						
OUTFALL-03-19-17-2			6.3	5.0				
OUTFALL-03-20-17-1	3.8	1.0						
OUTFALL-03-20-17-2			6.2	5.0				
OUTFALL-03-21-17-1	3.8	1.0						
OUTFALL-03-21-17-2			5.7	5.0				
OUTFALL-03-22-17-1	3.9	1.0						
OUTFALL-03-22-17-2			5.9	5.0				
OUTFALL-03-23-17-1	3.7	1.0						
OUTFALL-03-23-17-2			6.4	5.0				
OUTFALL-03-26-17-1	3.6	1.0						
OUTFALL-03-26-17-2			6.2	5.0				
OUTFALL-03-27-17-2			6.8	5.0				
OUTFALL-03-27-17-1	3.6	1.0						
OUTFALL-03-28-17-1	3.7	1.0						
OUTFALL-03-28-17-2			6.7	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-03-29-17-1	3.7	1.0						
OUTFALL-03-29-17-2			7.9	5.0				
OUTFALL-03-30-17-1	3.4	1.0						
OUTFALL-03-30-17-2			7.5	5.0				
Red Pond-03-06-17-06:00-1	420	10.0						D
Red Pond-03-13-17-08:00-1	380	10.0						D
Red Pond-03-20-17-06:30-1	370	10.0						D
Red Pond-03-27-17-06:30-1	390	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

O: Sample analyzed by and outside laboratory or DEQ, specified in the comment section.



MICHIGAN DEPARTMENT OF ENVIRONMENTAL QUALITY  
ENVIRONMENTAL LABORATORY

P.O. Box 30270  
Lansing, MI 48909  
TEL: (517) 335-9800  
FAX: (517) 335-9600

27 March 2017

Work Order: 1703070

Price: \$390.00

Dan Hamel  
MDEQ-RRD-JACKSON  
301 E. Louis Glick Highway  
Jackson, MI 49201-1556  
RE: GELMAN SCIENCES, INC

I certify that the analyses performed by the MDEQ Environmental Laboratory were conducted by methods approved by the U.S. Environmental Protection Agency and other appropriate regulatory agencies.

Sincerely,

Kirby Shane  
Laboratory Director





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ENVIRONMENTAL LABORATORY**

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Lansing, MI 48909  
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FAX: (517) 335-9600

MDEQ-RRD-JACKSON  
301 E. Louis Glick Highway  
Jackson MI, 49201-1556

Project: GELMAN SCIENCES, INC  
Site Code: 81000018  
Project Manager: Dan Hamel

**Reported:**  
03/27/2017

**Analytical Report for Samples**

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received	Qualifier
MW-76s	1703070-01	Water	03/09/2017	03/10/2017	
MW-76i	1703070-02	Water	03/09/2017	03/10/2017	
MW-84s	1703070-03	Water	03/09/2017	03/10/2017	

**Notes and Definitions**

A03 Result(s) and reporting limit(s) are estimated due to low matrix spike recovery.  
 ND Indicates compound analyzed for but not detected  
 RL Reporting Limit  
 NA Not Applicable



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P.O. Box 30270  
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TEL: (517) 335-9800  
FAX: (517) 335-9600

Client ID: MW-76s

Lab ID: 1703070-01

CAS #	Analyte	Result	RL	Units	Dilution	Analyzed Date	QC Batch	Method	Qualifier
<b>Organics-Dioxane</b>									
123-91-1	1,4-dioxane	250	10	ug/L	10	03/15/17	B7C1706	8260 Modified	



MICHIGAN DEPARTMENT OF ENVIRONMENTAL QUALITY  
ENVIRONMENTAL LABORATORY

P.O. Box 30270  
Lansing, MI 48909  
TEL: (517) 335-9800  
FAX: (517) 335-9600

Client ID: MW-76i

Lab ID: 1703070-02

CAS #	Analyte	Result	RL	Units	Dilution	Analyzed Date	QC Batch	Method	Qualifier
<b>Organics-Dioxane</b>									
123-91-1	1,4-dioxane	96	5.0	ug/L	5	03/15/17	B7C1706	8260 Modified	

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ENVIRONMENTAL LABORATORYP.O. Box 30270  
Lansing, MI 48909  
TEL: (517) 335-9800  
FAX: (517) 335-9600

Client ID: MW-84s

Lab ID: 1703070-03

CAS #	Analyte	Result	RL	Units	Dilution	Analyzed Date	QC Batch	Method	Qualifier
<b>Organics-Dioxane</b>									
123-91-1	1,4-dioxane	600	20	ug/L	20	03/15/17	B7C1706	8260 Modified	



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Organics-Dioxane - Quality Control

Analyte	Result	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Analyzed	Qualifier
<b>Batch B7C1706 - Method: 5030</b>						<b>Prepared: 03/15/2017</b>					
<b>Blank (B7C1706-BLK1)</b>											
1,4-dioxane	ND	1.0	ug/L							03/15/2017	
<b>LCS (B7C1706-BS1)</b>											
1,4-dioxane	8.94	1.0	ug/L	10.00		89.4	70-130			03/15/2017	
<b>Matrix Spike (B7C1706-MS1) Source: 1703070-01</b>											
1,4-dioxane	338	10	ug/L	100.0	254	84.1	70-130			03/15/2017	
<b>Matrix Spike Dup (B7C1706-MSD1) Source: 1703070-01</b>											
1,4-dioxane	322	10	ug/L	100.0	254	67.9	70-130	4.92	30	03/16/2017	A03



# Analysis Request Sheet

Lab Work Order Number <b>1703070</b>	Project Name <b>Gelman Sciences</b>	Matrix <b>WATER</b>
Site Code/Project Number <b>8100018</b>	AY <b>17</b>	CC Email 1 <b>adelmanm@michigan.gov</b>
Dept-Division-District <b>DEQ-RRD-Jackson</b>	Index <b>44410</b>	CC Email 2 <b>lundk@michigan.gov</b>
State Project Manager <b>Dan Hamel</b>	PCA <b>30740</b>	CC Email 3
State Project Manager Email <b>hameld@michigan.gov</b>	Project <b>451586</b>	Overflow Lab Choice 1
State Project Manager Phone <b>517-745-6595</b>	Phase <b>00</b>	Overflow Lab Choice 2
		Project TAT Days
		Project Due Date
		Sample Collector <b>Dan Hamel</b>
		Sample Collector Phone <b>517-745-6595</b>
		Contract Firm
		Contract Firm Primary Contact
		Primary Contact Phone
		Accept Analysis hold time codes

Lab Use Only	Field Sample Identification	Collection Date	Collection Time	Container Count	Comments
1	01 MW-76s	3/9/17	1200	3	PLEASE INCLUDE QA/QC INFO
2	02 MW-76I	3/9/17	1057	3	WITH LAB DATA REPORTS
3	03 MW-84s	3/9/17	1259	3	↓ ↓ ↓
4					
5					
6					
7					
8					
9					
10					

ORGANIC CHEMISTRY	MAD - DISSOLVED METALS	MA - TOTAL METALS	GENERAL CHEMISTRY
VOA - Volatile Organic Acidic	Diss - Silver - Ag	Silver - Ag	GB Total Cyanide - CN
Volatiles - Full List	Diss - Aluminum - Al	Aluminum - Al	GB Amenable Cyanide - CN
BTEX/MTBE/TMB only	Diss - Arsenic - As	Arsenic - As	GCN Available Cyanide - CN
Chlorinated only	Diss - Boron - B	Boron - B	CA Chlorophyll
GRO	Diss - Barium - Ba	Barium - Ba	GN Ortho Phosphate - OP
1,4 Dioxane	Diss - Beryllium - Be	Beryllium - Be	GN Nitrite - NO <sub>2</sub>
METH - Methane, Ethane, Ethene	Diss - Cadmium - Cd	Cadmium - Cd	GN Nitrate - NO <sub>3</sub> (Calc.)
Methane, Ethane, Ethene	Diss - Cobalt - Co	Cobalt - Co	GN Suspended Solids - SS
ON - Pesticides, PCBs	Diss - Chromium - Cr	Chromium - Cr	GN Dissolved Solids - TDS
Pesticides & PCBs	Diss - Copper - Cu	Copper - Cu	MN Diss Solids - TDS (Calc.)
Pesticides only	Diss - Iron - Fe	Iron - Fe	GN Turbidity
PCBs only	Diss - Mercury - Hg	Mercury - Hg	MN Total Alkalinity
Toxaphene	Diss - Lithium - Li	Lithium - Li	MN Bicarb/Carb Alkalinity
Chlordane	Diss - Manganese - Mn	Manganese - Mn	(Includes Total Alkalinity)
BNA - Base Neutral Acids	Diss - Molybdenum - Mo	Molybdenum - Mo	MN Chloride - Cl
BNAs	Diss - Nickel - Ni	Nickel - Ni	MN Fluoride - F
Benadines	Diss - Lead - Pb	Lead - Pb	MN Sulfate - SO <sub>4</sub>
PNAs only	Diss - Antimony - Sb	Antimony - Sb	MN Chromium 6 - Cr+6
BNs only	Diss - Selenium - Se	Selenium - Se	MN Conductivity
Acids only	Diss - Strontium - Sr	Strontium - Sr	MN pH
Organic Spectraly Requests	Diss - Titanium - Ti	Titanium - Ti	GA Chem Oxyg Dem - COD
Library search - Volatiles	Diss - Thallium - Tl	Thallium - Tl	GA Diss Org Carbon - DOC (FF)
Library search - SemiVols	Diss - Uranium - U	Uranium - U	(Field - Filtered & Preserved)
Finger Print	Diss - Vanadium - V	Vanadium - V	GN Diss Org Carbon - DOC (LF)
DRO / DRO	Diss - Zinc - Zn	Zinc - Zn	(Lab - Filtered & Preserved)
METALS CHEMISTRY PACKAGES	Diss - Calcium - Ca	Calcium - Ca	GA Total Org Carbon - TOC
OpMemo2 - Total	Diss - Potassium - K	Potassium - K	GA Ammonia - NH <sub>3</sub>
OpMemo2 - Dissolved	Diss - Magnesium - Mg	Magnesium - Mg	GA Nitrate+Nitrite - NO <sub>3</sub> +NO <sub>2</sub>
(Sb,As,Ba,Be,Cd,Cr,Cu,Co,Fe,Pb,Mn,Hg,Mo,Ni,Se,Ag,Tl,V,Zn)	Diss - Sodium - Na	Sodium - Na	GA Kjeldahl Nitrogen - KN
Michigan10 - Total	Diss - Hardness - Ca, Mg	Hardness - Ca, Mg	GA Total Phosphorus - TP
Michigan10 - Dissolved	MD - Metals Dissolved	LHG - Low Level Mercury	
(As,Ba,Cd,Cr,Cu,Pb,Hg,Se,Ag,Zn)	Lab Filtration	Mercury Low Level - Hg	

Chain of Custody	Relinquished by		Received By		Date / Time
	Print Name & Org.	<b>DAN HAMEL DEQ-RRD</b>	Print Name & Org.	<b>TERY HISKY DEQ-RRD</b>	3/10/17
	Signature:	<i>Dan Hamel</i>	Signature:	<i>Terry Hisky</i>	14:03
	Print Name & Org.	<b>TERY HISKY DEQ-RRD</b>	Print Name & Org.	<b>Melissa Syntel</b>	
Signature:	<i>Terry Hisky</i>	Signature:	<i>Melissa Syntel</i>	3/10/17 1515	
Print Name & Org.		Print Name & Org.			
Signature:		Signature:			