

## **CASE NARRATIVE**

**Monthly Data Pall Life Sciences**  
**Project: 1,4-Dioxane Remediation**  
**Date: January 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.

Some samples were analyzed at Ann Arbor Technical Services (ATS) for 1,4-dioxane due to delayed service from manufacturer. . In the sample analysis report these samples are designate as "O" in the comment section. The balance of the 1,4-dioxane samples and all bromate samples were analyzed at Pall Corporation's Environmental Laboratory. 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.

The delay in sample analysis was due to a catastrophic autosampler failure that took considerable time to isolate and fix. The manufacturer's representative made major repairs only to find out that these repairs did not entirely fix the problems. Samples were sent out to ATS for analysis after the service engineer was unable to eliminate all problems during his service call.

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  $\leq 2$ , 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.

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  $4^{\circ}\text{C}$  ( $\pm 2^{\circ}\text{C}$ ) 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, 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.

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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 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: 02-06-20

Report Checked by: Laurel Beyer Laurel Beyer Date: 2/6/20

# Sample Analysis Report

January, 2020

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

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) |
|---------------------------------|---------------------------|------------|-----------------------|------------|-----------------------|------------|----------|--------------|
| <b>Extraction Wells</b>         |                           |            |                       |            |                       |            |          |              |
| <b>C3</b>                       |                           |            |                       |            |                       |            |          |              |
| DOLPH-01-03-20-09:12-1          | 150                       | 10.0       |                       |            |                       |            |          | O, D         |
| TW-10-01-07-20-10:30-1          | 340                       | 10.0       |                       |            |                       |            |          | O, D         |
| TW-10-01-14-20-13:15-1          | 550                       | 10.0       |                       |            |                       |            |          | O, D         |
| TW-14-01-21-20-08:36-1          | 43                        | 1.0        |                       |            |                       |            |          |              |
| TW-20-01-03-20-09:21-1          | 740                       | 20.0       |                       |            |                       |            |          | O, D         |
| <b>D2</b>                       |                           |            |                       |            |                       |            |          |              |
| LB-4-01-03-20-08:55-1           | 560                       | 10.0       |                       |            |                       |            |          | O, D         |
| TW-21-01-03-20-09:05-1          | 250                       | 10.0       |                       |            |                       |            |          | O, D         |
| TW-5-01-02-20-13:04-1           | 810                       | 10.0       |                       |            |                       |            |          | O, D         |
| TW-5-01-03-20-09:33-1           | 810                       | 20.0       |                       |            |                       |            |          | O, D         |
| TW-9-01-07-20-11:15-1           | 520                       | 10.0       |                       |            |                       |            |          | O, D         |
| TW-9-01-14-20-13:20-1           | 530                       | 10.0       |                       |            |                       |            |          | O, D         |
| <b>E</b>                        |                           |            |                       |            |                       |            |          |              |
| TW-11-01-07-20-11:20-1          | 200                       | 4.0        |                       |            |                       |            |          | Q            |
| TW-11-01-24-20-15:17-1          | 180                       | 10.0       |                       |            |                       |            |          | D            |
| TW-17-01-03-20-09:26-1          | 110                       | 10.0       |                       |            |                       |            |          | O, D         |
| TW-17-01-24-20-15:13-1          | 83                        | 10.0       |                       |            |                       |            |          | D            |
| TW-18-01-03-20-09:08-1          | 300                       | 10.0       |                       |            |                       |            |          | O, D         |
| TW-18-01-23-20-08:05-1          | 250                       | 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-19-01-03-20-08:52-1              | 660                       | 10.0       |                       |            |                       |            |          | O, D         |
| TW-23-01-03-20-08:50-1              | 460                       | 10.0       |                       |            |                       |            |          | O, D         |
| <b>Marshy</b>                       |                           |            |                       |            |                       |            |          |              |
| PW-1-01-03-20-09:12-1               | 700                       | 10.0       |                       |            |                       |            |          | O, D         |
| <b>SW</b>                           |                           |            |                       |            |                       |            |          |              |
| TW-22-01-15-20-11:50-1              | 420                       | 10.0       |                       |            |                       |            |          | O, D         |
| TW-28-01-03-20-09:41-1              | 710                       | 10.0       |                       |            |                       |            |          | O, D         |
| <b>Monitoring Wells</b>             |                           |            |                       |            |                       |            |          |              |
| <b>C3</b>                           |                           |            |                       |            |                       |            |          |              |
| MW-32-01-30-20-11:41-1              | 19                        | 1.0        |                       |            |                       |            |          |              |
| <b>D0</b>                           |                           |            |                       |            |                       |            |          |              |
| A2 Cleaning Supply-01-06-20-12:40-1 | 66                        | 1.0        |                       |            |                       |            |          | O            |
| MW-53d-01-06-20-09:34-1             | nd                        | 1.0        |                       |            |                       |            |          | O            |
| MW-53i-01-06-20-11:59-1             | 35                        | 1.0        |                       |            |                       |            |          | O            |
| MW-53s-01-06-20-10:48-1             | nd                        | 1.0        |                       |            |                       |            |          | O            |
| <b>D2</b>                           |                           |            |                       |            |                       |            |          |              |
| 2819 Dexter Rd-01-29-20-13:56-1     | 150                       | 10.0       |                       |            |                       |            |          | D            |
| MW-107-01-21-20-15:06-1             | 650                       | 10.0       |                       |            |                       |            |          | D            |
| MW-113-01-21-20-10:55-1             | 96                        | 1.0        |                       |            |                       |            |          |              |
| MW-120s-01-29-20-12:38-1            | nd                        | 1.0        |                       |            |                       |            |          |              |
| MW-121s-01-29-20-08:52-1            | nd                        | 1.0        |                       |            |                       |            |          |              |
| MW-129i-01-28-20-08:55-1            | nd                        | 1.0        |                       |            |                       |            |          |              |
| MW-129s-01-28-20-10:06-1            | nd                        | 1.0        |                       |            |                       |            |          |              |
| MW-34d-01-30-20-09:24-1             | nd                        | 1.0        |                       |            |                       |            |          |              |
| <b>E</b>                            |                           |            |                       |            |                       |            |          |              |

| 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-101-01-21-20-12:23-1         | 93                        | 1.0        |                       |            |                       |            |          |              |
| MW-103d-01-10-20-13:02-1        | 8                         | 1.0        |                       |            |                       |            |          | O            |
| MW-103s-01-17-20-08:59-1        | 76                        | 1.0        |                       |            |                       |            |          |              |
| MW-104-01-17-20-12:46-1         | 18                        | 1.0        |                       |            |                       |            |          |              |
| MW-106s-01-30-20-13:06-1        | 210                       | 10.0       |                       |            |                       |            |          | D            |
| MW-108s-01-30-20-14:29-1        | 260                       | 10.0       |                       |            |                       |            |          | D            |
| MW-110-01-17-20-14:03-1         | 90                        | 1.0        |                       |            |                       |            |          |              |
| MW-112d-01-10-20-10:19-1        | 1                         | 1.0        |                       |            |                       |            |          | O            |
| MW-112i-01-10-20-11:35-1        | 9                         | 1.0        |                       |            |                       |            |          | O            |
| MW-112s-01-10-20-09:07-1        | nd                        | 1.0        |                       |            |                       |            |          | O            |
| MW-119-01-27-20-12:07-1         | 33                        | 1.0        |                       |            |                       |            |          |              |
| MW-120d-01-29-20-11:24-1        | nd                        | 1.0        |                       |            |                       |            |          |              |
| MW-121d-01-29-20-10:02-1        | 2.1                       | 1.0        |                       |            |                       |            |          |              |
| MW-129d-01-28-20-11:16-1        | 1.5                       | 1.0        |                       |            |                       |            |          |              |
| MW-76i-01-17-20-10:18-1         | 88                        | 1.0        |                       |            |                       |            |          |              |
| MW-76s-01-17-20-11:29-1         | 250                       | 10.0       |                       |            |                       |            |          | D            |
| MW-79d-01-27-20-09:30-1         | nd                        | 1.0        |                       |            |                       |            |          |              |
| MW-79s-01-27-20-10:44-1         | 320                       | 10.0       |                       |            |                       |            |          | D            |
| MW-81-01-21-20-13:45-1          | 190                       | 10.0       |                       |            |                       |            |          | D            |
| MW-84s-01-06-20-14:09-1         | 73                        | 1.0        |                       |            |                       |            |          | O            |
| MW-85-01-27-20-14:48-1          | 560                       | 10.0       |                       |            |                       |            |          | D            |
| MW-88-01-27-20-13:27-1          | 170                       | 10.0       |                       |            |                       |            |          | D            |
| MW-90-01-21-20-09:22-1          | 7.9                       | 1.0        |                       |            |                       |            |          |              |
| <b>SW</b>                       |                           |            |                       |            |                       |            |          |              |
| MW-57-01-23-20-11:29-1          | 3.2                       | 1.0        |                       |            |                       |            |          |              |
| <b>Surface Water</b>            |                           |            |                       |            |                       |            |          |              |

| 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>Not Applicable</b>           |                           |            |                       |            |                       |            |          |              |
| HC/HR-01-02-20-07:40-1          |                           |            | nd                    | 2.0        |                       |            |          |              |
| HC/HR-01-03-20-07:38-1          |                           |            | nd                    | 2.0        |                       |            |          |              |
| HC/HR-01-06-20-07:57-1          |                           |            | nd                    | 2.0        |                       |            |          |              |
| HC/HR-01-07-20-07:28-1          |                           |            | nd                    | 2.0        |                       |            |          |              |
| HC/HR-01-08-20-07:45-1          |                           |            | nd                    | 2.0        |                       |            |          |              |
| HC/HR-01-09-20-08:00-1          |                           |            | nd                    | 2.0        |                       |            |          |              |
| HC/HR-01-10-20-07:40-1          |                           |            | nd                    | 2.0        |                       |            |          |              |
| HC/HR-01-13-20-07:38-1          |                           |            | nd                    | 2.0        |                       |            |          |              |
| HC/HR-01-14-20-08:20-1          |                           |            | nd                    | 2.0        |                       |            |          |              |
| HC/HR-01-15-20-08:30-1          |                           |            | nd                    | 2.0        |                       |            |          |              |
| HC/HR-01-16-20-07:55-1          |                           |            | nd                    | 2.0        |                       |            |          |              |
| HC/HR-01-17-20-07:40-1          |                           |            | nd                    | 2.0        |                       |            |          |              |
| HC/HR-01-20-20-07:45-1          |                           |            | nd                    | 2.0        |                       |            |          |              |
| HC/HR-01-21-20-07:43-1          |                           |            | nd                    | 2.0        |                       |            |          |              |
| HC/HR-01-22-20-07:35-1          |                           |            | nd                    | 2.0        |                       |            |          |              |
| HC/HR-01-23-20-07:43-1          |                           |            | nd                    | 2.0        |                       |            |          |              |
| HC/HR-01-24-20-07:58-1          |                           |            | nd                    | 2.0        |                       |            |          |              |
| HC/HR-01-27-20-07:53-1          |                           |            | nd                    | 2.0        |                       |            |          |              |
| HC/HR-01-28-20-07:32-1          |                           |            | nd                    | 2.0        |                       |            |          |              |
| HC/HR-01-29-20-07:55-1          |                           |            | nd                    | 2.0        |                       |            |          |              |
| HC/HR-01-30-20-07:50-1          |                           |            | nd                    | 2.0        |                       |            |          |              |
| HC/HR-01-31-20-07:54-1          |                           |            | nd                    | 2.0        |                       |            |          |              |
| <b>Treatment System</b>         |                           |            |                       |            |                       |            |          |              |
| OUTFALL-01-01-20-2              |                           |            | 7.4                   | 5.0        |                       |            |          |              |
| OUTFALL-01-01-20-1              | 5                         | 1.0        |                       |            |                       |            |          | O            |
| OUTFALL-01-02-20-2              |                           |            | 6.4                   | 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-01-02-20-1              | 7                         | 1.0        |                       |            |                       |            |          | O            |
| OUTFALL-01-05-20-2              |                           |            | 5.7                   | 5.0        |                       |            |          |              |
| OUTFALL-01-05-20-1              | 7                         | 1.0        |                       |            |                       |            |          | O            |
| OUTFALL-01-06-20-2              |                           |            | 6.7                   | 5.0        |                       |            |          |              |
| OUTFALL-01-06-20-1              | 6                         | 1.0        |                       |            |                       |            |          | O            |
| OUTFALL-01-07-20-1              | 6                         | 1.0        |                       |            |                       |            |          | O            |
| OUTFALL-01-07-20-2              |                           |            | 5.6                   | 5.0        |                       |            |          |              |
| OUTFALL-01-08-20-1              | 5                         | 1.0        |                       |            |                       |            |          | O            |
| OUTFALL-01-08-20-2              |                           |            | 6.7                   | 5.0        |                       |            |          |              |
| OUTFALL-01-09-20-1              | 6                         | 1.0        |                       |            |                       |            |          | O            |
| OUTFALL-01-09-20-2              |                           |            | 6.0                   | 5.0        |                       |            |          |              |
| OUTFALL-01-12-20-2              |                           |            | 5.8                   | 5.0        |                       |            |          |              |
| OUTFALL-01-12-20-1              | 5                         | 1.0        |                       |            |                       |            |          | O            |
| OUTFALL-01-13-20-2              |                           |            | 5.4                   | 5.0        |                       |            |          |              |
| OUTFALL-01-13-20-1              | 8                         | 1.0        |                       |            |                       |            |          | O            |
| OUTFALL-01-14-20-2              |                           |            | 6.8                   | 5.0        |                       |            |          |              |
| OUTFALL-01-14-20-1              | 7                         | 1.0        |                       |            |                       |            |          | O            |
| OUTFALL-01-15-20-1              | 6.8                       | 1.0        |                       |            |                       |            |          |              |
| OUTFALL-01-15-20-2              |                           |            | 9.2                   | 5.0        |                       |            |          |              |
| OUTFALL-01-16-20-01             | 6.7                       | 1.0        |                       |            |                       |            |          |              |
| OUTFALL-01-16-20-02             |                           |            | 7.4                   | 5.0        |                       |            |          |              |
| OUTFALL-01-19-20-1              | 6.7                       | 1.0        |                       |            |                       |            |          |              |
| OUTFALL-01-19-20-2              |                           |            | 8.7                   | 5.0        |                       |            |          |              |
| OUTFALL-01-20-20-1              | 7.0                       | 1.0        |                       |            |                       |            |          |              |
| OUTFALL-01-20-20-2              |                           |            | 7.7                   | 5.0        |                       |            |          |              |
| OUTFALL-01-21-20-1              | 6.9                       | 1.0        |                       |            |                       |            |          |              |
| OUTFALL-01-21-20-2              |                           |            | 7.4                   | 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-01-22-20-1              | 6.2                       | 1.0        |                       |            |                       |            |          |              |
| OUTFALL-01-22-20-2              |                           |            | 7.4                   | 5.0        |                       |            |          |              |
| OUTFALL-01-23-20-1              | 5.1                       | 1.0        |                       |            |                       |            |          |              |
| OUTFALL-01-23-20-2              |                           |            | 8.8                   | 5.0        |                       |            |          |              |
| OUTFALL-01-26-20-1              | 3.9                       | 1.0        |                       |            |                       |            |          |              |
| OUTFALL-01-26-20-2              |                           |            | 7.5                   | 5.0        |                       |            |          |              |
| OUTFALL-01-27-20-1              | 4.0                       | 1.0        |                       |            |                       |            |          |              |
| OUTFALL-01-27-20-2              |                           |            | 8.7                   | 5.0        |                       |            |          |              |
| OUTFALL-01-28-20-1              | 4.0                       | 1.0        |                       |            |                       |            |          |              |
| OUTFALL-01-28-20-2              |                           |            | 7.2                   | 5.0        |                       |            |          |              |
| OUTFALL-01-29-20-1              | 4.0                       | 1.0        |                       |            |                       |            |          |              |
| OUTFALL-01-29-20-2              |                           |            | 8.9                   | 5.0        |                       |            |          |              |
| OUTFALL-01-30-20-1              | 3.9                       | 1.0        |                       |            |                       |            |          |              |
| OUTFALL-01-30-20-2              |                           |            | 7.6                   | 5.0        |                       |            |          |              |
| Red Pond-01-06-20-08:17-1       | 370                       | 10.0       |                       |            |                       |            |          | O, D         |
| Red Pond-01-13-20-09:48-1       | 390                       | 10.0       |                       |            |                       |            |          | O, D         |
| Red Pond-01-20-20-08:10-1       | 300                       | 10.0       |                       |            |                       |            |          | D            |
| Red Pond-01-27-20-08:15-1       | 400                       | 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).



Data Transmittal Cover Page

LABORATORY OPERATIONS  
CASE NARRATIVE

Project Name: Pall Corporation  
ATS Project Number: G001-002  
ATS Report Number(s): Org\_SRF\_0107201

ATS Project Number: G001-002  
Report Date: 1/13/20  
SRF / SDG Numbers: 0107201

Project Description: This data report contains the results of 20 water samples, received by ATS on 1/7/20, to be analyzed for 1,4-Dioxane.

Case Narrative Summary

This case narrative applies to the following 20 samples that were received at Ann Arbor Technical Services, Inc. (ATS) on 1/7/20, and associated matrix-specific QA/QC:


| Client Sample Identification | Sample Date | Sample Time | Turn Around Time | Analysis    | Matrix |
|------------------------------|-------------|-------------|------------------|-------------|--------|
| TW-23                        | 1/7/20      | 8.50        | Standard         | 1,4-Dioxane | Water  |
| TW-19                        | 1/7/20      | 8.52        | Standard         | 1,4-Dioxane | Water  |
| LB-4                         | 1/7/20      | 8.55        | Standard         | 1,4-Dioxane | Water  |
| TW-21                        | 1/7/20      | 9.05        | Standard         | 1,4-Dioxane | Water  |
| TW-18                        | 1/7/20      | 9.08        | Standard         | 1,4-Dioxane | Water  |
| PW-1                         | 1/7/20      | 9.12        | Standard         | 1,4-Dioxane | Water  |
| DOLPH                        | 1/7/20      | 9.12        | Standard         | 1,4-Dioxane | Water  |
| TW-20                        | 1/7/20      | 9.21        | Standard         | 1,4-Dioxane | Water  |
| TW-17                        | 1/7/20      | 9.26        | Standard         | 1,4-Dioxane | Water  |
| TW-5                         | 1/7/20      | 9.33        | Standard         | 1,4-Dioxane | Water  |
| TW-28                        | 1/7/20      | 9.41        | Standard         | 1,4-Dioxane | Water  |
| Outfall                      | 1/8/20      | na          | Rush             | 1,4-Dioxane | Water  |
| Outfall                      | 1/8/20      | na          | Rush             | 1,4-Dioxane | Water  |
| Red Pond                     | 1/8/20      | 8.17        | Standard         | 1,4-Dioxane | Water  |
| MW-534                       | 1/8/20      | 9.34        | Standard         | 1,4-Dioxane | Water  |
| MW-635                       | 1/8/20      | 10.48       | Standard         | 1,4-Dioxane | Water  |
| MS-531                       | 1/8/20      | 11.59       | Standard         | 1,4-Dioxane | Water  |
| A2 Cleaning Supply           | 1/8/20      | 12.40       | Standard         | 1,4-Dioxane | Water  |
| MW-84s                       | 1/8/20      | 14.09       | Standard         | 1,4-Dioxane | Water  |
| TW-10                        | 1/7/20      | 10.30       | Standard         | 1,4-Dioxane | Water  |

Recipient: Ms. Sue Peters Email: Sue\_Peters@Pall.com  
FAX Number:

No. of Pages (including cover pg.): 27

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

Additional Message:



Date: 1/13/20 Signed:

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

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Upon receipt, samples were scheduled for the following analyses:

- |                              |  |
|------------------------------|--|
| <u>Analysis</u>              | <u>Number of Samples</u>                         |
| • 1,4-Dioxane by US EPA 1624 | • 20 + 1 Matrix Spike / 1 Matrix Spike Duplicate |

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

Sample Receipt and Chain of Custody Records

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 (SOP) 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).

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

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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 diluted for 1,4-Dioxane:

|         |         |            |
|---------|---------|------------|
| • TW-23 | • PW-1  | • TW-28    |
| • TW-19 | • DOLPH | • Red Pond |
| • LB-4  | • TW-20 | • TW-10    |
| • TW-21 | • TW-17 |            |
| • TW-18 | • TW-5  |            |

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

ATS Project: Pall Corporation #G001-002  
 Report Date: 1/13/20  
 ATS SRF: 0107201

Sample Identification: TW-23

Sample Date: 1/3/20  
 Sample Time: 8:50 AM  
 Sampled By: Client  
 Laboratory Receipt Date: 1/7/20  
 Sample Matrix: Water

| Parameter                       | Method   | Units | Result | Reporting Limit | Analysis Date | Analysis Time | Analyzed By |
|---------------------------------|----------|-------|--------|-----------------|---------------|---------------|-------------|
| Organic Analysis<br>1,4-Dioxane | EPA 1624 | mg/L  | 0.46   | 0.01            | 1/8/20        | 17:52         | JEB         |

**Comments**

All methods reference USEPA methods unless otherwise noted.

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rev. 1/13/20

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

ATS Project: Pall Corporation #G001-002  
 Report Date: 1/13/20  
 ATS SRF: 0107201

Sample Identification: LB-4

Sample Date: 1/3/20  
 Sample Time: 8:55 AM  
 Sampled By: Client  
 Laboratory Receipt Date: 1/7/20  
 Sample Matrix: Water

| Parameter                       | Method   | Units | Result | Reporting Limit | Analysis Date | Analysis Time | Analyzed By |
|---------------------------------|----------|-------|--------|-----------------|---------------|---------------|-------------|
| Organic Analysis<br>1,4-Dioxane | EPA 1624 | mg/L  | 0.56   | 0.01            | 1/8/20        | 19:19         | JEB         |

**Comments**

All methods reference USEPA methods unless otherwise noted.

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rev. 1/13/20

*Mark T. DeLong*

/ January 13, 2020

Mark T. DeLong (Quality Assurance Coordinator)

*Philip B. Simon*

/ January 13, 2020

Philip B. Simon (Laboratory Director)

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

ATS Project: Pall Corporation #G001-002  
 Report Date: 1/13/20  
 ATS SRF: 0107201

Sample Identification: TW-19

Sample Date: 1/3/20  
 Sample Time: 8:52 AM  
 Sampled By: Client  
 Laboratory Receipt Date: 1/7/20  
 Sample Matrix: Water

| Parameter                       | Method   | Units | Result | Reporting Limit | Analysis Date | Analysis Time | Analyzed By |
|---------------------------------|----------|-------|--------|-----------------|---------------|---------------|-------------|
| Organic Analysis<br>1,4-Dioxane | EPA 1624 | mg/L  | 0.66   | 0.01            | 1/8/20        | 18:35         | JEB         |

**Comments**

All methods reference USEPA methods unless otherwise noted.

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rev. 1/13/20



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: 1/13/20
ATS SRF: 0107201

Sample Identification: TW-21

Sample Date: 1/3/20
Sample Time: 9:05 AM
Sampled By: Client
Laboratory Receipt Date: 1/7/20
Sample Matrix: Water

Table with 8 columns: Parameter, Method, Units, Result, Reporting Limit, Analysis Date, Analysis Time, Analyzed By. Row 1: 1,4-Dioxane, EPA 1624, mg/L, 0.25, 0.01, 1/8/20, 20:03, JEB

Comments
All methods reference USEPA methods unless otherwise noted.

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rev. 1/13/20



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: 1/13/20
ATS SRF: 0107201

Sample Identification: TW-18

Sample Date: 1/3/20
Sample Time: 9:08 AM
Sampled By: Client
Laboratory Receipt Date: 1/7/20
Sample Matrix: Water

Table with 8 columns: Parameter, Method, Units, Result, Reporting Limit, Analysis Date, Analysis Time, Analyzed By. Row 1: 1,4-Dioxane, EPA 1624, mg/L, 0.30, 0.01, 1/8/20, 20:47, JEB

Comments
All methods reference USEPA methods unless otherwise noted.

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rev. 1/13/20



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: 1/13/20
ATS SRF: 0107201

Sample Identification: PW-1

Sample Date: 1/3/20
Sample Time: 9:12 AM
Sampled By: Client
Laboratory Receipt Date: 1/7/20
Sample Matrix: Water

Table with 8 columns: Parameter, Method, Units, Result, Reporting Limit, Analysis Date, Analysis Time, Analyzed By. Row 1: 1,4-Dioxane, EPA 1624, mg/L, 0.70, 0.01, 1/8/20, 21:30, JEB

Comments
All methods reference USEPA methods unless otherwise noted.

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rev. 1/13/20



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: 1/13/20
ATS SRF: 0107201

Sample Identification: DOLPH

Sample Date: 1/3/20
Sample Time: 9:12 AM
Sampled By: Client
Laboratory Receipt Date: 1/7/20
Sample Matrix: Water

Table with 8 columns: Parameter, Method, Units, Result, Reporting Limit, Analysis Date, Analysis Time, Analyzed By. Row 1: 1,4-Dioxane, EPA 1624, mg/L, 0.15, 0.01, 1/8/20, 22:14, JEB

Comments
All methods reference USEPA methods unless otherwise noted.

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rev. 1/13/20

**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: 1/13/20  
 ATS SRF: 0107201

Sample Identification: TW-20

Sample Date: 1/3/20  
 Sample Time: 9:21 AM  
 Sampled By: Client  
 Laboratory Receipt Date: 1/7/20  
 Sample Matrix: Water

| Parameter                       | Method   | Units | Result | Reporting Limit | Analysis Date | Analysis Time | Analyzed By |
|---------------------------------|----------|-------|--------|-----------------|---------------|---------------|-------------|
| Organic Analysis<br>1,4-Dioxane | EPA 1624 | mg/L  | 0.74   | 0.02            | 1/8/20        | 22:58         | JEB         |

**Comments**  
 All methods reference USEPA methods unless otherwise noted.

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rev. 1/13/20

**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: 1/13/20  
 ATS SRF: 0107201

Sample Identification: TW-17

Sample Date: 1/3/20  
 Sample Time: 9:26 AM  
 Sampled By: Client  
 Laboratory Receipt Date: 1/7/20  
 Sample Matrix: Water

| Parameter                       | Method   | Units | Result | Reporting Limit | Analysis Date | Analysis Time | Analyzed By |
|---------------------------------|----------|-------|--------|-----------------|---------------|---------------|-------------|
| Organic Analysis<br>1,4-Dioxane | EPA 1624 | mg/L  | 0.11   | 0.01            | 1/8/20        | 23:41         | JEB         |

**Comments**  
 All methods reference USEPA methods unless otherwise noted.

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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: 1/13/20  
 ATS SRF: 0107201

Sample Identification: TW-5

Sample Date: 1/3/20  
 Sample Time: 9:33 AM  
 Sampled By: Client  
 Laboratory Receipt Date: 1/7/20  
 Sample Matrix: Water

| Parameter                       | Method   | Units | Result | Reporting Limit | Analysis Date | Analysis Time | Analyzed By |
|---------------------------------|----------|-------|--------|-----------------|---------------|---------------|-------------|
| Organic Analysis<br>1,4-Dioxane | EPA 1624 | mg/L  | 0.81   | 0.02            | 1/9/20        | 0:25          | JEB         |

**Comments**  
 All methods reference USEPA methods unless otherwise noted.

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rev. 1/13/20

**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: 1/13/20  
 ATS SRF: 0107201

Sample Identification: TW-28

Sample Date: 1/3/20  
 Sample Time: 9:41 AM  
 Sampled By: Client  
 Laboratory Receipt Date: 1/7/20  
 Sample Matrix: Water

| Parameter                       | Method   | Units | Result | Reporting Limit | Analysis Date | Analysis Time | Analyzed By |
|---------------------------------|----------|-------|--------|-----------------|---------------|---------------|-------------|
| Organic Analysis<br>1,4-Dioxane | EPA 1624 | mg/L  | 0.71   | 0.01            | 1/9/20        | 1:09          | JEB         |

**Comments**  
 All methods reference USEPA methods unless otherwise noted.

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rev. 1/13/20

**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: 1/13/20  
 ATS SRF: 0107201

**Sample Identification:** Outfall

Sample Date: 1/5/20  
 Sample Time: na  
 Sampled By: Client  
 Laboratory Receipt Date: 1/7/20  
 Sample Matrix: Water

| Parameter                       | Method   | Units | Result | Reporting Limit | Analysis Date | Analysis Time | Analyzed By |
|---------------------------------|----------|-------|--------|-----------------|---------------|---------------|-------------|
| Organic Analysis<br>1,4-Dioxane | EPA 1624 | mg/L  | 0.007  | 0.001           | 1/8/20        | 12:48         | JEB         |

**Comments**

All methods reference USEPA methods unless otherwise noted.  
 Sample analyzed at native pH.

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rev. 1/13/20

**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: 1/13/20  
 ATS SRF: 0107201

**Sample Identification:** Outfall

Sample Date: 1/5/20  
 Sample Time: na  
 Sampled By: Client  
 Laboratory Receipt Date: 1/7/20  
 Sample Matrix: Water

| Parameter                       | Method   | Units | Result | Reporting Limit | Analysis Date | Analysis Time | Analyzed By |
|---------------------------------|----------|-------|--------|-----------------|---------------|---------------|-------------|
| Organic Analysis<br>1,4-Dioxane | EPA 1624 | mg/L  | 0.006  | 0.001           | 1/8/20        | 12:04         | JEB         |

**Comments**

All methods reference USEPA methods unless otherwise noted.  
 Sample analyzed at native pH.

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rev. 1/13/20

**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: 1/13/20  
 ATS SRF: 0107201

**Sample Identification:** Red Pond

Sample Date: 1/6/20  
 Sample Time: 8:17 AM  
 Sampled By: Client  
 Laboratory Receipt Date: 1/7/20  
 Sample Matrix: Water

| Parameter                       | Method   | Units | Result | Reporting Limit | Analysis Date | Analysis Time | Analyzed By |
|---------------------------------|----------|-------|--------|-----------------|---------------|---------------|-------------|
| Organic Analysis<br>1,4-Dioxane | EPA 1624 | mg/L  | 0.37   | 0.01            | 1/9/20        | 1:52          | JEB         |

**Comments**

All methods reference USEPA methods unless otherwise noted.

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rev. 1/13/20

**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: 1/13/20  
 ATS SRF: 0107201

**Sample Identification:** MW-53d

Sample Date: 1/6/20  
 Sample Time: 9:34 AM  
 Sampled By: Client  
 Laboratory Receipt Date: 1/7/20  
 Sample Matrix: Water

| Parameter                       | Method   | Units | Result | Reporting Limit | Analysis Date | Analysis Time | Analyzed By |
|---------------------------------|----------|-------|--------|-----------------|---------------|---------------|-------------|
| Organic Analysis<br>1,4-Dioxane | EPA 1624 | mg/L  | <0.001 | 0.001           | 1/8/20        | 16:19         | JEB         |

**Comments**

All methods reference USEPA methods unless otherwise noted.

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rev. 1/13/20

**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: 1/13/20  
 ATS SRF: 0107201

Sample Identification: MW-53s

Sample Date: 1/6/20  
 Sample Time: 10:48 AM  
 Sampled By: Client  
 Laboratory Receipt Date: 1/7/20  
 Sample Matrix: Water

| Parameter                       | Method   | Units | Result | Reporting Limit | Analysis Date | Analysis Time | Analyzed By |
|---------------------------------|----------|-------|--------|-----------------|---------------|---------------|-------------|
| Organic Analysis<br>1,4-Dioxane | EPA 1624 | mg/L  | <0.001 | 0.001           | 1/9/20        | 2:36          | JEB         |

**Comments**  
 All methods reference USEPA methods unless otherwise noted.

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rev. 1/13/20

**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: 1/13/20  
 ATS SRF: 0107201

Sample Identification: MW-53i

Sample Date: 1/6/20  
 Sample Time: 11:59 AM  
 Sampled By: Client  
 Laboratory Receipt Date: 1/7/20  
 Sample Matrix: Water

| Parameter                       | Method   | Units | Result | Reporting Limit | Analysis Date | Analysis Time | Analyzed By |
|---------------------------------|----------|-------|--------|-----------------|---------------|---------------|-------------|
| Organic Analysis<br>1,4-Dioxane | EPA 1624 | mg/L  | 0.035  | 0.001           | 1/9/20        | 3:19          | JEB         |

**Comments**  
 All methods reference USEPA methods unless otherwise noted.

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rev. 1/13/20

**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: 1/13/20  
 ATS SRF: 0107201

Sample Identification: A2 Cleaning Supply

Sample Date: 1/6/20  
 Sample Time: 12:40 PM  
 Sampled By: Client  
 Laboratory Receipt Date: 1/7/20  
 Sample Matrix: Water

| Parameter                       | Method   | Units | Result | Reporting Limit | Analysis Date | Analysis Time | Analyzed By |
|---------------------------------|----------|-------|--------|-----------------|---------------|---------------|-------------|
| Organic Analysis<br>1,4-Dioxane | EPA 1624 | mg/L  | 0.068  | 0.001           | 1/9/20        | 5:30          | JEB         |

**Comments**  
 All methods reference USEPA methods unless otherwise noted.

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rev. 1/13/20

**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: 1/13/20  
 ATS SRF: 0107201

Sample Identification: MW-84s

Sample Date: 1/6/20  
 Sample Time: 2:09 PM  
 Sampled By: Client  
 Laboratory Receipt Date: 1/7/20  
 Sample Matrix: Water

| Parameter                       | Method   | Units | Result | Reporting Limit | Analysis Date | Analysis Time | Analyzed By |
|---------------------------------|----------|-------|--------|-----------------|---------------|---------------|-------------|
| Organic Analysis<br>1,4-Dioxane | EPA 1624 | mg/L  | 0.073  | 0.001           | 1/9/20        | 4:03          | JEB         |

**Comments**  
 All methods reference USEPA methods unless otherwise noted.

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rev. 1/13/20

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: 1/13/20  
 ATS SRF: 0107201

Sample Identification: TW-10

Sample Date: 1/7/20  
 Sample Time: 10:30 AM  
 Sampled By: Client  
 Laboratory Receipt Date: 1/7/20  
 Sample Matrix: Water

| Parameter        | Method   | Units | Result | Reporting Limit | Analysis Date | Analysis Time | Analyzed By |
|------------------|----------|-------|--------|-----------------|---------------|---------------|-------------|
| Organic Analysis |          |       |        |                 |               |               |             |
| 1,4-Dioxane      | EPA 1624 | mg/L  | 0.34   | 0.01            | 1/9/20        | 4:46          | JEB         |

Comments:  
 All methods reference USEPA methods unless otherwise noted.

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rev. 1/13/20

Quality Assurance / Quality Control  
 Data Summary

QC Batch Number: QCORG0108201  
 Parameter: 1,4-Dioxane (EPA 1624)

ATS Project: Pall Corporation #G001-002  
 Report Date: 1/13/20

Results of QA Samples run concurrently with project samples

| Sample                                  | Replicate #1 | Replicate #2 | Mean       | Relative Range (percent) |
|---|--------------|--------------|------------|--------------------------|
| #G001-002<br>MW-53d 1/8/20 Matrix Spike | 0.011 mg/L   | 0.010 mg/L   | 0.010 mg/L | 8.0                      |

| Sample/Analyte                                 | Known Concentration | Spike Concentration | Analyzed Concentration | Recovery (percent) |
|--|---------------------|---------------------|------------------------|--------------------|
| #G001-002<br>Laboratory Fortified Blank 1/8/20 | <0.001 mg/L         | 0.010 mg/L          | 0.010 mg/L             | 99.8               |
| MW-53d 1/8/20 Matrix Spike                     | <0.001 mg/L         | 0.010 mg/L          | 0.011 mg/L             | 107.5              |
| MW-53d 1/8/20 Matrix Spike Duplicate           | <0.001 mg/L         | 0.010 mg/L          | 0.010 mg/L             | 99.2               |

| Sample                                       | Analyzed Concentration | QC Decision |
|--|------------------------|-------------|
| #G001-002<br>Laboratory Reagent Blank 1/8/20 | <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%)

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rev 1/13/20

Data Transmittal Cover Page

Project Name: Pall Corporation  
 ATS Project Number: G001-002  
 ATS Report Number(s): Org\_SRF\_0109201

Project Description: This data report contains the results of 5 water samples, received by ATS on 1/9/20, 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](mailto:Sue_Peters@Pall.com)  
 FAX Number:

No. of Pages (including cover pg.): 11

From: Sarah Stubblefield Email: [Sarah.Stubblefield@AnnArborTechnicalServices.com](mailto:Sarah.Stubblefield@AnnArborTechnicalServices.com)  
 Senior Chemist / Lab Manager FAX Number: 734-995-3731

Additional Message:

Date: 1/13/20 Signed:

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CHAIN OF CUSTODY RECORD

| PROJECT NUMBER   | LABORATORY INFORMATION | SUPPORT INFORMATION | SPLITTING |          | SUBSAMPLING |          | ANALYSIS |          |       |
|--|------------------------|---------------------|-----------|----------|-------------|----------|----------|----------|-------|
|  |                        |                     | DATE      | BY       | DATE        | BY       | DATE     | BY       |       |
| PROJECT NUMBER<br>Pall/Gelman<br>PROJECT DESCRIPTION<br>Susan E.O. Peters, Pall Corp., 642 S. Wagner Rd., Ann Arbor, MI.<br>ANALYST INFORMATION<br>Susan E.O. Peters<br>RECEIVED BY INFORMATION<br>Susan E.O. Peters<br>DATE/TIME<br>01-07-20<br>10:45<br>ANALYSIS INFORMATION<br>Cutoff samples quick turn around balance of samples standard turn around | DATE                   | TIME                | BY        | DATE     | BY          | DATE     | BY       | DATE     | BY    |
|  | 01/03/20               | 08:50               | X         | 01/03/20 | 08:50       | 01/03/20 | 08:50    | 01/03/20 | 08:50 |
|  | 01/03/20               | 08:52               | X         | 01/03/20 | 08:52       | 01/03/20 | 08:52    | 01/03/20 | 08:52 |
|  | 01/03/20               | 08:55               | X         | 01/03/20 | 08:55       | 01/03/20 | 08:55    | 01/03/20 | 08:55 |
|  | 01/03/20               | 09:05               | X         | 01/03/20 | 09:05       | 01/03/20 | 09:05    | 01/03/20 | 09:05 |
|  | 01/03/20               | 09:08               | X         | 01/03/20 | 09:08       | 01/03/20 | 09:08    | 01/03/20 | 09:08 |
|  | 01/03/20               | 09:12               | X         | 01/03/20 | 09:12       | 01/03/20 | 09:12    | 01/03/20 | 09:12 |
|  | 01/03/20               | 09:12               | X         | 01/03/20 | 09:12       | 01/03/20 | 09:12    | 01/03/20 | 09:12 |
|  | 01/03/20               | 09:21               | X         | 01/03/20 | 09:21       | 01/03/20 | 09:21    | 01/03/20 | 09:21 |
|  | 01/03/20               | 09:26               | X         | 01/03/20 | 09:26       | 01/03/20 | 09:26    | 01/03/20 | 09:26 |
|  | 01/03/20               | 09:33               | X         | 01/03/20 | 09:33       | 01/03/20 | 09:33    | 01/03/20 | 09:33 |
|  | 01/03/20               | 09:41               | X         | 01/03/20 | 09:41       | 01/03/20 | 09:41    | 01/03/20 | 09:41 |
|  | 01/03/20               |                     | X         | 01/03/20 |             | 01/03/20 |          | 01/03/20 |       |
|  | 01/03/20               |                     | X         | 01/03/20 |             | 01/03/20 |          | 01/03/20 |       |
|  | 01/03/20               | 08:17               | X         | 01/03/20 | 08:17       | 01/03/20 | 08:17    | 01/03/20 | 08:17 |
|  | 01/03/20               | 09:34               | X         | 01/03/20 | 09:34       | 01/03/20 | 09:34    | 01/03/20 | 09:34 |
|  | 01/03/20               | 10:48               | X         | 01/03/20 | 10:48       | 01/03/20 | 10:48    | 01/03/20 | 10:48 |
|  | 01/03/20               | 11:59               | X         | 01/03/20 | 11:59       | 01/03/20 | 11:59    | 01/03/20 | 11:59 |
|  | 01/03/20               | 12:40               | X         | 01/03/20 | 12:40       | 01/03/20 | 12:40    | 01/03/20 | 12:40 |
|  | 01/03/20               | 14:09               | X         | 01/03/20 | 14:09       | 01/03/20 | 14:09    | 01/03/20 | 14:09 |
| 01/03/20   | 16:30                  | X                   | 01/03/20  | 16:30    | 01/03/20    | 16:30    | 01/03/20 | 16:30    |       |



LABORATORY OPERATIONS  
CASE NARRATIVE

ATS Project Number: G001-002  
Report Date: 1/13/20  
SRF / SDG Numbers: 0109201

Case Narrative Summary

This case narrative applies to the following 5 samples that were received at Ann Arbor Technical Services, Inc. (ATS) on 1/9/20, and associated matrix-specific QA/QC:

| Client Sample Identification | Sample Date | Sample Time | Turn Around Time | Analysis    | Matrix |
|------------------------------|-------------|-------------|------------------|-------------|--------|
| Outfall                      | 1/7/20      | na          | Rush             | 1,4-Dioxane | Water  |
| Outfall                      | 1/8/20      | na          | Rush             | 1,4-Dioxane | Water  |
| TW-5                         | 1/2/20      | 13:04       | Standard         | 1,4-Dioxane | Water  |
| TW-9                         | 1/7/20      | 11:15       | Standard         | 1,4-Dioxane | Water  |
| TW-11                        | 1/7/20      | 11:20       | Standard         | 1,4-Dioxane | Water  |

Upon receipt, samples were scheduled for the following analyses:

| Analysis                     | Number of Samples                               |
|------------------------------|---|
| • 1,4-Dioxane by US EPA 1624 | • 5 + 1 Matrix Spike / 1 Matrix Spike Duplicate |

Sample Receipt and Chain of Custody Records

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.

G001-002.20/CN\_0109201.doc

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

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).

Data Deliverables

This data package constitutes a Level II package; other data report packages (Level I, Level IV DVP, EPA RS 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

G001-002.20/CN\_0109201.doc



Organic Analysis  
Data Summary Sheet

|   |   |
|---|---|
| For: Ms. Sue Pelers<br>Pall Corporation<br>642 South Wagner Road<br>Ann Arbor, MI 48103 | ATS Project: Pall Corporation #G001-002<br>Report Date: 1/13/20<br>ATS SRF: 0109201 |
|---|---|

Sample Identification: Outfall

Sample Date: 1/7/20  
Sample Time: na  
Sampled By: Client  
Laboratory Receipt Date: 1/9/20  
Sample Matrix: Water

| Parameter                       | Method   | Units | Result | Reporting Limit | Analysis Date | Analysis Time | Analyzed By |
|---------------------------------|----------|-------|--------|-----------------|---------------|---------------|-------------|
| Organic Analysis<br>1,4-Dioxane | EPA 1624 | mg/L  | 0.006  | 0.001           | 1/9/20        | 16:38         | JEB         |

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 diluted for 1,4-Dioxane:

|        |        |         |
|--------|--------|---------|
| • TW-5 | • TW-9 | • TW-11 |
|--------|--------|---------|

/ January 13, 2020

Mark T. DeLong (Quality Assurance Coordinator)

/ January 13, 2020

Philip B. Simon (Laboratory Director)

Comments

All methods reference USEPA methods unless otherwise noted.  
Sample analyzed at native pH.

G001-002.20/CN\_0109201.doc





**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: 1/13/20  
 ATS SRF: 0109201

Sample Identification: Outfall

Sample Date: 1/8/20  
 Sample Time: na  
 Sampled By: Client  
 Laboratory Receipt Date: 1/9/20  
 Sample Matrix: Water

| Parameter        | Method   | Units | Result | Reporting Limit | Analysis Date | Analysis Time | Analyzed By |
|------------------|----------|-------|--------|-----------------|---------------|---------------|-------------|
| Organic Analysis |          |       |        |                 |               |               |             |
| 1,4-Dioxane      | EPA 1624 | mg/L  | 0.005  | 0.001           | 1/9/20        | 14:18         | JEB         |

**Comments**  
 All methods reference USEPA methods unless otherwise noted.  
 Sample analyzed at native pH.

**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: 1/13/20  
 ATS SRF: 0109201

Sample Identification: TW-5

Sample Date: 1/2/20  
 Sample Time: 1:04 PM  
 Sampled By: Client  
 Laboratory Receipt Date: 1/9/20  
 Sample Matrix: Water

| Parameter        | Method   | Units | Result | Reporting Limit | Analysis Date | Analysis Time | Analyzed By |
|------------------|----------|-------|--------|-----------------|---------------|---------------|-------------|
| Organic Analysis |          |       |        |                 |               |               |             |
| 1,4-Dioxane      | EPA 1624 | mg/L  | 0.81   | 0.01            | 1/9/20        | 17:20         | JEB         |

**Comments**  
 All methods reference USEPA methods unless otherwise noted.

**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: 1/13/20  
 ATS SRF: 0109201

Sample Identification: TW-9

Sample Date: 1/7/20  
 Sample Time: 11:15 AM  
 Sampled By: Client  
 Laboratory Receipt Date: 1/9/20  
 Sample Matrix: Water

| Parameter        | Method   | Units | Result | Reporting Limit | Analysis Date | Analysis Time | Analyzed By |
|------------------|----------|-------|--------|-----------------|---------------|---------------|-------------|
| Organic Analysis |          |       |        |                 |               |               |             |
| 1,4-Dioxane      | EPA 1624 | mg/L  | 0.52   | 0.01            | 1/9/20        | 18:04         | JEB         |

**Comments**  
 All methods reference USEPA methods unless otherwise noted.

**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: 1/13/20  
 ATS SRF: 0109201

Sample Identification: TW-11

Sample Date: 1/7/20  
 Sample Time: 11:20 AM  
 Sampled By: Client  
 Laboratory Receipt Date: 1/9/20  
 Sample Matrix: Water

| Parameter        | Method   | Units | Result | Reporting Limit | Analysis Date | Analysis Time | Analyzed By |
|------------------|----------|-------|--------|-----------------|---------------|---------------|-------------|
| Organic Analysis |          |       |        |                 |               |               |             |
| 1,4-Dioxane      | EPA 1624 | mg/L  | 0.20   | 0.004           | 1/9/20        | 18:48         | JEB         |

**Comments**  
 All methods reference USEPA methods unless otherwise noted.

**Quality Assurance / Quality Control  
 Data Summary**

IC Batch Number: QCORG0109201  
 Parameter: 1,4-Dioxane (EPA 1624)  
 ATS Project: Pall Corporation #G001-002  
 Report Date: 1/13/20

Results of QA Samples run concurrently with project samples

**REPLICATE ANALYSIS**

| Sample                                   | Replicate #1 | Replicate #2 | Mean       | Relative Range (percent) |
|--|--------------|--------------|------------|--------------------------|
| #G001-002<br>Outfall 1/8/20 Matrix Spike | 0.015 mg/L   | 0.014 mg/L   | 0.014 mg/L | 2.4                      |

**SPIKES and/or QC CHECK SAMPLES**

| Sample/Analyte                                 | Known Concentration | Spike Concentration | Analyzed Concentration | Recovery (percent) |
|--|---------------------|---------------------|------------------------|--------------------|
| #G001-002<br>Laboratory Fortified Blank 1/9/20 | <0.001 mg/L         | 0.010 mg/L          | 0.009 mg/L             | 87.6               |
| Outfall 1/8/20 Matrix Spike                    | 0.005 mg/L          | 0.010 mg/L          | 0.015 mg/L             | 95.3               |
| Outfall 1/8/20 Matrix Spike Duplicate          | 0.005 mg/L          | 0.010 mg/L          | 0.014 mg/L             | 92.9               |

**BLANK ANALYSIS**

| Sample                                       | Analyzed Concentration | QC Decision |
|--|------------------------|-------------|
| #G001-002<br>Laboratory Reagent Blank 1/9/20 | <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%)

**CHAIN OF CUSTODY RECORD**

290 South Wagner Road  
 Ann Arbor, Michigan 48103  
 Tel. 734/995-0995 Fax. 734/995-3731  
 Michigan Laboratory ID: 9504  
 Wisconsin Laboratory ID: 998321720

Page 1

**Pall/Golman**  
 Sue Peters, 642 S. Wagner Rd. Ann Arbor, Michigan

DATE TIME: 1/9/20 9:10:10  
 DATE TIME: 1/13/20 9:10:10

Quick Turn-around on Outfall please, standard on balance of samples. Thanks

| DATE   | TIME    | BY | REASON FOR CHANGE | ANALYSIS | RECOVERY | REMARKS |
|--------|---------|----|-------------------|----------|----------|---------|
| 1/9/20 | 9:10:10 | X  | Outfall           | 2        | X        |         |
| 1/9/20 | 13:04   | X  | Outfall           | 2        | X        |         |
| 1/9/20 | 11:15   | X  | TW-5              | 1        | X        |         |
| 1/9/20 | 11:15   | X  | TW-9              | 1        | X        |         |
| 1/9/20 | 11:20   | X  | TW-11             | 1        | X        |         |

G001-002.20\ORG\_SRF\_0109201

rev 1/13/20

**Data Transmittal Cover Page**

Project Name: Pall Corporation  
 ATS Project Number: G001-002  
 ATS Report Number(s): Org\_SRF\_0110201

Project Description: This data report contains the results of 1 water sample, received by ATS on 1/10/20, 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.): 7

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

Additional Message:

Date: 1/13/20 Signed:

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**LABORATORY OPERATIONS  
 CASE NARRATIVE**

ATS Project Number: G001-002  
 Report Date: 1/13/20  
 SRF / SDG Numbers: 0110201

**Case Narrative Summary**

This case narrative applies to the following 1 samples that were received at Ann Arbor Technical Services, Inc. (ATS) on 1/10/20, and associated matrix-specific QA/QC:

| Client Sample Identification | Sample Date | Sample Time | Turn Around Time | Analysis    | Matrix |
|------------------------------|-------------|-------------|------------------|-------------|--------|
| Outfall                      | 1/9/20      | na          | Rush             | 1,4-Dioxane | Water  |

Upon receipt, samples were scheduled for the following analyses:

| Analysis                   | Number of Samples                             |
|----------------------------|---|
| 1,4-Dioxane by US EPA 1624 | 1 + 1 Matrix Spike / 1 Matrix Spike Duplicate |

**Sample Receipt and Chain of Custody Records**

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).

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**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 diluted for 1,4-Dioxane:  
 • None

*Mark T. DeLong*

/ January 13, 2020

Mark T. DeLong (Quality Assurance Coordinator)

*Phillip B. Simon*

/ January 13, 2020

Phillip B. Simon (Laboratory Director)

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G001-002.20/CN\_0110201.doc



**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: 1/13/20  
 ATS SRF: 0110201

Sample Identification: Outfall  
 Sample Date: 1/9/20  
 Sample Time: na  
 Sampled By: Client  
 Laboratory Receipt Date: 1/10/20  
 Sample Matrix: Water

| Parameter        | Method   | Units | Result | Reporting Limit | Analysis Date | Analysis Time | Analyzed By |
|------------------|----------|-------|--------|-----------------|---------------|---------------|-------------|
| Organic Analysis | EPA 1624 | mg/L  | 0.006  | 0.001           | 1/10/20       | 11:53         | JEB         |

**Comments**  
 All methods reference USEPA methods unless otherwise noted.  
 Sample analyzed at native pH.



**Quality Assurance / Quality Control  
Data Summary**

QC Batch Number: QCORG0110201  
 Parameter: 1,4-Dioxane (EPA 1624)

ATS Project: Pall Corporation #G001-002  
 Report Date: 1/13/20

Results of QA Samples run concurrently with project samples

**REPLICATE ANALYSIS**

| Sample                                   | Replicate #1 | Replicate #2 | Mean       | Relative Range (percent) |
|--|--------------|--------------|------------|--------------------------|
| #G001-002<br>Outfall 1/9/20 Matrix Spike | 0.014 mg/L   | 0.015 mg/L   | 0.014 mg/L | 7.7                      |

**SPIKES and/or QC CHECK SAMPLES**

| Sample/Analyte                                  | Known Concentration | Spike Concentration | Analyzed Concentration | Recovery (percent) |
|---|---------------------|---------------------|------------------------|--------------------|
| #G001-002<br>Laboratory Fortified Blank 1/10/20 | <0.001 mg/L         | 0.010 mg/L          | 0.010 mg/L             | 105.3              |
| Outfall 1/9/20 Matrix Spike                     | 0.006 mg/L          | 0.010 mg/L          | 0.014 mg/L             | 83.5               |
| Outfall 1/9/20 Matrix Spike Duplicate           | 0.006 mg/L          | 0.010 mg/L          | 0.015 mg/L             | 94.7               |

**BLANK ANALYSIS**

| Sample  | Analyzed Concentration | QC Decision |
|---|------------------------|-------------|
| #G001-002<br>Laboratory Reagent Blank 1/10/20 | <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%)

**Data Transmittal Cover Page**

**Project Name:** Pall Corporation  
**ATS Project Number:** G001-002  
**ATS Report Number(s):** Org\_SRF\_0103201

**Project Description:** This data report contains the results of 3 water samples, received by ATS on 1/3/20, 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](mailto:Sue.Peters@Pall.com)  
**FAX Number:** \_\_\_\_\_

**No. of Pages (Including cover pg.):** 9

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

**Additional Message:** \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

**Date:** 1/8/20 **Signed:** 

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**CHAIN OF CUSTODY RECORD**

| SAMPLE NO. | DATE   | TIME | LOCATION  | ANALYSIS    | COLLECTED BY |          | ANALYZED BY        |          | DATE/TIME | LABORATORY                         |
|------------|--------|------|-----------|-------------|--------------|----------|--------------------|----------|-----------|------------------------------------|
|            |        |      |           |             | NAME         | INITIALS | NAME               | INITIALS |           |                                    |
| 1          | 1/3/20 |      | Westfield | 1,4-Dioxane | Sue Peters   | SP       | Sarah Stubblefield | SS       |           | Ann Arbor Technical Services, Inc. |
| 2          |        |      |           |             |              |          |                    |          |           |                                    |
| 3          |        |      |           |             |              |          |                    |          |           |                                    |
| 4          |        |      |           |             |              |          |                    |          |           |                                    |
| 5          |        |      |           |             |              |          |                    |          |           |                                    |
| 6          |        |      |           |             |              |          |                    |          |           |                                    |
| 7          |        |      |           |             |              |          |                    |          |           |                                    |
| 8          |        |      |           |             |              |          |                    |          |           |                                    |
| 9          |        |      |           |             |              |          |                    |          |           |                                    |
| 10         |        |      |           |             |              |          |                    |          |           |                                    |
| 11         |        |      |           |             |              |          |                    |          |           |                                    |
| 12         |        |      |           |             |              |          |                    |          |           |                                    |
| 13         |        |      |           |             |              |          |                    |          |           |                                    |
| 14         |        |      |           |             |              |          |                    |          |           |                                    |
| 15         |        |      |           |             |              |          |                    |          |           |                                    |
| 16         |        |      |           |             |              |          |                    |          |           |                                    |
| 17         |        |      |           |             |              |          |                    |          |           |                                    |
| 18         |        |      |           |             |              |          |                    |          |           |                                    |
| 19         |        |      |           |             |              |          |                    |          |           |                                    |
| 20         |        |      |           |             |              |          |                    |          |           |                                    |



**LABORATORY OPERATIONS  
 CASE NARRATIVE**

**ATS Project Number:** G001-002  
**Report Date:** 1/8/20  
**SRF / SDG Numbers:** 0103201

**Case Narrative Summary**

This case narrative applies to the following 3 samples that were received at Ann Arbor Technical Services, Inc. (ATS) on 1/3/20, and associated matrix-specific QA/QC:

| Samples | Client Sample Identification | Sample Date | Sample Time | Turn Around Time | Analysis    | Matrix        |
|---------|------------------------------|-------------|-------------|------------------|-------------|---------------|
|         | Outfall                      | 1/3/19      | na          | Standard         | 1,4-Dioxane | Treated Water |
|         | Outfall                      | 1/1/20      | na          | Standard         | 1,4-Dioxane | Treated Water |
|         | Outfall                      | 1/2/20      | na          | Standard         | 1,4-Dioxane | Treated Water |

Upon receipt, samples were scheduled for the following analyses:

- |                              |   |
|------------------------------|---|
| <b>Analysis</b>              | <b>Number of Samples</b>                        |
| • 1,4-Dioxane by US EPA 1624 | • 3 + 1 Matrix Spike / 1 Matrix Spike Duplicate |

**Sample Receipt and Chain of Custody Records**

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).

**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 diluted for 1,4-Dioxane:

- None

*Mark DeLong*

/ January 8, 2020

Mark T. DeLong (Quality Assurance Coordinator)

*Philip B. Simon*

/ January 8, 2020

Philip B. Simon (Laboratory Director)

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

ATS Project: Pall Corporation #G001-002  
Report Date: 1/8/20  
ATS SRF: 0103201

Sample Identification: Outfall

Sample Date: 12/31/19  
Sample Time: na  
Sampled By: Client  
Laboratory Receipt Date: 1/3/20  
Sample Matrix: Water

| Parameter                       | Method   | Units | Result | Reporting Limit | Analysis Date | Analysis Time | Analyzed By |
|---------------------------------|----------|-------|--------|-----------------|---------------|---------------|-------------|
| Organic Analysis<br>1,4-Dioxane | EPA 1624 | mg/L  | 0.005  | 0.001           | 1/8/20        | 13:16         | JEB         |

Comments

All methods reference USEPA methods unless otherwise noted.  
Sample analyzed at native pH.

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rev. 1/8/20

**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: 1/8/20  
ATS SRF: 0103201

Sample Identification: Outfall

Sample Date: 1/1/20  
Sample Time: na  
Sampled By: Client  
Laboratory Receipt Date: 1/3/20  
Sample Matrix: Water

| Parameter                       | Method   | Units | Result | Reporting Limit | Analysis Date | Analysis Time | Analyzed By |
|---------------------------------|----------|-------|--------|-----------------|---------------|---------------|-------------|
| Organic Analysis<br>1,4-Dioxane | EPA 1624 | mg/L  | 0.005  | 0.001           | 1/8/20        | 15:43         | JEB         |

Comments

All methods reference USEPA methods unless otherwise noted.  
Sample analyzed at native pH.

X:\G001-002.20\ORG\_SRF\_0103201

rev. 1/8/20

**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: 1/8/20  
ATS SRF: 0103201

Sample Identification: Outfall

Sample Date: 1/2/20  
Sample Time: na  
Sampled By: Client  
Laboratory Receipt Date: 1/3/20  
Sample Matrix: Water

| Parameter                       | Method   | Units | Result | Reporting Limit | Analysis Date | Analysis Time | Analyzed By |
|---------------------------------|----------|-------|--------|-----------------|---------------|---------------|-------------|
| Organic Analysis<br>1,4-Dioxane | EPA 1624 | mg/L  | 0.007  | 0.001           | 1/8/20        | 16:27         | JEB         |

Comments

All methods reference USEPA methods unless otherwise noted.  
Sample analyzed at native pH.

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rev. 1/8/20

**Quality Assurance / Quality Control  
 Data Summary**

IC Batch Number: QCORG0108201  
 Parameter: 1,4-Dioxane (EPA 1624)

ATS Project: Pall Corporation #G001-002  
 Report Date: 1/8/20

Results of QA Samples run concurrently with project samples

| Sample                                     | Replicate #1 | Replicate #2 | Mean       | Relative Range (percent) |
|--|--------------|--------------|------------|--------------------------|
| #G001-002<br>Outfall 12/31/19 Matrix Spike | 0.015 mg/L   | 0.015 mg/L   | 0.015 mg/L | 0.9                      |

| Sample/Analyte                                 | Known Concentration | Spike Concentration | Analyzed Concentration | Recovery (percent) |
|--|---------------------|---------------------|------------------------|--------------------|
| #G001-002<br>Laboratory Fortified Blank 1/6/20 | <0.001 mg/L         | 0.010 mg/L          | 0.008 mg/L             | 82.1*              |
| Outfall 12/31/19 Matrix Spike                  | 0.005 mg/L          | 0.010 mg/L          | 0.015 mg/L             | 101.5              |
| Outfall 12/31/19 Matrix Spike Duplicate        | 0.005 mg/L          | 0.010 mg/L          | 0.015 mg/L             | 102.8              |

| Sample                                       | Analyzed Concentration | QC Decision |
|--|------------------------|-------------|
| #G001-002<br>Laboratory Reagent Blank 1/6/20 | <0.001 mg/L            | Acceptable  |

**Comments:**  
 Calculations performed prior to rounding.  
 \* Outside standard control limits.

**Control Limits:**  
 Recoveries  
 Laboratory Control Sample Recovery (85 - 115%)  
 Matrix Spike Recovery (80 - 120%)  
 Relative Range  
 Replicates (<20%)



**CHAIN OF CUSTODY RECORD**

| PROJECT NUMBER      |      | LABORATORY IDENTIFIER  |      | METHODS/APPARATUS/ANALYSTS/DATE/NO. OF SAMPLES/REVISIONS |      |      |                       |      |      |      |      |                       |      |      |      |      |                       |
|---------------------|------|--|------|--|------|------|-----------------------|------|------|------|------|-----------------------|------|------|------|------|-----------------------|
| DATE                | TIME | DATE   | TIME | DATE   | TIME | DATE | TIME                  | DATE | TIME | DATE | TIME | DATE                  | TIME | DATE | TIME | DATE | TIME                  |
| Pall Corp           |      | Pall Corp, 642 South Wagner Road, Ann Arbor Michigan, Sue Peters |      |  |      |      |                       |      |      |      |      |                       |      |      |      |      |                       |
| SIGNED BY (Project) |      | SIGNED BY (Project)  |      | SIGNED BY (Project)                                      |      |      |                       |      |      |      |      |                       |      |      |      |      |                       |
| SIGNED BY (Lab)     |      | SIGNED BY (Lab)  |      | SIGNED BY (Lab)  |      |      |                       |      |      |      |      |                       |      |      |      |      |                       |
| SIGNED BY (Client)  |      | SIGNED BY (Client)   |      | SIGNED BY (Client)                                       |      |      |                       |      |      |      |      |                       |      |      |      |      |                       |
| SIGNED BY (Other)   |      | SIGNED BY (Other)  |      | SIGNED BY (Other)  |      |      |                       |      |      |      |      |                       |      |      |      |      |                       |
| SAMPLES             |      |  |      |  |      |      |                       |      |      |      |      |                       |      |      |      |      |                       |
| S                   | NO.  | DATE   | TIME | NO.  | DATE | TIME | SAMPLE IDENTIFICATION | S    | NO.  | DATE | TIME | SAMPLE IDENTIFICATION | S    | NO.  | DATE | TIME | SAMPLE IDENTIFICATION |
| 1                   | 1    | 12/31/19   |      | X  | 2    |      | Outfall               | X    | 2    |      |      |                       |      |      |      |      |                       |
| 2                   | 2    | 01/01/20   |      | X  | 2    |      | Outfall               | X    | 2    |      |      |                       |      |      |      |      |                       |
| 3                   | 3    | 01/03/20   |      | X  | 2    |      | Outfall               | X    | 2    |      |      |                       |      |      |      |      |                       |
| 4                   | 4    |  |      |  |      |      |                       |      |      |      |      |                       |      |      |      |      |                       |
| 5                   | 5    |  |      |  |      |      |                       |      |      |      |      |                       |      |      |      |      |                       |
| 6                   | 6    |  |      |  |      |      |                       |      |      |      |      |                       |      |      |      |      |                       |
| 7                   | 7    |  |      |  |      |      |                       |      |      |      |      |                       |      |      |      |      |                       |
| 8                   | 8    |  |      |  |      |      |                       |      |      |      |      |                       |      |      |      |      |                       |
| 9                   | 9    |  |      |  |      |      |                       |      |      |      |      |                       |      |      |      |      |                       |
| 10                  | 10   |  |      |  |      |      |                       |      |      |      |      |                       |      |      |      |      |                       |
| 11                  | 11   |  |      |  |      |      |                       |      |      |      |      |                       |      |      |      |      |                       |
| 12                  | 12   |  |      |  |      |      |                       |      |      |      |      |                       |      |      |      |      |                       |
| 13                  | 13   |  |      |  |      |      |                       |      |      |      |      |                       |      |      |      |      |                       |
| 14                  | 14   |  |      |  |      |      |                       |      |      |      |      |                       |      |      |      |      |                       |
| 15                  | 15   |  |      |  |      |      |                       |      |      |      |      |                       |      |      |      |      |                       |
| 16                  | 16   |  |      |  |      |      |                       |      |      |      |      |                       |      |      |      |      |                       |
| 17                  | 17   |  |      |  |      |      |                       |      |      |      |      |                       |      |      |      |      |                       |
| 18                  | 18   |  |      |  |      |      |                       |      |      |      |      |                       |      |      |      |      |                       |
| 19                  | 19   |  |      |  |      |      |                       |      |      |      |      |                       |      |      |      |      |                       |
| 20                  | 20   |  |      |  |      |      |                       |      |      |      |      |                       |      |      |      |      |                       |