# Technical Memorandum

**TO:** Andrew Smith, Washington State Department of Ecology

**CC:** Sarah Weeks, Port of Tacoma

**FROM:** Jennifer Wynkoop and Piper Roelen, PE

**DATE:** March 29, 2017

**RE:** **Groundwater Monitoring Results**
**Former Louisiana Pacific/Pony Lumber Facility**
**Port of Tacoma, Washington**
**Enforcement Order No. DE 92TC-S312**
**Department of Ecology Facility ID# 1209**
**Landau Project No. 0118035.010.015**

## Introduction

On behalf of the Port of Tacoma (Port), Landau Associates, Inc. (LAI) is providing results for groundwater monitoring activities at the former Louisiana Pacific/Pony Lumber Facility, located at 3701 Taylor Way, in Tacoma, Washington (site). Figure 1 shows the site location. Groundwater monitoring is required on a 30-month schedule in accordance with the site administrative agreement with the Department of Ecology (Ecology) and applicable maintenance and monitoring documents[1]. Groundwater monitoring requirements were most recently modified in 2011 (Ecology 2011).

Between 1968 and 1969, Louisiana Pacific Corporation developed the site as a log yard using approximately 1,800 tons of ASARCO smelter slag as ballast material to stabilize soft soil (Ecology 2017). ASARCO smelter slag is known to contain elevated concentrations of some heavy metals including arsenic and copper. A cap was installed at the site in 1993 to prevent stormwater infiltration that could cause contaminants to migrate offsite into adjacent waterways. The Port has owned the property since 2006, and the site currently operates as a parking and storage facility for new imported back-hoes and vehicles.

As part of the long-term monitoring plan, groundwater monitoring for dissolved arsenic and copper is required to ensure that metals concentrations in groundwater meet the site's cleanup standards (Louisiana Pacific 2000). The existing groundwater monitoring well network includes four wells LP-1, LP-2, LP-4, and LP-5. Figure 2 shows the locations of the monitoring wells. The condition of the environmental cap and stormwater system is also monitored on a 30-month schedule. The cap inspection is documented in a separate report (Windward 2017).

[1] Monitoring requirements are described in the Enforcement Order DE92TC-S312, the Logyard Cap Maintenance and Monitoring Plan (Louisiana Pacific 2000), and the 2011 Memorandum of Understanding between Ecology and the Port (Ecology 2011).

During the most recent periodic review, Ecology determined that the remedial action conducted at the site continue to be protective of human health and the environment (Ecology 2016).

## Groundwater Monitoring Activities

February 2017 groundwater monitoring activities included the collection of monitoring well coordinates, depth-to-water (DTW) measurements, and groundwater samples for laboratory analysis. Coordinates were collected using a handheld global positioning system (GPS). DTW measurements were collected with a water level meter that was decontaminated between each monitoring well. Samples were collected using low-flow sampling techniques with a peristaltic pump; new disposable polyethylene tubing was installed at each well and left in place for future use. Groundwater samples were analyzed for dissolved arsenic and copper by US Environmental Protection Agency (EPA) Method 200.8 by Analytical Resources, Inc. (ARI) located in Tukwila, Washington. Dissolved metals samples were field-filtered at the time of collection using a disposable 0.45 micron polyethylene filter. A duplicate sample was collected at LP-5 (DP-5) for quality control purposes. Data will be electronically submitted to Ecology's Environmental Information Management (EIM) system following submittal of this report.

Purged groundwater was collected and stored on-site in a properly labeled, 55-gallon steel drum pending laboratory analysis.

During monitoring activities, the casing of monitoring well LP-2 was found to be damaged; therefore, a water level was not collected and a sample was not analyzed from this well. Additional information regarding the damaged well is presented in the Occurrence of Problems section below.

## Analytical Results

Dissolved metals results from the February 2017 sampling event were all below site groundwater cleanup levels (36 micrograms per liter [µg/L] for dissolved arsenic and 2.9 µg/L for dissolved copper) but generally above the laboratory reporting limits (0.2 µg/L for dissolved arsenic and 0.5 µg/L for dissolved copper):

- LP-1 results indicates concentrations of 0.409 µg/L of dissolved arsenic and dissolved copper concentrations below the laboratory reporting limit (0.5 µg/L)
- LP-4 results indicate dissolved arsenic and copper concentrations of 0.421 µg/L and 0.984 µg/L, respectively
- LP-5 results indicate concentrations of dissolved arsenic and copper concentrations of 0.900 µg/L and 1.14 µg/L, respectively.

Table 1 presents horizontal GPS coordinates. Table 2 presents groundwater DTW data. Table 3 presents analytical and field data. Available historical data is also presented on Tables 2 and 3. February 2017 groundwater sample collection forms are provided in Attachment 1 and the laboratory

data package for the February 2017 sampling event is provided in Attachment 2. Time series plots of the dissolved metals data are presented in Attachment 3.

## Occurrence of Problems

Monitoring well LP-2 was found to be damaged during the February 2017 monitoring event. While removing the well cap, the PVC casing was pulled upward approximately 3 inches. The casing was pushed down and returned to its original position. However, the movement of the well casing indicates that the surface seal is compromised and it is likely that the PVC well casing is broken below. Sample collection activities proceeded; however, the observed color and turbidity of the groundwater fluctuated dramatically during low-flow purging from almost clear and colorless to highly turbid and dark brown (which was not observed during purging of the other monitoring wells). A sample was collected and placed on hold at ARI pending discussion with the Port and Ecology regarding the well condition. Ecology and the Port concurred that the well was likely compromised; therefore, the sample was not analyzed, and Ecology approved removal of the well from the monitoring program (Smith 2017). The well will be decommissioned later in 2017.

## Planned Groundwater Monitoring Activities

The next scheduled sampling event will occur in August 2019. Groundwater monitoring results will continue to be submitted to Ecology within 45 days after completion of data validation.

Please contact Sarah Weeks with the Port of Tacoma if you have any questions concerning groundwater monitoring activities or results presented in the technical memorandum.

LANDAU ASSOCIATES, INC.

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Attachments: Figure 1: Vicinity Map
Figure 2: Site Plan
Table 1: Monitoring Well Coordinates
Table 2: Depth to Water Data
Table 3: Groundwater Analytical Data
Attachment 1: February 2017 Groundwater Sample Collection Forms
Attachment 2: February 2017 Laboratory Data Package
Attachment 3: Dissolved Metals Time Series Plots

# References

Ecology website. 2017. Louisiana Pacific Corp. https://fortress.wa.gov/ecy/gsp/Sitepage.aspx?csid=2317. Washington State Department of Ecology. Accessed March 13, 2017.

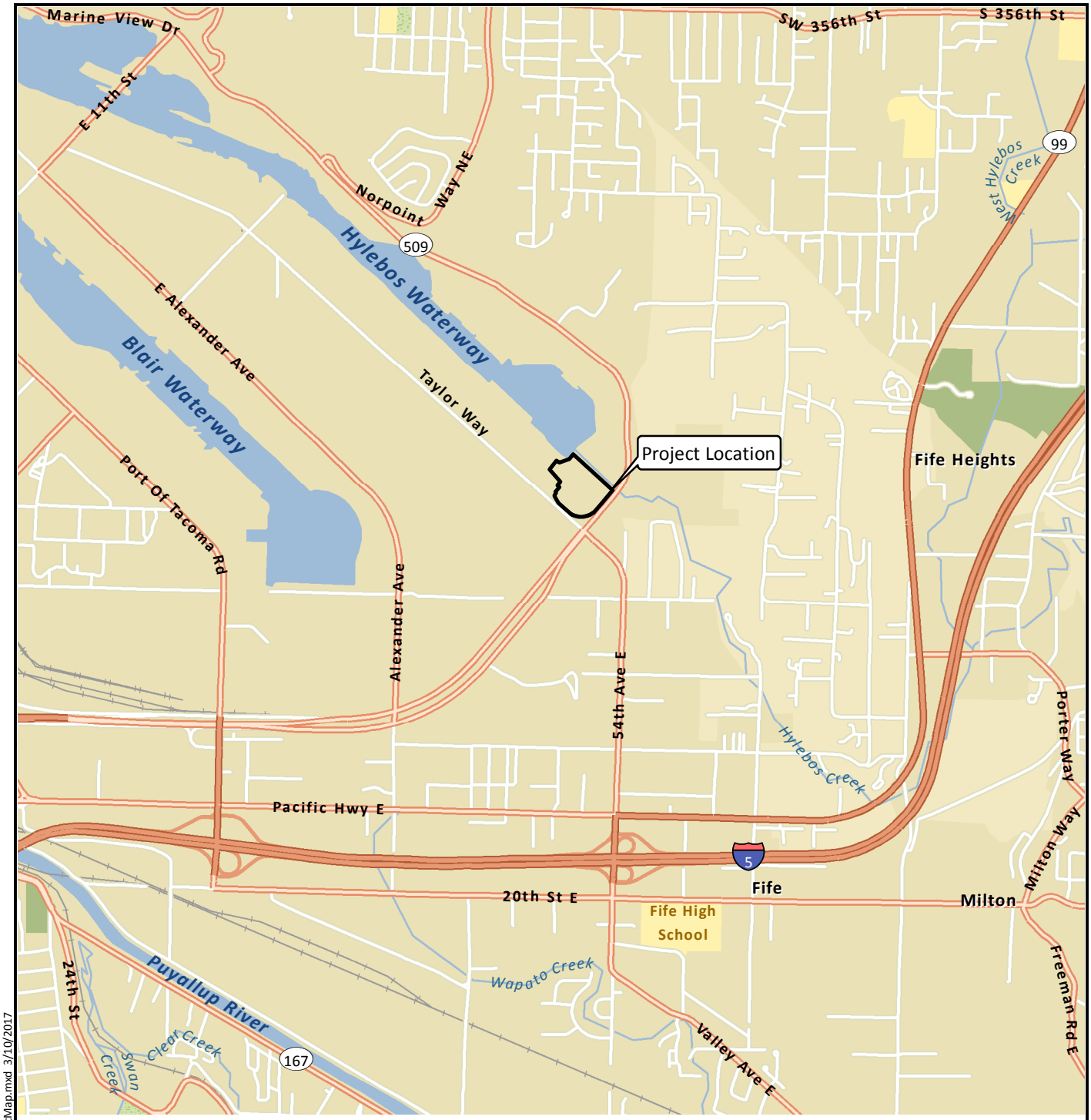
Ecology. 2016. Second Periodic Review Report, Louisiana Pacific Corporation. Washington State Department of Ecology. November.

Ecology. 2011. Memorandum of Understanding, Former Log Yard Groundwater Monitoring and Cap Inspection. Washington State Department of Ecology. September 12.

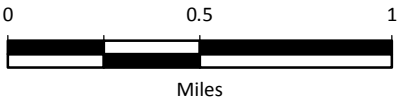
Louisiana Pacific. 2000. Logyard Cap Maintenance and Monitoring Plan. December.

Smith, A. 2017. "Re: POT Cascade Timber cap inspection report – FSID 1206." Andrew Smith, Washington State Department of Ecology. March 23.

Windward. 2017. Environmental Cap Inspection Report, Former Louisiana Pacific/Pony Lumber Facility. Windward Environmental, LLC. March 31.









Data Source: Esri 2012

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| | | |
|---|---|---|
| Former Louisiana Pacific-Pony Lumber Facility<br>Tacoma, Washington | **Vicinity Map** | Figure<br>1 |


Legend

- Monitoring Well Location
- Site Boundary

0 250 500

Scale in Feet

Notes

1. During the February 2017 sampling event, the well casing of LP-2 was observed to be damaged, therefore a sample was not collected.
2. Black and white reproduction of this color original may reduce its effectiveness and lead to incorrect interpretation.

Data Sources: Pierce County GIS; Esri World Imagery.

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| | | |
|---|---|---|
| Former Louisiana Pacific-Pony Lumber Facility Tacoma, Washington | **Site Plan** | Figure 2 |

# Table 1
## Monitoring Well Coordinates
## Former Louisiana Pacific/Pony Lumber Facility
## Port of Tacoma, Washington

| Well ID | Easting | Northing |
|---|---|---|
| LP-1 | 1178328.1 | 707654.6 |
| LP-2 | 1178347.1 | 708186.6 |
| LP-4 | 1178690.2 | 708122.0 |
| LP-5 | 1178885.9 | 707951.9 |

Notes:

Coordinates are presented in NAD83 Washington State Plane South (feet).

Coordinates were collected using a handheld global positioning system (GPS) on February 16, 2017.

# Table 2
## Depth to Water Data
## Former Louisiana Pacific/Pony Lumber Facility
## Port of Tacoma, Washington

| Well ID | Date | Water Level in Feet [(a)] |
|---|---|---|
| LP-1 | 7/7/07 | 14.15 |
| LP-1 | 5/8/08 | 12.2 |
| LP-1 | 9/16/10 | 13.75 |
| LP-1 | 3/5/12 | 11.71 |
| LP-1 | 9/6/14 | 14.07 |
| LP-1 | 2/16/17 | 10.17 |
| LP-2 | 7/7/07 | 15.9 |
| LP-2 | 5/8/08 | 13.1 |
| LP-2 | 9/16/10 | 12.71 |
| LP-2 | 2/16/12 | 10.37 |
| LP-2 | 9/6/14 | 6.46 |
| LP-4 | 7/7/07 | 8.42 |
| LP-4 | 5/8/08 | 9.26 |
| LP-4 | 9/16/10 | 7.89 |
| LP-4 | 3/5/12 | 7.47 |
| LP-4 | 9/6/14 | 8.85 |
| LP-4 | 2/16/17 | 6.10 |
| LP-5 | 7/7/07 | 8.8 |
| LP-5 | 5/8/08 | 8.56 |
| LP-5 | 9/16/10 | 8.81 |
| LP-5 | 3/5/12 | 8.39 |
| LP-5 | 9/6/14 | 9.10 |
| LP-5 | 2/16/17 | 6.49 |

Notes:

(a) Surveyed reference elevations are not available. Water levels are presented as feet below top of casing.

2017 depth-to-water measurements were collected by Landau Associates, Inc. Due to the broken well casing, a measurement was not collected from LP-2.

**Table 3**
**Groundwater Analytical Data**
**Former Louisiana Pacific/Pony Lumber Facility**
**Port of Tacoma, Washington**

| Well ID | Date | Dissolved Arsenic (µg/L) | Dissolved Copper (µg/L) | Dissolved Lead (µg/L) | Dissolved Zinc (µg/L) | pH (SU) | Conductivity (µmhos/cm) | Total Organic Carbon (mg/L) | Salinity (ppt) | TDS (mg/L) | TSS (mg/L) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Groundwater Cleanup Levels:** | | **36** | **2.9** | **8.5** | **86** | -- | -- | -- | -- | -- | -- |
| LP-1 | 03/22/95 | <10 | **3** | <3 | <20 | 6.81 | -- | 43 | 1.5 | 1,600 | 26 |
| LP-1 | 06/21/95 | **4.6** | **1.9** | <1 | **3** | 8.43 | -- | 40 | 1.5 | 1,500 | 30 |
| LP-1 | 09/25/95 | <5 | **1.4** | <3 | <20 | 6.64 | -- | 37 | 1.7 | 2,000 | 66 |
| LP-1 | 12/28/95 | <5 | <10 | <3 | **50** | 6.57 | -- | 46 | 0.9 | 940 | 32 |
| LP-1 | 04/19/96 | <5 | **3** | <3 | <10 | 6.82 | -- | 35 | 1.3 | 1,400 | 31 |
| LP-1 | 06/27/96 | <10 | <2 | <8 | <10 | 6.75 | -- | 30 | -- | 1,400 | 18 |
| LP-1 | 11/25/96 | <5 | <2 | <2 | <5 | 6.79 | -- | 27 | 1 | 1,300 | 22 |
| LP-1 | 12/17/96 | <200 | <20 | <50 | <20 | 6.79 | -- | 27 | 1 | 1,300 | 22 |
| LP-1 | 03/28/97 | <10 | <2 | <8 | <80 | 7.10 | -- | 29 | 1.1 | 1,200 | 11 |
| LP-1 | 07/09/97 | <1 | <1 | <0.5 | **9.4** | 6.66 | -- | 29 | 1.1 | 1,100 | 16 |
| LP-1 | 09/26/97 | **2.7** | <1 | <0.5 | **4.3** | 6.65 | -- | 25 | 1 | 1,200 | 29 |
| LP-1 | 12/18/97 | **3.3** | **1.8** | <0.5 | **5.6** | 6.68 | -- | 30 | 1.1 | 1,200 | 9 |
| LP-1 | 06/30/98 | **4.2** | <1 | <0.5 | <2 | 6.72 | -- | 32 | 1 | 1,200 | 15 |
| LP-1 | 10/22/99 | **1.7** | **1.3** | <1 | **170** | 6.63 | -- | 31 | 0.7 | 850 | 54 |
| LP-1 | 08/01/00 | **1.8** | **1.6** | ND | **4** | 6.66 | -- | -- | 1.0 | 1,100 | 59 |
| LP-1 | 02/02/02 | ND | **4.01** | ND | **14.9** | 7.00 | -- | -- | 0.9 | 974 | 42 |
| LP-1 | 07/07/07 | <1 | <2 | <1 | <10 | 6.79 | 1,640 | -- | 0.8 | 995 | 2.9 |
| LP-1 (Duplicate) | 07/07/07 | <1 | <2 | <1 | <10 | 6.79 | 1,630 | -- | 0.8 | 1,020 | 2 |
| LP-1 | 05/08/08 | ND | ND | ND | ND | 6.58 | 1,000 | -- | 0.5 | 720 | 13 |
| LP-1 (Duplicate) | 05/08/08 | ND | ND | ND | ND | 6.58 | -- | -- | -- | -- | -- |
| LP-1 | 9/16/10 | <0.5 | <0.5 | <0.5 | **2.7** | 6.63 | 1,690 | 27 | 0.985 | 1,200 | -- |
| LP-1 | 3/5/12 | <0.5 | **13** | -- | -- | -- | -- | -- | -- | -- | -- |
| LP-1 | 9/6/14 | <1 | <1 | -- | -- | -- | -- | -- | -- | -- | -- |
| LP-1 (Duplicate) | 9/6/14 | <1 | <1 | -- | -- | -- | -- | -- | -- | -- | -- |
| LP-1 | 2/16/17 | **0.409** | <0.5 | -- | -- | 7.16 | 1,130 | -- | -- | -- | -- |
| LP-2 | 03/22/95 | <10 | <2 | <3 | <20 | 6.82 | -- | 46 | 1.6 | 1,600 | 190 |
| LP-2 | 06/21/95 | **4.6** | **1.3** | <1 | **5.8** | 7.12 | -- | 42 | 1.3 | 1,400 | 320 |
| LP-2 | 09/25/95 | <5 | **43** | <5.8 | <20 | 6.74 | -- | 44 | 1.5 | 1,800 | 500 |
| LP-2 | 12/28/95 | <5 | <10 | <3 | <20 | 6.65 | -- | 47 | 1.5 | 1,500 | 710 |
| LP-2 | 03/28/96 | <10 | <2 | <8 | <20 | 6.76 | -- | 45 | <2 | 1,400 | 190 |
| LP-2 | 06/27/96 | <10 | <2 | <8 | <10 | 6.75 | -- | 41 | -- | 1,700 | 230 |
| LP-2 | 11/25/96 | <5 | <2 | <2 | <5 | 6.87 | -- | 49 | 1.2 | 1,400 | 520 |
| LP-2 | 12/17/96 | <200 | <20 | <50 | <20 | 6.82 | -- | 45 | 1.2 | 1,400 | 310 |
| LP-2 | 07/09/97 | <1 | <1 | **0.74** | **18** | 6.69 | -- | 48 | 1.4 | 1,400 | 280 |
| LP-2 | 09/26/97 | **3.7** | <1 | <0.5 | **3** | 6.77 | -- | 49 | 1.3 | 1,500 | 390 |
| LP-2 | 12/18/97 | **1.5** | **2** | <0.5 | **2.8** | 6.72 | -- | 51 | 1.3 | 1,400 | 410 |
| LP-2 | 06/30/98 | **4.2** | **1.3** | <0.5 | <2 | 6.77 | -- | 42 | 1 | 1,200 | 600 |
| LP-2 | 10/22/99 | **2.5** | <1 | <1 | **86** | 6.76 | -- | 110 | 1.1 | 1,300 | 2,100 |
| LP-2 | 08/01/00 | **1** | **1** | **0.5** | **4** | 6.73 | -- | -- | 1.1 | 1,100 | 1,200 |
| LP-2 | 02/02/02 | **2.58** | **35.5** | **3.87** | **78.5** | 6.95 | -- | -- | 0.9 | 1,050 | 789 |
| LP-2 | 07/07/07 | <1 | <2 | <1 | <10 | 6.87 | 1,650 | -- | 0.8 | 1,040 | 4.9 |
| LP-2 | 05/08/08 | ND | ND | ND | ND | 6.58 | 1,600 | -- | 0.7 | 960 | 160 |
| LP-2 | 9/16/10 | <0.5 | <0.5 | <0.5 | **4.0** | 6.77 | 1,580 | 25 | 0.916 | 1,100 | -- |
| LP-2 | 2/16/12 | <0.5 | **1.8** | -- | -- | -- | -- | -- | -- | -- | -- |
| LP-2 | 9/6/14 | <1 | <1 | -- | -- | -- | -- | -- | -- | -- | -- |

**Table 3**
**Groundwater Analytical Data**
**Former Louisiana Pacific/Pony Lumber Facility**
**Port of Tacoma, Washington**

| Well ID | Date | Dissolved Arsenic (µg/L) | Dissolved Copper (µg/L) | Dissolved Lead (µg/L) | Dissolved Zinc (µg/L) | pH (SU) | Conductivity (µmhos/cm) | Total Organic Carbon (mg/L) | Salinity (ppt) | TDS (mg/L) | TSS (mg/L) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Groundwater Cleanup Levels:** | | **36** | **2.9** | **8.5** | **86** | -- | -- | -- | -- | -- | -- |
| LP-4 | 03/22/95 | <10 | **5** | <3 | <20 | 6.65 | -- | 14 | 1.9 | 1,200 | 66 |
| LP-4 | 06/21/95 | **6.9** | **5.9** | <1 | **18** | 7.15 | -- | 23 | 2.0 | 1,800 | 81 |
| LP-4 | 09/25/95 | **7.1** | **22** | **4.6** | <20 | 6.54 | -- | 13 | 1.0 | 1,500 | 60 |
| LP-4 | 12/28/95 | <2 | **5** | <1 | <20 | 6.67 | -- | 14 | 1.1 | 1,100 | 20 |
| LP-4 | 03/28/96 | <10 | <2 | <8 | <20 | 6.71 | -- | 13 | <2 | 890 | 35 |
| LP-4 | 06/27/96 | <10 | **4** | <8 | <10 | 6.65 | -- | 14 | -- | 940 | 20 |
| LP-4 | 11/25/96 | <5 | **4** | **4** | **7** | 6.80 | -- | 25 | 0.3 | 500 | 120 |
| LP-4 | 12/17/96 | <200 | <20 | <50 | <20 | 6.80 | -- | 25 | 0.3 | 500 | 120 |
| LP-4 | 03/28/97 | <10 | **4** | <8 | <80 | 6.82 | -- | 6.6 | 0.4 | 490 | 160 |
| LP-4 | 07/09/97 | **2.9** | **1.7** | **0.55** | **27** | 6.62 | -- | 13 | 0.5 | 670 | 45 |
| LP-4 | 09/26/97 | **7.6** | **2** | <0.5 | <6.6 | 6.57 | -- | 11 | 2.5 | 3,900 | 50 |
| LP-4 | 12/18/97 | **7.3** | **6.2** | <0.5 | **10** | 6.32 | -- | 9.5 | 4.9 | 4,200 | 96 |
| LP-4 | 06/30/98 | **3.3** | **2.5** | <0.5 | <2 | 6.74 | -- | 10 | 0.7 | 940 | 49 |
| LP-4 | 10/22/99 | **1.8** | <1 | <1 | **75** | 6.63 | -- | 9.3 | 0.9 | 1,100 | 54 |
| LP-4 | 08/01/00 | **1** | **1** | **0.5** | **4** | 6.56 | -- | -- | 1.1 | 1,200 | 48 |
| LP-4 | 02/02/02 | **5.54** | **6.05** | **1.04** | **10.4** | 6.75 | -- | -- | 0.7 | 786 | 42 |
| LP-4 | 07/07/07 | **4** | **2** | <1 | <10 | 6.61 | 2,000 | -- | 1 | 1,140 | 3.4 |
| LP-4 | 05/08/08 | ND | ND | ND | ND | 6.44 | 1,500 | -- | 0.5 | 840 | 8.4 |
| LP-4 | 9/16/10 | <0.5 | **0.8** | <0.5 | **5.5** | 6.61 | 1,330 | 5 | 0.762 | 1,000 | -- |
| LP-4 | 3/5/12 | **0.5** | <0.5 | -- | -- | -- | -- | -- | -- | -- | -- |
| LP-4 | 9/6/14 | **1.7** | **2** | -- | -- | -- | -- | -- | -- | -- | -- |
| LP-4 | 2/16/17 | **0.421** | **0.984** | -- | -- | 6.68 | 909 | -- | -- | -- | -- |
| LP-5 | 03/22/95 | <100 | **2** | <3 | <20 | 6.73 | -- | 18 | 1.0 | 9,400 | 320 |
| LP-5 | 06/21/95 | **3.1** | **3.4** | <1 | **3.3** | 6.93 | -- | 18 | 1.1 | 1,400 | 84 |
| LP-5 | 09/25/95 | **5.6** | **20** | **4.4** | <20 | 6.31 | -- | 22 | 2.6 | 2,300 | 94 |
| LP-5 | 12/28/95 | <5 | <2 | <1 | <20 | 6.21 | -- | 25 | 2.6 | 2,600 | 100 |
| LP-5 | 03/28/96 | <10 | <2 | <8 | <20 | 6.41 | -- | 30 | 2 | 2,200 | 140 |
| LP-5 | 06/27/96 | <10 | <2 | <8 | <10 | 6.65 | -- | 23 | -- | 1,800 | 120 |
| LP-5 | 11/25/96 | <5 | <2 | <2 | **16** | 6.65 | -- | 16 | 2.0 | 2,300 | 63 |
| LP-5 | 12/17/96 | <200 | <20 | <50 | <20 | 6.65 | -- | 16 | 2.0 | 2,300 | 63 |
| LP-5 | 03/28/97 | <10 | <2 | <8 | <80 | 6.58 | -- | 20 | 1.5 | 1,700 | 320 |
| LP-5 | 07/09/97 | <1 | <1 | **1** | **37** | 6.54 | -- | 20 | 1.8 | 1,700 | 290 |
| LP-5 | 09/26/97 | **7.7** | <1 | <0.5 | **10** | 6.53 | -- | 25 | 2.3 | 2,200 | 290 |
| LP-5 | 12/18/97 | **4** | **1.7** | <0.5 | **6.1** | 6.39 | -- | 22 | 2.7 | 2,500 | 49 |
| LP-5 | 06/30/98 | **11** | <1 | <0.5 | **3.1** | 6.49 | -- | 20 | 2.5 | 2,800 | 140 |
| LP-5 | 10/22/99 | **7.9** | **1.2** | <1 | **140** | 6.53 | -- | 23 | 4.2 | 4,900 | 460 |
| LP-5 | Aug-00 | **1** | **1** | **0.5** | **4** | 8.57 | -- | -- | 4 | 3,800 | 850 |
| LP-5 | Feb-02 | **9.05** | **6.15** | **1.02** | **69.6** | 6.60 | -- | -- | 5 | 5,260 | 48 |
| LP-5 | Jul-07 | **3** | <2 | <1 | <10 | 6.69 | 4,600 | -- | 2.4 | 2,760 | 52.9 |
| LP-5 | May-08 | ND | ND | ND | ND | 6.44 | 5,500 | -- | 2.5 | 3,100 | 100 |
| LP-5 | 9/16/10 | **0.6** | <0.5 | <0.5 | **1.0** | 6.71 | 2,250 | 7 | 1.33 | 1,600 | -- |
| LP-5 (Duplicate) | 9/16/10 | **0.7** | <0.5 | <0.5 | **1.0** | 6.68 | 2,270 | 8 | 1.34 | 1,600 | -- |
| LP-5 | 3/5/12 | <0.5 | <0.5 | -- | -- | -- | -- | -- | -- | -- | -- |

**Table 3**
**Groundwater Analytical Data**
**Former Louisiana Pacific/Pony Lumber Facility**
**Port of Tacoma, Washington**

| Well ID | Date | Dissolved Arsenic (µg/L) | Dissolved Copper (µg/L) | Dissolved Lead (µg/L) | Dissolved Zinc (µg/L) | pH (SU) | Conductivity (µmhos/cm) | Total Organic Carbon (mg/L) | Salinity (ppt) | TDS (mg/L) | TSS (mg/L) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Groundwater Cleanup Levels:** | | **36** | **2.9** | **8.5** | **86** | **--** | **--** | **--** | **--** | **--** | **--** |
| LP-5 (Duplicate) | 3/5/12 | <0.5 | <0.5 | -- | -- | -- | -- | -- | -- | -- | -- |
| LP-5 | 9/6/14 | <1 | <1 | -- | -- | -- | -- | -- | -- | -- | -- |
| LP-5 | 2/16/17 | **0.900** | **1.14** | -- | -- | 6.99 | 2,972 | -- | -- | -- | -- |
| LP-5 (Duplicate) | 2/16/17 | **0.908** | **0.900** | -- | -- | 7.00 | 2,858 | -- | -- | -- | -- |

**Notes:**

2017 samples were collected by Landau Associates, Inc. and analyzed by Analytical Resources, Inc., in Tukwila, Washington.

Lead, zinc, and general parameter analyses were discontinued in 2011 with Washington State Department of Ecology approval dated June 21, 2011 (Ecology 2011).

Groundwater samples were analyzed for dissolved metals by US Environmental Protection Agency Method 200.8.

<0.5 = laboratory analytical result does not exceed laboratory reporting limit

**Bold** = detection above laboratory reporting limit

**Green Box** = exceedance of site cleanup level, as established in Enforcement Order 92TC-S312

**Abbreviations and Acronyms:**

µg/L = micrograms per liter

µmhos/cm = micromhos per centimeter

mg/L = milligrams per liter

ND = not detected; no quantitation limit indicated

ppt = parts per thousand

SU = standard unit

TDS = total dissolved solids

TSS = total suspended solids

ATTACHMENT 1

# February 2017 Groundwater Sample Collection Forms

LANDAU ASSOCIATES

# Groundwater Low-Flow Sample Collection Form

Project Name: Louisiana Pacific Pony Site
Project Number: 0118035.010.015
Event: February 2017 Cap
Date/Time: 2/16/2017 9:25
Sample Number: LP-1
Weather: overcast, 50 deg
Landau Representative: KMG

## WATER LEVEL/WELL/PURGE DATA

Well Condition: Secure (YES) Damaged (NO) Describe: flush mount
DTW Before Purging (ft) 10.17 Time: 8:54 Flow through cell vol. GW Meter No.(s tac 300'
Sounded Depth After Purging (ft) 27.9
Begin Purge: Date/Time: 9:08 End Purge: Date/Time: 923 Gallons Purged: 1
Purge water disposed to: [X] 55-gal Drum [ ] Storage Tank [ ] Ground [ ] Other

| Time | Temp (°C) | Cond. (uS/cm) | D.O. (mg/L) | pH | ORP (mV) | Turbidity (NTU) | DTW (ft) | Internal Purge Volume (gal) | Comments/ Observations |
|---|---|---|---|---|---|---|---|---|---|
| **Purge Goals: Stablization of Parameters for three consecutive readings within the following** | **+/- 3%** | **+/- 3%** | **+/- 10%** | **+/- 0.1 units** | **+/- 10 mV** | **+/- 10%** | **< 0.3 ft** | **>/= 1 flow through cell** | |
| 911 | 14.02 | 1275 | 1.77 | 7.06 | -40.3 | 44.75 | | | clear, very light yellow black particles, |
| 914 | 13.95 | 1212 | 1.47 | 7.13 | -43.4 | 28.78 | | | clear, very light yellow black particles, |
| 917 | 14.01 | 1161 | 1.37 | 7.14 | -42.6 | 27.24 | | | clear, very light yellow black particles, |
| 920 | 13.93 | 1143 | 1.36 | 7.15 | -43.1 | 23.54 | | | clear, very light yellow black particles, |
| 923 | 13.91 | 1132 | 1.25 | 7.15 | -43 | 21.04 | | | clear, very light yellow black particles, |

## SAMPLE COLLECTION DATA

Sample Collected With: [ ] Bailer [X] Pump/Pump Type peristaltic
Made of: [ ] Stainless Steel [ ] PVC [ ] Teflon [ ] Polyethylene [ ] Other [X] Dedicated
Decon Procedure: [ ] Alconox Wash [ ] Tap Rinse [ ] DI Water [ ] Dedicated
*(By Numerical Order)* [ ] Other
Sample Description (color, turbidity, odor, sheen, etc.): clear, very light yellow, no odor, no sheen

| Replicate | Temp (°C) | Cond. (uS/cm) | D.O. (mg/L) | pH | ORP (mV) | Comments/ Observations |
|---|---|---|---|---|---|---|
| 1 | 13.94 | 1131 | 1.21 | 7.16 | -43.5 | |
| 2 | 13.94 | 1130 | 1.2 | 7.16 | -43.6 | |
| 3 | 13.86 | 1129 | 1.17 | 7.16 | -43.6 | |
| 4 | 13.83 | 1128 | 1.16 | 7.16 | -43.7 | |
| Average: | 13.9 | 1130 | 1.19 | 7.16 | -43.60 | |

| QUANTITY | TYPICAL ANALYSIS ALLOWED PER BOTTLE TYPE (Circle applicable or write non-standard analysis below) |
|---|---|
| | WA ☐ OR ☐ |
| | WA ☐ OR ☐ |
| X | (Dissolved Metals) (As) (Cu) EPA Method 200.8 |
| | |
| | |
| | |
| | |
| | others |

Duplicate Sample No(s): N/A
Comments: Dissolved metals samples were field filtered. Installed new 3/8" poly tubing. Well is east of office building, between stalls73 and 75
Signature: kmg Date: 2/16/2017

LANDAU ASSOCIATES

# Groundwater Low-Flow Sample Collection Form

Project Name: Louisiana Pacific Pony Site
Project Number: 0118035.010.015
Event: February 2017 Cap
Date/Time: 2/16/2017 10:40
Sample Number: LP-2
Weather: partly sunny, 50 deg
Landau Representative: KMG

## WATER LEVEL/WELL/PURGE DATA

Well Condition: Secure (YES) Damaged (well PVC is loose) Describe: flush mount
DTW Before Purging (ft): 6.51 Time: 9:53 Flow through cell vol. GW Meter No.(s tac 300'
Sounded Depth After Purging (ft): 20.5
Begin Purge: Date/Time: 959 End Purge: Date/Time: 1035 Gallons Purged: 2.5
Purge water disposed to: ☒ 55-gal Drum ☐ Storage Tank ☐ Ground ☐ Other

| Time | Temp (°C) | Cond. (uS/cm) | D.O. (mg/L) | pH | ORP (mV) | Turbidity (NTU) | DTW (ft) | Internal Purge Volume (gal) | Comments/ Observations |
|---|---|---|---|---|---|---|---|---|---|
| **Purge Goals: Stablization of Parameters for three consecutive readings within the following** | **+/- 3%** | **+/- 3%** | **+/- 10%** | **+/- 0.1 units** | **+/- 10 mV** | **+/- 10%** | **< 0.3 ft** | **>/= 1 flow through cell** | |
| 1002 | 14.25 | 234 | 1.67 | 6.66 | 37.3 | 98.91 | | | cloudy, colorless with rust colored specks, |
| 1005 | 14.1 | 233 | 1.2 | 6.56 | 43.2 | 43.74 | | | clear with rust colored specks, no/ns |
| 1008 | 14.14 | 230 | 1.03 | 6.5 | 47.5 | 103.5 | | | cloudy, colorless with rust colored specks, |
| 1011 | 14 | 234 | 1.13 | 6.48 | 50.1 | 322.6 | | | very cloudy brown, no/ns |
| 1035 | 14.04 | 466 | 0.94 | 6.53 | 46.4 | 52.95 | | | cloudy, very dark brown, no/ns |

## SAMPLE COLLECTION DATA

Sample Collected With: ☐ Bailer ☒ Pump/Pump Type peristaltic
Made of: ☐ Stainless Steel ☐ PVC ☐ Teflon ☒ Polyethylene ☐ Other ☒ Dedicated
Decon Procedure: ☐ Alconox Wash ☐ Tap Rinse ☐ DI Water ☒ Dedicated
*(By Numerical Order)* ☐ Other
Sample Description (color, turbidity, odor, sheen, etc.): clear, very light yellow, no odor, no sheen

| Replicate | Temp (°C) | Cond. (uS/cm) | D.O. (mg/L) | pH | ORP (mV) | TDS (kg/L) | Comments/ Observatio | | |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 14.02 | 498 | 0.91 | 6.55 | 45.7 | | | | |
| 2 | 14 | 526 | 0.89 | 6.56 | 45.5 | | | | |
| 3 | 13.98 | 564 | 0.88 | 6.58 | 44.2 | | | | |
| 4 | 13.96 | 594 | 0.86 | 6.6 | 42.9 | | | | |
| Average: | 14.0 | 545.5 | 0.9 | 6.6 | 44.6 | | | | |

| QUANTITY | TYPICAL ANALYSIS ALLOWED PER BOTTLE TYPE (Circle applicable or write non-standard analysis below) | |
|---|---|---|
| | WA ☐ | OR ☐ |
| | WA ☐ | OR ☐ |
| X | (Dissolved Metals) (As) (Cu) EPA Method 200.8 (HOLD) | |
| | | |
| | | |
| | others | |

Duplicate Sample No(s): N/A
Comments: Dissolved metals samples were field filtered. Installed new 3/8" poly tubing. Extra purge time added for high turbidity

Signature: kmg Date: 2/16/2017

PVC is loose--came up about 3" when I tried to pull off the well cap; pushed pvc back down
sample was turbid, then clear, and then got very turbid and muddy. Mud eventually cleared up, and sample was very dark brown, but clear, like black coffe. Cond. increasing rapidly. Sample collected but placed on hold with lab; later received confirmation from PM that this sample will not be analyzed.

LANDAU ASSOCIATES

# Groundwater Low-Flow Sample Collection Form

Project Name: Louisiana Pacific Pony Site
Project Number: 0118035.010.015
Event: February 2017 Cap
Date/Time: 2/16/2017 12:05
Sample Number: LP-4
Weather: overcast, 55 deg
Landau Representative: KMG

## WATER LEVEL/WELL/PURGE DATA

Well Condition: Secure (YES) Damaged (NO) Describe: flush mount
DTW Before Purging (ft) 6.1 Time: 11:42 Flow through cell vol. GW Meter No.(s tac 300'
Sounded Depth After Purging (ft) 11.0'
Begin Purge: Date/Time: 1148 End Purge: Date/Time: 1202 Gallons Purged: 1
Purge water disposed to: [X] 55-gal Drum [ ] Storage Tank [ ] Ground [ ] Other

| Time | Temp (°C) | Cond. (uS/cm) | D.O. (mg/L) | pH | ORP (mV) | Turbidity (NTU) | DTW (ft) | Internal Purge Volume (gal) | Comments/ Observations |
|---|---|---|---|---|---|---|---|---|---|
| **Purge Goals: Stablization of Parameters for three consecutive readings within the following** | **+/- 3%** | **+/- 3%** | **+/- 10%** | **+/- 0.1 units** | **+/- 10 mV** | **+/- 10%** | **< 0.3 ft** | **>/= 1 flow through cell** | |
| 1151 | 9.29 | 1045 | 3.23 | 6.69 | 42.3 | 42.04 | | | clear with a few black particles, no/ns |
| 1154 | 8.97 | 983 | 3.66 | 6.68 | 43.3 | 34.07 | | | clear with a few black particles, no/ns |
| 1157 | 8.92 | 946 | 3.64 | 6.68 | 43.6 | 29.69 | | | clear with a few black particles, no/ns |
| 1200 | 8.83 | 914 | 3.81 | 6.68 | 43.9 | 19.8 | | | clear with a few black particles, no/ns |
| | | | | | | | | | |
| | | | | | | | | | |

## SAMPLE COLLECTION DATA

Sample Collected With: [ ] Bailer [X] Pump/Pump Type peristaltic
Made of: [ ] Stainless Steel [ ] PVC [ ] Teflon [X] Polyethylene [ ] Other [X] Dedicated
Decon Procedure: [ ] Alconox Wash [ ] Tap Rinse [ ] DI Water [X] Dedicated
*(By Numerical Order)* [ ] Other
Sample Description (color, turbidity, odor, sheen, etc.): clear, colorless, no odor, no sheen

| Replicate | Temp (°C) | Cond. (uS/cm) | D.O. (mg/L) | pH | ORP (mV) | TDS (kg/L) | Comments/ Observatio | | |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 8.8 | 905 | 3.82 | 6.68 | 44.1 | | | | |
| 2 | 8.79 | 909 | 3.84 | 6.67 | 44.8 | | | | |
| 3 | 8.78 | 912 | 3.83 | 6.67 | 44.8 | | | | |
| 4 | 8.77 | 909 | 3.81 | 6.68 | 44.2 | | | | |
| Average: | 8.8 | 908.8 | 3.8 | 6.7 | 44.5 | | | | |

| QUANTITY | TYPICAL ANALYSIS ALLOWED PER BOTTLE TYPE (Circle applicable or write non-standard analysis below) | |
|---|---|---|
| | WA ☐ | OR ☐ |
| | WA ☐ | OR ☐ |
| X | (Dissolved Metals) (As) (Cu) EPA Method 200.8 | |
| | | |
| | | |
| | | |
| | | |
| | others | |

Duplicate Sample No(s): N/A
Comments: Dissolved metals samples were field filtered. Installed new 3/8" poly tubing.
Signature: kmg Date: 2/16/2017

LANDAU ASSOCIATES

# Groundwater Low-Flow Sample Collection Form

Project Name: Louisiana Pacific Pony Site
Project Number: 0118035.010.015
Event: February 2017 Cap
Date/Time: 2/16/2017 12:45
Sample Number: LP-5
Weather: overcast, 55 deg
Landau Representative: KMG

## WATER LEVEL/WELL/PURGE DATA

Well Condition: Secure (YES) Damaged (NO) Describe: flush mount
DTW Before Purging (ft) 6.49 Time: 12:20 Flow through cell vol. GW Meter No.(s tac 300'
Sounded Depth After Purging (ft) 12
Begin Purge: Date/Time: 1225 End Purge: Date/Time: 1240 Gallons Purged: 1
Purge water disposed to: [X] 55-gal Drum [ ] Storage Tank [ ] Ground [ ] Other

| Time | Temp (°C) | Cond. (uS/cm) | D.O. (mg/L) | pH | ORP (mV) | Turbidity (NTU) | DTW (ft) | Internal Purge Volume (gal) | Comments/ Observations |
|---|---|---|---|---|---|---|---|---|---|
| **Purge Goals: Stablization of Parameters for three consecutive readings within the following** | **+/- 3%** | **+/- 3%** | **+/- 10%** | **+/- 0.1 units** | **+/- 10 mV** | **+/- 10%** | **< 0.3 ft** | **>/= 1 flow through cell** | |
| 1228 | 9.24 | 3590 | 1.98 | 6.91 | -14.6 | 20.23 | | | clear, organic particles, very strong |
| 1231 | 9.05 | 3278 | 1.67 | 6.99 | -20.2 | 19.13 | | | clear, organic particles, very strong |
| 1234 | 8.9 | 3050 | 1.47 | 7 | -16 | 18.44 | | | clear, organic particles, very strong |
| 1237 | 8.98 | 3194 | 1.49 | 6.98 | -10.7 | 16.51 | | | clear, organic particles, very strong |
| | | | | | | | | | |
| | | | | | | | | | |

## SAMPLE COLLECTION DATA

Sample Collected With: [ ] Bailer [X] Pump/Pump Type peristaltic
Made of: [ ] Stainless Steel [ ] PVC [ ] Teflon [ ] Polyethylene [ ] Other [X] Dedicated
Decon Procedure: [X] Alconox Wash [X] Tap Rinse [X] DI Water [ ] Dedicated
*(By Numerical Order)* [ ] Other
Sample Description (color, turbidity, odor, sheen, etc.): clear, colorless, strong sulfur odor, no sheen

| Replicate | Temp (°C) | Cond. (uS/cm) | D.O. (mg/L) | pH | ORP (mV) | TDS (kg/L) | Comments/ Observatio | | |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 8.95 | 3030 | 1.48 | 6.99 | -10.2 | | | | |
| 2 | 8.92 | 2993 | 1.48 | 6.99 | -9.7 | | | | |
| 3 | 8.91 | 2945 | 1.47 | 6.99 | -9.5 | | | | |
| 4 | 8.91 | 2919 | 1.46 | 6.99 | -9 | | | | |
| Average: | 8.9 | 2971.8 | 1.5 | 7.0 | -9.6 | | | | |

| QUANTITY | TYPICAL ANALYSIS ALLOWED PER BOTTLE TYPE (Circle applicable or write non-standard analysis below) | |
|---|---|---|
| | WA ☐ | OR ☐ |
| | WA ☐ | OR ☐ |
| X | (Dissolved Metals) (As) (Cu) EPA Method 200.8 | |
| | | |
| | | |
| | | |
| | | |
| | others | |

Duplicate Sample No(s): DLP-5
Comments: Dissolved metals samples were field filtered. Installed new 3/8" poly tubing.
Signature: kmg Date: 2/16/2017

LANDAU ASSOCIATES

# Groundwater Low-Flow Sample Collection Form

Project Name: Louisiana Pacific Pony Site
Project Number: 0118035.010.015
Event: February 2017 Cap
Date/Time: 2/16/2017 12:50
Sample Number: DLP-5
Weather: overcast, 55 deg
Landau Representative: KMG

## WATER LEVEL/WELL/PURGE DATA

Well Condition: Secure (YES) Damaged (NO) Describe: flush mount
DTW Before Purging (ft) 6.49 Time: 12:20 Flow through cell vol. GW Meter No.(s tac 300'
Sounded Depth After Purging (ft) 12
Begin Purge: Date/Time: 1225 End Purge: Date/Time: 1240 Gallons Purged: 1
Purge water disposed to: [X] 55-gal Drum [ ] Storage Tank [ ] Ground [ ] Other

| Time | Temp (°C) | Cond. (uS/cm) | D.O. (mg/L) | pH | ORP (mV) | Turbidity (NTU) | DTW (ft) | Internal Purge Volume (gal) | Comments/ Observations |
|---|---|---|---|---|---|---|---|---|---|
| **Purge Goals: Stablization of Parameters for three consecutive readings within the following** | **+/- 3%** | **+/- 3%** | **+/- 10%** | **+/- 0.1 units** | **+/- 10 mV** | **+/- 10%** | **< 0.3 ft** | **>/= 1 flow through cell** | |
| 1228 | 9.03 | 3241 | 1.65 | 6.99 | -20.2 | 20.23 | | | clear, organic particles, very strong |
| 1231 | 9.02 | 3218 | 1.62 | 7 | -20.1 | 19.13 | | | clear, organic particles, very strong |
| 1234 | 8.92 | 3079 | 1.46 | 6.98 | -13.8 | 18.44 | | | clear, organic particles, very strong |
| 1237 | 8.97 | 3.09 | 1.5 | 6.98 | -10.8 | 16.51 | | | clear, organic particles, very strong |
| | | | | | | | | | |
| | | | | | | | | | |

## SAMPLE COLLECTION DATA

Sample Collected With: [ ] Bailer [X] Pump/Pump Type peristaltic
Made of: [ ] Stainless Steel [ ] PVC [ ] Teflon [ ] Polyethylene [ ] Other [X] Dedicated
Decon Procedure: [X] Alconox Wash [X] Tap Rinse [X] DI Water [ ] Dedicated
*(By Numerical Order)* [ ] Other
Sample Description (color, turbidity, odor, sheen, etc.): clear, colorless, strong sulfur odor, no sheen

| Replicate | Temp (°C) | Cond. (uS/cm) | D.O. (mg/L) | pH | ORP (mV) | TDS (kg/L) | Comments/ Observatio | | |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 8.91 | 2905 | 1.45 | 6.99 | -8.3 | | | | |
| 2 | 8.91 | 2887 | 1.44 | 6.99 | -7.8 | | | | |
| 3 | 8.9 | 2844 | 1.44 | 7 | -7.9 | | | | |
| 4 | 8.89 | 2795 | 1.43 | 7.01 | -7.9 | | | | |
| Average: | 8.9 | 2857.8 | 1.4 | 7.0 | -8.0 | | | | |

| QUANTITY | TYPICAL ANALYSIS ALLOWED PER BOTTLE TYPE (Circle applicable or write non-standard analysis below) | |
|---|---|---|
| | WA ☐ | OR ☐ |
| | WA ☐ | OR ☐ |
| X | (Dissolved Metals) (As) (Cu) EPA Method 200.8 | |
| | | |
| | | |
| | | |
| | | |
| | others | |

Duplicate Sample No(s): LP-5
Comments: Dissolved metals samples were field filtered. Installed new 3/8" poly tubing. Filter became pressureized part way through filling this sample bottle.
Signature: kmg Date: 2/16/2017

ATTACHMENT 2

# February 2017 Laboratory Data Package

**Analytical Resources, Incorporated**
Analytical Chemists and Consultants

24 February 2017

Jennifer Wynkoop
Landau Associates, Inc. - Tacoma
950 Pacific Avenue
Tacoma, WA 98402

RE: Louisiana-Pacific/ Pony Lumber Sites

Please find enclosed sample receipt documentation and analytical results for samples from the project referenced above.

Sample analyses were performed according to ARI's Quality Assurance Plan and any provided project specific Quality Assurance Plan. Each analytical section of this report has been approved and reviewed by an analytical peer, the appropriate Laboratory Supervisor or qualified substitute, and a technical reviewer.

Should you have any questions or problems, please feel free to contact us at your convenience.

| Associated Work Order(s) | Associated SDG ID(s) |
|---|---|
| 17B0283 | N/A |

---

I certify that this data package is in compliance with the terms and conditions of the contract, both technically and for completeness, for other than the conditions detailed in the enclose Narrative. ARI, an accredited laboratory, certifies that the report results for which ARI is accredited meets all the reqirements of the accrediting body. A list of certified analyses, accreditations, and expiration dates is included in this report.

Release of the data contained in this hardcopy data package has been authorized by the Laboratory Manager or his/her designee, as verified by the following signature.

Analytical Resources, Inc.

Kelly Bottem, Client Services Manager

*The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.*

ACCREDITED IN ACCORDANCE WITH nelac
Cert# 100006

PJLA Testing
Accreditation # 66169

## Chain of Custody Record & Laboratory Analysis Request

| | | | |
|---|---|---|---|
| ARI Assigned Number: 17B0283 | Turn-around Requested: Standard | Page: 1 of 1 | |
| ARI Client Company: Landau Assc. | Phone: (253) 926-2493 | Date: 2/16/2017 | Ice Present? |
| Client Contact: Jennifer Wynkoop | | No. of Coolers: | Cooler Temps: |
| Client Project Name: Louisiana-Pacific / Pony Lumber | | | |
| Client Project #: 118035.010.015 | Samplers: KMG | | |


**Analytical Resources, Incorporated**
Analytical Chemists and Consultants
4611 South 134th Place, Suite 100
Tukwila, WA 98168
206-695-6200 206-695-6201 (fax)
www.arilabs.com


| Sample ID | Date | Time | Matrix | No. Containers | Analysis Requested: Dissolved Cu and As (EPA 200.8) | | | | | | | | Notes/Comments |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| LP-1 | 2/16/17 | 925 | $H_2O$ | 1 | X | | | | | | | | Sample is field filtered |
| LP-2 | " | 1040 | " | 1 | X | Hold | | | | | | | " |
| ~~LP-3~~ LP-4 | " | 1205 | " | 1 | X | | | | | | | | " |
| LP-5 | " | 1245 | " | 1 | X | | | | | | | | " |
| DLP-5 | " | 1250 | " | 1 | X | | | | | | | | " |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |

| Comments/Special Instructions | Relinquished by: (Signature) | Received by: (Signature) | Relinquished by: (Signature) | Received by: (Signature) |
|---|---|---|---|---|
| Please hold sample LP-2 until further instructions provided by LAI | Katie M. Gaughitt | | | |
| | Printed Name: Katie Gaughitt | Printed Name: Brian Warren | Printed Name: | Printed Name: |
| | Company: LAI | Company: ARI | Company: | Company: |
| | Date & Time: 2/17/2017 12:45 | Date & Time: 2-17-17 1245 | Date & Time: | Date & Time: |

***Limits of Liability:*** *ARI will perform all requested services in accordance with appropriate methodology following ARI Standard Operating Procedures and the ARI Quality Assurance Program. This program meets standards for the industry. The total liability of ARI, its officers, agents, employees, or successors, arising out of or in connection with the requested services, shall not exceed the Invoiced amount for said services. The acceptance by the client of a proposal for services by ARI release ARI from any liability in excess thereof, not withstanding any provision to the contrary in any contract, purchase order or co-signed agreement between ARI and the Client.*

**Sample Retention Policy:** All samples submitted to ARI will be appropriately discarded no sooner than 90 days after receipt or 60 days after submission of hardcopy data, whichever is longer, unless alternate retention schedules have been established by work-order or contract.

**WORK ORDER**

17B0283

| | |
|---|---|
| **Client: Landau Associates, Inc. - Tacoma** | **Project Manager: Kelly Bottem** |
| **Project: Louisiana-Pacific/ Pony Lumber Sites** | **Project Number: Louisiana-Pacific/ Pony Lumber Sites** |

## Preservation Confirmation

| Container ID | Container Type | pH | |
|---|---|---|---|
| 17B0283-01 A | HDPE NM, 500 mL, 1:1 HNO3 (FF) | <2 | P |
| 17B0283-02 A | HDPE NM, 500 mL, 1:1 HNO3 (FF) | <2 | P |
| 17B0283-03 A | HDPE NM, 500 mL, 1:1 HNO3 (FF) | <2 | P |
| 17B0283-04 A | HDPE NM, 500 mL, 1:1 HNO3 (FF) | <2 | P |
| 17B0283-05 A | HDPE NM, 500 mL, 1:1 HNO3 (FF) | <2 | P |

P= pass

PM
Preservation Confirmed By

2/17/2017
Date

Reviewed By

Date

Analytical Resources, Incorporated
Analytical Chemists and Consultants

# Cooler Receipt Form

ARI Client: Landau Tacoma  Project Name: 118035.010.015

COC No(s): _____ NA  Delivered by: Fed-Ex UPS Courier Hand Delivered Other: _____

Assigned ARI Job No: 17B0283  Tracking No: _____ NA

**Preliminary Examination Phase:**

| | | |
|---|---|---|
| Were intact, properly signed and dated custody seals attached to the outside of to cooler? | YES | NO |
| Were custody papers included with the cooler? | YES | NO |
| Were custody papers properly filled out (ink, signed, etc.) | YES | NO |

Temperature of Cooler(s) (°C) (recommended 2.0-6.0 °C for chemistry): 2.1

Time: 1330

If cooler temperature is out of compliance fill out form 00070F  Temp Gun ID#: D00527c

Cooler Accepted by: _____ Date: 2-17-17 Time: 1245

*Complete custody forms and attach all shipping documents*

## Log-In Phase:

| | | | |
|---|---|---|---|
| Was a temperature blank included in the cooler? | | YES | NO |
| What kind of packing material was used? ... Bubble Wrap Wet Ice Gel Packs Baggies Foam Block Paper Other: | | | |
| Was sufficient ice used (if appropriate)? | NA | YES | NO |
| Were all bottles sealed in individual plastic bags? | | YES | NO |
| Did all bottles arrive in good condition (unbroken)? | | YES | NO |
| Were all bottle labels complete and legible? | | YES | NO |
| Did the number of containers listed on COC match with the number of containers received? | | YES | NO |
| Did all bottle labels and tags agree with custody papers? | | YES | NO |
| Were all bottles used correct for the requested analyses? | | YES | NO |
| Do any of the analyses (bottles) require preservation? (attach preservation sheet, excluding VOCs)... | NA | YES | NO |
| Were all VOC vials free of air bubbles? | NA | YES | NO |
| Was sufficient amount of sample sent in each bottle? | | YES | NO |
| Date VOC Trip Blank was made at ARI | NA | | |

Was Sample Split by ARI : NA YES Date/Time: _____ Equipment: _____ Split by: _____

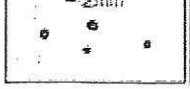
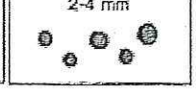
Samples Logged by: PM Date: 2/17/2017 Time: 14:34

*** Notify Project Manager of discrepancies or concerns ***

| Sample ID on Bottle | Sample ID on COC | Sample ID on Bottle | Sample ID on COC |
|---|---|---|---|
| | | | |
| | | | |
| | | | |
| | | | |

*Additional Notes, Discrepancies, & Resolutions:*

By: Date:

| Small Air Bubbles =2mm | Peabubbles 2-4 mm | LARGE Air Bubbles > 4 mm |
|---|---|---|
|  |  |  |

| |
|---|
| Small → "sm" ( < 2 mm ) |
| Peabubbles → "pb" ( 2 to < 4 mm ) |
| Large → "lg" ( 4 to < 6 mm ) |
| Headspace → "hs" ( > 6 mm ) |

Analytical Resources, Incorporated
Analytical Chemists and Consultants

# Analytical Report

| | | |
|---|---|---|
| Landau Associates, Inc. - Tacoma | Project: Louisiana-Pacific/ Pony Lumber Sites | |
| 950 Pacific Avenue | Project Number: Louisiana-Pacific/ Pony Lumber Sites | **Reported:** |
| Tacoma, WA 98402 | Project Manager: Jennifer Wynkoop | 24-Feb-2017 08:01 |

## ANALYTICAL REPORT FOR SAMPLES

| Sample ID | Laboratory ID | Matrix | Date Sampled | Date Received |
|---|---|---|---|---|
| LP-1 | 17B0283-01 | Water | 16-Feb-2017 09:25 | 17-Feb-2017 12:45 |
| LP-4 | 17B0283-03 | Water | 16-Feb-2017 12:05 | 17-Feb-2017 12:45 |
| LP-5 | 17B0283-04 | Water | 16-Feb-2017 12:45 | 17-Feb-2017 12:45 |
| DLP-5 | 17B0283-05 | Water | 16-Feb-2017 12:50 | 17-Feb-2017 12:45 |





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| | | |
|---|---|---|
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# Case Narrative

**Dissolved Metals - EPA Method 200.8**

The sample(s) were digested and analyzed within the recommended holding times.

Initial and continuing calibrations were within method requirements.

The method blank(s) were clean at the reporting limits.

The LCS percent recoveries were within control limits.

| | | |
|---|---|---|
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## LP-1

**17B0283-01 (Water)**

### Metals and Metallic Compounds (dissolved)

Method: EPA 200.8 — Sampled: 02/16/2017 09:25
Instrument: ICPMS2 — Analyzed: 02/22/2017 23:36

Sample Preparation: Preparation Method: REN EPA 600/4-79-020 4.1.4 HNO3 matrix
Preparation Batch: BFB0478 — Sample Size: 25 mL
Prepared: 02/20/2017 07:56 — Final Volume: 25 mL

| Analyte | CAS Number | Dilution | Detection Limit | Reporting Limit | Result | Units | Notes |
|---|---|---|---|---|---|---|---|
| Arsenic, Dissolved | 7440-38-2 | 1 | 0.0310 | 0.200 | **0.409** | ug/L | |
| Copper, Dissolved | 7440-50-8 | 1 | 0.378 | 0.500 | ND | ug/L | U |





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## LP-4

**17B0283-03 (Water)**

### Metals and Metallic Compounds (dissolved)

Method: EPA 200.8
Instrument: ICPMS2

Sampled: 02/16/2017 12:05
Analyzed: 02/22/2017 23:41

Sample Preparation: Preparation Method: REN EPA 600/4-79-020 4.1.4 HNO3 matrix
Preparation Batch: BFB0478 Sample Size: 25 mL
Prepared: 02/20/2017 07:56 Final Volume: 25 mL

| Analyte | CAS Number | Dilution | Detection Limit | Reporting Limit | Result | Units | Notes |
|---|---|---|---|---|---|---|---|
| Arsenic, Dissolved | 7440-38-2 | 1 | 0.0310 | 0.200 | **0.421** | ug/L | |
| Copper, Dissolved | 7440-50-8 | 1 | 0.378 | 0.500 | **0.984** | ug/L | |





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## LP-5

**17B0283-04 (Water)**

### Metals and Metallic Compounds (dissolved)

Method: EPA 200.8 — Sampled: 02/16/2017 12:45
Instrument: ICPMS2 — Analyzed: 02/22/2017 23:46

Sample Preparation: Preparation Method: REN EPA 600/4-79-020 4.1.4 HNO3 matrix
Preparation Batch: BFB0478 — Sample Size: 25 mL
Prepared: 02/20/2017 07:56 — Final Volume: 25 mL

| Analyte | CAS Number | Dilution | Detection Limit | Reporting Limit | Result | Units | Notes |
|---|---|---|---|---|---|---|---|
| Arsenic, Dissolved | 7440-38-2 | 1 | 0.0310 | 0.200 | **0.900** | ug/L | |
| Copper, Dissolved | 7440-50-8 | 1 | 0.378 | 0.500 | **1.14** | ug/L | |





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| | | |
|---|---|---|
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| Tacoma, WA 98402 | Project Manager: Jennifer Wynkoop | 24-Feb-2017 08:01 |

## DLP-5

**17B0283-05 (Water)**

### Metals and Metallic Compounds (dissolved)

Method: EPA 200.8 — Sampled: 02/16/2017 12:50
Instrument: ICPMS2 — Analyzed: 02/22/2017 23:51

Sample Preparation: Preparation Method: REN EPA 600/4-79-020 4.1.4 HNO3 matrix
Preparation Batch: BFB0478 — Sample Size: 25 mL
Prepared: 02/20/2017 07:56 — Final Volume: 25 mL

| Analyte | CAS Number | Dilution | Detection Limit | Reporting Limit | Result | Units | Notes |
|---|---|---|---|---|---|---|---|
| Arsenic, Dissolved | 7440-38-2 | 1 | 0.0310 | 0.200 | **0.908** | ug/L | |
| Copper, Dissolved | 7440-50-8 | 1 | 0.378 | 0.500 | **0.900** | ug/L | |





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| | | |
|---|---|---|
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| 950 Pacific Avenue | Project Number: Louisiana-Pacific/ Pony Lumber Sites | **Reported:** |
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## Metals and Metallic Compounds (dissolved) - Quality Control

### Batch BFB0478 - REN EPA 600/4-79-020 4.1.4 HNO3 matrix

Instrument: ICPMS2

| QC Sample/Analyte | Isotope | Result | Detection Limit | Reporting Limit | Units | Spike Level | Source Result | %REC | %REC Limits | RPD | RPD Limit | Notes |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Blank (BFB0478-BLK1)** | | | | | Prepared: 20-Feb-2017 Analyzed: 22-Feb-2017 21:10 | | | | | | | |
| Arsenic | | ND | 0.0310 | 0.200 | ug/L | | | | | | | U |
| Copper | 63 | ND | 0.378 | 0.500 | ug/L | | | | | | | U |
| Copper | 65 | ND | 0.350 | 0.500 | ug/L | | | | | | | U |
| **LCS (BFB0478-BS1)** | | | | | Prepared: 20-Feb-2017 Analyzed: 22-Feb-2017 21:55 | | | | | | | |
| Arsenic | | 24.4 | 0.0310 | 0.200 | ug/L | 25.0 | | 97.5 % | 80-120 | | | |
| Copper | 63 | 26.5 | 0.378 | 0.500 | ug/L | 25.0 | | 106 % | 80-120 | | | |
| Copper | 65 | 26.0 | 0.350 | 0.500 | ug/L | 25.0 | | 104 % | 80-120 | | | |

| | | |
|---|---|---|
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## Certified Analyses included in this Report

| Analyte | Certifications |
|---|---|
| ***EPA 200.8 in Water*** | |
| Arsenic-75a | NELAP,WADOE,WA-DW,DoD-ELAP |
| Arsenic-75b | NELAP,WADOE,WA-DW,DoD-ELAP |
| Copper-63 | NELAP,WADOE,WA-DW,DoD-ELAP |
| Copper-65 | NELAP,WADOE,WA-DW,DoD-ELAP |

| Code | Description | Number | Expires |
|---|---|---|---|
| ADEC | Alaska Dept of Environmental Conservation | UST-033 | 05/06/2017 |
| CALAP | California Department of Public Health CAELAP | 2748 | 02/28/2018 |
| DoD-ELAP | DoD-Environmental Laboratory Accreditation Program | 66169 | 03/30/2017 |
| NELAP | ORELAP - Oregon Laboratory Accreditation Program | WA100006 | 05/11/2017 |
| WADOE | WA Dept of Ecology | C558 | 06/30/2017 |
| WA-DW | Ecology - Drinking Water | C558 | 06/30/2017 |

# Analytical Report

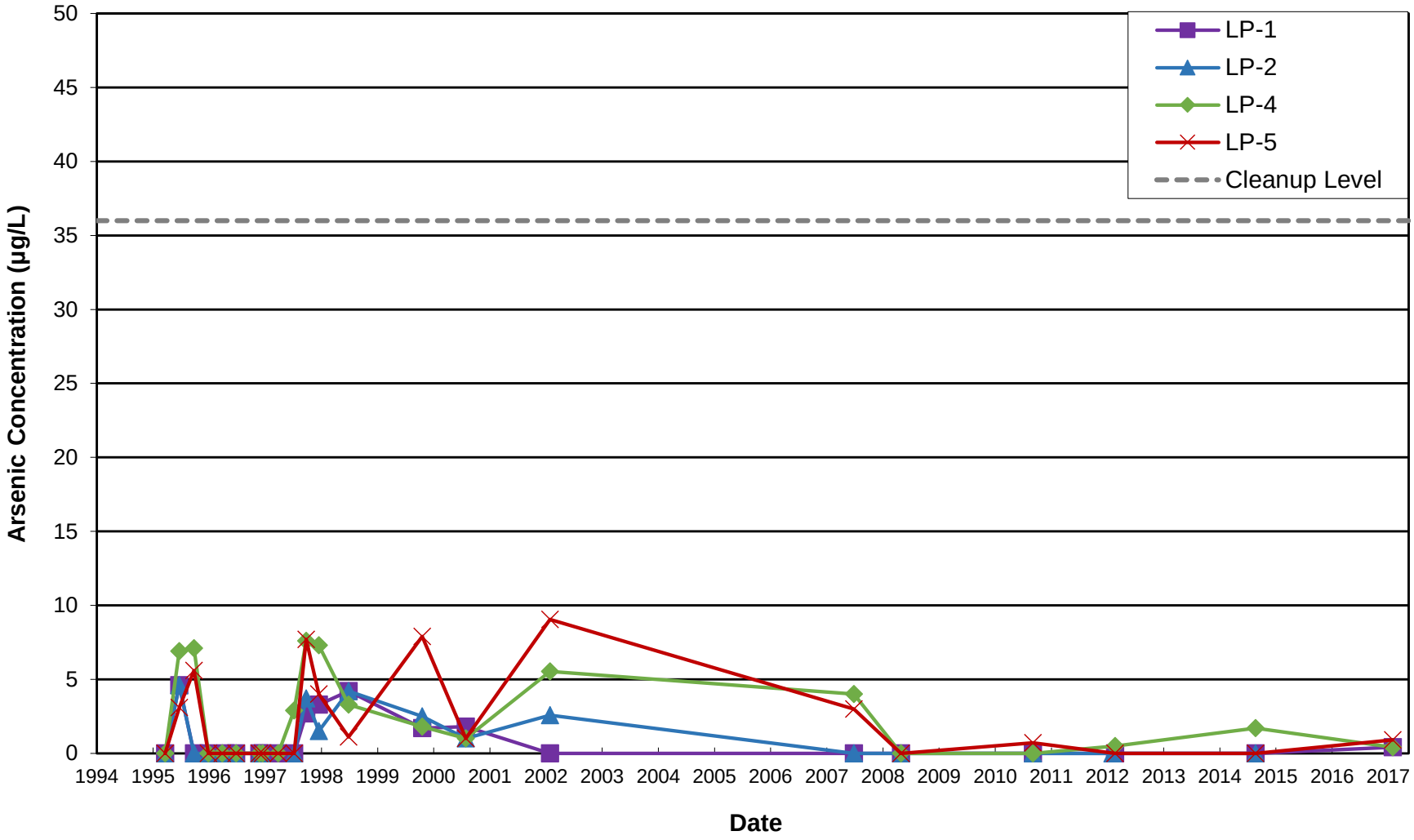
| | | |
|---|---|---|
| Landau Associates, Inc. - Tacoma | Project: Louisiana-Pacific/ Pony Lumber Sites | |
| 950 Pacific Avenue | Project Number: Louisiana-Pacific/ Pony Lumber Sites | **Reported:** |
| Tacoma, WA 98402 | Project Manager: Jennifer Wynkoop | 24-Feb-2017 08:01 |

## Notes and Definitions

| | |
|---|---|
| D | The reported value is from a dilution |
| J | Estimated concentration value detected below the reporting limit. |
| U | This analyte is not detected above the applicable reporting or detection limit. |
| DET | Analyte DETECTED |
| ND | Analyte NOT DETECTED at or above the reporting limit |
| NR | Not Reported |
| dry | Sample results reported on a dry weight basis |
| RPD | Relative Percent Difference |
| [2C] | Indicates this result was quantified on the second column on a dual column analysis. |

ATTACHMENT 3

# Dissolved Metals Time Series Plots




Note:
For sampling events completed prior to 2017 that included a duplicate sample for dissolved arsenic analysis, the greater analytical result for the two samples is plotted (see Table 1).

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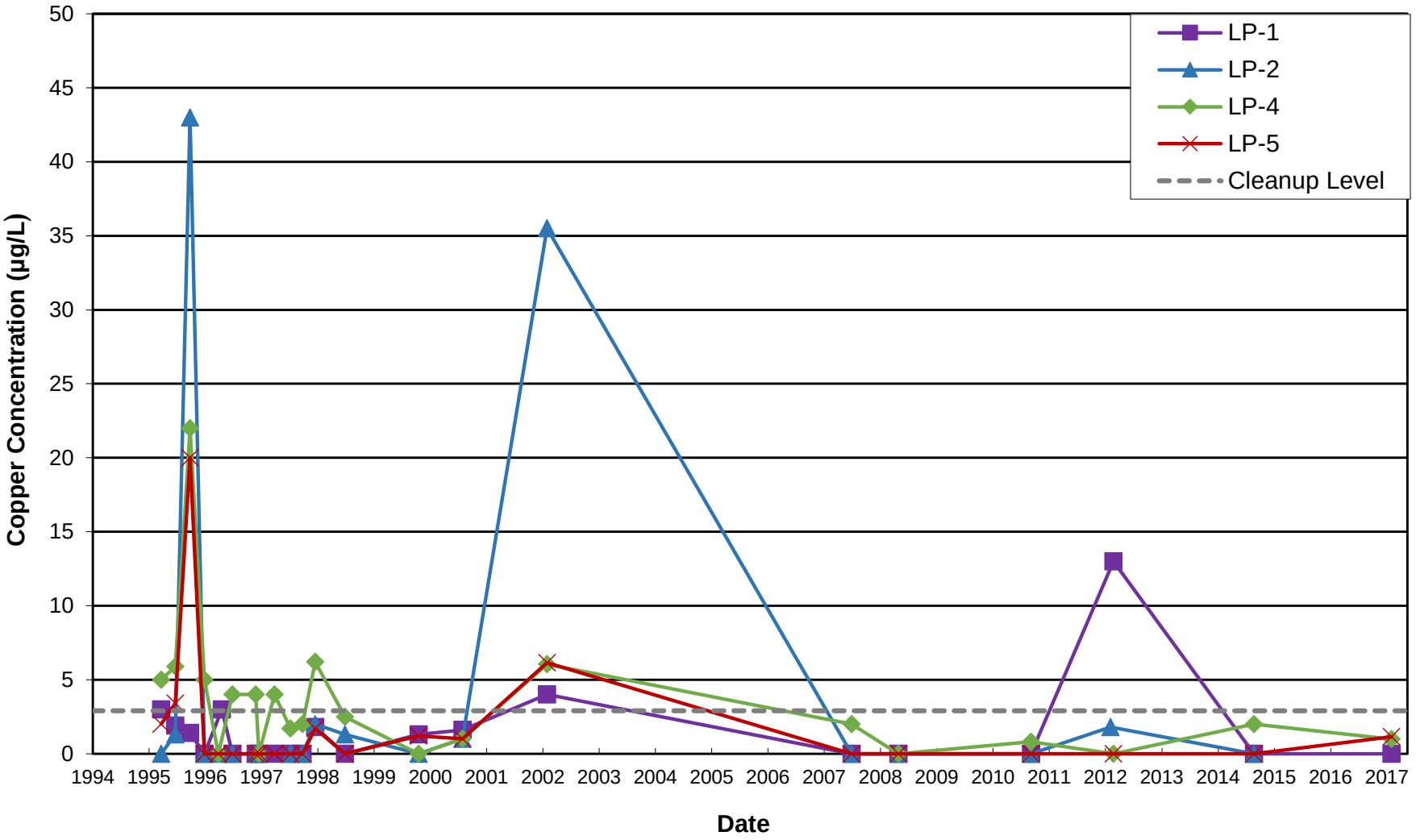
| | | |
|---|---|---|
| Former Louisiana Pacific-Pony Lumber Facility<br>Tacoma, Washington | **Arsenic Concentrations vs. Time** | Figure<br>3-1 |




Note:
For sampling events completed prior to 2017 that included a duplicate sample for dissolved copper analysis, the greater analytical result for the two samples is plotted (see Table 1).

LANDAU ASSOCIATES

| | | |
|---|---|---|
| Former Louisiana Pacific-Pony Lumber Facility<br>Tacoma, Washington | **Copper Concentrations vs. Time** | Figure<br>3-2 |