Mallinckrodt US LLC

March 23, 2017

Mr. Chris Swain
Bureau of Remediation and Waste Management
Maine Department of Environmental Protection
17 State House Station
Augusta ME 04333

Subject: **Fourth Quarter 2016 Groundwater Monitoring Results**
Orrington Remediation Site
Orrington, Maine

Dear Mr. Swain:

Enclosed for your information is a report of the **fourth quarter 2016** groundwater sampling data for the monitoring performed at the Orrington Remediation Site by Sevee & Maher Engineers, Inc. (SME). The groundwater monitoring was performed using the low flow sampling protocols described in the Work Plan submitted July 8, 2010.

This groundwater monitoring report includes data summary tables, a figure showing the well locations sampled and field data sheets. Electronic data deliverables (EDDs) and laboratory analytical reports were previously submitted to Maine DEP on March 22, 2017.

The first quarter 2017 groundwater monitoring event was completed during the week of March 20, 2017. If you have any questions please feel free to contact me at 314-281-5947.

Sincerely,

Kathy Zeigler

Kathy Zeigler
Director, Environmental Remediation

Cc: John Beane, DEP
Audrey Snowden, Town Librarian, Town of Orrington
Paul White, Town Manager, Town of Orrington

SME
Sevee & Maher Engineers, Inc.

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March 23, 2017

Kathryn Zeigler
Director, Environmental Remediation
Mallinckrodt US LLC
444 McDonnell Boulevard
Hazelwood, Missouri 63042

Subject: Fourth Quarter 2016 Groundwater Monitoring Report
Orrington Remediation Site, Orrington, Maine

Dear Ms. Zeigler:

Results from the December 2016 fourth quarter groundwater sampling round at the Orrington Remediation Site in Orrington, Maine (Site) are presented in this monitoring report. Groundwater samples were obtained from 22 monitoring wells located within the southwestern portion of the Site (Ferry Road Area), the former Manufacturing Area, Landfill 1 Area, Landfill 3, Landfill 4, and Landfill 5. Monitoring well locations are shown in Figure 1. Low-flow sampling protocols consistent with procedures requested by the Maine Department of Environmental Protection (MEDEP) in September 2010 were utilized to obtain unfiltered groundwater samples. Sevee & Maher Engineers, Inc. (SME) also obtained water samples from the Haseltine and Safian domestic wells on Ferry Road that are routinely analyzed as part of the quarterly sampling event. The water samples from the residential properties were obtained using methods consistent with the previous quarterly sampling events. Groundwater samples could not be obtained from Site monitoring wells B-303-O1 (Landfill 5) and MW-503-O1 (former Manufacturing Area) because of dry or insufficient water levels in the wells. Landfill 1 Area monitoring well MW-402-O1 also was not sampled during the December 2016 fourth quarter sampling round because it has been temporarily inaccessible due to ongoing remedial activities along the Northern Drainage Ditch. An influent sample from the Landfill 1 Area groundwater interim extraction system (IES) was obtained at the onsite water treatment plant for analysis.

Alpha Analytical (Alpha) of Westborough, Massachusetts provided laboratory services for the analysis of groundwater from the December 2016 fourth quarter sampling round. Analytical results for parameters were quantified to the laboratory's method detection limit (MDL). Concentrations detected between the MDL and the laboratory's reporting limit (RL) were qualified by Alpha as estimated (J) values. Electronic data deliverables (EDDs) and Alpha

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laboratory analytical reports from the December 2016 fourth quarter sampling round were submitted to MEDEP on March 22, 2017. Tables 1 through 7 attached to this report contain a summary of the analytical results from the monitoring wells sampled during December 2016. SME field data sheets completed at each well sampled are also included in the attachments to this transmittal.

QUALITY CONTROL REVIEW

Groundwater analytical results were reviewed to ensure that they were representative of the area sampled using guidelines in the U.S.EPA *National Functional Guidelines* (NFG) *for Superfund Organic Methods*,[1] U.S.EPA *National Functional Guidelines for Inorganic Superfund Data Review*[2] and U.S.EPA *New England Environmental Data Review Supplement*.[3] Laboratory method blanks for volatile organic compounds (VOCs), metals, and inorganics, laboratory control samples (LCS), matrix spikes (MS), matrix spike duplicates (MSD), laboratory duplicates, and VOC surrogate compound recoveries were evaluated. The sampling process and field and sample transport conditions were evaluated in laboratory-supplied trip blanks, and in field blanks. Sampling and analytical precision was evaluated in three duplicate groundwater sample pairs submitted for laboratory analysis. Relative percent differences (RPDs) in duplicate sample pairs were evaluated against the NFG for organic and inorganic parameters. The quality control (QC) data reviewed in the analytical laboratory reports were of acceptable quality for the December 2016 fourth quarter sampling round.

Relevant QC findings are summarized for the Site areas sampled during routine quarterly groundwater monitoring.

Ferry Road Area

- QC results meet the acceptance criteria for parameters analyzed. The laboratory results were accepted as reported by Alpha.

Manufacturing Area

- Bromomethane was detected in two laboratory method blanks at concentrations between the MDL and RL. The associated sample delivery

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[1] U.S.EPA, 2014. *National Functional Guidelines for Superfund Organic Methods Data Review*; Office of Superfund Remediation and Technology Innovation, U.S.EPA-540-R-014-002; Washington, DC; August 2014.
[2] U.S.EPA, 2014. *National Functional Guidelines for Inorganic Superfund Data Review*; Office of Superfund Remediation and Technology Innovation, U.S.EPA-540-R-013-001; Washington, DC; August 2014.
[3] U.S.EPA New England, 2013; *Environmental Data Review Supplement*, Quality Assurance Unit, U.S.EPA New England; April 22, 2013.

groups (SDG) did not contain bromomethane; therefore, the laboratory results were accepted as reported by Alpha.

- Surrogate recoveries for VOC analysis were within the acceptance criteria.
- The RPD value in the MW-510-O1 field duplicate pair with detectable chloropicrin detections exceeded the acceptance criterion of 30 percent. The chloropicrin result for MW-510-10 and the duplicate sample were qualified as estimated (J).

Landfill 1

- Bromomethane was detected in a laboratory method blank at a concentration between the MDL and RL. The associated sample did not contain bromomethane; therefore, the laboratory result was accepted as reported by Alpha.
- A field blank associated with the Landfill 1 Area contained mercury at a concentration between the MDL and the RL. Detections of mercury greater than the RL in the SDG were qualified (B) to indicate an indeterminate amount of laboratory or sampling error had potentially impacted the sample results. Regardless, mercury has been detected several orders of magnitude higher than the field blank result in these wells over the record of groundwater monitoring.
- Surrogate recoveries for VOC analysis were within the acceptance criteria.
- A field duplicate pair from Landfill 1 Area was within acceptance criterion for RPD.

Landfills 3 and 4

- Bromomethane was detected in two laboratory method blanks at concentrations between the MDL and RL. The associated sample delivery groups (SDG) did not contain bromomethane; therefore, the laboratory results were accepted as reported by Alpha.
- Surrogate recoveries for VOC analysis within the acceptance criteria.
- Analytical results from a field duplicate pair obtained near Landfill 3 were within acceptance criterion for RPD.

Landfill 5

- Bromomethane was detected in a laboratory method blank, and the associated trip blank and field blank at a concentration between the MDL and RL. None of the groundwater samples in the SDG contained bromomethane. Therefore, the bromomethane results in the trip blank and field blank were qualified as not

detected (U) at the RL, and no action was required for the associated groundwater samples.

- Surrogate recoveries for VOC analysis within the acceptance criteria.

Treatment Plant Influent

- Bromomethane was detected in a laboratory method blank at a concentration between the MDL and RL. The associated sample delivery group (SDG) did not contain bromomethane; therefore, the laboratory result was accepted as reported by Alpha.
- Sulfate and alkalinity were detected in method blanks at concentrations between the MDL and RL. Both parameters were detected in the influent sample at concentrations significantly greater than that found in the method blank. The detections of sulfate and alkalinity were qualified (B) to indicate an indeterminate amount of laboratory or sampling error had potentially impacted the sample results. These two parameters, however, have been consistently detected in the treatment plant influent over the record of groundwater monitoring.
- Surrogate recoveries for VOC analysis were within the acceptance criteria. Acceptance criteria for the surrogate recovery associated with the EPA 8011 analysis was not attained because of the dilution required to quantitate chloropicrin within the calibration range.

LABORATORY ANALYTICAL RESULTS

Mercury concentrations greater than the RL (0.0002 milligrams per liter [mg/L]) were detected in ten monitoring wells sampled during the fourth quarter December 2016 round, consistent with locations in previous routine quarterly monitoring. The Media Protection Standard (MPS) for mercury (0.002 mg/L) was exceeded in seven monitoring wells where concentrations ranged from 0.00392 to 0.4611 mg/L. Three monitoring wells had detections of mercury from 0.00065 to 0.00156 mg/L that were less than the MPS, but greater than the RL. Overall, the average mercury concentration calculated over the four quarterly sample rounds in 2016 decreased in 9 of 11 wells compared to last year's values. The mercury concentrations in the nine wells decreased from 7 to 60 percent, and averaged about 20 percent overall for the combined group of wells.

Monitoring well MW-501-O1 in the Landfill 1 Area near the Lined Process Lagoon had the highest concentration of mercury (0.4611 mg/L) detected in the fourth quarter round, which was consistent with results from previous routine quarterly monitoring. Monitoring wells B-326-O2 and B-326-O3, positioned downgradient of MW-501-O1 near the edge of the Landfill 1 Area, had mercury concentrations of 0.1339 mg/L and 0.279 mg/L, respectively.

Lesser concentrations of mercury were detected in MW-512-O1 (0.00835 mg/L) and MW-513-O1 (0.04798 mg/L), which are offset to the north and south, respectively, from the B-326-series wells. Averaged yearly 2016 mercury concentration in B-326-O3, MW-402-O1, MW-501-O1 and MW-512-O1 decreased between about 7 percent and 38 percent compared to the 2015 monitoring period. Mercury concentrations detected in B-326-02 and B-326-03 continued to be similar in magnitude to those in groundwater captured by Landfill 1 Area IES wells EW-1 and MW-601 (documented in quarterly operation summary reports for the IES).

Two wells were sampled in the former Manufacturing Area during the December 2016 fourth quarter sampling round. The mercury concentration detected in MW-510-O1 (0.00392 mg/L), located just downgradient from the former salt storage pad, exceeded the MPS of 0.002 mg/L. The average concentration of mercury in MW-510-O1 during 2016 was about half the amount detected in 2015. Mercury was detected in MW-502-O1 (0.00065 mg/L) at a concentration less than the MPS, and has not exceeded the MPS since December 2010. A representative groundwater sample could not be obtained from MW-503-O1 during the December 2016 fourth quarter sampling round, which has been typical during quarterly rounds over the last few years because of a lack of water in the well. However, the limited mercury detections in MW-503-O1 during seasons with enough water to allow sampling over the last seven years of monitoring were usually less than the MPS.

Four monitoring wells near Landfills 3 and 4 were sampled during the December 2016 fourth quarter sampling round. Mercury was detected in each well, but only groundwater from monitoring well MW-506-B1 (0.02839 mg/L) installed beneath Landfill 4 exceeded the MPS. The average mercury concentration in MW-506-B1 (0.0156 mg/L) in 2016 was less than half the amount detected in the two previous years of monitoring. Groundwater moving in a southerly direction downgradient from Landfill 3 and Landfill 4 contained mercury at concentrations less than the MPS in monitoring wells MW-410-B1 (0.00156 mg/L) and P-2A (0.00115 mg/L). The quarterly averaged 2016 yearly concentrations in MW-410-B1 and P-2A were also less than the detections in 2015. Mercury was detected in well P-13 to the north of Landfill 3 at an estimated concentration (0.00011 mg/L), less than the RL. The MPS has not been exceeded in P-13 since 2010.

Mercury was not detected in five Landfill 5 monitoring wells sampled during the December 2016 fourth quarter sampling round. Six monitoring wells were sampled in the southwestern portion of the Site near the Southerly Stream, and two residential wells on Ferry Road (collectively the Ferry Road Area). Mercury was not detected in five of the Ferry Road Area site wells or in the two domestic wells. A less-than-RL detection of mercury (0.00008 mg/L), qualified as estimated (J), was reported by the laboratory in a groundwater sample from B-321-B2. A review of the available water quality record indicated that mercury detections in B-321-B2 have been scarce. Prior to the December 2016 mercury result, mercury had not

been detected in B-321-B2 over the last 14 years of groundwater monitoring. This isolated detection is significantly less than the MPS for mercury, as well as the RL.

Groundwater obtained from former Manufacturing Area monitoring wells MW-502-O1 and MW-510-O1, and from MW-501-O1 near the Lined Process Lagoon in the Landfill 1 Area was analyzed for chloropicrin. Chloropicrin was detected in MW-510-O1 (7.99 J µg/L) and its duplicate (5.6 J µg/L) at concentrations that were less than the MPS of 30 µg/L. Detectable chloropicrin was not present in MW-501-O1 or MW-502-O1. Since 2011, chloropicrin has been sporadically detected in MW-510-O1 at less than the MPS, and seldom in MW-501-O1 and MW-502-O1.

Groundwater samples from (1) the former Manufacturing Area, (2) near the Lined Process Lagoon and (3) around Landfills 3, 4, and 5 were submitted to the laboratory for VOC analysis. VOCs were detected in nine wells routinely monitored during the December 2016 quarterly sampling round. In addition to chloropicrin, nine different VOCs were detected. Carbon tetrachloride in Landfill 3 and 4 wells was the only VOC that exceeded an MPS (3 µg/L), consistent with previous quarterly sampling rounds. The carbon tetrachloride exceedances occurred in MW-410-B1 (31 µg/L), P-2A (9.1 µg/L) and MW-506-B1 (6.8 µg/L). Carbon tetrachloride concentrations less than the MPS were detected north of Landfill 3 in P-13 and in former Manufacturing Area mónitoring well MW-510-O1. Less-than-MPS (57 µg/L) detections of chloroform, the most frequently detected VOC, were present in nine monitoring wells at a maximum concentration of 10 µg/L. Trichloroethene, tetrachloroethene, 1,1-dichloroethene, cis-1,2-dichloroethene, dichlorodifluoromethane, chloroethane and chloromethane were detected in four or fewer monitoring wells at concentrations less than their respective MPS or Maine Maximum Exposure Guideline (MEG). The VOC analytes and ranges of detection are similar to the results in previous quarterly sampling rounds.

An influent water sample from the combined flow from the Landfill 1 Area IES wells (MW-601, EW-1, EW-2, EW-3, and EW-4) was obtained at the Site treatment plant and submitted to the laboratory for analysis of a suite of parameters. Analytical results for the influent sample are summarized in Table 6. Mercury, VOCs, and chloropicrin concentrations were comparable with the historical ranges detected in the Landfill 1 Area and in recent influent sampling.

GROUNDWATER QUALITY SUMMARY

A comparison of the December 2016 fourth quarter sample results to the Site MPS for mercury and VOCs indicated the following groundwater quality:

- Landfill 1 Area – The MPS for mercury (0.002 mg/L) was exceeded in monitoring wells B-326-O2, B-326-O3, MW-501-O1, MW-512-O1 and

MW-513-O1 (0.00835 to 0.4611 mg/L). Detectable VOCs in MW-501-O1 were less than their respective MPS.

- Former Manufacturing Area – Mercury was detected in MW-510-O1 (0.00392 and 0.00412 mg/L) at a concentration greater than the MPS. VOCs and chloropicrin detections did not exceed their respective MPS.

- Landfills 3 and 4 – The mercury concentration in groundwater beneath Landfill 4 in MW-506-B1 (0.02839 mg/L) exceeded the MPS. Detectable mercury in MW-410-B1 (0.00156 mg/L) and P-2A (0.00115 mg/L) downgradient of Landfills 3 and 4 was less than the MPS. Carbon tetrachloride was detected at concentrations greater than the MPS of 3 µg/L in MW-410-B1 (31 µg/L), P-2A (9.1 µg/L) and MW-506-B1 (6.8 µg/L). These results were consistent with previous quarterly sampling rounds at the Site.

- Landfill 5 – Detectable mercury was not present in the Landfill 5 monitoring wells. The concentration of VOCs detected (chloroform) were significantly less than the MPS.

- Ferry Road Area and Residential Wells – Mercury concentrations greater than the RL were not detected in the southwestern part of the Site or in the two domestic wells sampled on Ferry Road, consistent with results from more than five years of routine quarterly monitoring.

WATER LEVEL MONITORING

Groundwater levels routinely monitored during the quarterly sampling rounds increased in elevation at most locations during the period between September and December of 2016. The water level increase was greater in the landfill ridge area than other Site areas in the lower topographic setting. Over a 4-foot increase in groundwater elevation was measured in monitoring well B-303-B3 and B-307-B2 around Landfill 5. Overall, groundwater elevations in the wells monitored on the landfill ridge averaged close to 2.5 feet higher. In the lower topography at the Site, rising water levels in monitoring wells around the former Manufacturing Area and the Ferry Road Area averaged about a 1-foot increase by the December 2016 quarterly sampling round. Groundwater elevations for the Landfill 1 Area wells were determined from pressure transducers in the wells sampled, or nearby piezometers because of the tidal-induced daily fluctuation in the Penobscot River. Based on the transducer data that was recorded hourly, the daily averaged groundwater elevation on the day the Landfill 1 Area wells were sampled was about 0.46 feet NAVD88. The groundwater elevation was slightly more than a 0.1 foot higher than the third quarter September 2016 value, which was determined by the same method.

A rainfall total of about nine inches was measured at the Orrington Site weather station between the third quarter September and fourth quarter December 2016 sampling rounds. During the quarterly interval, monthly rainfall was below normal for two months, but above normal in November preceding the fourth quarter December 2016 sampling round. Approximately 3 inches of snowfall was recorded at the nearby Bangor International Airport in the late Fall prior to the December 2016 groundwater sampling round (NOAA National Climatic Data Center[4]). Between the third and fourth quarter 2016, the region was characterized as having experienced severe drought for most of the period (U.S. Drought Monitor[5]). Regardless, sufficient infiltration of precipitation was available in the temperate climate setting to provide recharge to groundwater system.

A comparison of groundwater levels measured during the fourth quarters of 2015 and 2016 revealed mostly lower water levels in December 2016. Groundwater elevations in the landfill ridge area averaged about 2.5 feet lower, while water levels monitored in the Ferry Road Area, former Manufacturing Area and Landfill 1 Area experienced less of a decrease that averaged from about 0.5 foot to 1.6 feet. Although 10 inches more total rainfall was measured at the Site weather station during 2016 compared to 2015, approximately 30 percent more rainfall (13.5 inches versus 10.5 inches) was recorded in the three month period preceding the December 2015 sampling round. In addition, the regional drought was more severe in 2016 compared to 2015. Abnormally dry conditions existed from mid-May to the end of September in 2015. In contrast, over six months of drought progressed from abnormally dry in mid-June 2016 to severe drought through the fourth quarter sampling round in December 2016. As a consequence of the 2016 drought, groundwater levels measured during second and third quarters of 2016 were also lower than levels measured the same two quarters of 2015.

SCHEDULE FOR FUTURE MONITORING

SME personnel were at the Orrington Remediation Site during the week of March 20, 2017 and completed the first quarter groundwater sampling round according to the February 24, 2017 Short-Term Comprehensive Monitoring Plan (CMP)[6] at (1) Landfill 5 for routine assessment and detection monitoring, (2) the five interim groundwater extraction wells that are operating in the Landfill 1 Area and influent sampling at the groundwater treatment plant, and (3) Site perimeter monitoring. Quarterly/monthly sampling of groundwater, surface water

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[4] *Record of Climatological Observations, Bangor International Airport, ME.* National Climatic Data Center Federal Building, Asheville, North Carolina, http://www.ncdc.noaa.gov (accessed February 26, 2017).

[5] *U.S. Drought Monitor*, http://droughtmonitor.unl.edu (accessed February 26, 2017).

[6] Sevee & Maher Engineers, Inc., February 2017. *Short-Term Comprehensive Monitoring Plan, Orrington Remediation Site, Orrington Maine.* Prepared for Mallinckrodt US LLC, February 24, 2017

and sediment was also conducted as part of the remediation monitoring program detailed in the February 24, 2017 Short-Term CMP. The next monthly remediation monitoring of groundwater, surface water and sediment is scheduled for the week of April 24, 2017. If you have any questions concerning the December 2016 groundwater quality results, please do not hesitate to contact Bill Metzger or me.

Very truly yours,

SEVEE & MAHER ENGINEERS, INC.

for John Sevee

John E. Sevee, P.E., C.G.

Attachments:

- Figure 1 – Well Locations
- Groundwater Monitoring Results Summary - Tables 1 through 7
- Data Tables
- Relative Percent Difference for Duplicate Samples
- Field Data Sheets

FIGURE 1 – WELL LOCATIONS

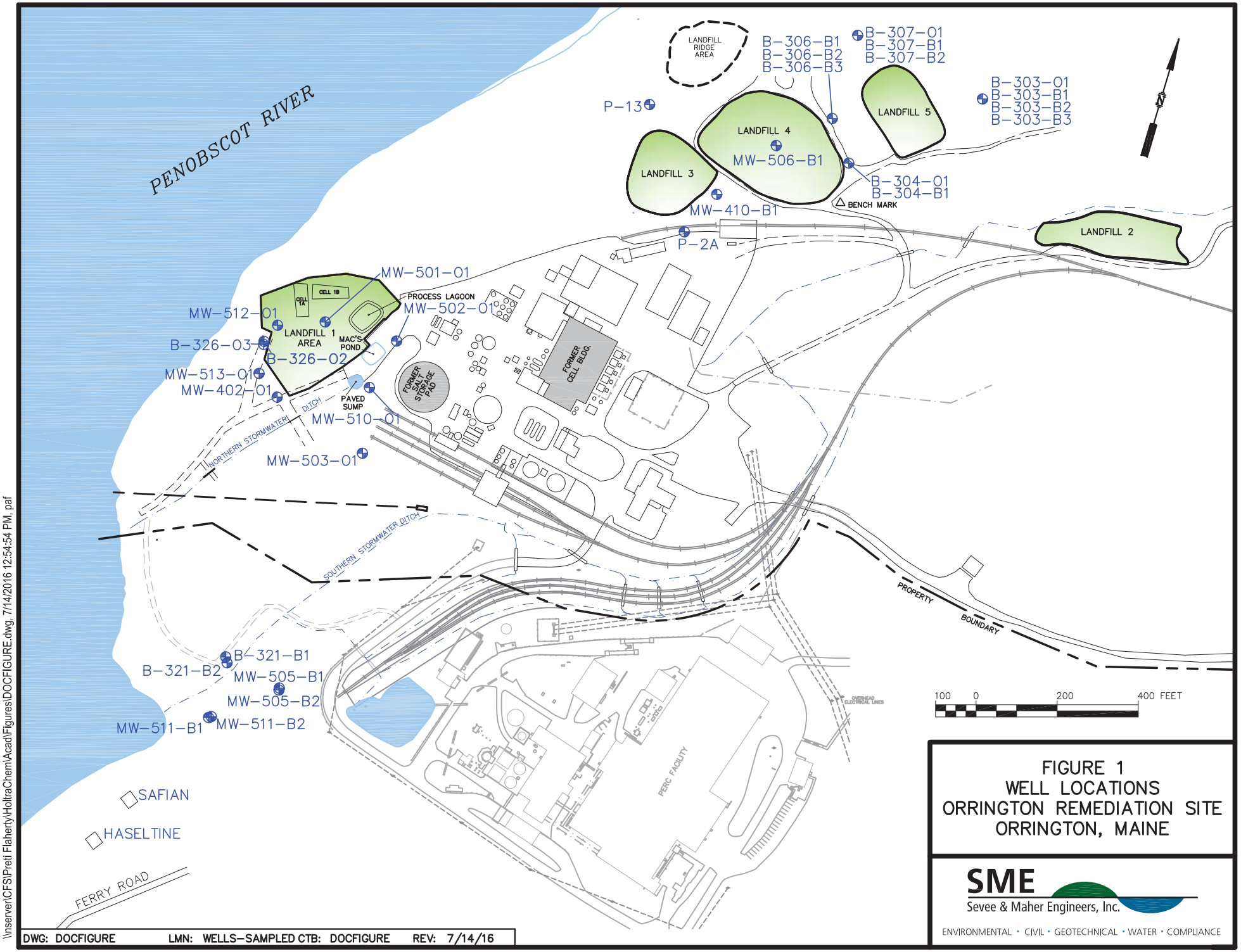

FIGURE 1
WELL LOCATIONS
ORRINGTON REMEDIATION SITE
ORRINGTON, MAINE

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DWG: DOCFIGURE LMN: WELLS-SAMPLED CTB: DOCFIGURE REV: 7/14/16

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GROUNDWATER MONITORING RESULTS SUMMARY
TABLES 1 THROUGH 7

TABLE 1
FOURTH QUARTER DECEMBER 2016
GROUNDWATER MONITORING RESULTS

Parameters	Ferry Road Monitoring Well Locations							
	Haseltine	Safian	B-321-B1	B-321-B2	MW-505-B1	MW-505-B2	MW-511-B1	MW-511-B2
	12/06/16	12/06/16	12/07/16	12/07/16	12/07/16	12/07/16	12/07/16	12/07/16
Mercury (mg/L)	< 0.0002	< 0.0002	< 0.0002	0.00008 J	< 0.0002	< 0.0002	< 0.0002	< 0.0002
Chloride (mg/L)	1,300	940	1,700	820	2,200	1,700	2,300	2,300
Specific Conductance (µS/cm @25°C)	5,152	3,490	5,228	2,912	7,001	6,312	7,382	7,226
pH (Standard Units)	8.08	7.54	6.95	7.07	7.41	7.4	7.17	7.21
Temperature (Degrees Celcius)	7.7	10.3	7.6	7.5	8.3	8.2	7.4	8.2
Salinity (g/L)	2.86	1.89	2.9	1.56	3.97	3.55	4.2	4.1
Turbidity (field) (NTU)	8.1	1.5	6.7	7.7	0.3	0.2	0.3	0.4
Dissolved Oxygen (mg/L)	4.8	2.2	0.6	2.3	1.1	1.2	0.1	1
VOCs								
Acetone (µg/L)	NA	NA	NA	NA	NA	NA	NA	NA
Chloroform (µg/L)	NA	NA	NA	NA	NA	NA	NA	NA
Carbon Tetrachloride (µg/L)	NA	NA	NA	NA	NA	NA	NA	NA
Benzene (µg/L)	NA	NA	NA	NA	NA	NA	NA	NA
Toluene (µg/L)	NA	NA	NA	NA	NA	NA	NA	NA
Ethylbenzene (µg/L)	NA	NA	NA	NA	NA	NA	NA	NA
Carbon Disulfide (µg/L)	NA	NA	NA	NA	NA	NA	NA	NA
o-Xylene (µg/L)	NA	NA	NA	NA	NA	NA	NA	NA
m,p-Xylene (µg/L)	NA	NA	NA	NA	NA	NA	NA	NA
Methyltertiarybutylether (µg/L)	NA	NA	NA	NA	NA	NA	NA	NA
Trichloroethene (µg/L)	NA	NA	NA	NA	NA	NA	NA	NA
1,1-Dichloroethene (µg/L)	NA	NA	NA	NA	NA	NA	NA	NA
Dibromochloromethane (µg/L)	NA	NA	NA	NA	NA	NA	NA	NA
Tetrachloroethene (µg/L)	NA	NA	NA	NA	NA	NA	NA	NA
Bromodichloromethane (µg/L)	NA	NA	NA	NA	NA	NA	NA	NA
Bromoform (µg/L)	NA	NA	NA	NA	NA	NA	NA	NA
1,1,1-Trichloroethane (µg/L)	NA	NA	NA	NA	NA	NA	NA	NA
1,1,2-Trichloroethane (µg/L)	NA	NA	NA	NA	NA	NA	NA	NA
cis-1,2-Dichlorethene (µg/L)	NA	NA	NA	NA	NA	NA	NA	NA
Chloroethane (µg/L)	NA	NA	NA	NA	NA	NA	NA	NA
Chloromethane (µg/L)	NA	NA	NA	NA	NA	NA	NA	NA
Bromomethane (µg/L)	NA	NA	NA	NA	NA	NA	NA	NA
Dichlorodifluoromethane (µg/L)	NA	NA	NA	NA	NA	NA	NA	NA
Chloropicrin (µg/L)	NA	NA	NA	NA	NA	NA	NA	NA

Qualifiers:

J = Analyte was positively identified/Associated value is an estimate

NA = Parameter was not analyzed

< = Not detected above the reported sample detection limit

TABLE 2
FOURTH QUARTER DECEMBER 2016
GROUNDWATER MONITORING RESULTS

Former Manufacturing Area Monitoring Well Locations					
Parameters	MW-502-O1	MW-503-O1	MW-510-O1	(DUP-3) MW-510-O1	FB-1
	12/06/16	12/06/16	12/06/16	12/06/16	12/06/16
Mercury (mg/L)	0.00065	I	0.00392	0.00412	< 0.0002
Specific Conductance (µS/cm @25°C)	1,512	I	49,436	NA	NA
pH (Standard Units)	7.53	I	7.44	NA	NA
Temperature (Degrees Celcius)	11.2	I	9.3	NA	NA
Salinity (g/L)	0.78	I	33.45	NA	NA
Turbidity (field) (NTU)	0.1	I	0.3	NA	NA
Dissolved Oxygen (mg/L)	0.3	I	3.3	NA	NA
VOCs					
Acetone (µg/L)	< 5	I	< 5	< 5	< 5
Chloroform (µg/L)	2.6	I	5.5	5.2	< 0.75
Carbon Tetrachloride (µg/L)	< 0.103	I	0.171	< 0.5	< 0.5
Benzene (µg/L)	< 0.5	I	< 0.5	< 0.5	< 0.5
Toluene (µg/L)	< 0.75	I	< 0.75	< 0.75	< 0.75
Ethylbenzene (µg/L)	< 0.5	I	< 0.5	< 0.5	< 0.5
Carbon Disulfide (µg/L)	< 1	I	< 1	< 1	< 1
o-Xylene (µg/L)	< 1	I	< 1	< 1	< 1
m,p-Xylene (µg/L)	< 1	I	< 1	< 1	< 1
Methyltertiarybutylether (µg/L)	< 1	I	< 1	< 1	< 1
Trichloroethene (µg/L)	< 0.5	I	0.37 J	0.37 J	< 0.5
1,1-Dichloroethene (µg/L)	< 0.5	I	0.21 J	0.18 J	< 0.5
Dibromochloromethane (µg/L)	< 0.5	I	< 0.5	< 0.5	< 0.5
Tetrachloroethene (µg/L)	< 0.5	I	< 0.5	< 0.5	< 0.5
Bromodichloromethane (µg/L)	< 0.5	I	< 0.5	< 0.5	< 0.5
Bromoform (µg/L)	< 1	I	< 1	< 1	< 1
1,1,1-Trichloroethane (µg/L)	< 0.5	I	< 0.5	< 0.5	< 0.5
1,1,2-Trichloroethane (µg/L)	< 0.75	I	< 0.75	< 0.75	< 0.75
cis-1,2-Dichlorethene (µg/L)	< 0.5	I	< 0.5	< 0.5	< 0.5
Chloroethane (µg/L)	< 1	I	0.16 J	< 1	< 1
Chloromethane (µg/L)	< 2	I	1.2 J	1.1 J	< 2
Bromomethane (µg/L)	< 1	I	< 1	< 1	< 1
Dichlorodifluoromethane (µg/L)	< 2	I	2.1	1.9 J	< 2
Chloropicrin - SW8011M (µg/L)	< 0.206	I	7.99 J	5.6 J	< 0.203

Qualifiers:

I = The sampling location yielded insufficient quantity to collect a sample.

J = Analyte was positively identified/Associated value is an estimate; chloropicrin qualified due to RPD exceeding 30% in the MW-510-O1 duplicate pair

NA = Parameter was not analyzed

< = Not detected above the reported sample detection limit

TABLE 3
FOURTH QUARTER DECEMBER 2016
GROUNDWATER MONITORING RESULTS

Landfill 1 Area Monitoring Well Locations								
Parameters	B-326-O2	B-326-O3	(DUP-1) B-326-O3	MW-402-O1	MW-501-O1	MW-512-O1	MW-513-O1	(FB-2) Field Blank
	12/06/16	12/06/16	12/06/16	12/06/16	12/06/16	12/06/16	12/06/16	12/06/16
Mercury (mg/L)	0.1339 B	0.279 B	0.2816 B	A	0.4611 B	0.00835 B	0.04798 B	0.00007 J
Chloride (mg/L)	890	300	300	A	NA	160	550	< 0.5
Specific Conductance (µS/cm @25°C)	3,073	1,264	NA	A	1,840	831	1,954	NA
pH (Standard Units)	6.62	6.7	NA	A	7.59	6.68	6.76	NA
Temperature (Degrees Celcius)	9.4	7.3	NA	A	6.3	9.5	10.4	NA
Salinity (g/L)	1.65	0.65	NA	A	0.96	0.42	1.02	NA
Turbidity (field) (NTU)	1.1	8.7	NA	A	4.7	0.4	0.7	NA
Dissolved Oxygen (mg/L)	3.2	11.7	NA	A	9.8	9.2	2.4	NA
VOCs								
Acetone (µg/L)	NA	NA	NA	NA	< 5	NA	NA	NA
Chloroform (µg/L)	NA	NA	NA	NA	3.3	NA	NA	NA
Carbon Tetrachloride (µg/L)	NA	NA	NA	NA	< 0.102	NA	NA	NA
Benzene (µg/L)	NA	NA	NA	NA	< 0.5	NA	NA	NA
Toluene (µg/L)	NA	NA	NA	NA	< 0.75	NA	NA	NA
Ethylbenzene (µg/L)	NA	NA	NA	NA	< 0.5	NA	NA	NA
Carbon Disulfide (µg/L)	NA	NA	NA	NA	< 1	NA	NA	NA
o-Xylene (µg/L)	NA	NA	NA	NA	< 1	NA	NA	NA
m,p-Xylene (µg/L)	NA	NA	NA	NA	< 1	NA	NA	NA
Methyltertiarybutylether (µg/L)	NA	NA	NA	NA	< 1	NA	NA	NA
Trichloroethene (µg/L)	NA	NA	NA	NA	4.9	NA	NA	NA
1,1-Dichloroethene (µg/L)	NA	NA	NA	NA	< 0.5	NA	NA	NA
Dibromochloromethane (µg/L)	NA	NA	NA	NA	< 0.5	NA	NA	NA
Tetrachloroethene (µg/L)	NA	NA	NA	NA	0.8	NA	NA	NA
Bromodichloromethane (µg/L)	NA	NA	NA	NA	< 0.5	NA	NA	NA
Bromoform (µg/L)	NA	NA	NA	NA	< 1	NA	NA	NA
1,1,1-Trichloroethane (µg/L)	NA	NA	NA	NA	< 0.5	NA	NA	NA
1,1,2-Trichloroethane (µg/L)	NA	NA	NA	NA	< 0.75	NA	NA	NA
cis-1,2-Dichlorethene (µg/L)	NA	NA	NA	NA	0.2 J	NA	NA	NA
Chloroethane (µg/L)	NA	NA	NA	NA	< 1	NA	NA	NA
Chloromethane (µg/L)	NA	NA	NA	NA	< 2	NA	NA	NA
Bromomethane (µg/L)	NA	NA	NA	NA	< 1	NA	NA	NA
Dichlorodifluoromethane (µg/L)	NA	NA	NA	NA	0.43 J	NA	NA	NA
Chloropicrin - SW8011M (µg/L)	NA	NA	NA	NA	< 0.204	NA	NA	NA

Qualifiers:

A = The sampling location was inaccessible

B = Sample result greater than the reporting limit, parameter detected in an associated blank

J = Analyte was positively identified/Associated value is an estimate

NA = Parameter was not analyzed

< = Not detected above the reported sample detection limit

TABLE 4
FOURTH QUARTER DECEMBER 2016
GROUNDWATER MONITORING RESULTS

Landfills 3 & 4 Monitoring Well Locations					
Parameters	P-2A	P-13	(DUP-2) P-13	MW-410-B1	MW-506-B1
	12/06/16	12/06/16	12/06/16	12/06/16	12/06/16
Mercury (mg/L)	0.00115	0.00011 J	0.00011 J	0.00156	0.02839
Specific Conductance (µS/cm @25°C)	598	552	NA	847	1,559
pH (Standard Units)	6.92	7.16	NA	7.6	6.7
Temperature (Degrees Celcius)	12.4	6.6	NA	7.5	6.8
Salinity (g/L)	0.3	0.28	NA	0.43	0.81
Turbidity (field) (NTU)	0.4	1.3	NA	0.1	1.1
Dissolved Oxygen (mg/L)	5	7.9	NA	1.8	1.7
VOCs					
Acetone (µg/L)	< 5	< 10	< 10	< 5	< 5
Chloroform (µg/L)	3.1	1 J	0.99 J	10	5
Carbon Tetrachloride (µg/L)	9.1	1.1	1.1	31	6.8
Benzene (µg/L)	< 0.5	< 1	< 1	< 0.5	< 0.5
Toluene (µg/L)	< 0.75	< 1.5	< 1.5	< 0.75	< 0.75
Ethylbenzene (µg/L)	< 0.5	< 1	< 1	< 0.5	< 0.5
Carbon Disulfide (µg/L)	< 1	< 2	< 2	< 1	< 1
o-Xylene (µg/L)	< 1	< 2	< 2	< 1	< 1
m,p-Xylene (µg/L)	< 1	< 2	< 2	< 1	< 1
Methyltertiarybutylether (µg/L)	< 1	< 2	< 2	< 1	< 1
Trichloroethene (µg/L)	< 0.5	< 1	< 1	0.42 J	0.51
1,1-Dichloroethene (µg/L)	< 0.5	< 1	< 1	< 0.5	< 0.5
Dibromochloromethane (µg/L)	< 0.5	< 1	< 1	< 0.5	< 0.5
Tetrachloroethene (µg/L)	< 0.5	< 1	< 1	< 0.5	< 0.5
Bromodichloromethane (µg/L)	< 0.5	< 1	< 1	< 0.5	< 0.5
Bromoform (µg/L)	< 1	< 2	< 2	< 1	< 1
1,1,1-Trichloroethane (µg/L)	< 0.5	< 1	< 1	< 0.5	< 0.5
1,1,2-Trichloroethane (µg/L)	< 0.75	< 1.5	< 1.5	< 0.75	< 0.75
cis-1,2-Dichlorethene (µg/L)	< 0.5	< 1	< 1	< 0.5	< 0.5
Chloroethane (µg/L)	< 1	< 2	< 2	< 1	< 1
Chloromethane (µg/L)	< 2	< 4	< 4	< 2	< 2
Bromomethane (µg/L)	< 1	< 2	< 2	< 1	< 1
Dichlorodifluoromethane (µg/L)	< 2	< 4	< 4	< 2	< 2
Chloropicrin (µg/L)	NA	NA	NA	NA	NA

Qualifiers:

J = Analyte was positively identified/Associated value is an estimate

NA = Parameter was not analyzed

< = Not detected above the reported sample detection limit

TABLE 5
FOURTH QUARTER DECEMBER 2016
GROUNDWATER MONITORING RESULTS

Landfill 5 Monitoring Well Locations							
Parameters	B-303-B1	B-303-B2	B-303-B3	B-303-O1	B-306-B1	B-306-B2	(FB-3) Field Blank
	12/05/16	12/05/16	12/05/16	12/05/16	12/05/16	12/05/16	12/05/16
Mercury (mg/L)	< 0.0002	< 0.0002	< 0.0002	D	< 0.0002	< 0.0002	< 0.0002
Chloride (mg/L)	NA	NA	NA	NA	NA	NA	NA
Sulfate (mg/L)	NA	NA	NA	NA	NA	NA	NA
Total Organic Carbon (mg/L)	NA	NA	NA	NA	NA	NA	NA
Total Recoverable Phenolics (ug/L)	NA	NA	NA	NA	NA	NA	NA
Total Organic Halides (mg/L)	NA	NA	NA	NA	NA	NA	NA
Specific Conductance (µS/cm @25°C)	191	179	148	D	1,873	1,703	NA
pH (Standard Units)	7.58	7.63	7.61	D	7.8	7.59	NA
Temperature (Degrees Celcius)	7.6	7.3	8	D	6.6	7.9	NA
Salinity (g/L)	0.1	0.09	0.08	D	0.98	0.89	NA
Turbidity (field) (NTU)	0.1	0.2	0.1	D	0.1	0.3	NA
Dissolved Oxygen (mg/L)	6.2	6.8	7	D	1	2.4	NA
Iron (mg/L)	NA	NA	NA	NA	NA	NA	NA
Manganese (mg/L)	NA	NA	NA	NA	NA	NA	NA
Sodium (mg/L)	NA	NA	NA	NA	NA	NA	NA
VOCs							
Acetone (µg/L)	< 5	< 5	< 5	D	< 5	< 5	< 5
Chloroform (µg/L)	< 0.75	< 0.75	< 0.75	D	1.4	0.9	< 0.75
Carbon Tetrachloride (µg/L)	< 0.5	< 0.5	< 0.5	D	< 0.5	< 0.5	< 0.5
Benzene (µg/L)	< 0.5	< 0.5	< 0.5	D	< 0.5	< 0.5	< 0.5
Toluene (µg/L)	< 0.75	< 0.75	< 0.75	D	< 0.75	< 0.75	< 0.75
Ethylbenzene (µg/L)	< 0.5	< 0.5	< 0.5	D	< 0.5	< 0.5	< 0.5
Carbon Disulfide (µg/L)	< 1	< 1	< 1	D	< 1	< 1	< 1
o-Xylene (µg/L)	< 1	< 1	< 1	D	< 1	< 1	< 1
m,p-Xylene (µg/L)	< 1	< 1	< 1	D	< 1	< 1	< 1
Methyltertiarybutylether (µg/L)	< 1	< 1	< 1	D	< 1	< 1	< 1
Trichloroethene (µg/L)	< 0.5	< 0.5	< 0.5	D	< 0.5	< 0.5	< 0.5
1,1-Dichloroethene (µg/L)	< 0.5	< 0.5	< 0.5	D	< 0.5	< 0.5	< 0.5
Dibromochloromethane (µg/L)	< 0.5	< 0.5	< 0.5	D	< 0.5	< 0.5	< 0.5
Tetrachloroethene (µg/L)	< 0.5	< 0.5	< 0.5	D	< 0.5	< 0.5	< 0.5
Bromodichloromethane (µg/L)	< 0.5	< 0.5	< 0.5	D	< 0.5	< 0.5	< 0.5
Bromoform (µg/L)	< 1	< 1	< 1	D	< 1	< 1	< 1
1,1,1-Trichloroethane (µg/L)	< 0.5	< 0.5	< 0.5	D	< 0.5	< 0.5	< 0.5
1,1,2-Trichloroethane (µg/L)	< 0.75	< 0.75	< 0.75	D	< 0.75	< 0.75	< 0.75
cis-1,2-Dichlorethene (µg/L)	< 0.5	< 0.5	< 0.5	D	< 0.5	< 0.5	< 0.5
Chloroethane (µg/L)	< 1	< 1	< 1	D	< 1	< 1	< 1
Chloromethane (µg/L)	< 2	< 2	< 2	D	< 2	< 2	< 2
Bromomethane (µg/L)	< 1	< 1	< 1	D	< 1	< 1	1 U
Dichlorodifluoromethane (µg/L)	< 2	< 2	< 2	D	< 2	< 2	< 2
Chloropicrin (µg/L)	NA	NA	NA	NA	NA	NA	NA

Abbreviations:

D = Sampling location was dry

J = Analyte was positively identified/Associated value is an estimate

U = Sample result qualified as not detected at the reporting limit due to presence in an associated blank

NA = Parameter was not analyzed

< = Not detected above the reported sample detection limit

TABLE 6
FOURTH QUARTER DECEMBER 2016
GROUNDWATER MONITORING RESULTS

Groundwater Treatment Plant	
Parameters	Influent
	12/05/16
Mercury (mg/L)	0.07154
Chloride (mg/L)	560
Sulfate (mg/L)	62 B
Alkalinity (mg/L as $CaCO_3$)	130 B
Specific Conductance (µS/cm @25°C)	2,038
pH (Standard Units)	7.11
Temperature (Degrees Celcius)	12.2
Salinity (g/L)	1.07
Turbidity (field) (NTU)	1.3
Dissolved Oxygen (mg/L)	5.7
Iron (mg/L)	0.035 J
Manganese (mg/L)	0.1004
Sodium (mg/L)	317
VOCs	
Acetone (µg/L)	< 10
Chloroform (µg/L)	1.2 J
Carbon Tetrachloride (µg/L)	< 2.55
Benzene (µg/L)	< 1
Toluene (µg/L)	< 1.5
Ethylbenzene (µg/L)	< 1
Carbon Disulfide (µg/L)	< 2
o-Xylene (µg/L)	< 2
m,p-Xylene (µg/L)	< 2
Methyltertiarybutylether (µg/L)	< 2
Trichloroethene (µg/L)	1
1,1-Dichloroethene (µg/L)	< 1
Dibromochloromethane (µg/L)	< 1
Tetrachloroethene (µg/L)	< 1
Bromodichloromethane (µg/L)	< 1
Bromoform (µg/L)	< 2
1,1,1-Trichloroethane (µg/L)	< 1
1,1,2-Trichloroethane (µg/L)	< 1.5
cis-1,2-Dichlorethene (µg/L)	< 1
Chloroethane (µg/L)	< 2
Chloromethane (µg/L)	< 4
Bromomethane (µg/L)	< 2
Dichlorodifluoromethane (µg/L)	< 4
Chloropicrin - SW8011M (µg/L)	3,740

Abbreviations:

B = Sample result greater than the reporting limit, parameter detected in an associated blank

J = Analyte was positively identified/Associated value is an estimate

< = Not detected above the reported sample detection limit

TABLE 7
FOURTH QUARTER DECEMBER 2016
GROUNDWATER MONITORING RESULTS

Trip Blanks							
Parameters	QCBT (9B1)	QCBT (9GD)	QCBT (9GE)	QCBT (9GF)	QCBT (9HI)	QCBT (9I0)	QCBT (9I1)
	12/05/16	12/05/16	12/06/16	12/05/16	12/07/16	12/05/16	12/06/16
VOCs							
Acetone (µg/L)	NA	< 5	< 5	< 5	NA	NA	NA
Chloroform (µg/L)	NA	< 0.75	< 0.75	< 0.75	NA	NA	NA
Carbon Tetrachloride (µg/L)	NA	< 0.5	< 0.5	< 0.5	< 0.102	< 0.101	< 0.103
Benzene (µg/L)	NA	< 0.5	< 0.5	< 0.5	NA	NA	NA
Toluene (µg/L)	NA	< 0.75	< 0.75	< 0.75	NA	NA	NA
Ethylbenzene (µg/L)	NA	< 0.5	< 0.5	< 0.5	NA	NA	NA
Carbon Disulfide (µg/L)	NA	< 1	< 1	< 1	NA	NA	NA
o-Xylene (µg/L)	NA	< 1	< 1	< 1	NA	NA	NA
m,p-Xylene (µg/L)	NA	< 1	< 1	< 1	NA	NA	NA
Methyltertiarybutylether (µg/L)	NA	< 1	< 1	< 1	NA	NA	NA
Trichloroethene (µg/L)	NA	< 0.5	< 0.5	< 0.5	NA	NA	NA
1,1-Dichloroethene (µg/L)	NA	< 0.5	< 0.5	< 0.5	NA	NA	NA
Dibromochloromethane (µg/L)	NA	< 0.5	< 0.5	< 0.5	NA	NA	NA
Tetrachloroethene (µg/L)	NA	< 0.5	< 0.5	< 0.5	NA	NA	NA
Bromodichloromethane (µg/L)	NA	< 0.5	< 0.5	< 0.5	NA	NA	NA
Bromoform (µg/L)	NA	< 1	< 1	< 1	NA	NA	NA
1,1,1-Trichloroethane (µg/L)	NA	< 0.5	< 0.5	< 0.5	NA	NA	NA
1,1,2-Trichloroethane (µg/L)	NA	< 0.75	< 0.75	< 0.75	NA	NA	NA
cis-1,2-Dichlorethene (µg/L)	NA	< 0.5	< 0.5	< 0.5	NA	NA	NA
Chloroethane (µg/L)	NA	< 1	< 1	< 1	NA	NA	NA
Chloromethane (µg/L)	NA	< 2	< 2	< 2	NA	NA	NA
Bromomethane (µg/L)	NA	1 U	< 1	< 1	NA	NA	NA
Dichlorodifluoromethane (µg/L)	NA	< 2	< 2	< 2	NA	NA	NA
Chloropicrin - SW8011M (µg/L)	< 0.213	NA	NA	NA	< 0.204	< 0.202	< 0.205

Abbreviations:
U = Sample result qualified as not detected at the reporting limit due to presence in an associated blank
NA = Parameter was not analyzed
< = Not detected above the reported sample detection limit