STATE OF MAINE
Department of Environmental Protection (MEDEP)
Bureau of Remediation and Waste Management

**MEMORANDUM**

TO: Linda Butler, Project Manager, Division of Solid Waste

FROM: Richard Heath, Senior Geologist, Division of Technical Services

DATE: May 11, 2017

RE: Review of
2016 Water Quality Report
Pine Tree Landfill
Hampden, Maine
Prepared for New England Waste Services of Maine, Inc.
March 2017

Consultant – SME, Inc.

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## General Comments

Post-closure monitoring results through Year-End 2016 are summarized in the following figures and tables:

- Figure 1 – Monitoring Wells located to the South of the Landfill;
- Figure 2 – Monitoring Wells located to the West of the Landfill;
- Figure 3 – Monitoring Wells located to the East of the Landfill;
- Figure 4 – Surface Water;
- Figure 5 – Residential Wells;
- Figure 6 – Leachate; and
- Figure 7 – Dissolved Methane.

The following tables are also included in this memorandum:

- Table 1A – Summary of Water Quality by Sample Location;
- Table 1B – Comparison of Corrective Action Criteria with Monitoring Results;
- Table 2 – Summary of Mann Kendall Trend Analysis;
- Tables 3A,B – Summary of MCL and MEG Exceedances; and
- Table 4 – Summary of 2016 Detections of Volatile Organic Compounds (VOCs)

## General Comments

As indicated in Table 1 and Figures 1 through 5, monitoring results through year-end 2016 at many locations are consistent with water quality reported within the last several years. A number of locations remain strongly impacted but the majority of parameters concentrations are stable or

have decreased since 2010 (Table 1). However, deteriorating water quality has recently occurred at several locations. The following bullets provide specific discussion regarding this and other issues at the site.

- A statistically significant increase in specific conductance measurements continue to occur at monitoring wells MW03-802B and MW03-803A (Table 2). Time-series plots indicate a variable but relatively continual increase in parameter levels at both wells since they were installed in 2003. Monitoring requirements for both wells were reduced to field parameters in 2011. However, monitoring requirements were expanded at both locations in 2016 to include a comprehensive list of field and laboratory parameters to more fully assess possible causes affecting water quality at these wells.

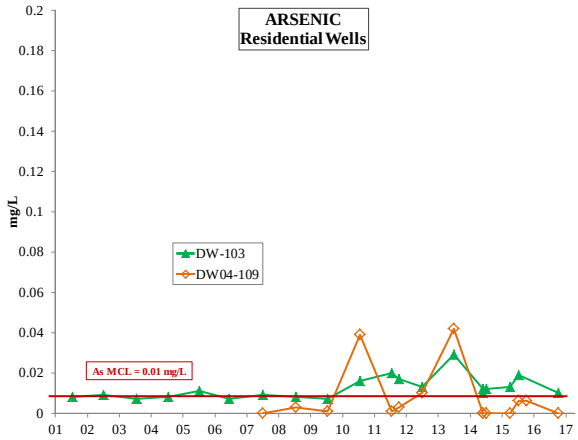
  Results from 2016 show elevated chloride levels at MW03-803B. This may be associated with road salting or, alternatively, release of leachate from the secure landfill which contains high levels of chloride (Figure 6). However, similar high levels of chloride were not reported for MW03-802B. Recent reductions in dissolved methane levels at both locations (Figure 7) suggest landfill gas migration may not be the primary source of impacts to groundwater in this area.

- Increases in specific conductance have recently occurred at the following locations; MW03-803B, P-914A, P-914B, MW03-804A, and 516B-B (Figures1 and 2). At locations reporting full parameter lists (i.e., MW03-803B, P-914A, 516B-B), other parameter concentrations do not appear to be increasing proportionally to the higher specific conductance levels suggesting a systematic measurement error. This cannot be assessed at locations reporting only field parameters.

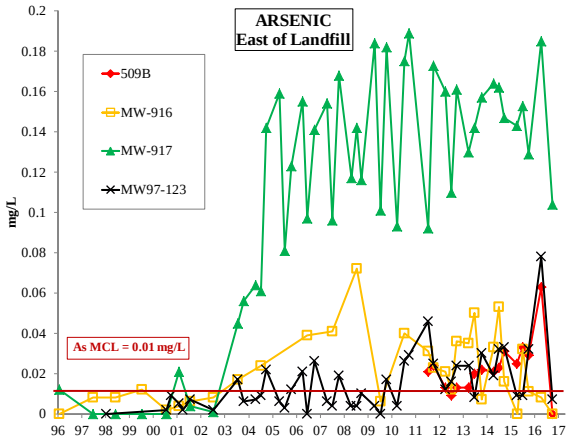
- An obviously high specific conductance measurement was reported for MW-916 in October 2016. This may be the result of a measurement or transcription error.

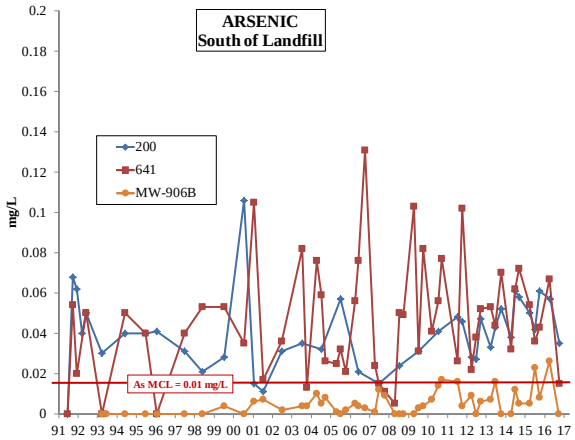
- Based on 2016 dissolved methane results, the extent of LGF migration continues to shrink in the areas surrounding the landfill (Figure 7).

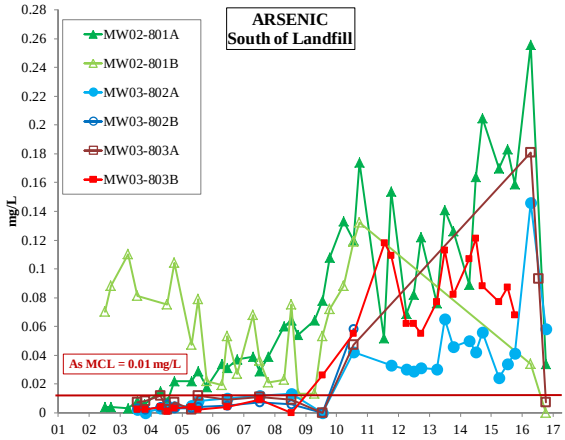
- Elevated on-site arsenic concentrations resulted in implementation of the 2014 Supplemental Residential Water Quality Monitoring Program. The one location where the MCL for arsenic was exceeded in the 2014 program, DW-103, is the only residential well remaining in the post-closure monitoring program. The arsenic concentration at DW-103 for 2016 was reported at the MCL threshold of 0.01 mg/L. Monitoring well DW04-109 is an open bedrock well that was installed as a surrogate for another (now removed) residential well.

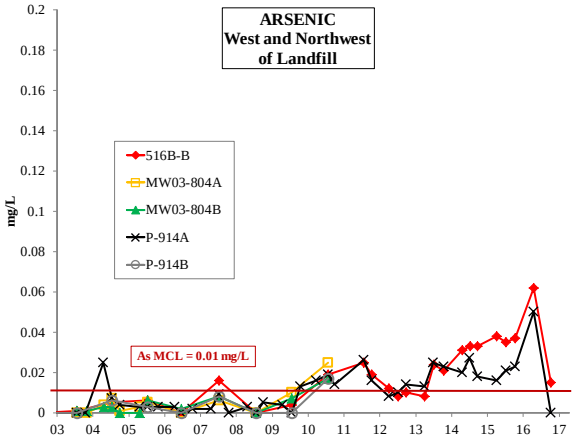



- The following time-series plots show arsenic levels at the remaining on-site monitoring wells. All of these locations showed a significant reduction in arsenic concentrations in October 2016. Additional monitoring is necessary to determine the consistency of this reduction.



A detailed summary of my understanding of the possible causes behind elevated arsenic levels at PTL monitoring locations is provided in a November 2014 memorandum[1].

- Most monitoring locations did not meet the site specific "Successful Corrective Action Criteria" in 2016 (Table 1B). As shown on the previous plots the MCL threshold for arsenic was exceeded at multiple monitoring locations in 2016. MEG thresholds for cobalt, iron, manganese, nickel, sodium, and vinyl chloride were also exceeded in varying combinations at multiple monitoring locations in 2016 (Table 3A). Exceedance of MCL/MEG thresholds for these parameters are not an on-site criteria for successful corrective action.

- Surface water results did not indicate a significant impact by the landfill in 2016. Similar to previous results, parameters levels were variable at SW-D (upstream) and SW-E (downstream) on Coldbrook Stream but trends were generally consistent at both locations; although several parameter were statistically higher at SW-E (Table 2B). No ambient water quality criteria were exceeded in 2016.

**Water Quality Review Conclusions**

1. Most groundwater parameter trends are improving to south and east of the landfill with the exception of the area southwest of the landfill (MW03-802B and MW03-803A). In addition, increasing specific conductance levels are occurring at monitoring wells MW03-803B, P-914A, P-914B, MW03-804A, and 516B-B (Figures1 and 2). However, groundwater quality remains significantly degraded even with improving trends at many locations. As of the end of 2016 only two on-site monitoring wells (MW03-802A and MW-906B) have achieved the successful corrective action criteria of consistent specific conductance measurements of less than 500 µmhos/cm (Table 1B).

2. In 2016 monitoring well MW-916 achieved the "off-site" criteria of no exceedance of MC/MEG threshold values. Both MW-916 and MW-917 achieved the "off-site" criteria of dissolved methane concentrations of less than 700 µg/L.

3. Well DW04-109 is a deep bedrock monitoring well that is considered a residential well for the purposes of the Post-Closure monitoring program. This well also achieved the successful corrective action criteria for residential wells in 2016 which includes: no exceedance of MCL/MEG thresholds; specific conductance measurements of less than 400 µmhos/cm; and dissolved methane levels of less than 700 µg/L. However, the analytical method reporting limits for a number of VOC compounds were reported at, or above, their MCL or MEG threshold level (Table 3B) preventing comparison to the threshold values.

4. Arsenic concentrations increased at many monitoring locations between early and late 2000s and remain elevated above the MCL threshold through 2016. This includes the residential well DW-103.

[1] Heath, Richard, MEDEP, memorandum to Karen Knuuti, MEDEP, RE: New England Waste Services of Maine dba Pine Tree Landfill, Response to Richard Heath's, Review of 2013 Water Quality Monitoring Results, August 26, 2014, memorandum dated November 12, 2014.

5. Volatile Organic Compound (VOC) detections (excluding dissolved methane) in groundwater for 2016 (Table 4) were limited to several compounds at MW02-801A, MW03-802B and MW03-803A,B and generally reported at near reporting limit concentrations. No VOC MCL thresholds were exceeded in 2016; although the MEG for vinyl chloride was exceeded at in October 2016 at MW02-801A, MW03-802B, MW03-803A, and MW03-803B.

6. Dissolved methane levels have improved significantly at all monitoring locations.

7. Surface water results do not indicate a significant impact by the landfill. No chronic (CCC) Ambient Water Quality Criteria (AWQC) were exceeded in 2016.

**SME Recommendations**

The following bullets include the two changes proposed by SME followed by my comments in *italicized* font.

- Elimination of VOC analysis at monitoring wells 641, MW-916, and DW04-109.

  *I did not concur with this recommendation last year due to the fact that analytical method reporting limits were too high for a number of VOC compounds to determine if MCL/MEG thresholds had been exceeded. Lower reporting limits were achieved in 2016 using EPA Method 8260B. However these lower reporting limits either were the same as the MCL/MEG threshold or still exceeded the threshold value for several VOCs (Table 3B). As noted last year, this is important for DW04-109 and MW-916 which are subject to off-site successful corrective action criteria requiring that MCL/MEG thresholds not be exceeded.*

  *However, since VOCs have not been detected at these monitoring wells since between 2009 and 2011, I agree that they may be currently removed from the monitoring program given the following the provision. Prior to designating a "Successful Corrective Action" for locations subject to "off-site successful corrective action criteria",VOCs must be analyzed and not detected at levels above the MCL/MEG threshold for a minimum of two sampling rounds. To be representative VOC reporting limits must be below the current MCL/MEG threshold values.*

- Reduction in frequency of landfill gas monitoring program to twice per year in the spring and fall.

  *This recommendation refers to monitoring of monitoring well and gas probe head space for gas pressure; and percent methane, carbon dioxide, oxygen, and balance gas. Most monitoring locations no longer consistently detect appreciable methane gas; exceptions being 05-GS-18 (61%), MW03-803B (23%), P04-714 (31%), and 05-GS-9 (23%),[ Note – percentage measurements for 12/29/16]. Agreed – recommendation should be implemented.*

- Continued supplemental sampling in 2017 at MW03-802B and MW03-803A. In 2016 a possible source of increasing parameter levels at these locations was identified as leachate draining from defects in the landfill cover system to soils outside the solid waste boundary. Impacted soils were removed and the cover system was repaired. Based on these actions it is expected that water quality will improve a these downgradient monitoring wells.

  *Agreed.*

**MEDEP Conclusions and Recommendations**

1. At this point the MEDEP considers monitoring wells MW-916 and MW-917 to be subject to off-site corrective action criteria. The MEDEP's current understanding is that the wells are considered "off-site" if they are not located on property owned by the facility.

2. Additional investigation is necessary into the cause of increasing specific conductance measurements at monitoring wells P-914A, P-914B, MW03-804A, and 516B-B, located to the west of the landfill. As part of this investigation I recommend these wells be monitored for Field Parameters, Indicator Parameters, Expanded Parameters, and Dissolved Methane for the next two sampling events. Currently none of these locations are monitored for dissolved methane; and P-914A and MW03-804A are monitored for field parameters only. Future monitoring requirements will be determined based on the outcome of the investigation.

pc Steve Farrar

# TABLE 1A

**SUMMARY OF WATER QUALITY BY SAMPLE LOCATIONS**
**YEAR-END 2016**
**PINE TREE LANDFILL**

| Sample Location | Aquifer Type | Monitoring Level | Indication of Contamination | Exceedance of Arsenic MCL 0.01 mg/L in 2016 | Prodominant Parameter Trend Direction Since 2012 (See Note 1) | Possible Source of Water Quality Impact | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | Landfill Gas | Conventional Landfill Leachate | Releases of Secure Landfill Leachate | Comments |
| **Figure 1 - South of Landfill** | | | | | | | | | |
| 200 | O | Post-Closure | **Moderate** | X | | | X | X | Elevated As. |
| 641 | SB | Post-Closure | **Strong** | X | **Down** | | X | X | Elevated As. |
| MW-906B | SB | Post-Closure | **Slight** | X | **Down** | | X | X | Variable As levels. |
| MW02-801A | DB | Post-Closure | **Strong** | X | **Down** | X | X | X | Substantial decrease in "As" October 2016. |
| MW02-801B | O | Field Parameters | **Strong** | NA | **Down*** | X | X | X | Substantial decrease in "As" October 2016. |
| MW03-802A | DB | Post-Closure | **Slight** | X | **Down** | X | X | | Substantial decrease in "As" October 2016. |
| MW03-802B | SB/O | Field Parameters | **Strong** | X | **Up*** | X | X | | Increasing Specific conductance. Substantial decrease in "As" October 2016. |
| MW03-803A | DB | Field Parameters | **Strong** | X | **Up*** | X | X | | Increasing Specific conductance. Substantial decrease in "As" October 2016. |
| MW03-803B | SB | Post-Closure | **Strong** | X | | X | X | | Increasing Specific conductance. |
| **Figure 2 - West of Landfill** | | | | | | | | | |
| 516B-B | SB | Post-Closure | **Strong** | X | **Up** | X | X | X | Increasing Specific conductance. Substantial decrease in "As" October 2016. |
| P-914A | DB | Post-Closure | **Moderate** | X | **Up** | X | | | Increasing Specific conductance. Substantial decrease in "As" October 2016. |
| P-914B | SB | Field Parameters | **Moderate** | NA | **Up*** | X | | | Increasing Specific conductance. |
| MW03-804A | DB | Field Parameters | **Strong** | NA | **Up*** | | X | | Increasing Specific conductance. |
| **Figure 3 - East of Landfill** | | | | | | | | | |
| MW98-601A | SB | Field Parameters | **Strong** | NA | | X | X | X | |
| MW98-601B | O | Field Parameters | **Strong** | NA | | X | X | X | |
| MW01-602B | SB | Field Parameters | **Moderate** | NA | | X | X | X | Sharp decrease in parameter levels in 2008. |
| MW-97-123 | DB | Post-Closure | **Strong** | X | **Down** | X | X | X | Substantial decrease in "As" October 2016. |
| MW-916 | SB | Post-Closure | **Slight** | did not exceed | **Down** | X | | | "As" below MCL in 2016. |
| MW-917 | DB | Post-Closure | **Moderate** | X | **Down** | X | | | Substantial decrease in "As" October 2016. |
| 509A | SB | Field Parameters | **Strong** | NA | | X | X | X | Impacted groundwater. |
| 509B | O | Post-Closure | **Strong** | X | **Up** | X | X | X | Increasing Specific conductance. Substantial decrease in "As" October 2016. |
| P-911B | O | Field Parameters | **Moderate** | NA | **Down*** | X | X | | Impacted groundwater. Specific conductance is decreasing. |
| **Figure 4 - Surface Water** | | | | | | | | | |
| SW-A (background) | | Post-Closure | | NA | | | | | |
| SW-C | | Post-Closure | | NA | | | | | |
| SW-D (background) | | Post-Closure | **Moderate** | NA | **Up*** | | | | |
| SW-E | | Post-Closure | **Moderate** | NA | **Up*** | X | X | | Statistically significant difference from background SW-D (Table 2B) |
| **Figure 5 - Residential Wells** | | | | | | | | | |
| DW04-109 * (Bedrock Monitoring Well) | | Post-Closure | | did not exceed | **Down** | | | | "As" below MCL since 2014. |
| DW-103 (Water Supply Well) | DB | Post-Closure | Slight | X | | X | | | "As" slightly exceeds MCL in 2016. |

# TABLE 1A

**SUMMARY OF WATER QUALITY BY SAMPLE LOCATIONS**
**YEAR-END 2016**
**PINE TREE LANDFILL**

Notes:

1.) Predominant parameter trend direction based on statistical evaluation of water quality data (see Table 2A) and visual inspection of time-series plots included in Figures 1, 2, 3, 4, and 5. ChemStat version 5 software used to perform Mann Kendall trend analysis to determine statistical significance of parameter trends.

Upward and Downward trending "Specific Conductance" identified with "Up*" and "Down*", respectively adn may be based specfically on visual observations of time-series plots.

2.) Definitions:
GW = groundwater
SW = surface water
WS = water supply well

SB = shallow bedrock
DB = deep bedrock
O = overburden

3.) Qualitative determination of "Indication of Contamination" as follows:
Strong = Specific Conductance > 1000 µmhos/cm
Moderate = Specific Conductance between 500 and 1000 µmhos/cm
Slight = Specific Conductance between background water quality and 500 µmhos/cm

# TABLE 1B

**COMPARISON TO GROUNDWATER SUCCESSFUL CORRECTIVE ACTION CRITERIA**
**YEAR-END 2016**
**PINE TREE LANDFILL**

| Sample Location | Monitoring Level | On-Site Groundwater Criteria | Off-Site Groundwater Criteria | | |
|---|---|---|---|---|---|
| | | Less than 500 µmhos/cm Specfic Conductance | No Exceedance of MCL/MEG Thresholds | Less than 400 µmhos/cm Specific Conductance Private Water Supply Wells | Less Than 700 µg/L Dissolved Methane Water Supply Wells |
| **Figure 1 - South of Landfill** | | | | | |
| 200 | Post-Closure | Not Achieved | | | |
| 641 | Post-Closure | Not Achieved | | | |
| MW-906B | Post-Closure | **ACHIEVED** | | | |
| MW02-801A | Post-Closure | Not Achieved | | | |
| MW02-801B | **Field Parameters** | Not Achieved | | | |
| MW03-802A | Post-Closure | **ACHIEVED** | | | |
| MW03-802B | **Field Parameters** | Not Achieved | | | |
| MW03-803A | **Field Parameters** | Not Achieved | | | |
| MW03-803B | Post-Closure | Not Achieved | | | |
| **Figure 2 - West of Landfill** | | | | | |
| 516B-B | Post-Closure | Not Achieved | | | |
| P-914A | Post-Closure | Not Achieved | | | |
| P-914B | **Field Parameters** | Not Achieved | | | |
| MW03-804A | **Field Parameters** | Not Achieved | | | |
| **Figure 3 - East of Landfill** | | | | | |
| MW98-601A | **Field Parameters** | Not Achieved | | | |
| MW98-601B | **Field Parameters** | Not Achieved | | | |
| MW01-602B | **Field Parameters** | Not Achieved | | | |
| MW-97-123 | Post-Closure | Not Achieved | | | |
| MW-916 | Post-Closure | | **ACHIEVED** | | **ACHIEVED** |
| MW-917 | Post-Closure | | Not Achieved | | **ACHIEVED** |
| 509A | **Field Parameters** | Not Achieved | | | |
| 509B | Post-Closure | Not Achieved | | | |
| P-911B | **Field Parameters** | Not Achieved | | | |
| **Figure 5 - Residential Wells** | | | | | |
| DW04-109 | Post-Closure | | **ACHIEVED** | **ACHIEVED** | **ACHIEVED** |
| DW-103 | Post-Closure | | Not Achieved | Not Achieved | **ACHIEVED** |

**TABLE 2A**
Mann-Kandall Trend Analysis
PINE TREE LANDFILL
2012 through 2016

| Well ID | Trend | Confidence Level | CATIONS | | | | ANIONS | | | | REDOX SENSTIVE | | | INDICATOR | | | MISC | Total Positive Results |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | CALCIUM | MAGNESIUM | SODIUM | POTASSIUM | ALKALINITY, BICARBONATE | CHLORIDE | SULFATE | TOTAL ORGANIC CARBON | DISSOLVED OXYGEN | IRON | MANGANESE | PH | SPECIFIC CONDUCTANCE | TOTAL DISSOLVED SOLIDS | ARSENIC | |
| **FIGURE 1 - SOUTH OF LANDFILL** | | | | | | | | | | | | | | | | | | |
| 200 | Down | 95% | FALSE | TRUE | FALSE | FALSE | FALSE | FALSE | TRUE | FALSE | TRUE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | 3 |
| | | 99% | FALSE | TRUE | FALSE | FALSE | FALSE | FALSE | TRUE | FALSE | TRUE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | 3 |
| | Up | 95% | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | TRUE | FALSE | FALSE | FALSE | FALSE | TRUE | 2 |
| | | 99% | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | TRUE | FALSE | FALSE | FALSE | FALSE | FALSE | 1 |
| 641 | Down | 95% | FALSE | TRUE | FALSE | TRUE | TRUE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | TRUE | FALSE | 4 |
| | | 99% | FALSE | TRUE | FALSE | TRUE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | 2 |
| | Up | 95% | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | TRUE | FALSE | FALSE | FALSE | 1 |
| | | 99% | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | 0 |
| MW-906B | Down | 95% | FALSE | FALSE | TRUE | FALSE | FALSE | TRUE | FALSE | FALSE | FALSE | FALSE | TRUE | FALSE | TRUE | TRUE | FALSE | 5 |
| | | 99% | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | TRUE | FALSE | TRUE | TRUE | FALSE | 3 |
| | Up | 95% | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | TRUE | FALSE | FALSE | FALSE | 1 |
| | | 99% | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | TRUE | FALSE | FALSE | FALSE | 1 |
| MW02-801A | Down | 95% | TRUE | TRUE | TRUE | TRUE | TRUE | TRUE | FALSE | TRUE | FALSE | FALSE | TRUE | FALSE | TRUE | TRUE | FALSE | 10 |
| | | 99% | TRUE | TRUE | TRUE | TRUE | TRUE | TRUE | FALSE | TRUE | FALSE | FALSE | FALSE | FALSE | TRUE | TRUE | FALSE | 9 |
| | Up | 95% | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | TRUE | 1 |
| | | 99% | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | 0 |
| MW02-801B | Down | 95% | PARAMETERS NOT MONITORED | | | | | | | | FALSE | PARAMETERS NOT MONITORED | | FALSE | TRUE | PARAMETERS NOT MONITORED | | 1 |
| | | 99% | | | | | | | | | FALSE | | | FALSE | FALSE | | | 0 |
| | Up | 95% | | | | | | | | | FALSE | | | TRUE | FALSE | | | 1 |
| | | 99% | | | | | | | | | FALSE | | | FALSE | FALSE | | | 0 |
| MW03-802A | Down | 95% | FALSE | TRUE | TRUE | TRUE | TRUE | FALSE | FALSE | FALSE | FALSE | TRUE | FALSE | FALSE | TRUE | TRUE | FALSE | 7 |
| | | 99% | FALSE | TRUE | TRUE | TRUE | TRUE | FALSE | FALSE | FALSE | FALSE | TRUE | FALSE | FALSE | FALSE | TRUE | FALSE | 6 |
| | Up | 95% | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | TRUE | FALSE | FALSE | FALSE | 1 |
| | | 99% | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | TRUE | FALSE | FALSE | FALSE | 1 |
| MW03-802B | Down | 95% | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | 0 |
| | | 99% | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | 0 |
| | Up | 95% | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | TRUE | FALSE | FALSE | 1 |
| | | 99% | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | 0 |
| MW03-803A | Down | 95% | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | 0 |
| | | 99% | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | 0 |
| | Up | 95% | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | TRUE | FALSE | FALSE | FALSE | TRUE | FALSE | FALSE | 2 |
| | | 99% | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | TRUE | FALSE | FALSE | FALSE | TRUE | FALSE | FALSE | 2 |
| MW03-803B | Down | 95% | FALSE | FALSE | TRUE | FALSE | TRUE | FALSE | FALSE | TRUE | FALSE | FALSE | TRUE | FALSE | FALSE | FALSE | FALSE | 4 |
| | | 99% | FALSE | FALSE | FALSE | FALSE | TRUE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | 1 |
| | Up | 95% | FALSE | TRUE | FALSE | TRUE | FALSE | FALSE | FALSE | FALSE | TRUE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | 3 |
| | | 99% | FALSE | TRUE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | TRUE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | 2 |
| **FIGURE 2 - WEST OF LANDFILL** | | | | | | | | | | | | | | | | | | |
| 516B-B | Down | 95% | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | TRUE | FALSE | FALSE | FALSE | FALSE | TRUE | FALSE | FALSE | FALSE | 2 |
| | | 99% | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | 0 |
| | Up | 95% | TRUE | FALSE | FALSE | FALSE | TRUE | TRUE | FALSE | FALSE | FALSE | TRUE | FALSE | FALSE | FALSE | FALSE | TRUE | 5 |
| | | 99% | FALSE | FALSE | FALSE | FALSE | TRUE | FALSE | FALSE | FALSE | FALSE | TRUE | FALSE | FALSE | FALSE | FALSE | TRUE | 3 |
| P-914A | Down | 95% | FALSE | FALSE | FALSE | FALSE | TRUE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | 1 |
| | | 99% | FALSE | FALSE | FALSE | FALSE | TRUE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | 1 |
| | Up | 95% | FALSE | FALSE | TRUE | FALSE | FALSE | TRUE | TRUE | FALSE | FALSE | FALSE | TRUE | FALSE | FALSE | TRUE | FALSE | 5 |
| | | 99% | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | TRUE | FALSE | FALSE | FALSE | TRUE | FALSE | FALSE | TRUE | FALSE | 3 |
| P-914B | Down | 95% | PARAMETERS NOT MONITORED | | | | | | | | FALSE | PARAMETERS NOT MONITORED | | FALSE | FALSE | PARAMETERS NOT MONITORED | | 0 |
| | | 99% | | | | | | | | | FALSE | | | FALSE | FALSE | | | 0 |
| | Up | 95% | | | | | | | | | FALSE | | | FALSE | TRUE | | | 1 |
| | | 99% | | | | | | | | | FALSE | | | FALSE | FALSE | | | 0 |
| MW03-804A | Down | 95% | PARAMETERS NOT MONITORED | | | | | | | | FALSE | PARAMETERS NOT MONITORED | | FALSE | FALSE | PARAMETERS NOT MONITORED | | 0 |
| | | 99% | | | | | | | | | FALSE | | | FALSE | FALSE | | | 0 |
| | Up | 95% | | | | | | | | | FALSE | | | FALSE | TRUE | | | 1 |
| | | 99% | | | | | | | | | FALSE | | | FALSE | TRUE | | | 1 |
| **FIGURE 3 - EAST OF LANDFILL** | | | | | | | | | | | | | | | | | | |
| MW98-601A | Down | 95% | PARAMETERS NOT MONITORED | | | | | | | | FALSE | PARAMETERS NOT MONITORED | | FALSE | FALSE | PARAMETERS NOT MONITORED | | 0 |
| | | 99% | | | | | | | | | FALSE | | | FALSE | FALSE | | | 0 |
| | Up | 95% | | | | | | | | | TRUE | | | FALSE | FALSE | | | 1 |
| | | 99% | | | | | | | | | FALSE | | | FALSE | FALSE | | | 0 |
| MW98-601B | Down | 95% | PARAMETERS NOT MONITORED | | | | | | | | FALSE | PARAMETERS NOT MONITORED | | FALSE | FALSE | PARAMETERS NOT MONITORED | | 0 |
| | | 99% | | | | | | | | | FALSE | | | FALSE | FALSE | | | 0 |
| | Up | 95% | | | | | | | | | TRUE | | | FALSE | FALSE | | | 1 |
| | | 99% | | | | | | | | | FALSE | | | FALSE | FALSE | | | 0 |

**TABLE 2A**
Mann-Kandall Trend Analysis
PINE TREE LANDFILL
2012 through 2016

| | | | CATIONS | | | | ANIONS | | | | REDOX SENSTIVE | | | INDICATOR | | | MISC | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Well ID | Trend | Confidence Level | CALCIUM | MAGNESIUM | SODIUM | POTASSIUM | ALKALINITY, BICARBONATE | CHLORIDE | SULFATE | TOTAL ORGANIC CARBON | DISSOLVED OXYGEN | IRON | MANGANESE | PH | SPECIFIC CONDUCTANCE | TOTAL DISSOLVED SOLIDS | ARSENIC | **Total Positive Results** |
| MW01-602B | Down | 95% | PARAMETERS NOT MONITORED | | | | | | | | TRUE | PARAMETERS NOT MONITORED | | FALSE | FALSE | PARAMETERS NOT MONITORED | | 1 |
| | | 99% | | | | | | | | | FALSE | | | FALSE | FALSE | | | 0 |
| | Up | 95% | | | | | | | | | FALSE | | | FALSE | FALSE | | | 0 |
| | | 99% | | | | | | | | | FALSE | | | FALSE | FALSE | | | 0 |
| MW97-123 | Down | 95% | TRUE | TRUE | TRUE | TRUE | TRUE | TRUE | TRUE | TRUE | FALSE | FALSE | FALSE | FALSE | TRUE | TRUE | FALSE | 10 |
| | | 99% | TRUE | TRUE | TRUE | TRUE | TRUE | FALSE | TRUE | TRUE | FALSE | FALSE | FALSE | FALSE | TRUE | TRUE | FALSE | 9 |
| | Up | 95% | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | TRUE | FALSE | FALSE | FALSE | FALSE | FALSE | 1 |
| | | 99% | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | 0 |
| MW-916 | Down | 95% | TRUE | TRUE | FALSE | FALSE | TRUE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | TRUE | TRUE | TRUE | 6 |
| | | 99% | FALSE | FALSE | FALSE | FALSE | TRUE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | TRUE | FALSE | 2 |
| | Up | 95% | FALSE | FALSE | FALSE | TRUE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | TRUE | FALSE | FALSE | FALSE | 2 |
| | | 99% | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | 0 |
| MW-917 | Down | 95% | TRUE | TRUE | TRUE | FALSE | TRUE | FALSE | FALSE | FALSE | TRUE | TRUE | FALSE | FALSE | TRUE | TRUE | FALSE | 8 |
| | | 99% | FALSE | TRUE | FALSE | FALSE | TRUE | FALSE | FALSE | FALSE | FALSE | TRUE | FALSE | FALSE | TRUE | TRUE | FALSE | 5 |
| | Up | 95% | FALSE | FALSE | FALSE | FALSE | FALSE | TRUE | FALSE | FALSE | FALSE | FALSE | FALSE | TRUE | FALSE | FALSE | FALSE | 2 |
| | | 99% | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | 0 |
| 509A | Down | 95% | PARAMETERS NOT MONITORED | | | | | | | | FALSE | PARAMETERS NOT MONITORED | | FALSE | FALSE | PARAMETERS NOT MONITORED | | 0 |
| | | 99% | | | | | | | | | FALSE | | | FALSE | FALSE | | | 0 |
| | Up | 95% | | | | | | | | | FALSE | | | FALSE | FALSE | | | 0 |
| | | 99% | | | | | | | | | FALSE | | | FALSE | FALSE | | | 0 |
| 509B | Down | 95% | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | 0 |
| | | 99% | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | 0 |
| | Up | 95% | TRUE | TRUE | TRUE | FALSE | FALSE | TRUE | FALSE | FALSE | TRUE | TRUE | TRUE | FALSE | TRUE | TRUE | TRUE | 10 |
| | | 99% | FALSE | FALSE | TRUE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | TRUE | FALSE | FALSE | FALSE | FALSE | TRUE | 3 |
| P-911B | Down | 95% | PARAMETERS NOT MONITORED | | | | | | | | FALSE | PARAMETERS NOT MONITORED | | FALSE | TRUE | PARAMETERS NOT MONITORED | | 1 |
| | | 99% | | | | | | | | | FALSE | | | FALSE | TRUE | | | 1 |
| | Up | 95% | | | | | | | | | FALSE | | | FALSE | FALSE | | | 0 |
| | | 99% | | | | | | | | | FALSE | | | FALSE | FALSE | | | 0 |
| **FIGURE 4 - SURFACE WATER** | | | | | | | | | | | | | | | | | | |
| SW-A | Down | 95% | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | 0 |
| | | 99% | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | 0 |
| | Up | 95% | FALSE | FALSE | TRUE | TRUE | FALSE | TRUE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | 3 |
| | | 99% | FALSE | FALSE | TRUE | FALSE | FALSE | TRUE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | 2 |
| SW-C | Down | 95% | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | 0 |
| | | 99% | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | 0 |
| | Up | 95% | TRUE | FALSE | TRUE | FALSE | FALSE | TRUE | FALSE | FALSE | FALSE | FALSE | FALSE | TRUE | FALSE | FALSE | TRUE | 5 |
| | | 99% | FALSE | FALSE | FALSE | FALSE | FALSE | TRUE | FALSE | FALSE | FALSE | FALSE | FALSE | TRUE | FALSE | FALSE | FALSE | 2 |
| SW-D | Down | 95% | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | 0 |
| | | 99% | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | 0 |
| | Up | 95% | FALSE | FALSE | TRUE | FALSE | FALSE | TRUE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | 2 |
| | | 99% | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | 0 |
| SW-E | Down | 95% | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | TRUE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | 1 |
| | | 99% | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | 0 |
| | Up | 95% | FALSE | FALSE | FALSE | FALSE | FALSE | TRUE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | TRUE | TRUE | 3 |
| | | 99% | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | 0 |
| **FIGURE 5 - RESIDENTIAL WELLS** | | | | | | | | | | | | | | | | | | |
| DW04-109 | Down | 95% | FALSE | FALSE | FALSE | FALSE | TRUE | FALSE | TRUE | FALSE | FALSE | FALSE | FALSE | FALSE | TRUE | TRUE | FALSE | 4 |
| | | 99% | FALSE | FALSE | FALSE | FALSE | TRUE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | TRUE | TRUE | FALSE | 3 |
| | Up | 95% | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | TRUE | FALSE | FALSE | FALSE | 1 |
| | | 99% | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | TRUE | FALSE | FALSE | FALSE | 1 |
| DW-103 | Down | 95% | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | 0 |
| | | 99% | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | 0 |
| | Up | 95% | FALSE | FALSE | FALSE | FALSE | FALSE | TRUE | FALSE | FALSE | FALSE | FALSE | FALSE | TRUE | TRUE | FALSE | FALSE | 3 |
| | | 99% | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | 0 |
| **FIGURE 6 - LEACHATE** | | | | | | | | | | | | | | | | | | |
| LCS-3C | Down | 95% | TRUE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | TRUE | FALSE | FALSE | FALSE | 2 |
| | | 99% | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | 0 |
| | Up | 95% | FALSE | FALSE | FALSE | FALSE | TRUE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | 1 |
| | | 99% | FALSE | FALSE | FALSE | FALSE | TRUE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | 1 |
| LCS-6 | Down | 95% | TRUE | FALSE | FALSE | TRUE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | 2 |
| | | 99% | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | 0 |
| | Up | 95% | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | TRUE | FALSE | FALSE | FALSE | 1 |
| | | 99% | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | 0 |

**TABLE 2A**
Mann-Kandall Trend Analysis
PINE TREE LANDFILL
2012 through 2016

| | | | CATIONS | | | | ANIONS | | | | REDOX SENSTIVE | | | INDICATOR | | | MISC | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Well ID | Trend | Confidence Level | CALCIUM | MAGNESIUM | SODIUM | POTASSIUM | ALKALINITY, BICARBONATE | CHLORIDE | SULFATE | TOTAL ORGANIC CARBON | DISSOLVED OXYGEN | IRON | MANGANESE | PH | SPECIFIC CONDUCTANCE | TOTAL DISSOLVED SOLIDS | ARSENIC | **Total Positive Results** |
| LCS-7 | Down | 95% | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | **0** |
| | | 99% | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | **0** |
| | Up | 95% | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | **0** |
| | | 99% | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | **0** |
| LCS-SI | Down | 95% | TRUE | TRUE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | | FALSE | TRUE | FALSE | FALSE | FALSE | FALSE | **3** |
| | | 99% | TRUE | TRUE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | **2** |
| | Up | 95% | FALSE | FALSE | TRUE | TRUE | TRUE | FALSE | FALSE | FALSE | | FALSE | FALSE | FALSE | FALSE | TRUE | TRUE | **5** |
| | | 99% | FALSE | FALSE | FALSE | TRUE | TRUE | FALSE | FALSE | FALSE | | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | **2** |
| LCS-SII | Down | 95% | TRUE | FALSE | TRUE | TRUE | FALSE | TRUE | FALSE | FALSE | FALSE | FALSE | TRUE | FALSE | TRUE | TRUE | FALSE | **7** |
| | | 99% | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | **0** |
| | Up | 95% | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | **0** |
| | | 99% | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | **0** |
| LCS-SIII | Down | 95% | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | **0** |
| | | 99% | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | **0** |
| | Up | 95% | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | **0** |
| | | 99% | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | **0** |

**TABLE 2B**

Kruskal-Wallis Analysis

PINE TREE LANDFILL

2012 - 2016

| | CATIONS | | | | | ANIONS | | | | REDOX SENSITIVE | | | INDICATOR | | MISC | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Well ID | CALCIUM | MAGNESIUM | SODIUM | POTASSIUM | TOTAL ALKALINITY | ALKALINITY, BICARBONATE | CHLORIDE | SULFATE | TOTAL ORGANIC CARBON | DISSOLVED OXYGEN | IRON | MANGANESE | SPECIFIC CONDUCTANCE | TOTAL DISSOLVED SOLIDS | ARSENIC | **Total Positive Results** |
| SW-C | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | FALSE | **TRUE** | FALSE | FALSE | FALSE | FALSE | FALSE | **1** |
| SW-E | **TRUE** | FALSE | FALSE | FALSE | FALSE | **TRUE** | FALSE | **TRUE** | FALSE | FALSE | FALSE | **TRUE** | **TRUE** | FALSE | FALSE | **5** |

# TABLES 3A

Maximum Contaminant Level (MCL) / Maximum Exposure Guideline (MEG) - Threshold Exceedances
PINE TREE LANDFILL
2016

| Sample Point Name | Sample Date | ARSENIC | | COBALT | IRON | MANGANESE | NICKEL | SODIUM | VINYL CHLORIDE |
|---|---|---|---|---|---|---|---|---|---|
| | | **MCL** | **MEG** | **MEG** | **MEG** | **MEG** | **MEG** | **MEG** | **MEG** |
| | | **0.01** | **0.01** | **0.01** | **5** | **0.3** | **0.02** | **20** | **0.0002** |
| | | **MG/L** | | | | | | | |
| 200 | Apr-16 | 0.057 | 0.057 | | 5.22 | | | | |
| | Oct-16 | 0.035 | 0.035 | | 6.96 | 1.5 | | | |
| 509B | Apr-16 | 0.063 | 0.063 | | | | | 44.4 | |
| | Oct-16 | | | | | 10.8 | | 58.1 | |
| 516B-B | Apr-16 | 0.062 | 0.062 | | | | | 62.8 | |
| | Oct-16 | 0.015 | 0.015 | | | 1.94 | | 70.8 | |
| 641 | Apr-16 | 0.067 | 0.067 | | | | | 53.1 | |
| | Oct-16 | 0.013 | 0.013 | | 5.42 | 1.74 | | 32.5 | |
| | Oct-16 | 0.015 | 0.015 | | 5.51 | 1.75 | | 32 | |
| DW-103 | Oct-16 | 0.01 | 0.01 | | | | | 35.7 | |
| MW02-801A | Apr-16 | 0.256 | 0.256 | | 8.44 | | | 237 | |
| | Oct-16 | 0.034 | 0.034 | | 5.15 | 2.59 | 0.114 | 265 | 0.0004 |
| MW03-802A | Apr-16 | 0.034 | 0.034 | | | | | | |
| MW03-802B | Apr-16 | 0.146 | 0.146 | 0.023 | 25.1 | 22.3 | | 23 | |
| | Oct-16 | 0.058 | 0.058 | | 23.6 | 8.87 | 0.029 | 71.3 | 0.0015 |
| MW03-803A | Apr-16 | 0.031 | 0.031 | 0.014 | | 1.65 | | 29.7 | |
| | Jul-16 | 0.048 | 0.048 | 0.025 | | 3.13 | | | |
| | Jul-16 | 0.044 | 0.044 | 0.024 | | 3.09 | | | |
| | Oct-16 | | | 0.011 | | 2.29 | | 22 | 0.0003 |
| | Oct-16 | | | 0.012 | | 2.27 | | 22.3 | |
| MW03-803B | Apr-16 | 0.181 | 0.181 | | 10.1 | | | | |
| | Jul-16 | 0.092 | 0.092 | | | | | | |
| | Jul-16 | 0.093 | 0.093 | | | | | | |
| | Oct-16 | | | 0.057 | | 22.8 | | | 0.0016 |
| MW-906B | Apr-16 | 0.026 | 0.026 | | | | | 27.1 | |
| | Oct-16 | | | | | 0.55 | | 39.5 | |
| MW-917 | Apr-16 | 0.185 | 0.185 | | 7.12 | | | | |
| | Oct-16 | 0.104 | 0.104 | | 7.75 | 0.91 | | | |
| MW97-123 | Apr-16 | 0.078 | 0.078 | | | | | 84.1 | |
| | Oct-16 | | | | | 1.87 | | 37.3 | |
| P-914A | Apr-16 | 0.05 | 0.05 | | | | | 22.8 | |
| | Oct-16 | | | | | 2.04 | | 27.7 | |

**TABLE 3B**

Maximum Contaminant Level (MCL) / Maximum Exposure Guideline (MEG)
REPORTING LIMIT Exceeds Threshold
PINE TREE LANDFILL
2016

| Sample Point Name | Sample Date | 1,1,2,2-TETRACHLOROETHANE | 1,2,3-TRICHLOROPROPANE | 1,2-DIBROMO-3-CHLOROPROPANE | | 1,2-DIBROMOETHANE | | ACRYLONITRILE | COBALT | METHYLENE CHLORIDE | VINYL CHLORIDE | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | MEG | MEG | MCL | MEG | MCL | MEG | MEG | MEG | MCL | MCL | MEG |
| | | 0.002 | 0.00001 | 0.0002 | 0.0004 | 0.00005 | 0.0002 | 0.0006 | 0.01 | 0.005 | 0.002 | 0.0002 |
| | | MG/L | | | | | | | | | | |
| 200 | Oct-16 | | | | | | | | <0.01 | | | |
| 509B | Oct-16 | | | | | | | | <0.01 | | | |
| 516B-B | Oct-16 | | | | | | | | <0.01 | | | |
| 641 | Oct-16 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.02 | <0.01 | <0.005 | | <0.0002 |
| | Oct-16 | | <0.00005 | | | <0.00005 | | | <0.01 | | | |
| DW04-109 | Oct-16 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.02 | <0.01 | <0.005 | | <0.0002 |
| | Oct-16 | | <0.00005 | | | <0.00005 | | | | | | |
| DW-103 | Oct-16 | | | | | | | | <0.01 | | | |
| MW02-801A | Oct-16 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.02 | <0.01 | <0.005 | | |
| | Oct-16 | | <0.00005 | | | <0.00005 | | | | | | |
| MW03-802A | Oct-16 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.02 | <0.01 | <0.005 | | <0.0002 |
| | Oct-16 | | <0.00005 | | | <0.00005 | | | | | | |
| MW03-802B | Apr-16 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.02 | | <0.005 | <0.002 | <0.002 |
| | Oct-16 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.02 | <0.01 | <0.005 | | |
| | Oct-16 | | <0.00005 | | | <0.00005 | | | | | | |
| MW03-803A | Apr-16 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.02 | | <0.005 | <0.002 | <0.002 |
| | Oct-16 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.02 | | <0.005 | | |
| | Oct-16 | | <0.00005 | | | <0.00005 | | | | | | |
| MW03-803B | Oct-16 | <0.002 | <0.00005 | <0.002 | <0.002 | <0.00005 | <0.002 | <0.02 | | <0.005 | | |
| | Oct-16 | | <0.00005 | | | <0.00005 | | | | | | |
| MW-906B | Oct-16 | | | | | | | | <0.01 | | | |
| MW-916 | Oct-16 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.02 | <0.01 | <0.005 | | <0.0002 |
| | Oct-16 | | <0.00005 | | | <0.00005 | | | <0.01 | | | |
| MW-917 | Oct-16 | | | | | | | | <0.01 | | | |
| MW97-123 | Oct-16 | | | | | | | | <0.01 | | | |
| P-914A | Oct-16 | | | | | | | | <0.01 | | | |

**TABLE 4**

PINE TREE LANDFILL

Summary of Volatile Organic Compound (VOC) Detections

2016

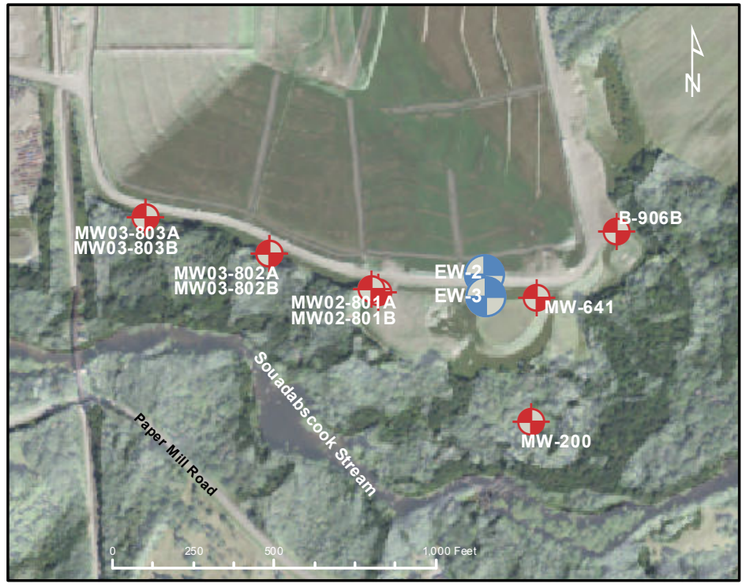
| SAMPLE POINT | SAMPLE DATE | 1,1-DICHLOROETHANE | 1,2-DICHLOROBENZENE | 1,4-DICHLOROBENZENE | 2-BUTANONE (MEK) | ACETONE | BENZENE | CIS-1,2-DICHLOROETHENE | DIETHYL ETHER | TETRAHYDROFURAN | TOLUENE | VINYL CHLORIDE | METHANE |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | µg/L | | | | | | | | | | | |
| Groundwater | | | | | | | | | | | | | |
| DW04-109 | 10/17/2016 | | | | | | | | | | | | 190 |
| DW-103 | 4/25/2016 | | | | | | | | | | | | 50 |
| | 10/17/2016 | | | | | | | | | | | | 60 |
| MW02-801A | 10/17/2016 | | 1 | 4 | | | 3 | | 34 | 10 | | 0.4 | 730 |
| | 10/17/2016 | | | | | | | | | | | | 730 |
| MW03-802A | 10/17/2016 | | | | | | | | | | | | 50 |
| MW03-802B | 4/25/2016 | | | | | | | | | | | | 700 |
| | 10/17/2016 | | | | | | 2 | 4 | 40 | | | 1.5 | 1300 |
| MW03-803A | 4/25/2016 | 2 | | | | | | | 22 | | | | 90 |
| | 7/27/2016 | | | | | | | | | | | | 40 |
| | 10/17/2016 | 4 | | | | | | | 61 | | | 0.3 | 30 |
| MW03-803B | 10/17/2016 | 5 | | | | | | 4 | 120 | | | 1.6 | 310 |
| MW-916 | 10/18/2016 | | | | | | | | | | | | 20 |
| MW-917 | 10/18/2016 | | | | | | | | | | | | 20 |
| Leachate | | | | | | | | | | | | | |
| PDPS | 10/18/2016 | | | | | | | | | | | | 290 |
| LCS-3C | 10/18/2016 | | | | 200 | 300 | | | | 400 | 30 | | 700 |
| LCS-SI | 10/18/2016 | | | | | | | | | 300 | | | 60 |

# FIGURE 1

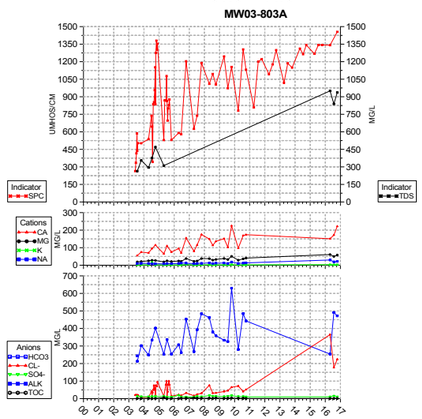
# SOUTH OF LANDFILL

**PINE TREE LANDFILL**
**POST-CLOSURE**
**WATER QUALITY MONITORING RESULTS**
**THRU YEAR-END 2016**
**SUMMARY OF MAJOR IONS AND**
**INDICATOR PARAMETERS**

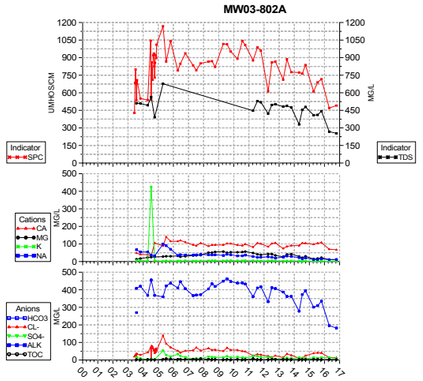
Figure prepared by Richard Heath MEDEP
5/5/17



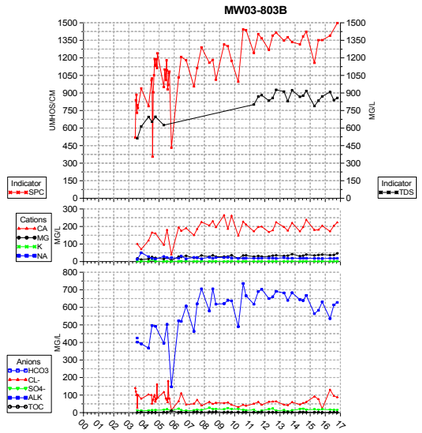

FIELD PARAMETERS
Bedrock Well
31.6' - 41.6'



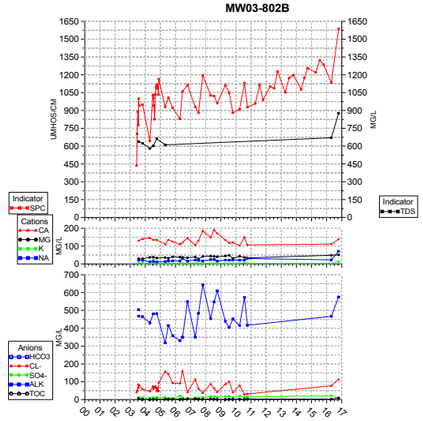

Bedrock Well
41.8' - 51.8'



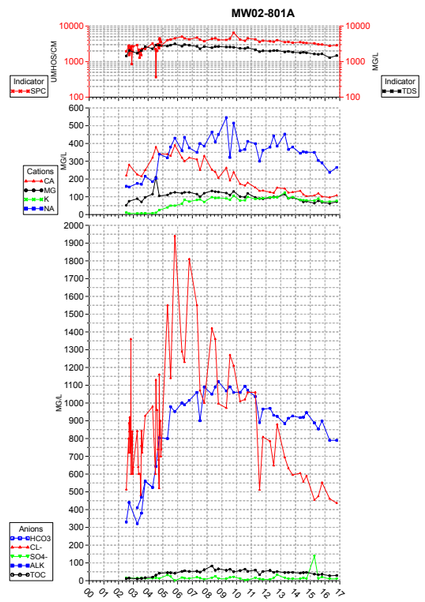

Bedrock Well
18' - 28'



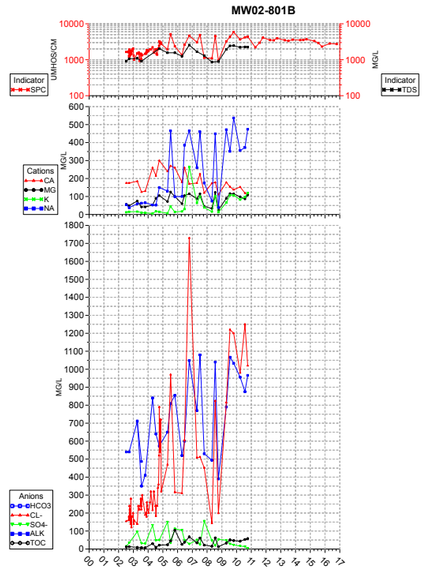

FIELD PARAMETERS
Overburden/Bedrock Well
21.8' - 31.8'



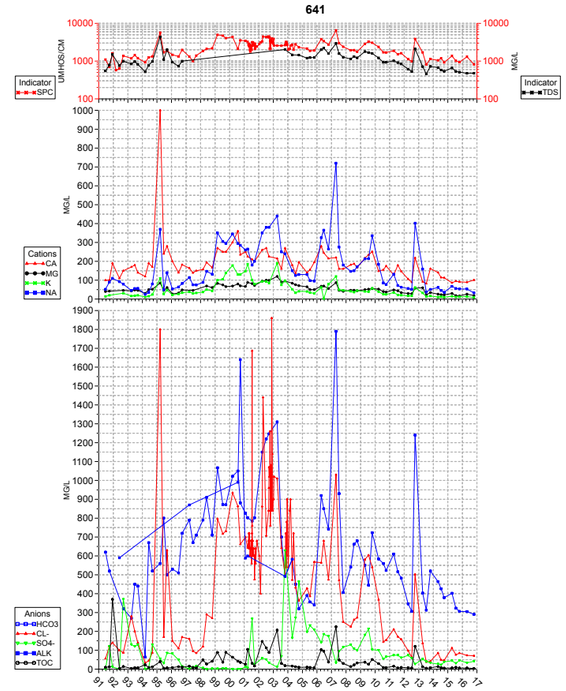

Bedrock Well
48' - 58'



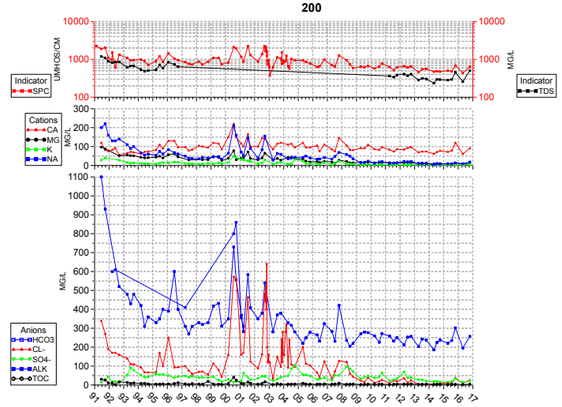

FIELD PARAMETERS
Overburden Well
20' - 30'



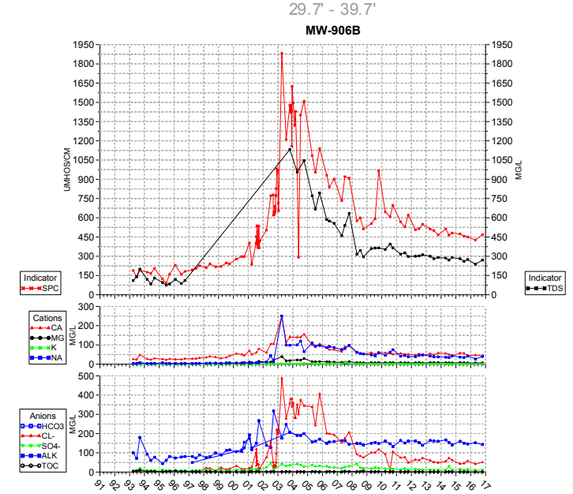

Bedrock Well
20' - 30'




Overburden Well
11.6' - 21.6'




Bedrock Well
29.7' - 39.7'

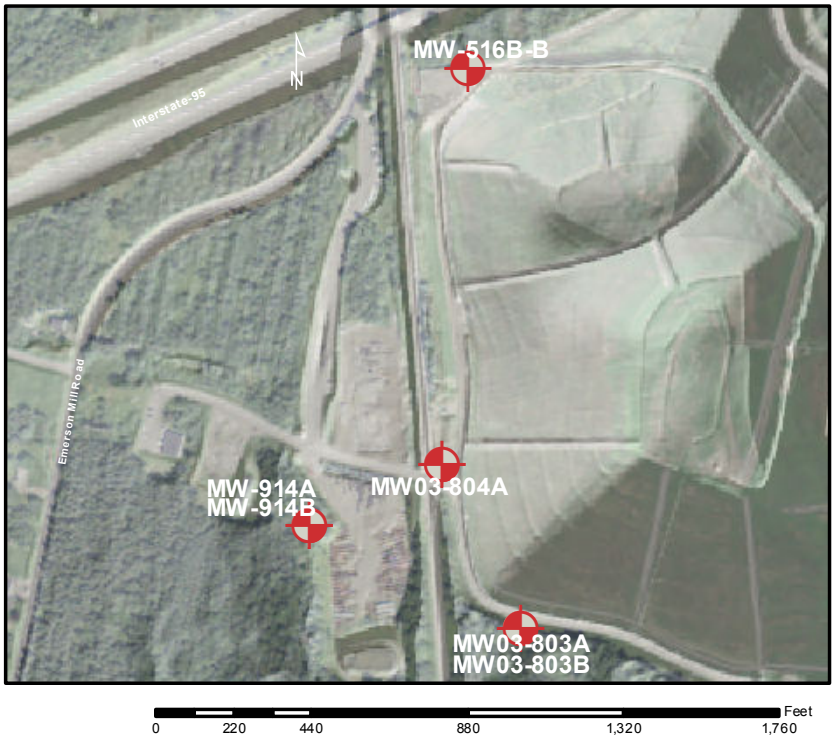


# FIGURE 2

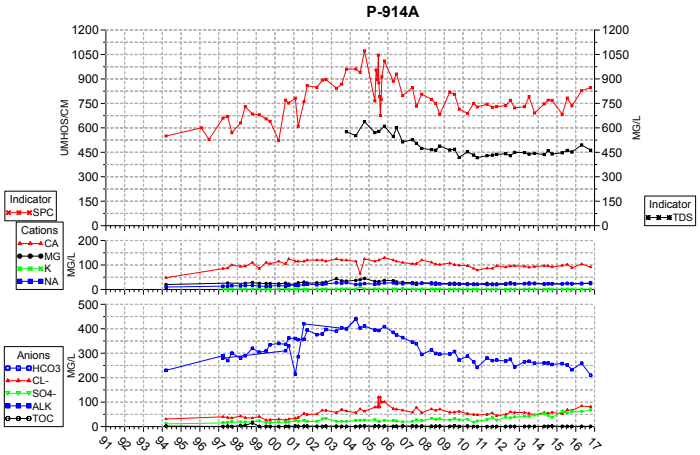
# WEST OF LANDFILL

PINE TREE LANDFILL
POST-CLOSURE
WATER QUALITY MONITORING RESULTS
THRU YEAR-END 2016
SUMMARY OF MAJOR IONS AND
INDICATOR PARAMETERS

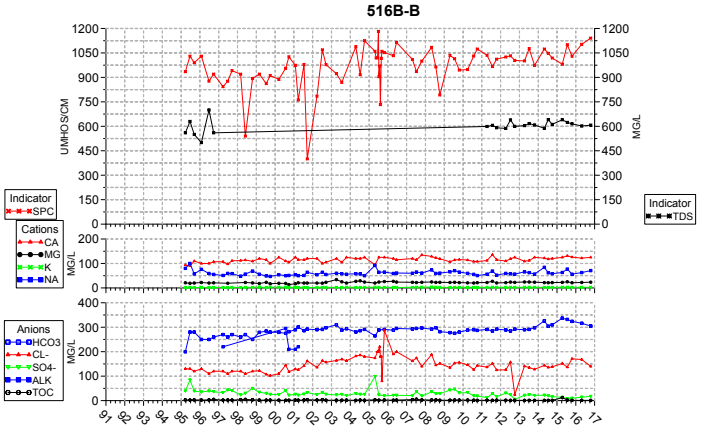
Prepared by Richard Heath MEDEP
5/5/17




Bedrock Well
37' - 42'

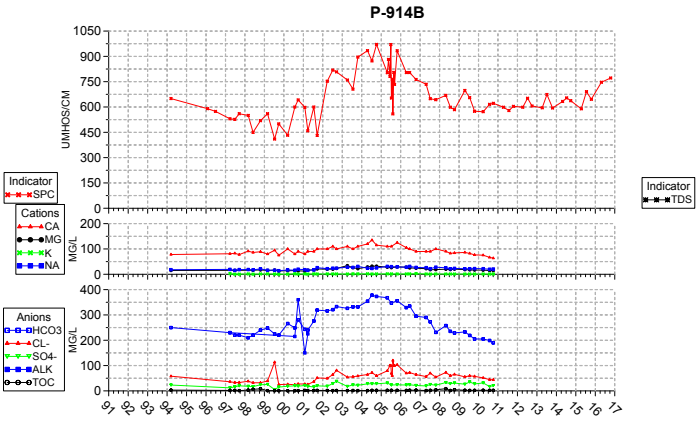



Bedrock Well
37' - 47'



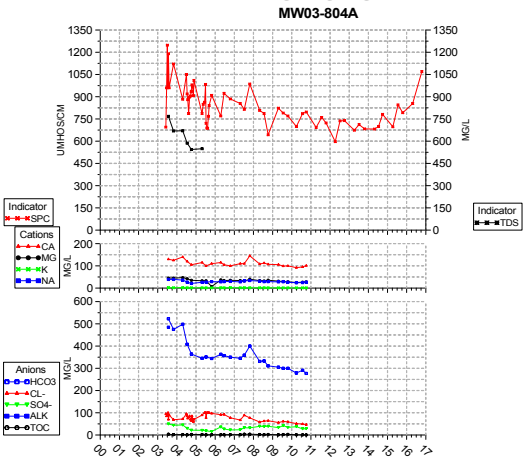

FIELD PARAMETERS

Bedrock Well
16' - 18'




FIELD PARAMETERS

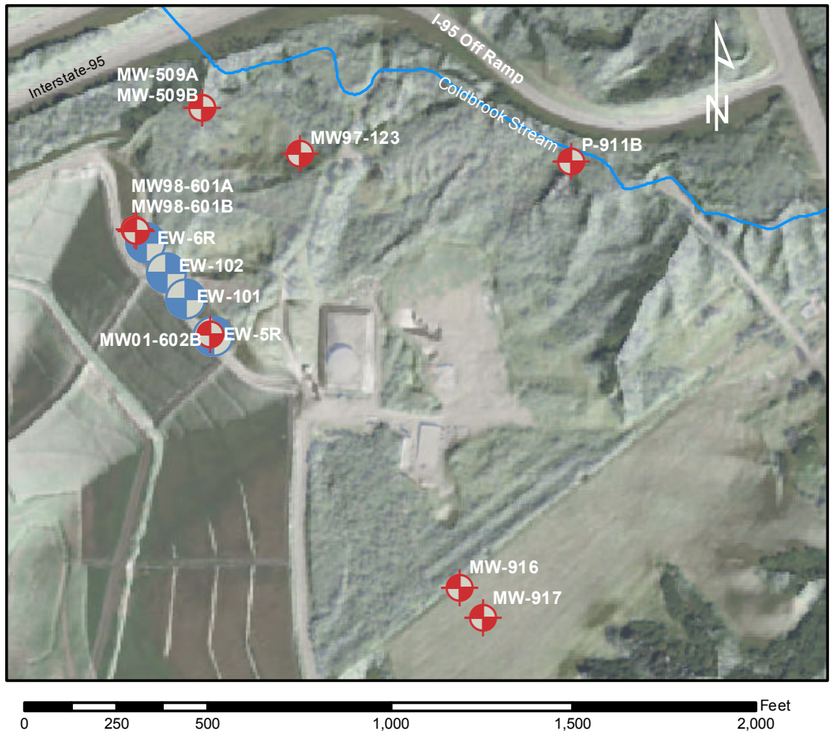
Bedrock Well
41.8' - 51.8'



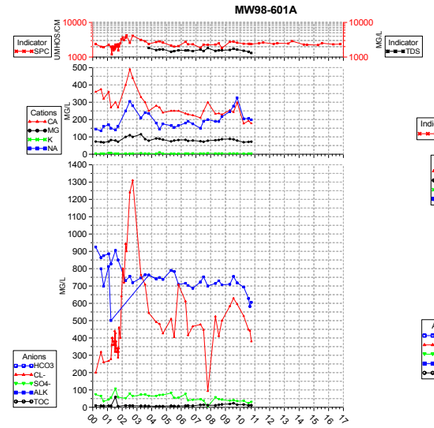
# FIGURE 3

# EAST OF LANDFILL

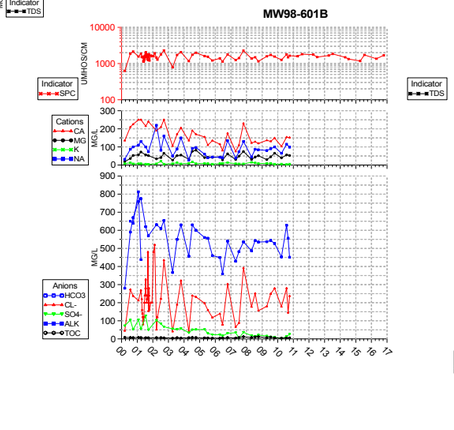
PINE TREE LANDFILL
WATER QUALITY
POST-CLOSURE
MONITORING RESULTS
THRU YEAR-END 2016
SUMMARY OF MAJOR IONS
AND
INDICATOR PARAMETERS



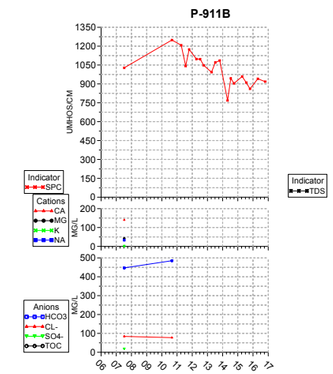

FIELD PARAMETERS
Bedrock Well
20.7' - 25.7'



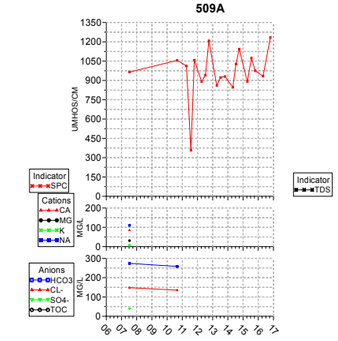

FIELD PARAMETERS
Overburden Well
7' - 12'



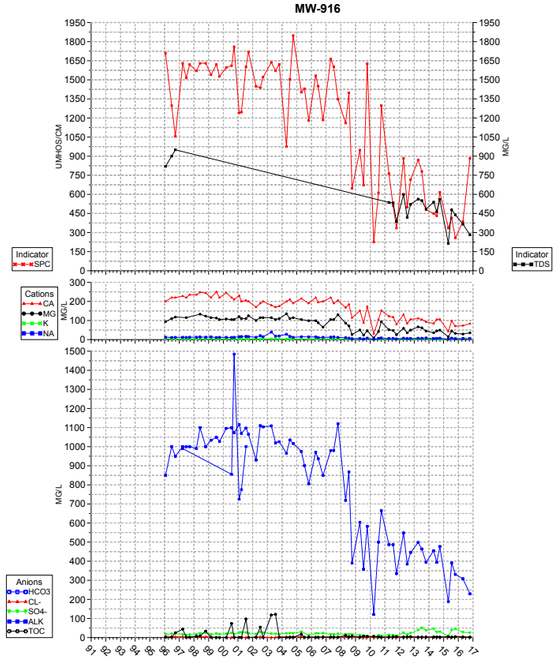

FIELD PARAMETERS
Overburden Well
15.4' - 20.4'



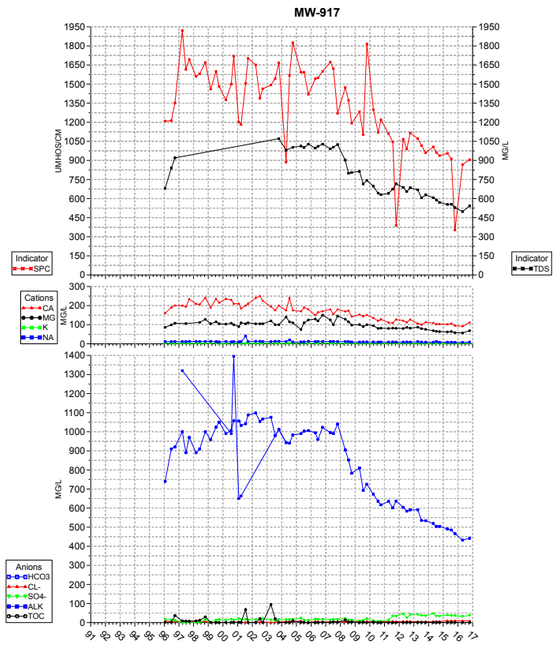

FIELD PARAMETERS
Bedrock Well
25'



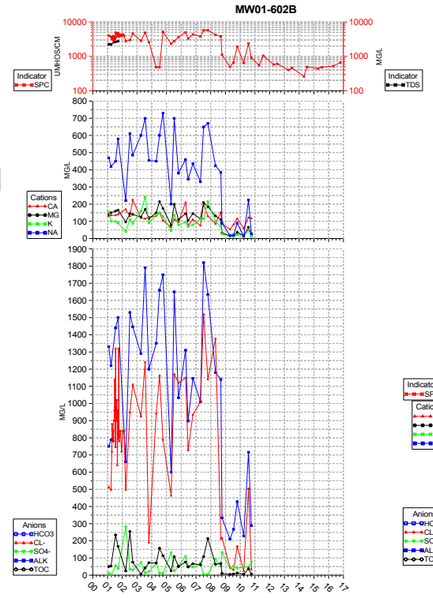

Bedrock Well
35.2' - 45.2'



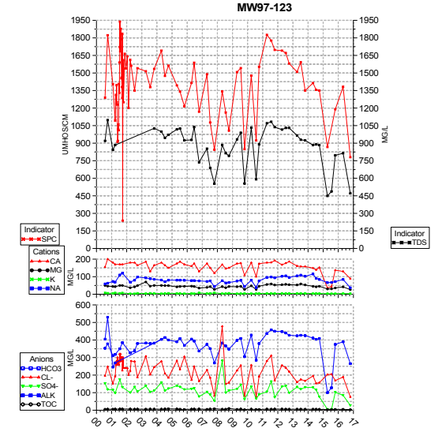

Bedrock Well
53.7' - 63.7'



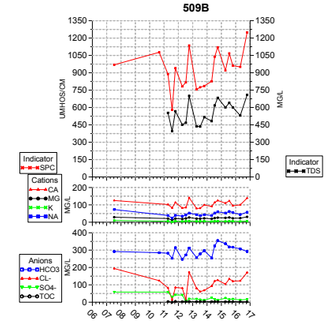

FIELD PARAMETERS
Bedrock Well
30' - 40'



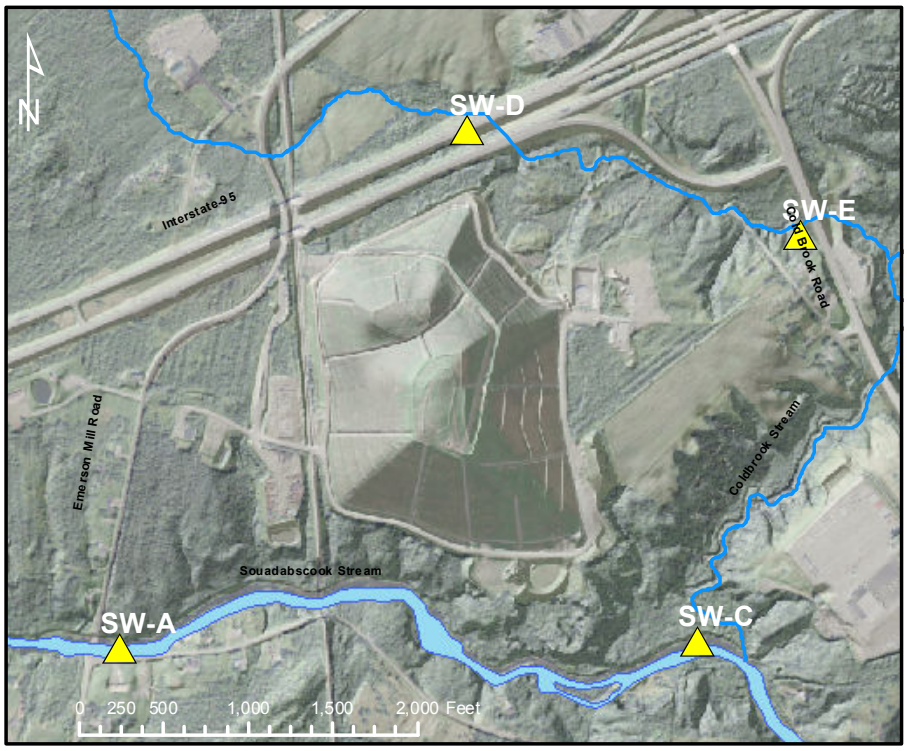

Bedrock Well
95' - 105'




Overburden Well
15'




Prepared by Richard Heath, MEDEP, 5/5/17

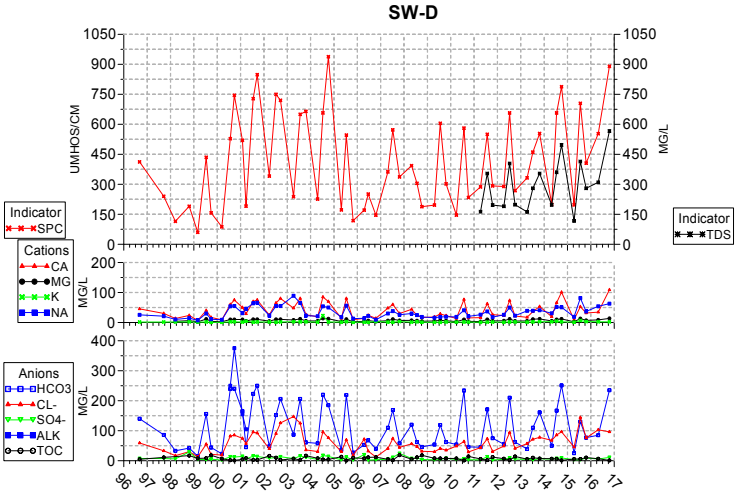


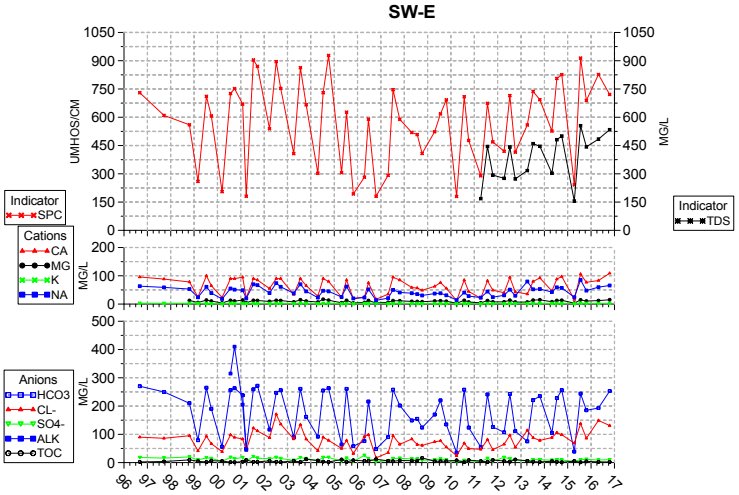

# FIGURE 4

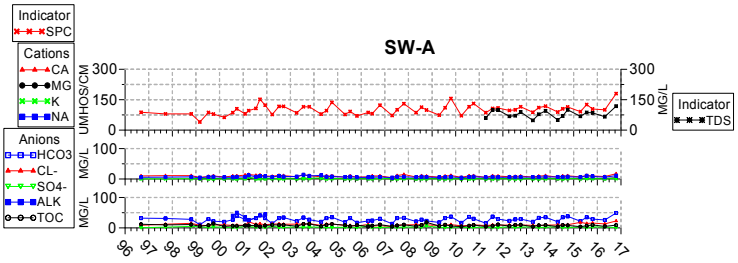
# SURFACE WATER

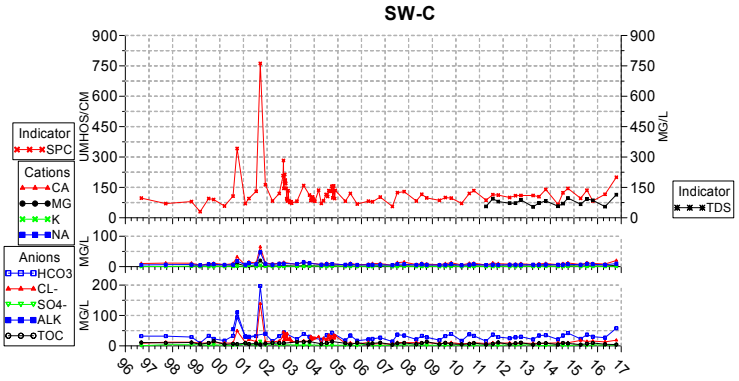
PINE TREE LANDFILL
POST-CLOSURE
WATER QUALITY MONITORING RESULTS
THRU YEAR-END 2016
SUMMARY OF MAJOR IONS AND
INDICATOR PARAMETERS

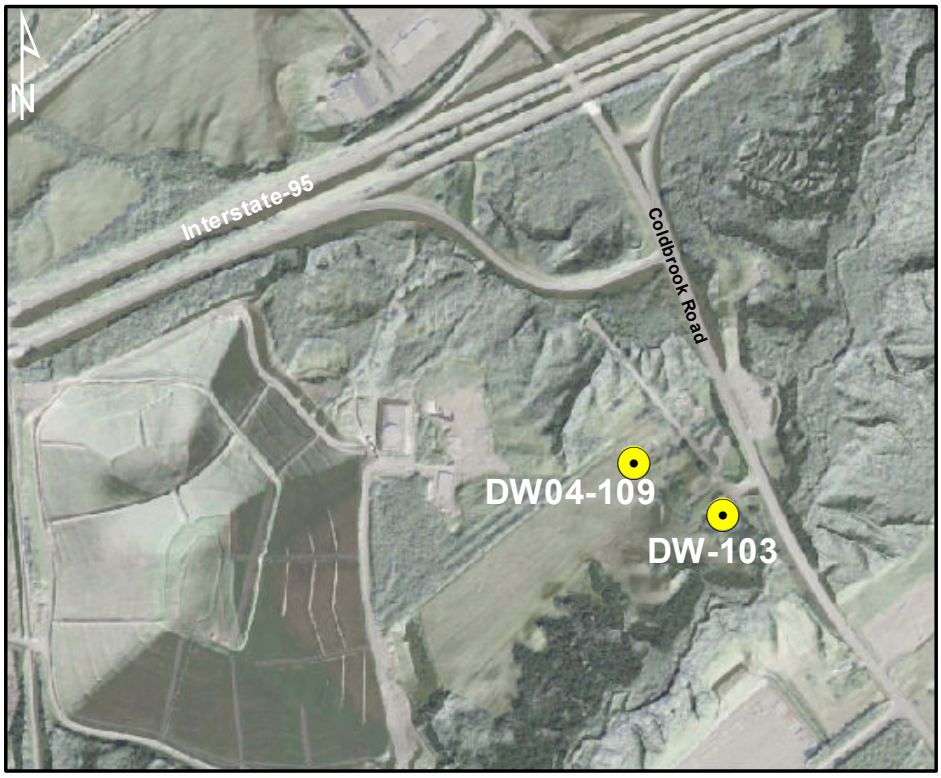
Prepared by Richard Heath MEDEP
5/5/17






0 250 500 1,000 1,500 2,000 2,500 Feet

# FIGURE 5

# RESIDENTIAL WELLS

**PINE TREE LANDFILL**
**POST-CLOSURE**
**WATER QUALITY MONITORING RESULTS**
**THRU YEAR-END 2016**
**SUMMARY OF MAJOR IONS AND**
**INDICATOR PARAMETERS**

Prepared by Richard Heath MEDEP
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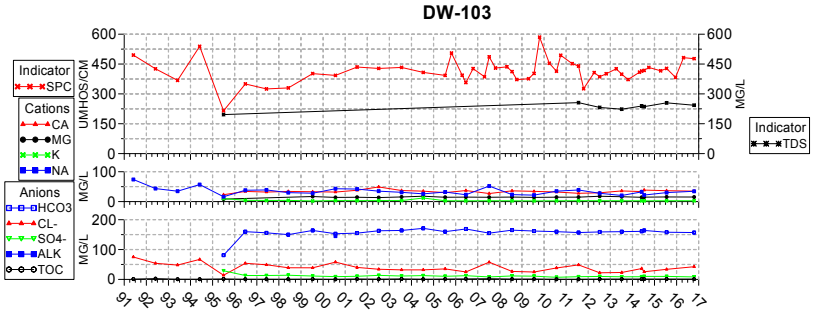
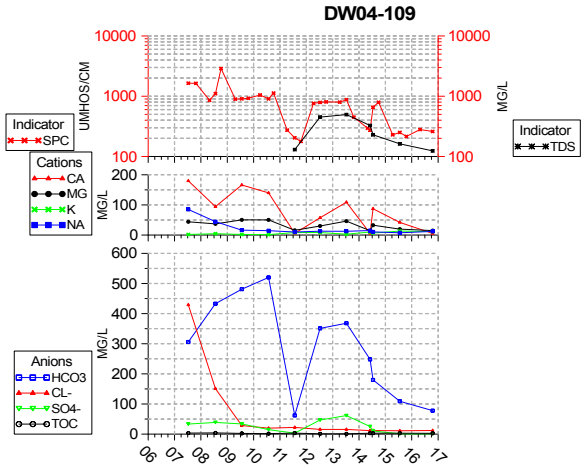
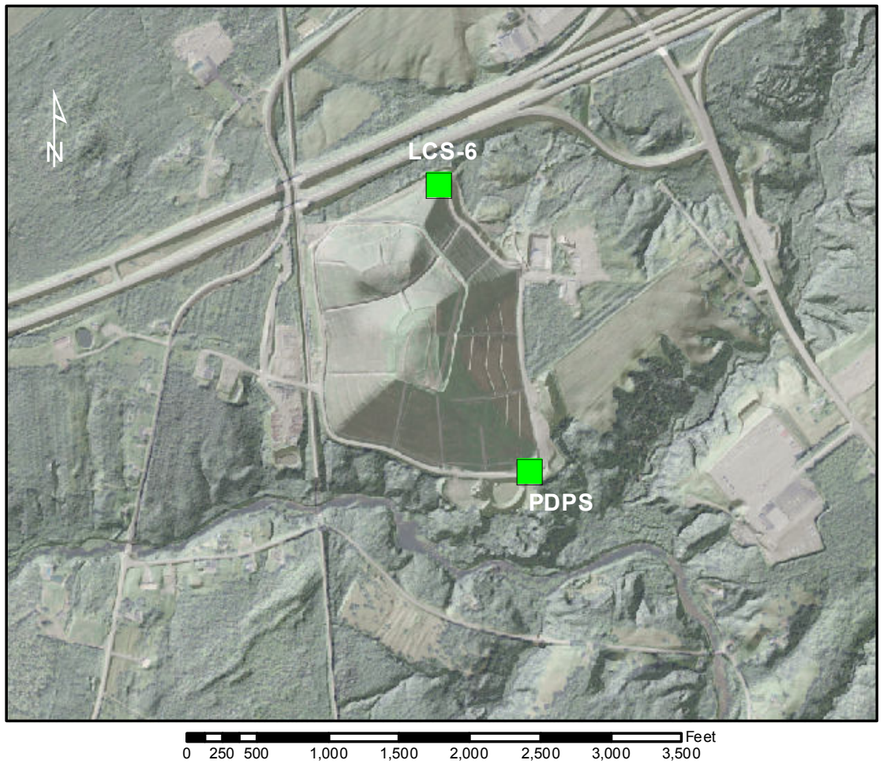



Bedrock
Monitoring Well

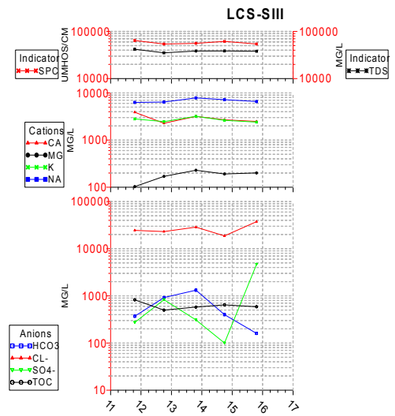


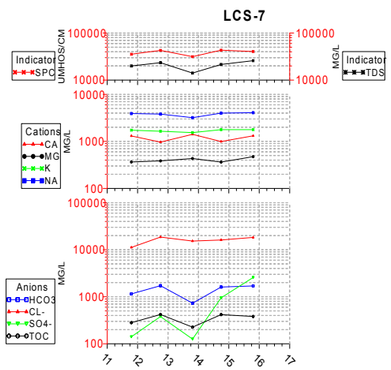



# FIGURE 6

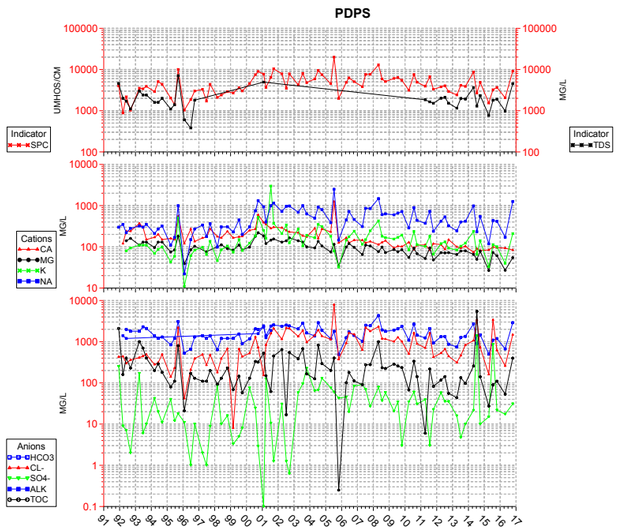
# LEACHATE

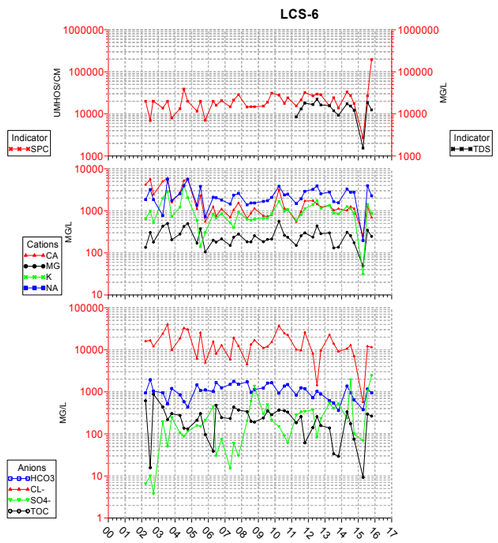
PINE TREE LANDFILL
POST-CLOSURE
WATER QUALITY MONITORING RESULTS
THRU YEAR-END 2016
SUMMARY OF MAJOR IONS AND
INDICATOR PARAMETERS

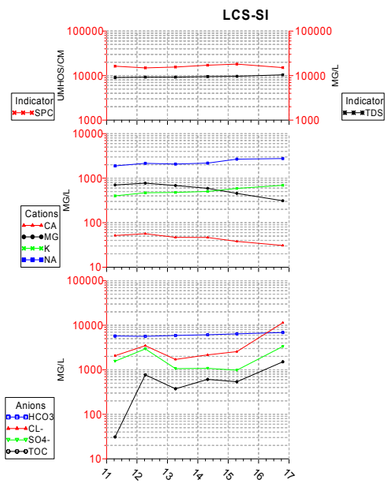


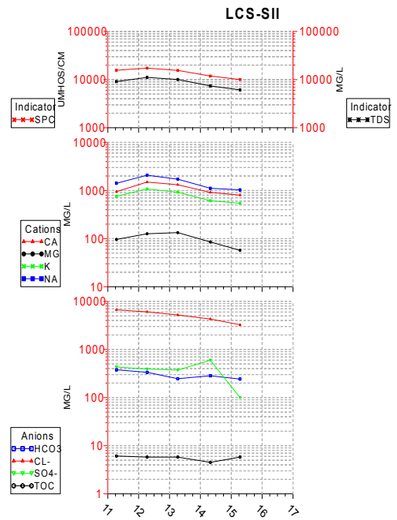



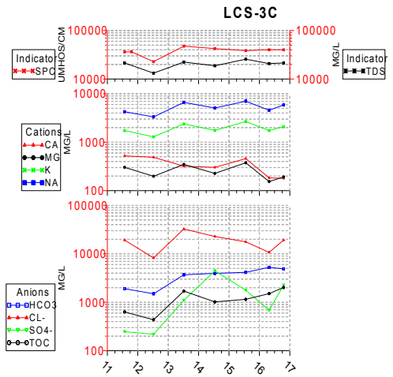

Prepared by Richard Heath MEDEP
5/5/2017



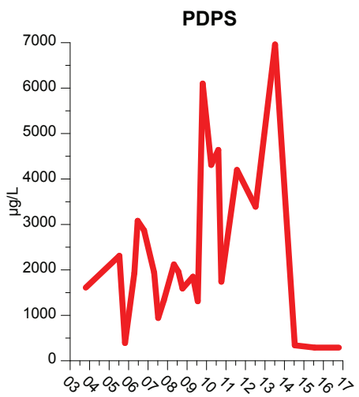



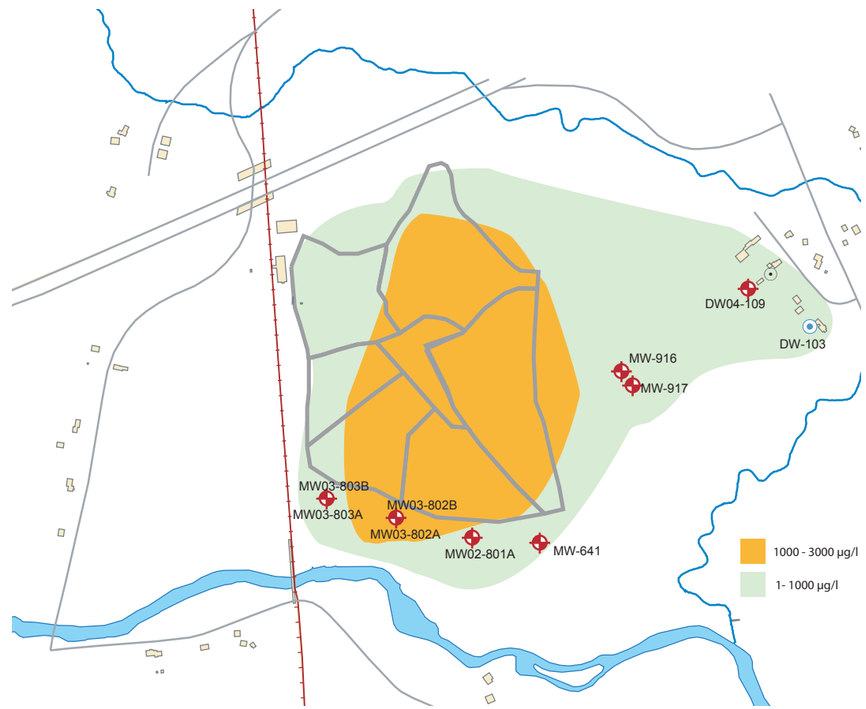



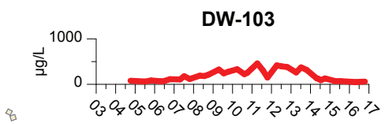
# Figure 7

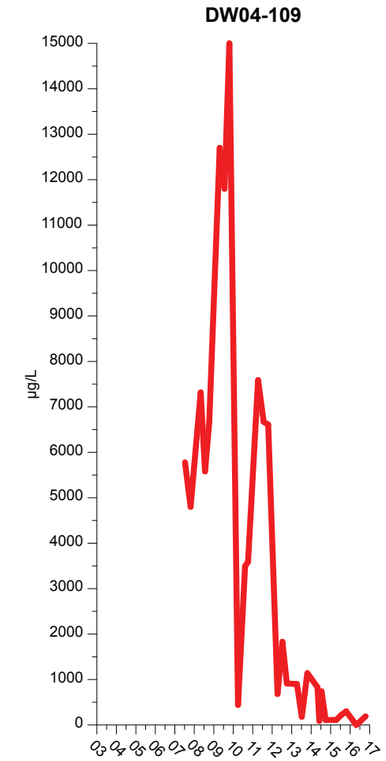
Pine Tree Landfill
Hampden, ME
Dissolved Methane
Concentration (µg/L)
through Year-End 2016

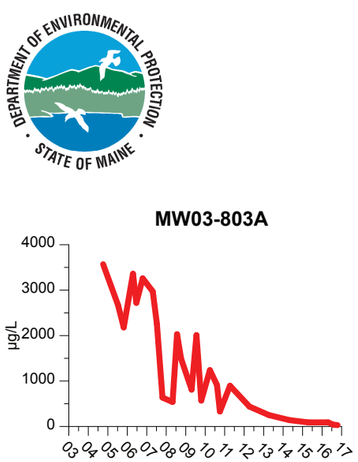
Note:
Contours based on Maximum Results from 2016

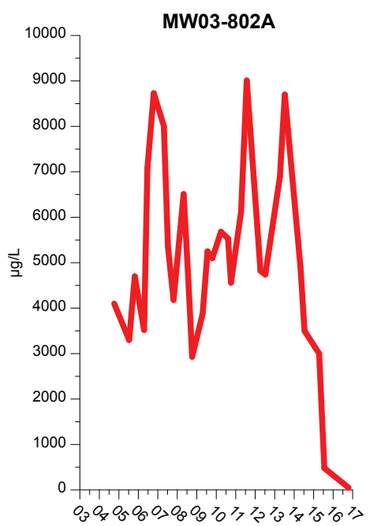


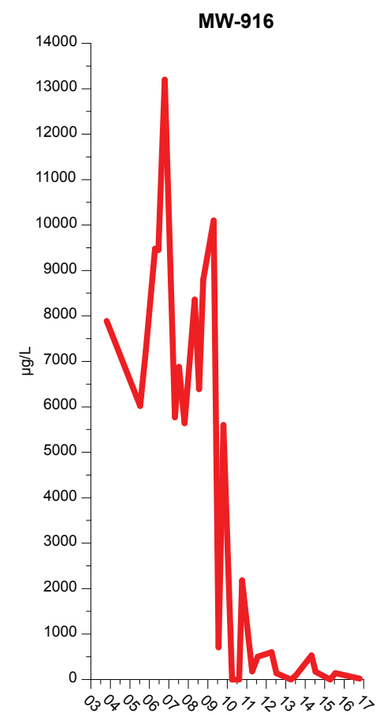



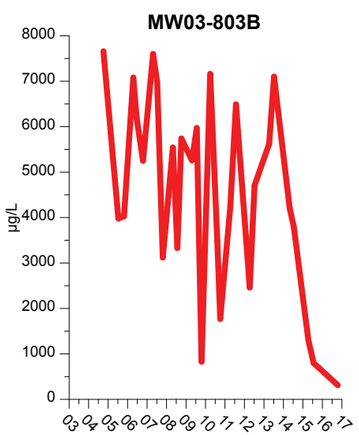



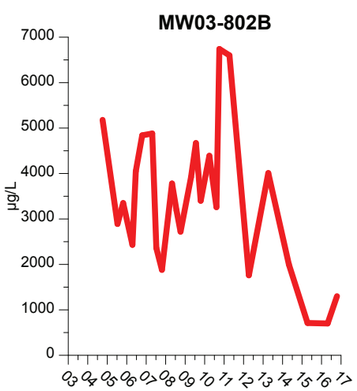



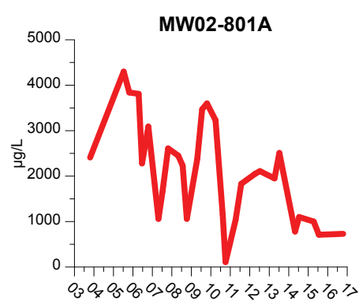



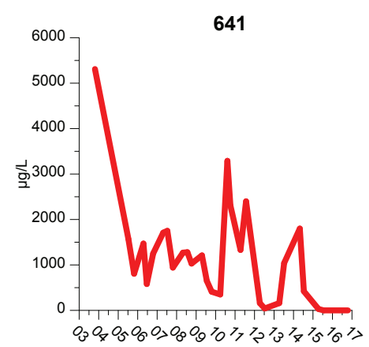



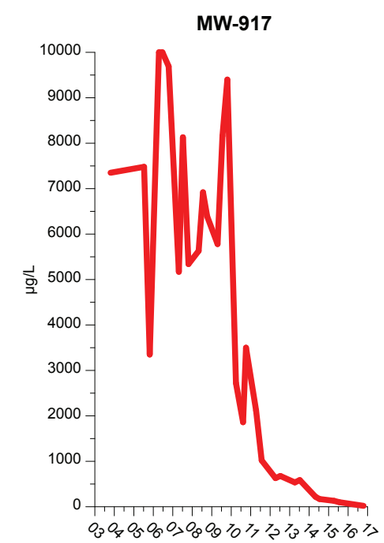




5Figure prepared by Richard Heath MEDEP
5/9/2017