# 2014 LIMITED HYDROGEOLOGIC ASSESSMENT REPORT

## SUBJECT SITE: PORTLAND BANGOR WASTE OIL FACILITY

## TENNEY HILL ROAD
## CASCO, MAINE

**Remediation Site No. 00487**

*Prepared by:*

Bureau of Remediation and Waste Management
Division of Technical Services

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Augusta, Maine 04333-0017

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## CERTIFICATION STATEMENT

I, Jason S. Langley, C.G. No. GE541, certify that I currently hold an active Certified Geologist license in the State of Maine. I further certify that the September 2014 document titled: "*2014 Limited Hydrogeologic Assessment Report, Portland Bangor Waste Oil Facility, Tenney Hill Road, Casco, Maine*" was prepared under my responsible charge.

9/30/2014

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# 1. INTRODUCTION

## 1.1 Purpose of the Hydrogeologic Assessment Report

This report has been prepared by the Maine Department of Environmental Protection (MEDEP) Technical Services staff to follow up on recommendations made in the 2012 Triennial Sampling and Well Decommissioning Report [MEDEP, 2013] for the former Portland Bangor Waste Oil (PBWO) facility in Casco, Maine (hereafter referred to as Site). This report presents a narrative discussion of fieldwork and associated observations from completed tasks during the summer of 2014 with results from a recent drinking water supply sample; transducer data collected from 5 monitoring wells with discussion and analysis; and concludes with recommendations for institutional controls together with long term groundwater monitoring.

## 1.3 Background Specific to the Hydrogeologic Assessment Report

PBWO operated a satellite storage facility in a gravel pit on Tenney Hill Road in Casco, Maine from 1969 to 1980 (**Figures 1-3**). During the late 1980s to early 1990s the USEPA investigated the PBWO facility, and volatile organic compounds (VOCs) and petroleum products were detected in soils and surface water at the gravel pit. MEDEP began investigating the gravel pit area in 1997, which culminated in a remedial investigation (RI) and removal of 6,500 tons of VOC and petroleum impacted soils from the gravel pit site in 2002-2003 [Drumlin, 2004].

After completion of the RI subsequent Site work by MEDEP included installing overburden and bedrock monitoring wells in 2005-2006, and groundwater sampling of monitoring wells in 2005, 2007, 2008, 2009 and 2012. Results from these sampling events were summarized in the aforementioned triennial report with recommendations to complete the following tasks:

1. Survey top-of-casing elevations of existing monitoring wells that were installed in 2005-2006 to tie in with other surveyed monitoring wells;

2. Collect a drinking water sample for VOCs from the Hancock DW well;

3. Deploy transducers to assess the potential pumping effects of Hancock Lumber production wells on Site monitoring wells [MEDEP, 2013].

## 2. METHODOLOGY

### 2.1 Monitoring Well Elevation Survey

At the request of MEDEP Survey Inc. of Windham Maine mapped top-of-casing (TOC) elevations for monitoring wells MW-19A, -19B, -19C, and -20B on December 15, 2013. Mapped TOC elevations were referenced to existing TOC information of other monitoring wells at the Site. This facilitated a comparison of Telog™ groundwater potentiometric surface data relative to a benchmark datum, thereby allowing for a better understanding of vertical gradients in the wells selected for this assessment.

### 2.2 Hydraulic Influence Testing

The Hancock Lumber facility has several process supply wells and one drinking water supply well "Hancock DW" which draw groundwater from granitic bedrock greater than 200 feet below ground surface (bgs). Telog™ down-hole data loggers were installed in Site monitoring wells MW-19A, -19B, -19C, -20B, and HL-1A to monitor water level fluctuations in overburden, shallow and deep bedrock from May 14 to June 3, 2014 (**Figure 2**). Each Telog™ instrument was programmed to record a water level measurement every 5 minutes. However, due to a software glitch the logger in HL-1A only recorded every 8 hours during the initial study period. That logger was reinstalled in HL-1A on June 4, and recorded every 5 minutes until it was retrieved on July 2, 2014. Plots of the resultant water level data together with daily total precipitation reported by wunderground.com for Naples, Maine are included in **Charts 1-6**.

### 2.3 Drinking Water Supply Sample

On May 22, 2014 MEDEP technical services staff collected a groundwater sample from supply well "Hancock DW" via the kitchen sink tap (**Figure 2**). The tap was allowed to run for at least 10 minutes prior to sample collection per MEDEP SOP DR#001. This sample was submitted to Katahdin for analysis of VOCs (8260B) and vinyl chloride (8260SIM), and was non-detect for all VOCs tested including Site contaminants of concern (COCs). Results from this sample are included on **Table 1** along with historical groundwater data from the selected Telog™ instrumented monitoring wells and the two closest Hancock Lumber supply wells to the VOC plume (**Figure 3**).

## 3. ASSESSMENT RESULTS

### 3.1 Telog™ Data

The data plot on **Chart 1** shows the groundwater potentiometric surface elevations for each of the instrumented monitoring wells from May 14 to June 3, 2014. Note the potentiometric surface of each well is higher than the elevation of Decker Brook (est. 315 ft) over the study period. This indicates that Decker Brook is a gaining stream continually recharged by groundwater. The MW-19 well cluster data shows a definitive upward vertical gradient from deep bedrock (MW-19A) to overburden (MW-19C) with a total head difference of approximately 6.5 ft. At the vertical scale of this plot, there is a slight response to precipitation events on May 17 and May 27, however overall potentiometric surface elevations are within +/- 1.0 ft over the study period. Overall there does not appear to be any obvious pumping effects from supply wells at Hancock Lumber. The obvious exception begins on May 24 with MW-19C and is discussed later in this section. Also note the plot of HL-1A is shown as data points connected by a smooth line because of the 8 hour recording glitch.

Looking at detailed plots of MW-19A and MW-19B (**Charts 2-3**) the response to precipitation events is of a similar magnitude and time frame, suggesting that both deep and shallow bedrock fractures are hydraulically connected. After May 29 both wells show decreasing water levels due to aquifer drainage (i.e. base flow recession).

The data for MW-19C (**Chart 4**) shows a similar magnitude but more immediate response to precipitation on May 17, which makes sense as this is a shallow overburden well. However on May 24 the data becomes erratic with no correlation to precipitation events, and with a greater magnitude than data recorded at the other monitoring wells (**Chart 1**). Most likely this erratic response represents a failure due to leakage of the pressure transducer, and not actual groundwater level fluctuations.

On the other side of Decker Brook at MW-20B (**Chart 5**) the data shows strong recharge responses to precipitation on May 17 and May 27, and base flow recession preceding the first rain event and again after May 30.

**Chart 6** shows data sets from HL-1A recorded from May 14 to June 3 (every 8 hours) and June 4 to July 2 (every 5 minutes). The gap between the two data sets is a straight line connection on the plot, and not actual data points. The second data set clearly shows a pattern of recharge from precipitation followed by base flow recession.

## 3.2 Groundwater Sampling Data

In reviewing historical groundwater sample data presented in **Table 1** it is apparent that the VOC plume has not impacted the Hancock Lumber DW or PW wells since completion of the source removal in 2003. Even pre-remedial action when source area VOCs were in the parts per million range, the detections of COCs in these wells were trace level estimates well below current MEGs.

The distribution of VOCs in the MW-19 well cluster shows that the dissolved phase has concentrated in the shallow bedrock (MW-19B), with roughly an order of magnitude difference as compared to overburden (MW-19C) and deep bedrock (MW-19A) well data. This also correlates with the strong upward vertical gradient, which has the effect of counteracting the tendency of DNAPLs such as TCE and PCE to sink. This effect has also been documented in other monitoring well clusters at the Site [MEDEP, 2013].

# 4. CONCLUSIONS AND RECOMMENDATIONS

Since the completion of remedial actions in 2003 concentrations of Site COCs in groundwater have attenuated from one to two orders of magnitude, but still persist above Maine CDC maximum exposure guidelines in some wells and will continue to do so for at least 120 years [MEDEP, 2013]. Hydraulic influence testing results presented herein show hydraulic connectivity between shallow and deep bedrock fractures as evidenced by similar responses to precipitation events and base flow recession to Decker Brook. However, pumping effects from Hancock Lumber supply wells were not observed in the selected monitoring wells, therefore COCs are unlikely to impact these wells as natural attenuation of the VOC plume continues over time as expected.

Based on the data collected to date Technical Services recommends the following:

1. Continue monitoring natural attenuation of Site COCs at a 5-year frequency in accordance with the attached long term monitoring plan (**Appendix A**);

2. Place institutional controls in the form of groundwater use restrictions on Site parcels 0005-0012, 0005-0012-A1, and 0005-0031 (**Figure 3**);

3. Restrict future development of structures or utilities over the current VOC plume (**Figure 3**);

4. Require a Soil Management Plan (SMP) for any proposed redevelopment of parcel 0005-0012-A1 along with a commercial use restriction in the event residual soil, soil vapor, or groundwater contamination is discovered at the former Site parcel.

5. Require that the Town of Casco notify MEDEP of any proposed housing developments or new residential supply wells to be installed in the immediate vicinity of the Site.

## 5. REFERENCES

Drumlin Environmental, LLC. May 2004. Remedial Investigation Report Portland-Bangor Waste Oil Site Casco, Maine.

Maine Department of Environmental Protection, August 2013. 2012 Triennial Sampling and Well Decommissioning Report, Portland Bangor Waste Oil Facility, Tenney Hill Road, Casco, Maine.

# TABLES

# TABLE 1: HISTORICAL GROUNDWATER RESULTS (2003-2012)

## PORTLAND BANGOR WASTE OIL SITE
## CASCO, MAINE

| Geologic Unit | Well ID | Screen Interval (ft bgs) | Sample Collection Date | MEG | 4 | 40 | 10000 | 10 |
|---|---|---|---|---|---|---|---|---|
| | | | | COC | TCE | PCE | 1,1,1-TCA | cis-1,2 DCE |
| Overburden | MW-19C | 8-13 | 9/30/2005 | | **61** | **2.0** | **3.0** | **14** |
| | | | 8/20/2008 | | **56** | **2.9** | **1.9** | **9.8** |
| | | | 10/29/2009 | | **22** | **1.7** | 1.0 U | **5.1** |
| | | | 9/11/2012 | | **17** | **1.4** | 1.0 U | **5.2** |
| Shallow Bedrock | MW-19B | 21-31 | 9/30/2005 | | **140** | **6.0** | **6.0** | **17** |
| | | | 8/20/2008 | | **120** | **5.4** | **4.1** | **14** |
| | | | 10/29/2009 | | **110** | **5.8** | **3.5** | **14** |
| | | | 9/11/2012 | | **100** | **4.5** | **3.6** | **15** |
| | HL-1A | 18-28 | 6/23/2003 | | **4.3** | 1.0 U | 1.0 U | 1.0 U |
| | | | 9/30/2005 | | **2.0** | 1.0 U | 1.0 U | 1.0 U |
| | | | 5/24/2007 | | 5.0 U | 5.0 U | 5.0 U | 5.0 U |
| | | | 9/11/2012 | | 1.0 U | 1.0 U | 1.0 U | 1.0 U |
| | MW-20B | 20-25 | 10/3/2005 | | **25** | **2.0** | 1.0 U | **4.0** |
| | | | 5/24/2007 | | 5.0 U | 5.0 U | 5.0 U | 5.0 U |
| | | | 8/20/2008 | | **6.9** | 1.0 U | 1.0 U | 1.0 U |
| | | | 10/29/2009 | | **11** | 1.0 U | 1.0 U | 1.0 U |
| | | | 9/12/2012 | | **11** | 1.0 U | 1.0 U | **1.4** |
| Deep Bedrock | MW-19A | 58-68 | 9/30/2005 | | **21** | 1.0 U | **1.0** | **3.0** |
| | | | 8/20/2008 | | **22** | **1.1** | 1.0 U | **3.3** |
| | | | 10/29/2009 | | **22** | **1.4** | 1.0 U | **3.4** |
| | | | 9/11/2012 | | **18** | 1.0 U | 1.0 U | **3.1** |
| Bedrock Drinking Water | Hancock DW | 295* | 3/7/2003 | | **0.54** K | **0.52** K | 1.0 U | 1.0 U |
| | | | 4/17/2003 | | **0.38** J | 0.5 U | 0.5 U | 0.5 U |
| | | | 9/30/2005 | | 1.0 U | 1.0 U | 1.0 U | 1.0 U |
| | | | 5/5/2006 | | 1.0 U | 1.0 U | 1.0 U | 1.0 U |
| | | | 5/24/2007 | | 5.0 U | 5.0 U | 5.0 U | 5.0 U |
| | | | 8/21/2008 | | 1.0 U | 1.0 U | 1.0 U | 1.0 U |
| | | | 10/30/2009 | | 1.0 U | 1.0 U | 1.0 U | 1.0 U |
| | | | 9/11/2012 | | 1.0 U | 1.0 U | 1.0 U | 1.0 U |
| | | | 5/22/2014 | | 1.0 U | 1.0 U | 1.0 U | 1.0 U |
| Bedrock Process Water | Hancock PW | 220* | 3/7/2003 | | 1.0 U | **0.51** K | 1.0 U | 1.0 U |
| | | | 4/17/2003 | | 2.0 U | 2.0 U | 2.0 U | 2.0 U |
| | | | 9/30/2005 | | 1.0 U | 1.0 U | 1.0 U | 1.0 U |
| | | | 5/5/2006 | | 1.0 U | 1.0 U | 1.0 U | 1.0 U |
| | | | 9/11/2012 | | 1.0 U | 1.0 U | 1.0 U | 1.0 U |

**Notes:**

1. MEG = Maine CDC October 2012 maximum exposure guideline for drinking water
2. Bold values indicate detection above laboratory RL or PQL
3. J or K = laboratory estimated value
4. U = not detected above laboratory PQL or RL
5. *denotes total wellbore depth in feet bgs
6. Concentrations reported in micrograms per liter (ug/L)

# FIGURES

# Figure 1: Portland Bangor Waste Oil Casco Site Location Map

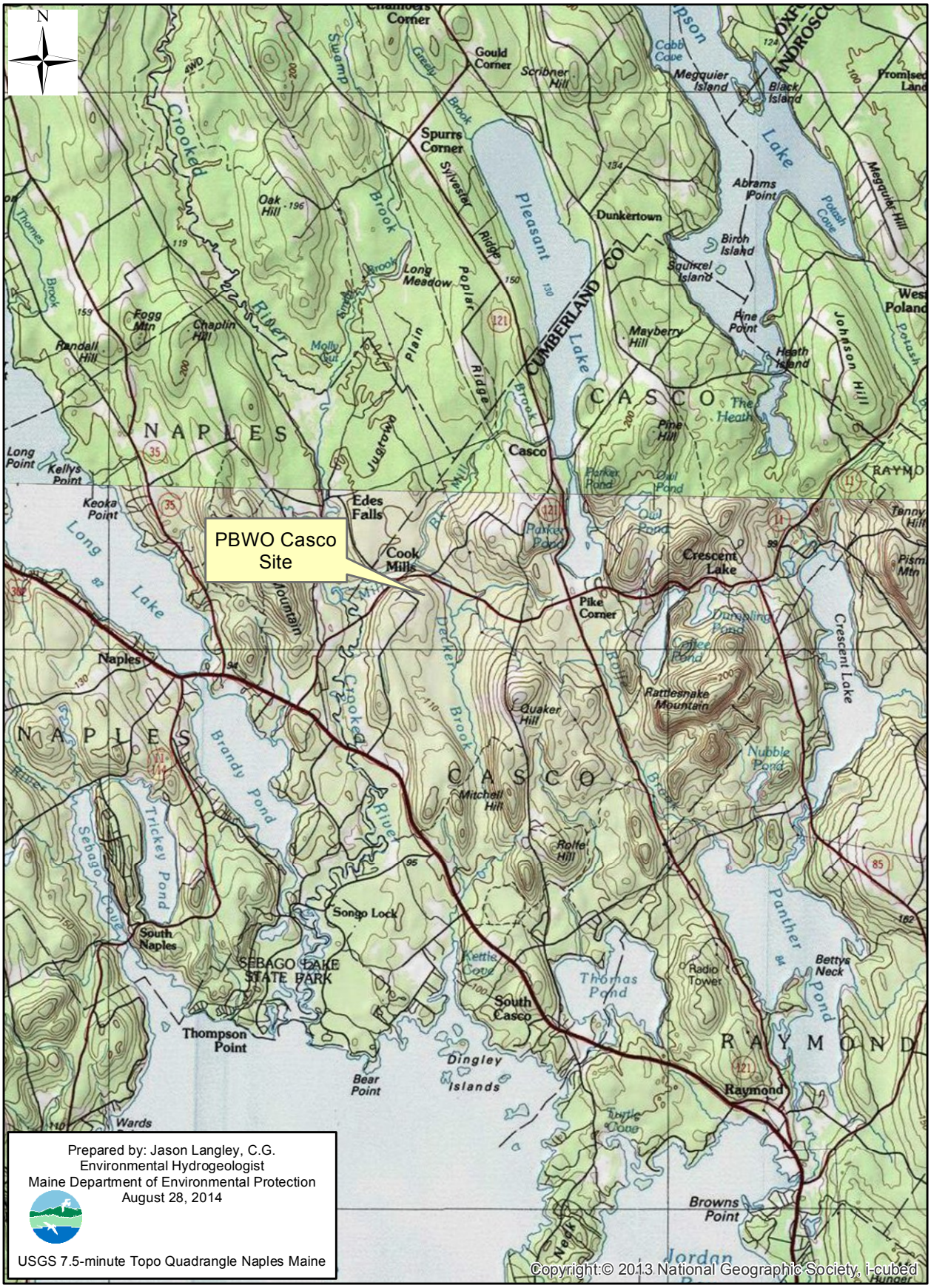


**Figure 2: Portland Bangor Waste Oil Casco**
**Monitoring Well Transducer Study Locations**

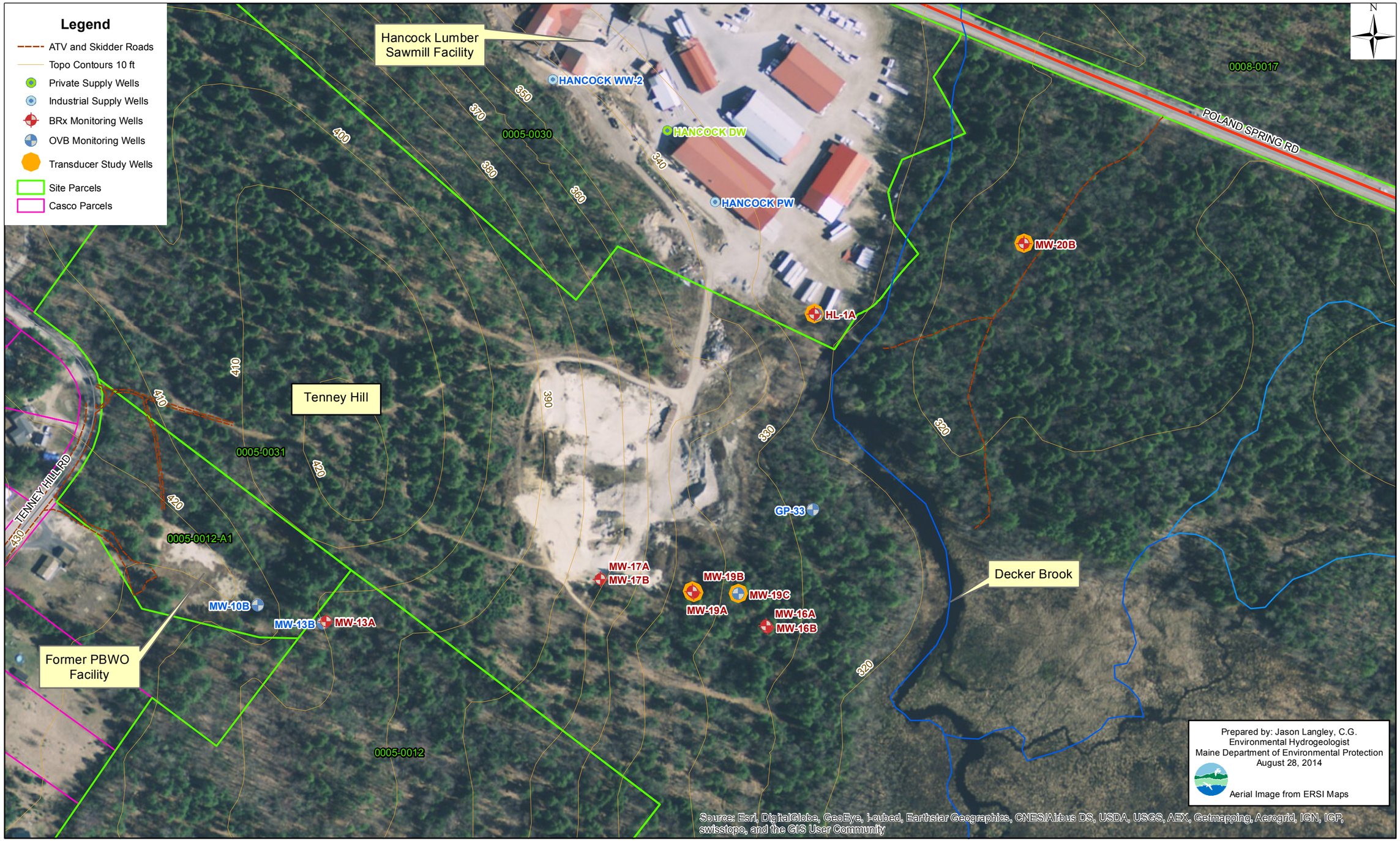
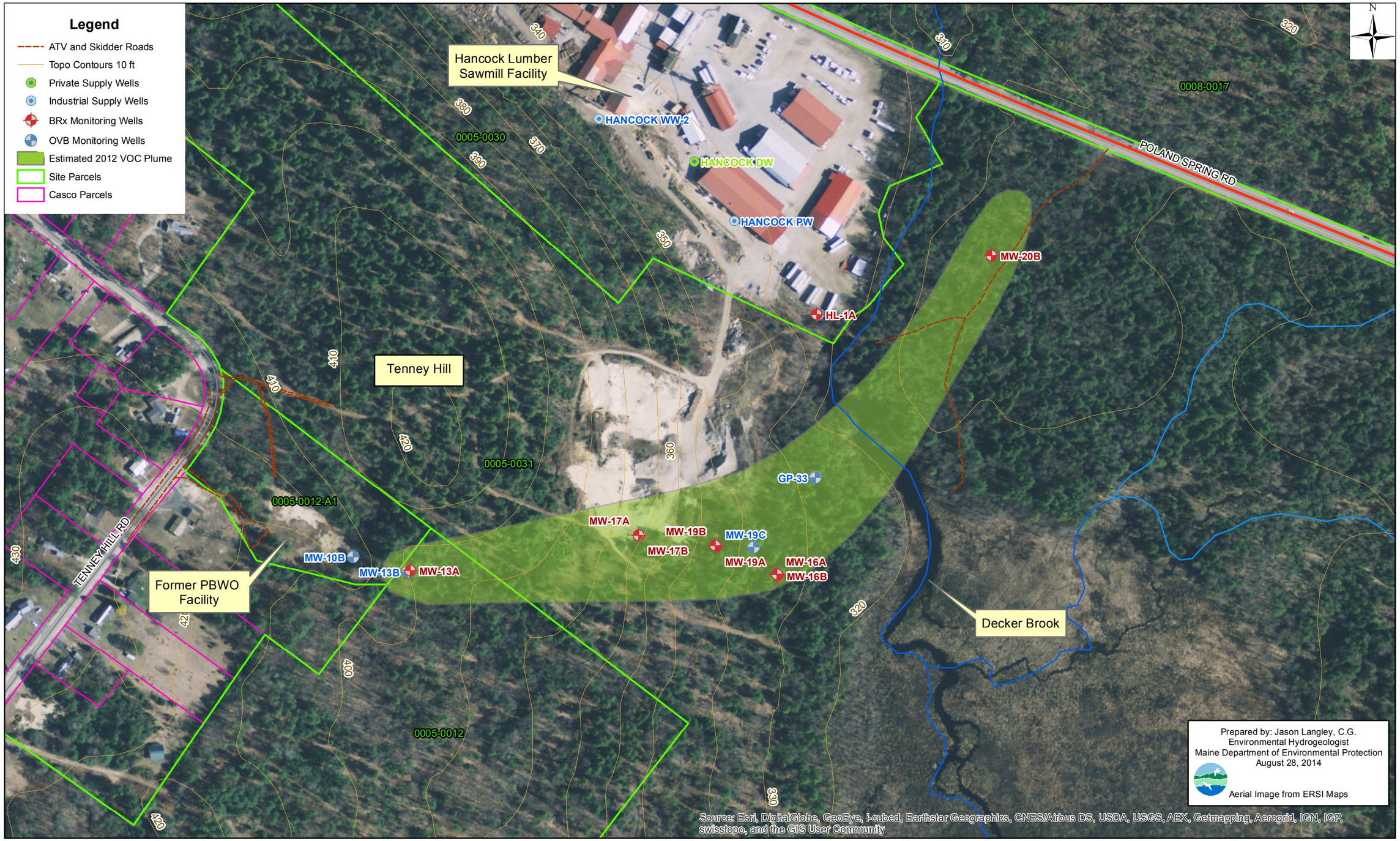


**Figure 3: Portland Bangor Waste Oil Casco**
**Estimated VOC Plume and Parcel Boundaries**



# CHARTS

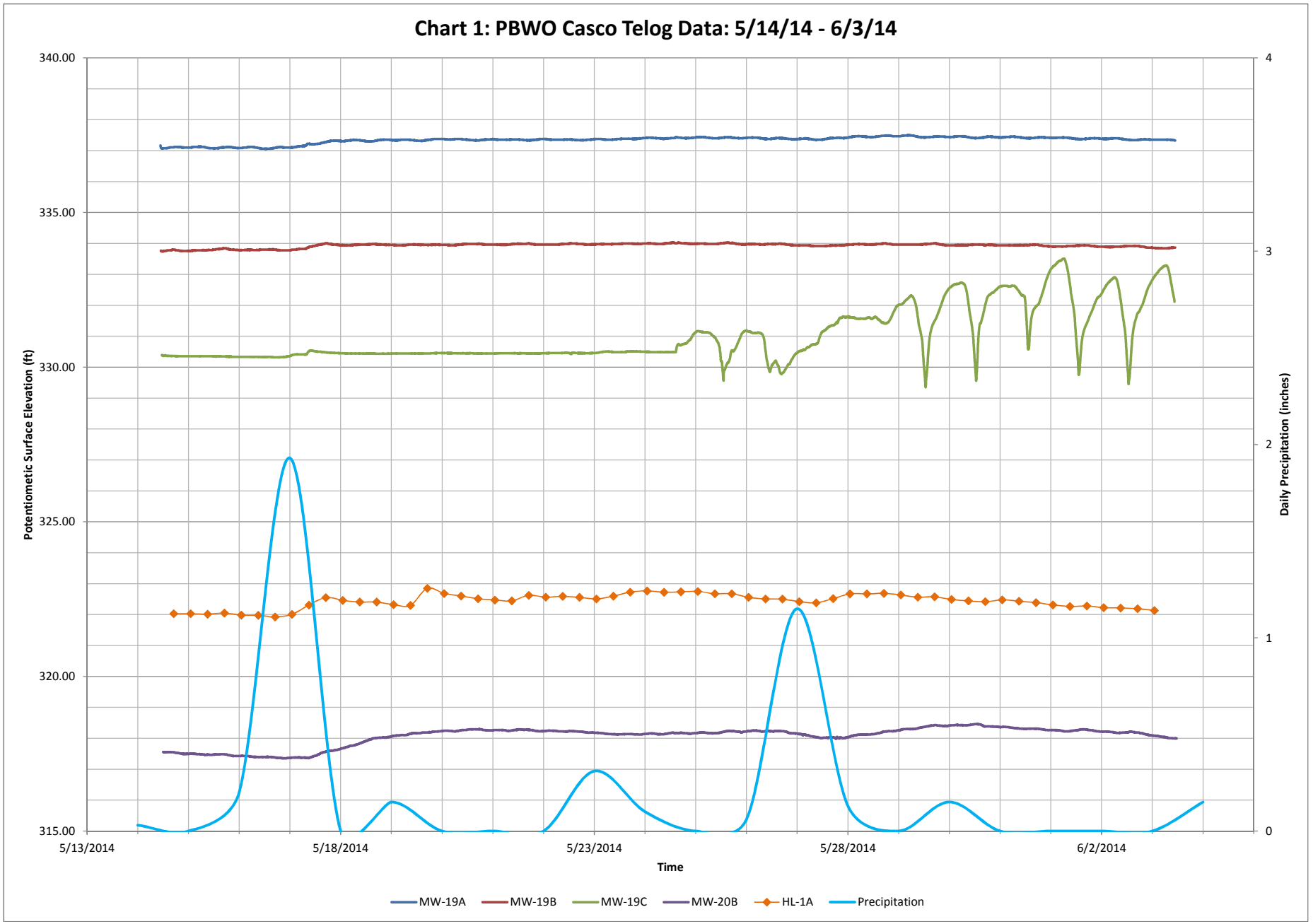
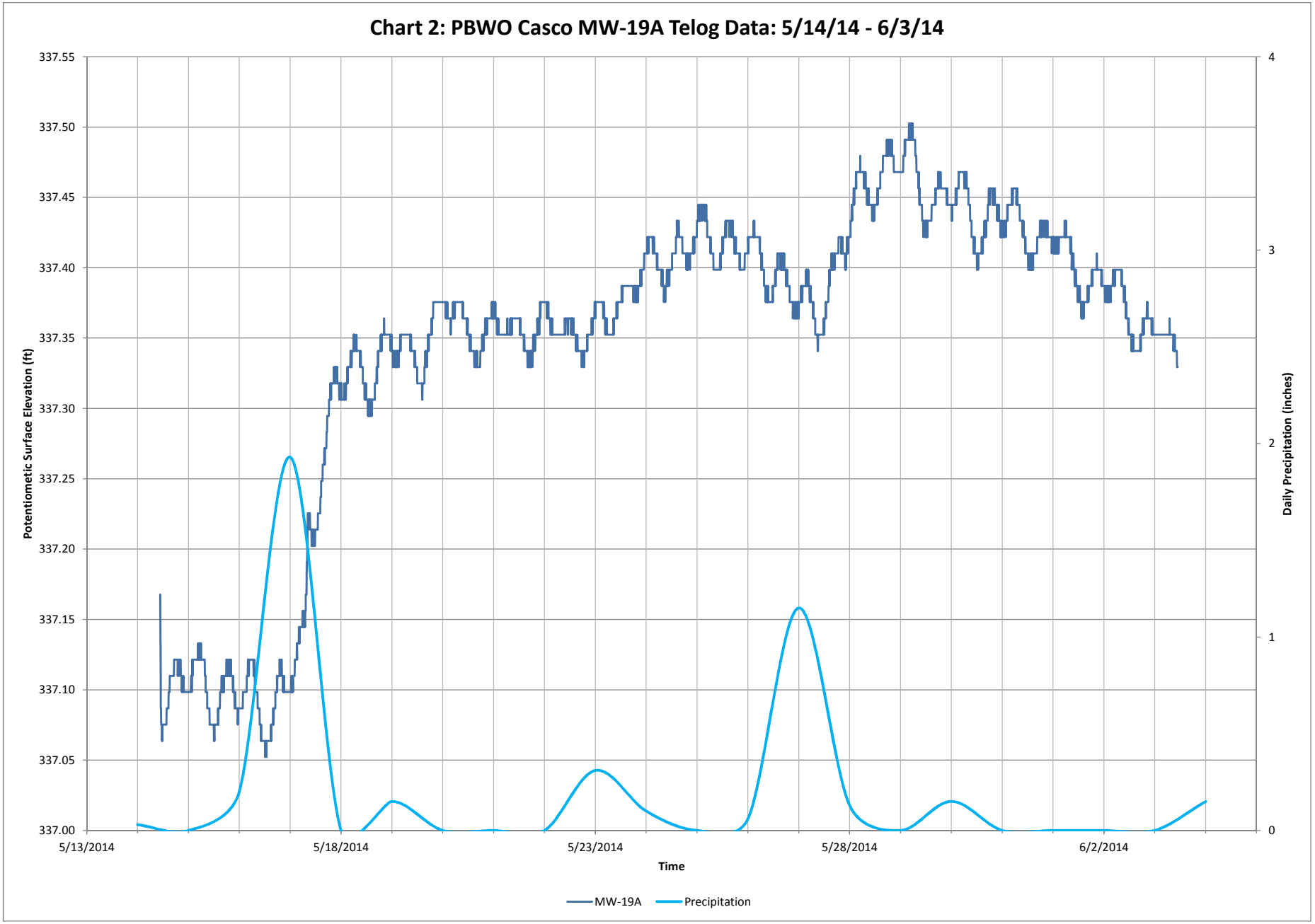
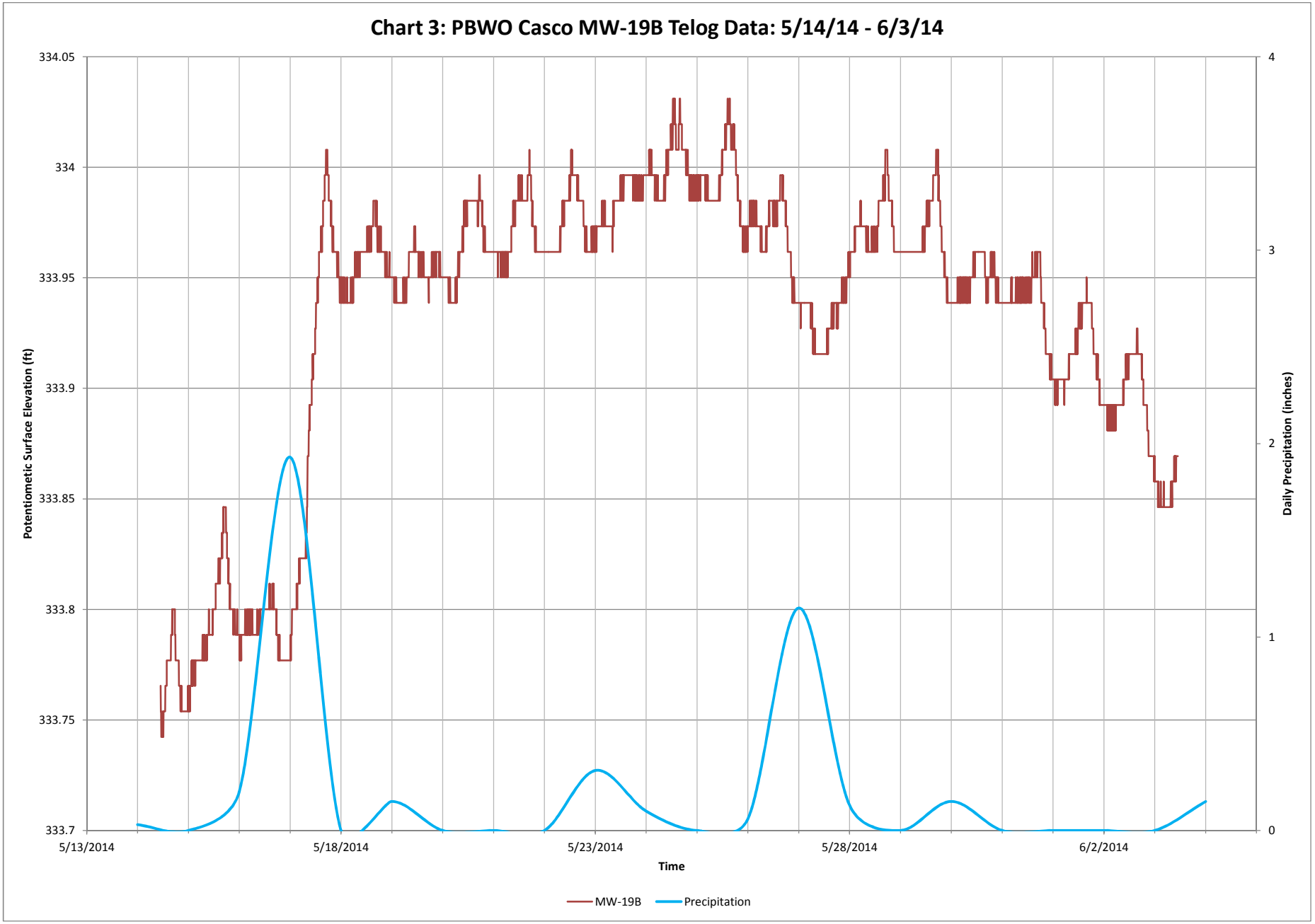


Chart 1: PBWO Casco Telog Data: 5/14/14 - 6/3/14
340.00
335.00
330.00
325.00
320.00
315.00
Potentiometic Surface Elevation (ft)
4
3
2
1
0
Daily Precipitation (inches)
5/13/2014
5/18/2014
5/23/2014
5/28/2014
6/2/2014
Time
MW-19A
MW-19B
MW-19C
MW-20B
HL-1A
Precipitation

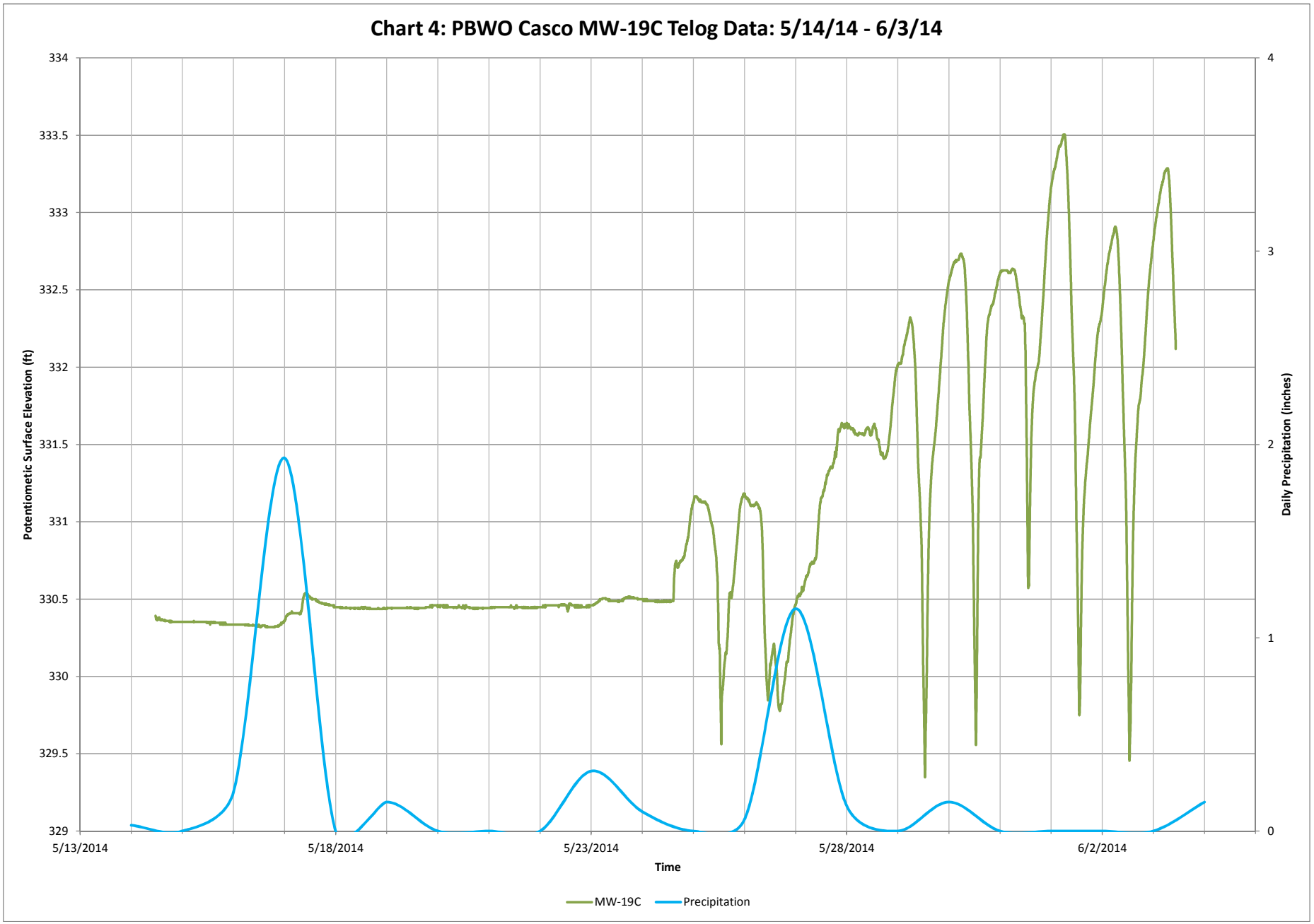
## Chart 2: PBWO Casco MW-19A Telog Data: 5/14/14 - 6/3/14




TOC ELEV 353.34 ft
Screen 58-68 ft BTOC

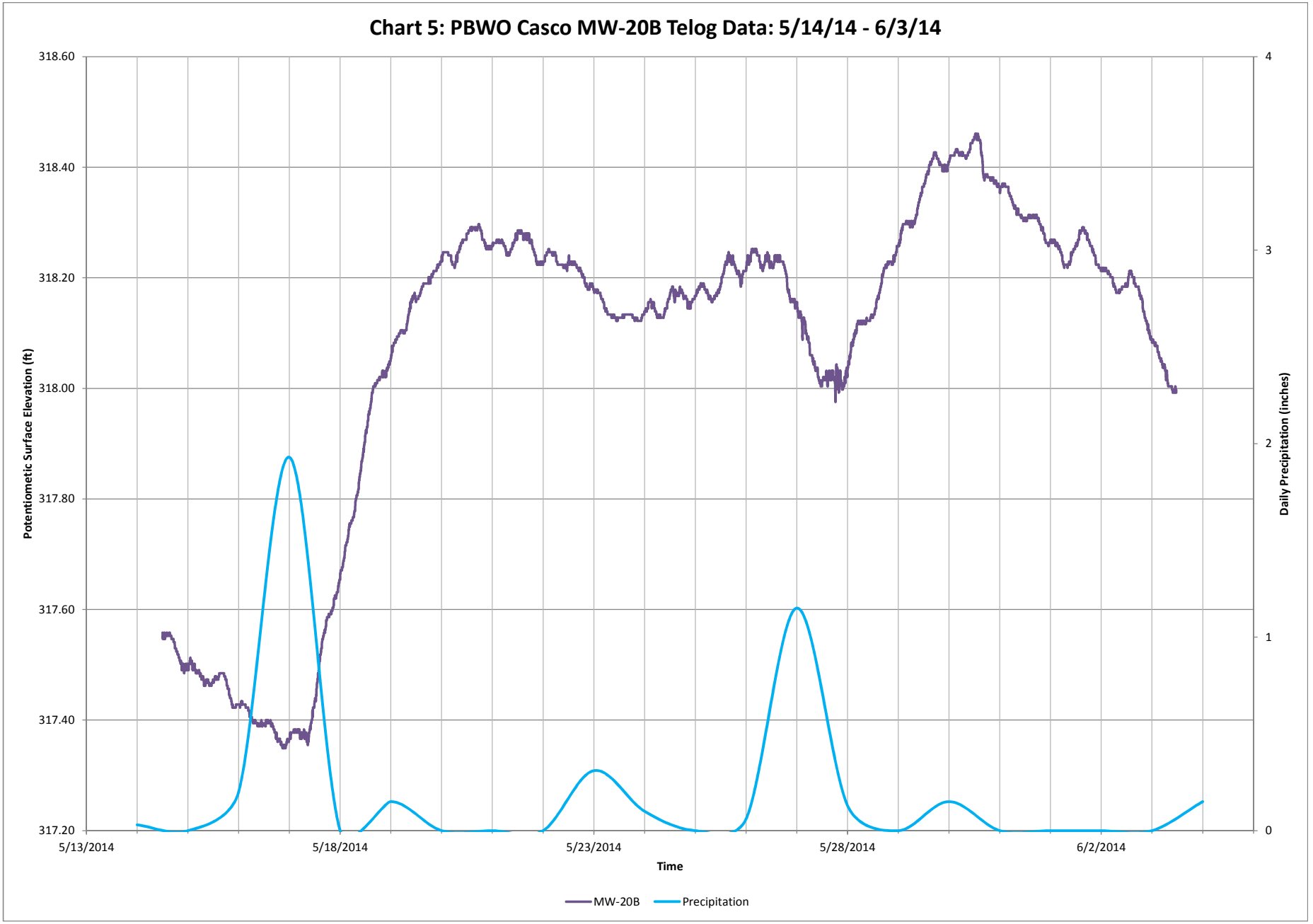



TOC ELEV 353.36 ft
Screen 21-31 ft BTOC




TOC ELEV 334.04 ft
Screen 8-13 ft BTOC

## Chart 5: PBWO Casco MW-20B Telog Data: 5/14/14 - 6/3/14




TOC ELEV 329.92 ft
Screen 20-25 ft BTOC

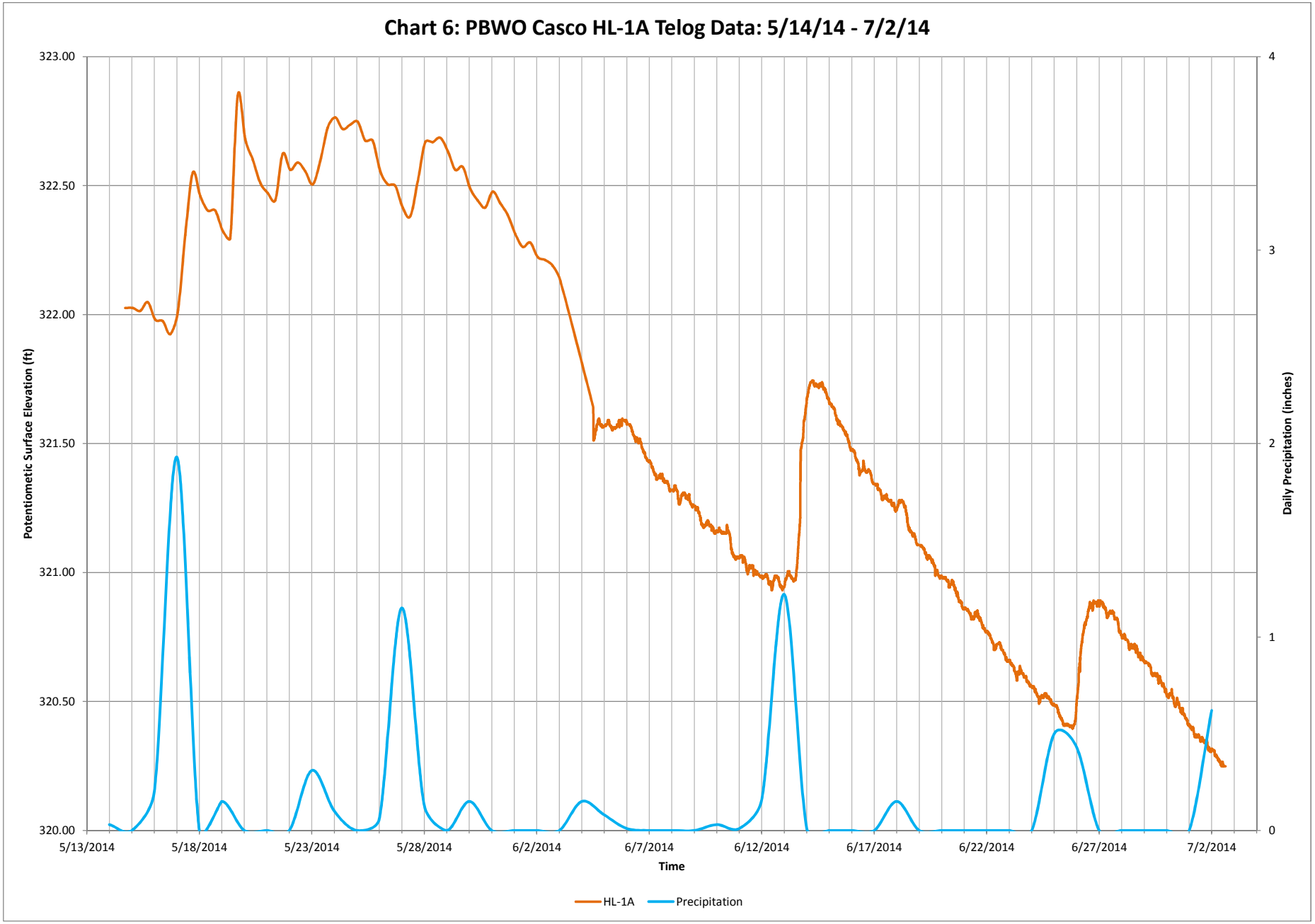


Chart 6: PBWO Casco HL-1A Telog Data: 5/14/14 - 7/2/14
Potentiometic Surface Elevation (ft)
323.00
322.50
322.00
321.50
321.00
320.50
320.00
Daily Precipitation (inches)
4
3
2
1
0
5/13/2014
5/18/2014
5/23/2014
5/28/2014
6/2/2014
6/7/2014
6/12/2014
6/17/2014
6/22/2014
6/27/2014
7/2/2014
Time
HL-1A
Precipitation

# APPENDIX A

# LONG TERM MONITORING PLAN

# Bureau of Remediation Technical Services
# Long Term Groundwater Sampling Plan

## Portland Bangor Waste Oil Facility
## Casco, Maine

Nicholas Mayhew, Project Manager
Jason Langley, Project Geologist

### Historical Summary

The Portland Bangor Waste Oil (PBWO) site located on Tenney Hill Road in Casco was a formerly licensed waste oil facility that accepted various petroleum products and solvents for disposal and/or storage in above ground storage tanks. Subsequent investigations by the MEDEP and EPA in the late 1990's found soil and groundwater contaminated with chlorinated solvents such as TCE, PCE, 1,1,1-TCA and waste oils as indicated by elevated levels of diesel range organics (DRO). Actions taken by MEDEP in 2003 to remove contaminated soil at the site helped reduce the risk of exposure, and eliminated source materials that were continuing to contaminate groundwater in overburden materials and granitic bedrock. Subsequent analysis of site monitoring wells in 2005, 2007, 2008, 2009, and 2012 showed attenuation of chlorinated solvents and waste oil in groundwater, resulting in the elimination of some groundwater monitoring points and the reduction of groundwater sampling requirements to once every five years.

### Long Term Monitoring Plan

Sampling events are to be completed every 5 years beginning in 2017. The recommended time of year to complete the sampling is late fall (October or November) when vegetation is not as overgrown and restrictive of access to the monitoring wells.

At least two weeks prior to the scheduled sampling event, DEP staff should contact Hancock Lumber and conduct a site visit to verify the existence and locations of monitoring wells, as well as collect depth-to-water measurements from all site monitoring wells. DEP staff should bring bolt-cutters and lubricant in case monitoring well padlocks have rusted or become inoperable since the previous sampling event. Please note groundwater in MW-10B and MW-13B is of **very low conductivity**, so be sure to bring various depth-to-water meters when measuring these wells!

Each sampling event includes a total of 16 sample locations (5 overburden wells, 6 shallow bedrock wells, 3 deep bedrock wells, and 2 supply wells at Hancock Lumber). Refer to **Figure 1** for an overall layout of the site and sampling locations. **Table 1** provides a summary of monitoring well information and lab analyses/QC for each sample location. Trip blanks must be provided for each

cooler containing VOC samples and included on the chain of custody for analysis. Sample containers will be provided by Katahdin Analytical Services or comparable Maine DEP pre-qualified analytical laboratory and tested for VOCs by EPA 8260 with reporting limits for Site COCs (TCE, PCE, cis-1,2-DCE, and 1,1,1-TCA) not to exceed 1.0 ppb.

**Table 1: PBWO Casco LTM Groundwater Sampling**

| Groundwater Sample Points | Geologic Unit | Well Dia. (inches) | Screen Int (ft BGS) | 2012 TCE (ppb) | Sample Analyses EPA 8260 VOCs |
|---|---|---|---|---|---|
| GP-33 | OvB | 1 | 1-4 | **1.8** | X |
| HL-1B | | 2 | 5-10 | ND | X |
| MW-19C | | 2 | 8-13 | **18** | X |
| MW-13B | | 2 | 6.5-16.5 | **590** | X |
| MW-10B | | 2 | 9-19 | ND | X |
| HL-1A | Shal-Brx | 2 | 18-28 | ND | X |
| MW-13A | | 1 | 24-34 | **26** | X |
| MW-16B | | 1 | 23-33 | **3.3** | X |
| MW-17B | | 1 | 22-32 | **20** | X |
| MW-19B | | 2 | 21-31 | **100** | X + DUP |
| MW-20B | | 2 | 20-25 | **11** | X |
| MW-16A | Deep-Brx | 1 | 55-65 | **2.2** | X |
| MW-17A | | 1 | 77-87 | **3.4** | X |
| MW-19A | | 2 | 58-68 | **18** | X |
| Hancock PW | Brx | 6 | | ND | X |
| Hancock DW | Brx | 6 | | ND | X |

Groundwater monitoring wells will be sampled using modified low flow protocols with a peristaltic pump in accordance with MEDEP SOP RWM-DR-003. Field parameters such as dissolved oxygen (DO), pH, specific conductivity, oxidation reduction potential (ORP), temperature, and turbidity must be recorded during purging. Supply well "Hancock DW" will be collected from the bathroom sink inside the main office building, and "Hancock PW" will be collected from the pump house spigot. Both supply wells will be sampled in accordance with MEDEP SOP RWM-DR-001.

**Sampling Event Equipment List**

VOA vials supply wells (6 plus trip blank)
VOA vials site wells (48 plus field duplicate)
Sample labels
Sample coolers and ice
Chain of custody
Monitoring well sample forms
Gloves
Spigot adapters
Decon bottles
Depth to water meter(s)
Peristaltic pump(s)
Deep cycle batteries
YSI 556MPS multi meter(s) (*rent from Pine Environmental*)
Turbidity meter(s)
Graduated cylinders (flow rate)
PE and silicone tubing
Knife or tubing cutter
Bolt cutters
Master padlock keys
Machete or brush clearing tools
Clamps
Plastic table(s)
Bright orange safety clothing

**TAMS Information**
General Fund, PTLD BANGOR WASTE OIL, CASCO, REM00487

**Phone Numbers**

| **Contact** | **Office** | **Cell** |
|---|---|---|
| Shelley Brown (Katahdin) | 874-2400 | 749-5711 |
| Pine Environmental | 885-9100 | |
| Wayne York (H. Lumber) | 627-7676 | 318-4075 |
| Jason Langley (MDEP) | 287-6829 | 263-8957 |
| Nicholas Mayhew (MDEP) | | 215-9619 |

**Figure 1: Portland Bangor Waste Oil Casco**
**Long Term Monitoring Site Plan**