MEMORANDUM

To: Dr. Charles Andrews
S. S. Papadopulos & Associates, Inc.
7944 Wisconsin Avenue
Bethesda, MD 20814

Sarah Prowell, R.G.
Prowell Environmental, Inc.
Phone: 503/452-0972
E-mail: sprowell@ix.netcom.com

Date: July 26, 2012

RE: 2012 Monitoring and Contingency Plan for PWB Pumping Events
TSA Remedy, East Multnomah County, Oregon

1. Introduction

This memorandum is prepared for the Troutdale Sandstone Aquifer (TSA) Remedial Action being implemented under the Oregon Department of Environmental Quality's (DEQ's) Consent Order No. WMCSR-NWR-96-08 (DEQ, 1997). It presents plans for groundwater monitoring during periods of Columbia South Shore Well Field operation by the Portland Water Bureau (PWB). It additionally presents water quality criteria for the purpose of triggering consultation and decision making with the DEQ and PWB, should contingency actions for plume control or well field protection be needed. PWB production wells that are nearest to the TSA remedy area are shown in Figure 1. TSA remedy response monitoring wells are shown in Figures 2, 3, and 4.

Requirements for TSA remedy contingency plans are outlined in DEQ's Record of Decision[1] (DEQ, 1996) and Consent Order[2] for the TSA remedy. Those requirements were initially addressed in the 1998 Revised System Optimization and Performance Evaluation Plan[3] (Revised SOPEP; Landau Associates, Prowell Environmental, and Pegasus Geoscience, 1998), which was issued during phased startup of the TSA remedy. This document updates and supersedes the Revised SOPEP to incorporate actions consistent with restoration progress and plume shrinkage that has occurred since phased remedy startup began in 1996. This document additionally updates the *2009 Monitoring and Contingency Plan for PWB Pumping Events, TSA Remedy, East Multnomah Count, Oregon* (Prowell Environmental and Landau Associates, 2009) to reflect plans for decommissioning consultation threshold well BOP-43(ds), per DEQ's July 11, 2012 email (DEQ, 2012).

2. Objectives and Approach

The primary operational objectives of the TSA remedy are to maintain TSA plume control, continue restoration progress during periods of both non-PWB pumping and active PWB pumping, as established

[1] Section 9.15 of TSA *Remedial Action Record of Decision.*
[2] Attachment B, Section F of *DEQ Consent Order No. WMCSR-NWR-96-08*.
[3] Section 3.0 of *Revised SOPEP*.

in the ROD and Consent Order[4]. While ongoing baseline remedy monitoring provides data sufficient for evaluating performance during periods of non-PWB pumping, additional TSA remedy response monitoring outlined in this memorandum will be performed during periods of active PWB pumping. The data will be used to evaluate the hydraulic affects of well field operation on horizontal and vertical TSA plume control. The response monitoring program will be implemented when the PWB operates TSA, Sand and Gravel Aquifer (SGA), and/or Blue Lake Aquifer (BLA) production wells for more than 30 days for augmentation or emergency scenarios.

Contingency remedy response monitoring wells have been selected from the Upper TSA, Lower TSA, and SGA to evaluate hydraulic and water quality conditions between the area of the plume and PWB production wells at locations where hydraulic responses are most likely to occur. If contaminant concentrations in selected "threshold" monitoring wells are found to exceed the threshold level established in this plan during or near the end of a PWB pumping event, contingency action consultation will be held with DEQ and the PWB to evaluate whether response actions are needed.

3. Response Monitoring and Consultation Threshold

Selected TSA remedy monitoring wells and their associated monitoring frequencies were most recently identified in the 2009 *Monitoring and Contingency Plan for PWB Pumping Events* and remain unchanged, with the following exceptions:

- Removing Upper TSA consultation threshold well BOP-43(ds), in response to plans to decommission this well [and associated cluster wells BOP-43(dg) and BOP-68(usg)], per DEQ's email dated July 11, 2012.
- Adding BOP-21(ds) as a replacement Upper TSA consultation threshold well, replicating the former BOP-43(ds) water level, datalogger, and threshold water quality monitoring schedule. BOP-21(ds) is located approximately 600 feet southwest of BOP-43(ds).

The updated 2012 response monitoring schedule is outlined in Table 1 and shown in Figures 2 through 4 for the Upper TSA, Lower TSA, and SGA, respectively.

The monitoring is designed to address two PWB pumping duration scenarios, including (1) periods of well field operation lasting more than 30 days but less than 90 days and (2) periods of well field operation lasting more than 90 days.

(1) For PWB pumping events lasting more than 30 days but less than 90 days, the TSA remedy groundwater monitoring program will include:

- Manual water level measurements in selected monitoring wells shown in Table 1 within approximately one week of pumping cessation, when the schedule is known in advance

[4] See DEQ's August 19, 2004 letter for the most recent update of remedy performance criteria.

- Continuous water level monitoring in selected monitoring wells, using dedicated electronic data logging equipment
- Groundwater quality sample collection from selected monitoring wells shown in Table 1 within 30 days of pumping start-up and within 30 days of pumping cessation. Regularly scheduled water quality samples may be used if collected within this timeframe.

(2) For PWB pumping events lasting more than 90 days, the TSA remedy groundwater monitoring program will include:

- Manual water level measurements in all baseline remedy monitoring wells (listed in Table 2-2 of the most recent TSA semiannual performance report [Prowell Environmental, Landau Associates, and S. S. Papadopulos & Associates, 2012) within approximately one week of pumping cessation, when the schedule is known in advance
- Continuous water level monitoring in selected monitoring wells, using dedicated electronic data logging equipment
- Groundwater quality sample collection from selected wells within 30 days of pumping start-up, 90 days after startup, and every subsequent 90 days until pumping ends. A final sampling round shall be performed within 30 days of pumping cessation.

One or more "threshold" monitoring wells have been identified within each of the TSA subunits and within the SGA for use in comparing TCE groundwater concentrations to the threshold concentration of 5 μg/L TCE (i.e., the TSA remedy cleanup level for TCE in groundwater). If the TCE concentration in any threshold monitoring well equals or exceeds 5 μg/L, the individual well(s) will be resampled. If the resample results indicate a TCE concentration equal to or greater than 5 μg/L, the threshold exceedance will be considered "confirmed" and will trigger consultation with DEQ and the PWB to determine whether contingency actions may be appropriate.

The threshold monitoring wells include Upper TSA well BOP-21(ds), Lower TSA wells BOP-20(dg), EMC-2(dg) and PWB-1(lts), and SGA wells BOP-44(usg) and PWB-1(usg). A list of the response monitoring wells and schedules are presented in Table 1 and Figures 1 through 3, attached. Monitoring results will be presented in TSA remedy quarterly data reports and annual performance reports.

4. References

Department of Environmental Quality, 2012. Email to S. Prowell, Prowell Environmental *Re: TSA Remedy: BOP-43(ds,dg) and BOP-68(usg) property owner's requests*. July 11.

Department of Environmental Quality, 1997. *DEQ Order on Consent No. WMCSR-NWR-96-08 In the Matter of The Boeing Company and Cascade Corporation*, February 14.

Department of Environmental Quality, 1996. *DEQ Remedial Action Record of Decision for the East Multnomah County Groundwater Contamination Site, Troutdale Sandstone Aquifer. Oregon Department of Environmental Quality*. December.

Landau Associates, Prowell Environmental, and Pegasus Geoscience, 1998. *Revised System Optimization and Performance Evaluation Plan, Troutdale Sandstone Aquifer, East Multnomah County, Oregon*. March 31.

Prowell Environmental and Landau Associates, 2009. *Monitoring and Contingency Plan for PWB Pumping Events, TSA Remedy, East Multnomah County, Oregon*. July 2.

Prowell Environmental, Landau Associates, and S. S. Papadopulos & Associates, 2012. *Semiannual Performance Report: October 1, 2011 through March 31, 2012, Troutdale Sandstone Aquifer Remedy, East Multnomah County, Oregon*. May 14.

Memorandum enclosures:

Table 1. Response Monitoring During PWB Well Field Pumping - Updated 2012
Figure 1. PWB Production Well Locations and TSA Plume Size Reduction
Figure 2. Upper TSA Monitoring Locations During PWB Pumping – Updated 2012
Figure 3. Lower TSA Monitoring Locations During PWB Pumping – Updated 2012
Figure 4. SGA Monitoring Locations During PWB Pumping – Updated 2012

cc: John Cushing, Cascade Corporation
Ken Chaput, The Boeing Company
Chris Kimmel, Landau Associates

Table 1
Response Monitoring During PWB Wellfield Pumping - Updated 2012
TSA Remedy - East Multnomah County

Well	Aquifer	Water Levels During PWB Pumping	Water Quality Sampling			Threshold Consultation Criterion	Monitoring Responsibility
			PWB BLA Pumping	PWB TSA Pumping	PWB SGA Pumping		
BOP-20(ds)	Upper TSA	C	-	-	-	-	Boeing
BOP-21(ds)	Upper TSA	C,M	-	P	-	5 μg/L TCE	Boeing
BOP-22R(ds)	Upper TSA	C,M	-	P	-	-	Boeing
BOP-43(ds)	Upper TSA	**Discontinue**	-	-	-	-	Cascade
BOP-44(ds)	Upper TSA	C,M	-	P	-	-	Cascade
BOP-60(ds)	Upper TSA	C	-	-	-	-	Boeing
BOP-70(ds-215)	Upper TSA	C	-	P	-	-	Cascade
BOP-71(ds)	Upper TSA	C	-	P	-	-	Cascade
BOP-20(dg)	Lower TSA	C,M	-	P	P	5 μg/L TCE	Boeing
BOP-22R(dg)	Lower TSA	C,M	-	P	P	-	Boeing
BOP-44(dg)	Lower TSA	C,M	-	P	P	-	Cascade
EMC-2(dg)	Lower TSA	C,M	P	-	P	5 μg/L TCE	Cascade
PWB-1(lts)	Lower TSA	C,M	P	-	P	5 μg/L TCE	Cascade
BOP-44(usg)	Upper SGA	C,M	-	-	P	5 μg/L TCE	Cascade
EMC-2(usg)	Upper SGA	C,M	P	-	P	-	Cascade
PWB-1(usg)	Upper SGA	C,M	-	-	P	5 μg/L TCE	Cascade

Notes:

C = Continuous water level data collected with dataloggers.

M = Manual water levels to be measured in wells noted above within 1 week before the end of PWB pumping, when schedule is known in advance and pumping has lasted >30 days. If pumping lasts >60 days, the end of pumping water levels will be measured in all remedy baseline water level monitoring wells.

P = If pumping lasts <30 days, no samples are required. If pumping lasts >30 days, initial water quality sampling will be performed within 30 days of pumping start-up and final sampling will be performed within 30 days of end of pumping. Regularly scheduled water quality samples may be used for initial or final samples if collected within 30 days of a required sample. If pumping last >90 days, sampling will be performed every 90 days until pumping ends.

μg/L = micrograms per liter.

Wells shown in boxes are identified as consultation threshold wells. If TCE is detected at or above 5 micrograms per liter for two consecutive sampling events in these wells, Cascade and Boeing will coordinate with DEQ and the PWB to discuss and determine whether actions are appropriate.

Upper TSA consultation threshold well BOP-43(ds) is planned for decommissioning in 2012. The BOP-43(ds) threshold well monitoring schedule has been transferred to newly added Upper TSA well BOP-21(ds), per DEQ's July 11, 2012 email request.

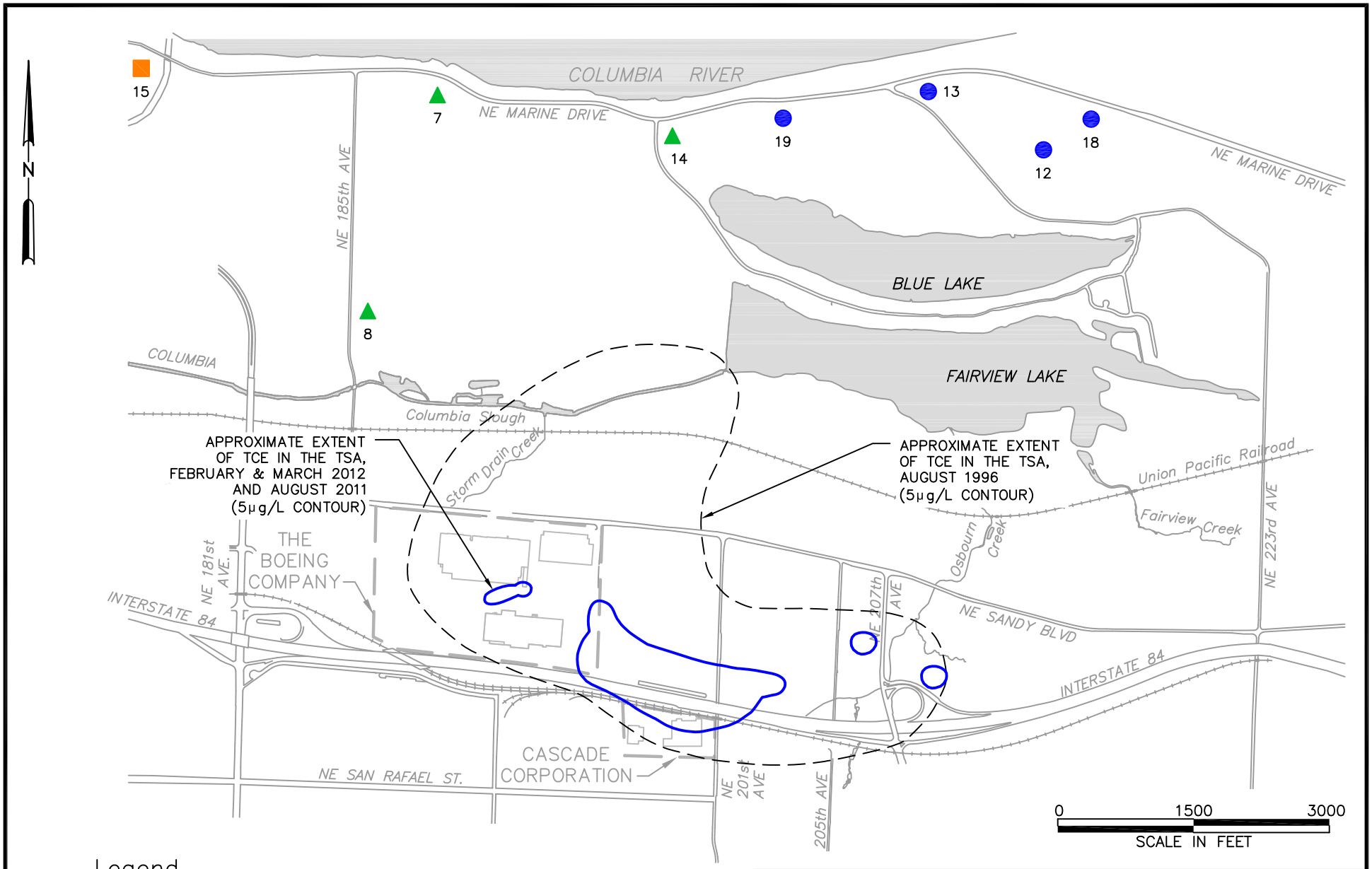

Figure 1
PWB Production Well Locations
And TSA Plume Size Reduction
TSA Remedy – East Multnomah County

Y:\Prowell Environmental\Cascade\TSA Monitoring for PWB Pumping\2012\Figure1.dwg 7/23/12

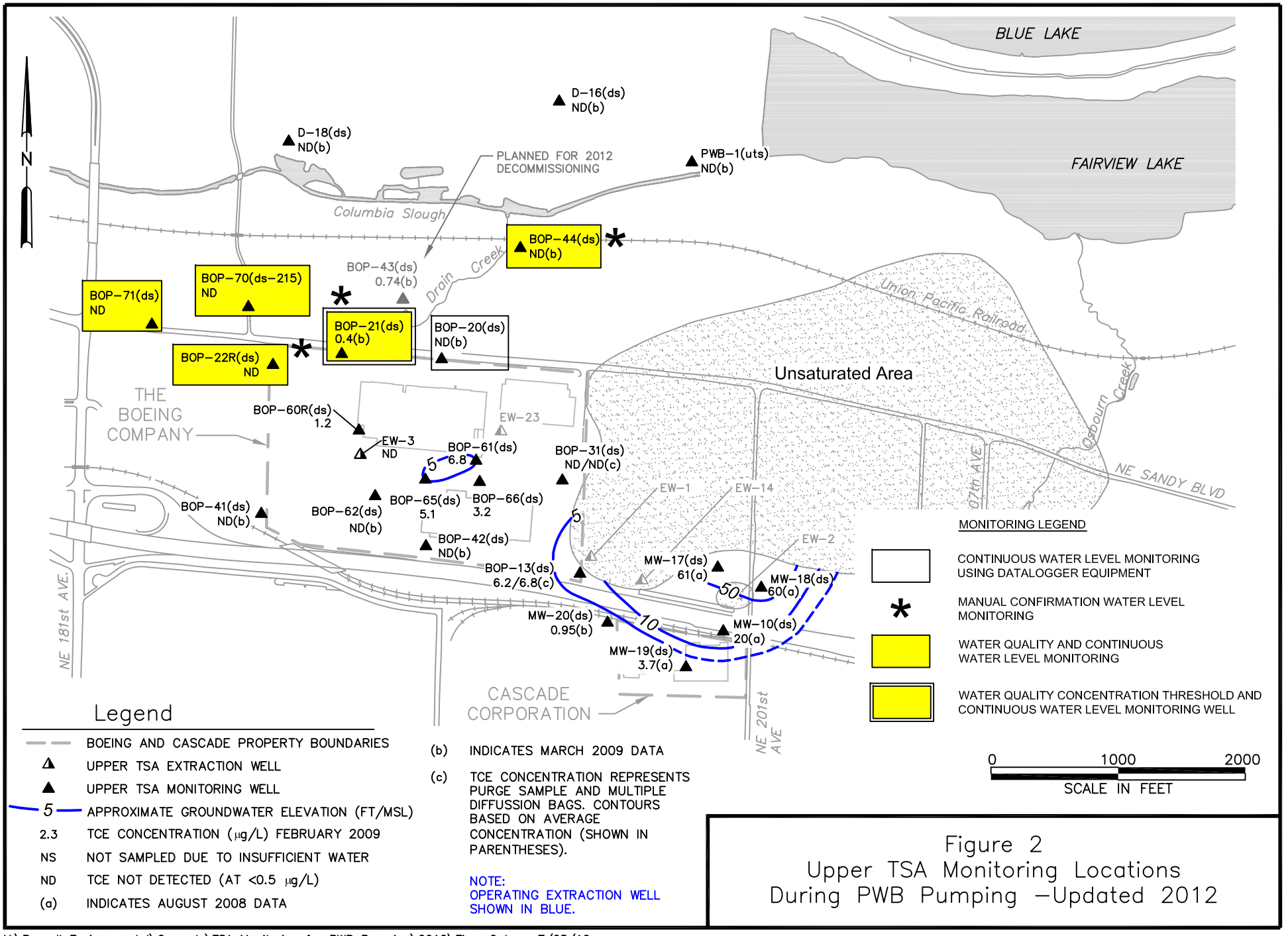

Figure 2
Upper TSA Monitoring Locations
During PWB Pumping –Updated 2012

Y:\Prowell Environmental\Cascade\TSA Monitoring for PWB Pumping\2012\Figure2.dwg 7/25/12

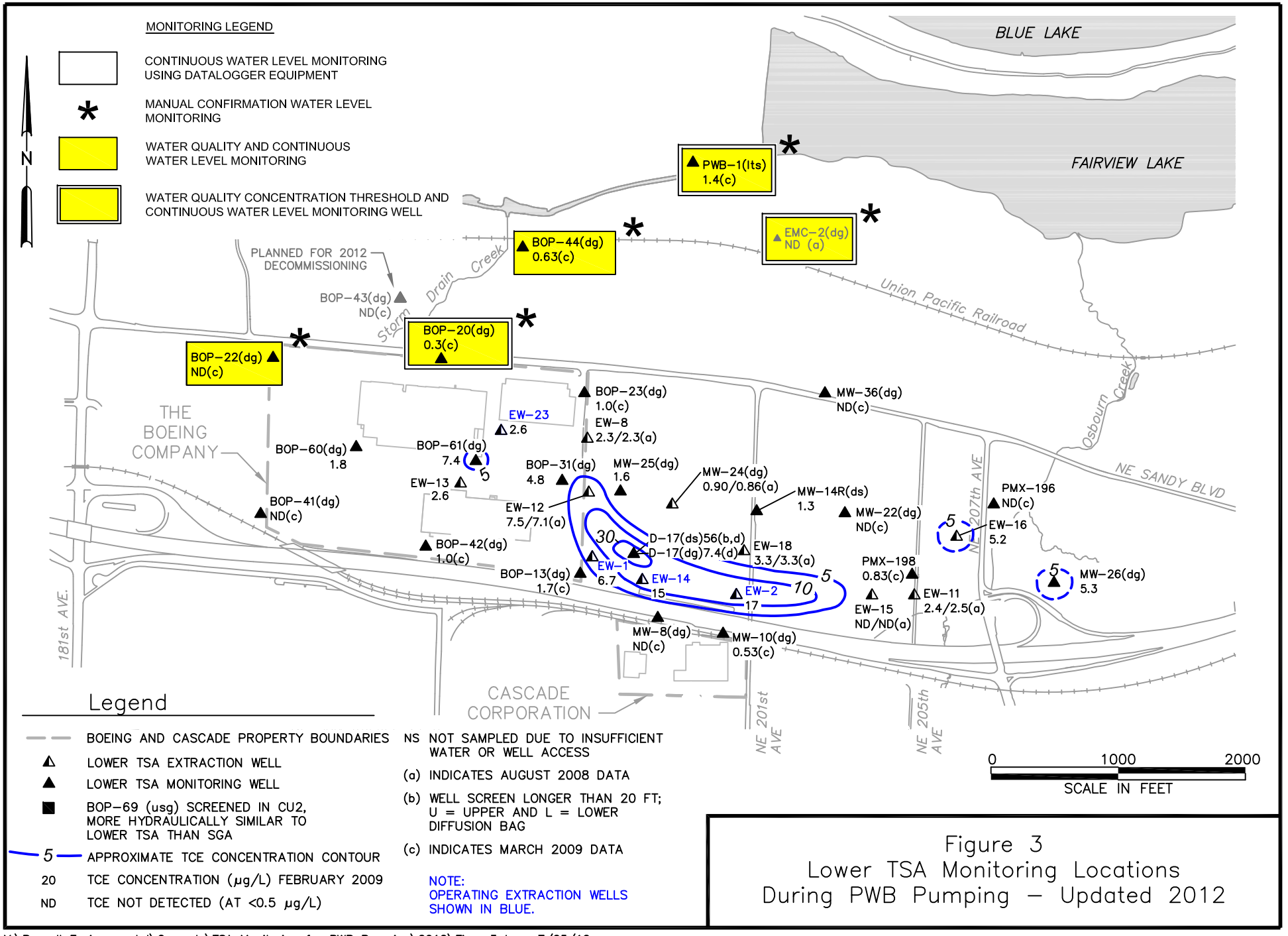

Figure 3
Lower TSA Monitoring Locations
During PWB Pumping – Updated 2012

Y:\Prowell Environmental\Cascade\TSA Monitoring for PWB Pumping\2012\Figure3.dwg 7/25/12

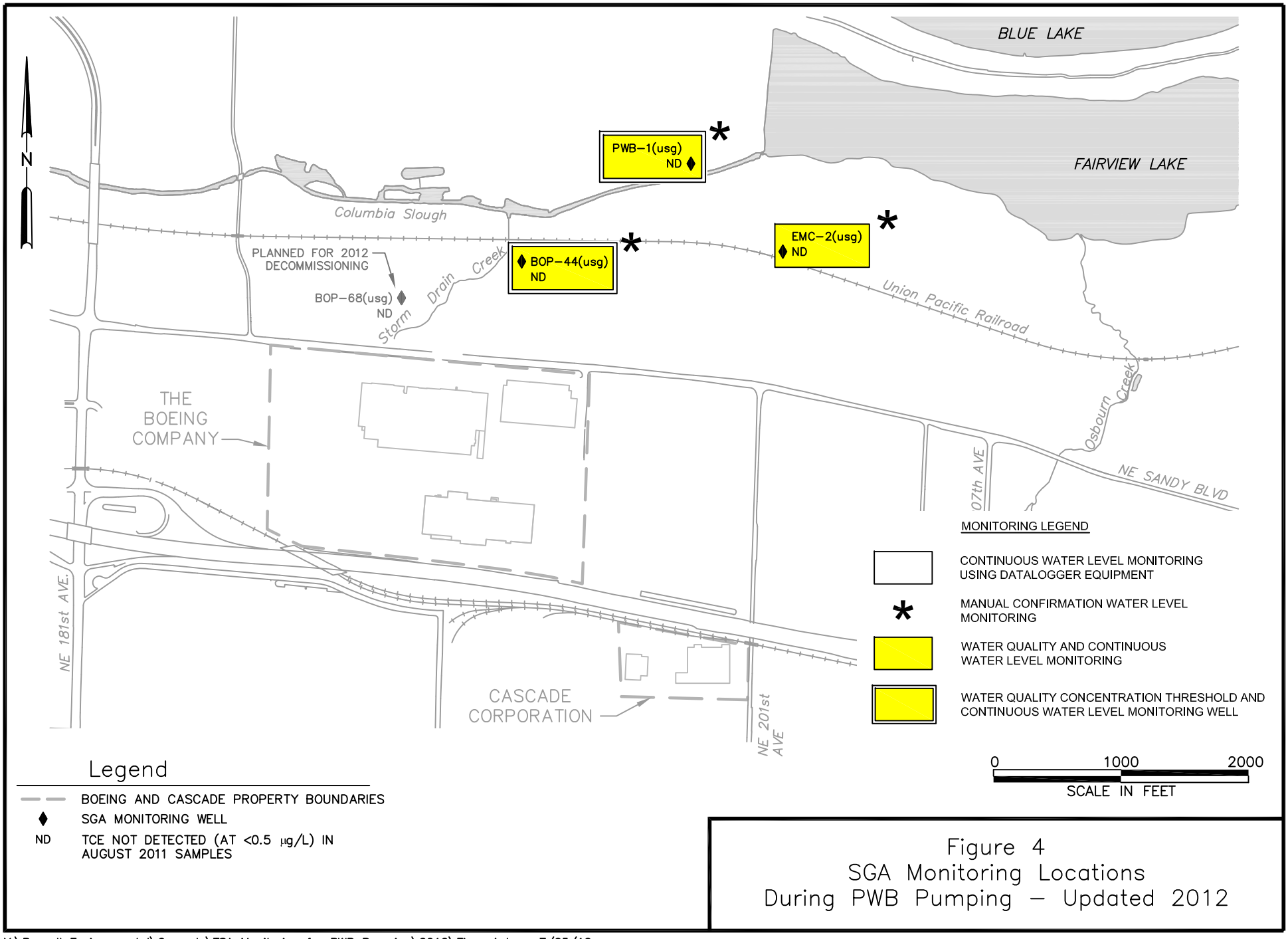

Figure 4
SGA Monitoring Locations
During PWB Pumping – Updated 2012

Y:\Prowell Environmental\Cascade\TSA Monitoring for PWB Pumping\2012\Figure4.dwg 7/25/12