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**SEMI-ANNUAL PERFORMANCE REPORT
1 OCTOBER 2012 – 31 MARCH 2013;
FIVE YEAR REMEDY EVALUATION
TROUTDALE SANDSTONE AQUIFER REMEDY**

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**Semi-Annual Performance Report
1 October 2012 – 31 March 2013
Five Year Remedy Evaluation
Troutdale Sandstone Aquifer Remedy**

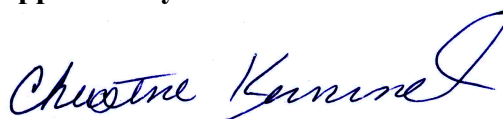
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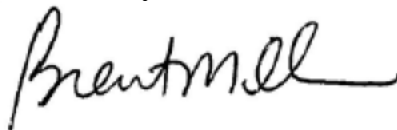
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1.0 INTRODUCTION

This report is submitted on behalf of Cascade Corporation (Cascade) and The Boeing Company (Boeing) and summarizes performance and monitoring data for the East Multnomah County, Troutdale Sandstone Aquifer (TSA) remedy. Data presented in this report were collected during the semiannual period of 1 October 2012 through 31 March 2013 as part of the joint remedy being implemented under the Department of Environmental Quality's (DEQ's) Consent Order No. WMCSR-NWR-96-08 (DEQ, 1997). This report also includes the third five-year performance evaluation, or the 15-year performance evaluation, for the TSA remedy.

1.1 Purpose of Report

The purpose of this report is to provide an evaluation of TSA remedy performance, including:

- A summary of the remediation system operation, maintenance, and performance monitoring data.
- An assessment of aquifer restoration progress.
- An evaluation of the remedy over the last five years between 1 April 2008 and 31 March 2013.

The data presented and evaluated in this report include water level, extraction rate, discharge compliance, and water quality data. Laboratory reports and data validation reports for this period along with groundwater quality data and groundwater elevation data from the previous 5 years are contained on compact disc.

Due to compliant groundwater quality, the monitoring program for the Sand and Gravel Aquifer (SGA), located below the TSA aquifer and the second confining layer (CU2), has been reduced to sampling three wells once every 2 years. SGA groundwater elevation data are collected on a semiannual basis, and the next SGA sampling event is scheduled for August 2013.

1.2 Report Organization

This report is organized into six sections as follows:

- **Section 1.0. Introduction.** This section includes a description of this report and description of report organization.
- **Section 2.0. Remedy Status Review.** This section summarizes the remedy status and significant performance issues, events, and recommendations made during the current reporting period. This section also includes a summary of significant documents submitted during the current reporting period and an update on well and water rights in the remedy area.

- **Section 3.0. Portland Water Bureau Well Field.** This section summarizes use of the Portland Water Bureau's (PWB) Columbia South Shore well field during the current reporting period, and projected augmentation supply operations for the summer of 2013.
- **Section 4.0. Treatment System Operational Overview.** This section provides an overview of the treatment system and describes operating efficiencies, trichloroethene (TCE) mass removal rates, extraction flow rates, system maintenance, and system downtime.
- **Section 5.0. Remedy Performance Data Analysis.** This section describes remedy performance data for groundwater extraction wells and monitoring wells, including water levels and water quality data. This section also evaluates hydraulic plume control and changes in TCE concentrations over time in the TSA.
- **Section 6.0. Five-Year Evaluation.** This section describes progress made toward attaining cleanup performance goals during the past five years, describes the amount of TCE removed from the aquifer, and discusses potential trends.
- **Section 7.0 Recommendations.** This section includes recommendations for remedy extraction and treatment system modifications, modification to the groundwater monitoring program, and recommendations for changes in the monitoring schedule.
- Section 8.0. References.

Report appendices consist of:

- **Appendix A.** This appendix includes graphs of extraction rates through time for currently operating extraction wells.
- **Appendix B.** This appendix includes precipitation data and groundwater level data for remedy extraction wells and monitoring wells for the current reporting period.
- **Appendix C.** This appendix includes groundwater quality data for extraction wells and monitoring wells for the current reporting period.
- **Appendix D (CD).** This appendix includes the laboratory reports and data validation reports for the current reporting period. In addition, it also includes all water level and water quality data from the extraction and monitoring wells for the past five years.
- **Appendix E.** This appendix includes data and charts that illustrate TCE removal rates since 1998.

2.0 REMEDY BACKGROUND AND CURRENT STATUS

The project area and site as defined in the 1996 Record of Decision (ROD; DEQ 1996) is shown on Figure 2-1. The Lower TSA restoration zones (Zones A, B, C, and D) and the TSA remedy network of extraction wells and monitoring wells are shown on Figure 2-2. The former and current TSA remedy extraction system layout is summarized on Figure 2-3.

A summary of TSA remedy milestones is provided in Table 2-1 and discussed below.

Upon completion of the RI/FS in 1997, Cascade and Boeing entered into the current Order of Consent with DEQ (WMCSR-NWR-96-08) to design and implement remedial measures to meet the following remedial action objections (RAOs):

- RAO-a. *Restore the TSA to protective concentrations in a reasonable time, if feasible. If not feasible, minimize the extent of the TSA containing VOCs above the MCLs, and provide long-term containment of areas where concentrations are above the MCLs;*
- RAO-b. *Prevent ingestion of TSA groundwater that contains chemicals of potential concern (COPCs) at concentrations above the respective MCLs;*
- RAO-c. *Protect environmental receptors by preventing surface water discharge of TSA groundwater with VOC concentrations that exceed surface water ambient water-quality criteria;*
- RAO-d. *Prevent further spread of the contamination in the TSA to the extent practicable;*
- RAO-e. *Protect groundwater quality in the SGA and the BLA; and*
- RAO-f. *Allow existing uses of groundwater resources in Multnomah County, or if not feasible, minimize the type and length of groundwater use restrictions.*

Pump and treat techniques were the selected remediation action for achievement of the RAOs. Between 1996 and 1998, extraction wells and six treatment systems were installed and commenced operation to achieve both hydraulic control and mass removal of the dissolved VOC plume in the Upper TSA, Lower TSA, and SGA. The remedy included the following treatment system; West Groundwater Treatment System (GWTS), the Central Treatment System (CTS), the Far North Groundwater Treatment System (FNST), North Treatment System (NTS), East Groundwater Treatment System (ETS), and the EW-21 Groundwater Treatment System, as shown on Figure 2-4. Only the Central Treatment System is still operating.

2.1 Pilot Shutdowns and Extraction/Treatment Decommissioning

As the remedy progressed, the operational status of selected extraction wells and treatment systems were modified based on DEQ approved criteria (DEQ 2008):

- Pilot Shutdown Criteria – *If the operation of an extraction well is not required to maintain hydraulic control, the well can be placed in pilot shut down for a minimum of 2 years. If quarterly groundwater quality data, collected during the pilot shutdown period, indicates TCE concentrations are below the MCL the well can be modified to groundwater monitoring location or requested for decommissioning. If TCE is detected in two consecutive quarters above the MCL then the extraction well will resume pumping until TCE concentrations remain below MCLs for two consecutive quarters.*
- Monitoring Well Network Modifications Criteria – *Wells may be removed from the monitoring program if 1) TCE concentrations have been consistently non-detectable for 2 or more years, 2) the well is located outside the limits of the plume and is no longer needed to monitor hydraulic plume control or restoration progress, or 3) the location of a well duplicate is better suited to evaluate hydraulic control and restoration progress.*
- Sampling Frequency Modifications Criteria – *If TCE concentrations have been non-detectable for 2 or more years and increases to detectable levels for two consecutive sampling events, or if TCE concentrations increase to above the MCL, then the sampling frequency will be increased. Conversely, If TCE concentrations have consistently been below the detection limit for the prior 2 years and or TCE concentrations are stable to declining for the prior 2 years, the sampling frequency may be reduced.*
- Well Decommissioning Criteria – *Extraction well decommissioning may be proposed to DEQ if TCE concentration remain consistently below the MCL in that well for 2 years following pilot shutdown; two consecutive TCE detections at or above the MCL may prompt resumed operation. Monitoring well decommissioning may be proposed to DEQ if TCE concentrations remain below the MCL during the confirmation sampling round that will be performed 2 years after a well has been removed from the remedy monitoring schedule. If TCE is detected at or above the MCL during the confirmation sampling round, additional monitoring may be required.*

2.2 Operating Extraction Wells

The CTS currently is the only extraction and treatment system remaining in operation for the TSA remedy. Lower TSA extraction well EW-1, EW-2, EW-14, EW-16, and EW-23 are operating and groundwater from these well is conveyed to the CTS for treatment, as shown on Figure 2-4.

2.3 Monitoring Program, Schedule, and Diffusion Bag Modifications

The performance monitoring conducted during this reporting period is provided in Table 2-2.

2.4 Significant Issues, Events, and Actions Taken During the Current Reporting Period

The following subsections summarize significant issues and events that occurred during the current reporting period (1 October 2012 through 31 March 2013) and describe actions taken to address them.

2.4.1 Institutional Controls Plan

In accordance with the *Institutional Controls Plan* (Landau Associates and Prowell Environmental 1999), the water rights records were reviewed on 25 June 2013. The review was performed to identify whether new water supply wells have been installed or if new water rights in the remedy area have been granted that may pose a risk of potential adverse influence to the TSA remedy. The review area is bounded by NE 181st Avenue, the Columbia River, NE 223rd Avenue, and NE Halsey Street (i.e. Section 20, 21, 28, and 29 and portions of Sections 19, 22, 27, and 30 of Township 1 North, Range 3 East). The 2013 review of the Oregon Water Resources Department (OWRD's) online GRID-Web database (OWRD 2013) indicated no new TSA or SGA wells (other than those installed for the TSA remedy) and no new water rights applications or permits within the search area for the period between June 2012 and June 2013.

2.5 Significant Documents Issued During the Current Reporting Period

A summary of communications and reports documenting remedy activities submitted to DEQ during the current reporting period, along with DEQ's comments or approvals, are listed on Table 2-3.

3.0 PORTLAND WATER BUREAU WELL FIELD

The Columbia South Shore well field was not utilized during this reporting period. Because PWB did not operate the well field, no TSA remedy contingency monitoring was conducted, pursuant to the *2012 Monitoring and Contingency Plan* for PWB Pumping Events (Prowell Environmental, 2012).

4.0 TREATMENT SYSTEM OPERATIONAL OVERVIEW

This section summarizes the CTS operation and performance, and the operation and performance of the operating extraction wells. The locations of the currently operating five extraction wells, extraction wells that were formerly operated, and the CTS compound are shown on Figure 2-3.

4.1 Central Treatment System Operational Summary

The CTS and Lower TSA extraction wells EW-1, EW-2, EW-14, EW--16, and EW-23 operated nearly continuously during the six-month reporting period. Four unplanned temporary well shutdowns occurred during the reporting period:

- 13-15 October 2012: Extraction well EW-14 was temporarily offline due to in-well water levels below the targeted water level set point. The pump rate was adjusted and reset on 15 October 2012. Normal operation resumed 15 October 2012.
- 22-24 December 2012: EW-23 shut down due to a power outage.
- 15-26 February 2013: EW-16 was offline due to a pump failure. The well pump was disassembled and the technician observed that the water well transfer line assembly had significant corrosion that had corrupted the insulation of the electrical lines at the top of the well head. In addition, the down-well water transfer line had significant corrosion. The electrical line and water well transfer line were repaired and the pump resumed normal operation on 26 February 2013.
- 2-3 March 2013: EW-14 was offline for less than one day because it was over-running its set point. The set point was adjusted slightly and the pump restarted. Normal operation resumed 3 March 2013.

Upper TSA extraction well EW-3 was converted from pilot shutdown mode to monitoring use in April 2013 following DEQ's approval (15 April 2013). Extraction well EW-18 was in pilot shutdown mode during the reporting period. EW-13 and EW-15 were converted from pilot shutdown mode to monitoring use in August 2012. EW-16 was in pilot shutdown mode from April 2010 through August 2012, when it was turned back on for full operation.

4.1.1 Groundwater Extraction Rates

Current operating extraction wells include EW-1, EW-2, EW-14, located in the mound area near the CTS, EW-16 located in the eastern treatment area and EW-23 on the Boeing property. Well construction data are presented in Table 4-1.

Daily flow data from each well are recorded by the automated Program Logic Controller (PLC) system. Data from the PLC are downloaded weekly, and manual inspections and system field checks are conducted biweekly. In addition, pH and temperature data are collected on a weekly

basis. Routine system inspections include manual collection of total flow meter readings, filter pressure monitoring, and system inspection and maintenance.

Monthly average extraction rates increased in EW-1, EW-2, EW-14, and EW-23, and were relatively stable during the reporting period, averaging 72 gpm, 34 gpm, 21 gpm, and 31 gpm, respectively. Extraction rates in EW-16 were stable at about 22 gpm until the pump failure, described above, in February 2013.

Total and average flow data for the semi-annual reporting period are included in Table A-1. Extraction rates and significant repair/cleaning events for the operating TSA extraction wells are shown on Figures A-1 through A-5.

4.1.2 Treatment System Influent and Effluent Data Summary

CTS performance data consist of weekly flow, pH, and temperature measurements. In addition, influent and effluent samples are collected from the CTS on a quarterly basis. Permits to discharge treated groundwater effluent from the CTS is presented in Attachment C to TSA Remedy Consent Order No. WMCSR-NWR-96-08 (DEQ, 1997).

CTS data for the reporting period are as follows:

- CTS flow averaged 179 gallons per minute (gpm). The average flow during the 12-month period April 2012 through March 2013 was 157 gpm;
- pH measurements of the effluent ranged from 7.8 to 8.0 standard units (SU) and remained within the effluent limits of 6 to 9 SUs;
- Temperature of effluent ranged from 54 to 60 degrees Fahrenheit (F); and
- VOCs were not detected in effluent samples.

Flow, pH, temperature, and influent and effluent VOC data for the reporting period, including compliance (or discharge) limits, are presented in Appendix A (Tables A-1 and A-2).

4.1.3 TCE Mass Removal

TCE mass removed from the groundwater treated at the system was 3.3 pounds (1.5 kilograms [kg]) during the semi-annual reporting period, and 7.2 pounds (3.3 kg) between March 2012 and February 2013. TCE mass removal is discussed in more detail in Section 6.

5.0 REMEDY PERFORMANCE DATA ANALYSIS

This section summarizes remedy performance data during this reporting period including groundwater levels and groundwater quality data. Groundwater elevation data are summarized in Appendix B and groundwater quality data are summarized in Appendix C. Laboratory reports along with data validation reports are presented in Appendix D.

5.1 Groundwater Elevations

Groundwater elevations are measured in the five operating Lower TSA extractions wells, one extraction well (EW-18) in pilot shutdown mode, and 60 Upper and Lower TSA monitoring wells. In addition, water levels in three SGA wells are monitored. The monitoring schedule for measuring groundwater levels is included in Table 2-2.

Depths to groundwater were measured using a portable depth to water meter in the monitoring wells, along with pressure transducers located in 16 wells for PWB contingency monitoring. Water level data are downloaded monthly from the pressure transducers. Groundwater depths and groundwater elevations summarized in Table B-1. Water level hydrographs for the 16 wells with pressure transducers, for the 13 month period March 2012 through March 2013, are also included in Appendix B on Figures B-1 through B-8.

The Upper and Lower TSA groundwater elevations for August 2012 (dry season) are presented in Figures 4-1a and 4-1b, and for February 2013 (wet season) are presented in Figures 4-2a and 4-2b.

Precipitation during the semi-annual reporting period was 28.14 inches, as shown in Appendix B, Figure B-1.

5.1.1 Upper TSA Water Levels and Flow Direction

Groundwater levels in monitoring wells in and adjacent to the mound area remain above the base of their respective well screens, as they have since May 2009. However, water levels are generally below historical (prior to 1998) groundwater elevations (see profile plots in Appendix C, Figures C-1 through C-7) due to continued operation of the extraction wells.

In both the dry and wet season, groundwater flow in the western portion of the site, west of the mound area, is to the northeast. Groundwater flow adjacent and south of the mound area continues to flow inward and downward toward Lower TSA extraction wells EW-1, EW-2, and EW-14, and in the western mound area towards EW-23 (Figures 4-1a and 4-2a). Groundwater elevations and flow directions were similar to previous monitoring events, October 2011 through March 2012 (dry and wet seasons).

5.1.2 Lower TSA Water Levels and Flow Direction

Groundwater elevations in Lower TSA monitoring wells also indicate downward and inward flow towards the extraction wells. Groundwater levels measured in the Lower TSA extraction wells reflect changes in pumping rates at the five operating extraction wells. Groundwater elevations at EW-16 were similar relative to the previous year for the dry season (Aug 2011), but significantly lower (over 40 feet) in the wet season (Feb 2012) due to restarting the well in August 2012.

In the eastern remedy area, groundwater elevations at monitoring wells EW-15 and PMX-198 are significantly elevated; the cause of local mounding in this area is uncertain (Figure 4-2b). Water levels at EW-15 and PMX-198 have been elevated since approximately the time pumping at EW-15 and EW-16 stopped in April 2010, and since pumping at EW-16 resumed in 2012 (historical [5 year] water levels are included in Appendix E).

Despite the variability observed between the wet and dry season at individual pumping wells, groundwater elevations near the TSA mound area indicate continued inward horizontal gradients in the central remediation area, due to ongoing remedy pumping (Figures 4-1a, 4-1b, 4-2a, and 4-2b). Inward hydraulic gradients are indicative of hydraulic capture and demonstrate the effectiveness of Lower TSA extraction wells EW-1, EW-2, and EW-14. Hydraulic capture is also achieved by the operation of EW-23 and EW-16 for areas upgradient of these wells with elevated TCE concentrations in both the dry season (August 2012; Figures 4-1a and 4-1b) and the wet season (February 2013; Figures 4-2a and 4-2b).

5.2 Water Quality

Analytical results for groundwater samples collected during the reporting period are summarized in Appendix C, Table C-1. Graphs of TCE concentrations for monitoring wells in the mound area and the five operating extraction wells from the early 1990's through March 2013 are presented in Figures C-1 through C-8. TCE concentrations from the samples collected in late July and early August are posted and contoured in Figures 5-1a and 5-2b for the Upper and Lower TSA, respectively.

5.2.1 Upper TSA

TCE concentrations in the Upper TSA in the western remediation area remain below the MCL with the exception of BOP-61(ds) at 8.0 micrograms per liter ($\mu\text{g/L}$). TCE concentrations at BOP-61(ds) have been relatively stable near the MCL cleanup level since the well resaturated in late 2008, with concentrations ranging between 4.4 $\mu\text{g/L}$ and 6.3 $\mu\text{g/L}$.

In the central remediation area, near an area where the Cascade TGA plume historically discharged into the TSA, TCE concentrations in water table well MW-17(ds) ranged between 50

and 71 µg/L during the reporting period. Groundwater in the vicinity of MW-17(ds) is captured by nearby Lower TSA extraction wells EW-2 and EW-14.

At MW-10(ds), located approximately 500 feet south of MW-17(ds), TCE during the current reporting period ranged from 19 to 27 µg/L, as shown in Figure C-5.

The highest TCE concentrations in Upper TSA mound area wells occurred in well MW-18(ds) during the reporting period. This well is located approximately 300 feet east of MW-17(ds). During the current reporting period, TCE concentrations in MW-18(ds) samples ranged from 89 to 180 µg/L (Figure C-6). Groundwater near MW-18(ds) is captured by operating extraction well EW-2.

In the Upper TSA, near the western extent of the TSA mound area, TCE concentrations at BOP-13(ds) ranged from 3.6 to 9.4 µg/L (including split and quality assurance samples) during the reporting period. Prior to the well screen becoming unsaturated (1998), TCE concentrations were approximately 8.4 µg/L. Since recent resaturation (2009), TCE concentrations at BOP-13(ds) have ranged between approximately 4.4 and 15 µg/L, as shown in Figure C-2. These data indicate that remedy pumping in the area near BOP-13(ds) has not been effective at reducing TCE concentrations; however, it has been effective in maintaining hydraulic plume control.

At locations further northwest [BOP-31(ds)] and southwest [MW-20(ds)] of the TSA mound area, TCE concentrations remain are low or below detection limits, as shown in Figures C-3 and C-4.

South of the mound area in well MW-19(ds), TCE concentrations were 2.0 and 2.1 µg/L in November 2012 and February 2013, respectively.

5.3 Lower TSA

TCE concentrations in the Lower TSA wells located in Zone A (northern portion of the remedy) remained below the MCL during this reporting period and continue to indicate remediation has been completed in this zone.

In Lower TSA Zone B (western portion of the remedy), TCE concentrations were below the MCL during this reporting period with the exception of operating extraction well EW-23. TCE concentrations at EW-23 have increased from 1.3 µg/L at the startup of pumping in May 2007 to 6.9 µg/L in February 2013.

In Lower TSA Zone C (central remediation area), TCE concentrations remained above the MCL in operating extraction wells EW-1 (6.5 and 7.5 µg/L), EW-2 (20 and 22 µg/L), and EW-14 (15 and 16 µg/L) during this reporting period.

In Lower TSA non-pumping well EW-12, TCE concentrations ranged from 6.0 to 7.6 µg/L during this reporting period. Extraction well EW-12 was pilot shutdown in 2007 and converted to monitoring well status in November 2009. TCE concentrations at EW-12 have been above the MCL in quarterly sampling results since February 2012. This well was proposed (SSP&A, 2012a) and approved (DEQ 2012) for continued pilot shutdown.

The highest TCE concentration in the Lower TSA Zone C continued to occur in mound area well D-17(ds), screened at the top of the Lower TSA. TCE concentrations in monthly samples ranged from 62 to 79 µg/L during this reporting period. TCE concentrations have fluctuated between 55 to 80 µg/L since resaturation in 2009. Directly prior to dry condition in 1998, the TCE concentration was approximately 120 µg/L, as shown in Figure C-7.

In Lower TSA Zone D (eastern remediation area), TCE concentrations remained below the MCL in the remedy wells with the exception of MW-26(dg). TCE concentrations at MW-26(dg) ranged from 6.3 to 7.6 µg/L during this reporting period.

5.4 Discussion of Remedy Performance

Groundwater flow directions, TCE concentrations, and mass removal rates have been evaluated to evaluate compliance with the RAOs for the TSA remedy (described in Section 2, above). Significant remedy performance findings are summarized below.

5.4.1 Groundwater Extraction

Groundwater flow directions in the Upper and Lower TSA indicate ongoing inward and downward flow towards the operating extraction wells. The 12-month average flow rate from the five operating extraction wells was 176 gpm. This rate is greater than in the previous year (124 gpm), primarily due to restarting EW-16 in August 2012 and increased extraction rates at EW-1 and EW-2 following sonar cleaning in July 2012 and May 2012, respectively. Groundwater extraction rates during the next reporting period are anticipated to be about 170-180 gpm as extraction rates at EW-14 have increased by more than 10 gpm following sonar cleaning in June 2013 and as the pump at EW-16 was replaced in February 2013.

5.4.2 Mass Removal

During the current reporting period, 7.2 pounds of TCE were extracted. The total amount of TCE removed since January 1998 is 477 pounds (Figure E-1). Approximately 5.5 pounds of TCE were removed during the prior reporting period. The increase in TCE mass removed during the past 12-month period may likely be due to resumed operation of extraction well EW-16 (August 2012) and sonar cleaning of other wells.

5.4.3 Hydraulic Plume Control

In the Upper TSA, TCE concentrations in two areas remain above the MCL: near BOP-61ds, west of the mound area, and near MW-17ds and MW-18ds, in the mound area. In the Lower TSA, TCE concentrations above the MCL occur in the vicinity of the five operating extraction wells. The TCE plume continues to be hydraulically captured by remedy operation (Figures 5-1a and 5-1b).

Restoration has been achieved in Zone A. Restoration in Zone B has been achieved with the exception of an area near EW-23.

In the Lower TSA Zone C, TCE concentrations remain above the MCL with the maximum concentrations observed at MW-18ds, where TCE concentrations increased from 110 µg/L in February 2013 to 180 µg/L in March 2013. TCE concentrations subsequently decreased to 91 µg/L in April 2013. These data will be included in the next semiannual report.

In Lower TSA Zone D, TCE concentrations remain slightly above the MCL at MW-26dg, and are below the MCL at EW-16. Operation of EW-16 was resumed in September 2012 to capture TCE mass present in Zone D.

Performance data continue to indicate that the existing remedy will not restore groundwater in the mound area by 2018.

6.0 FIVE-YEAR EVALUATION

Previous annual reports on the TSA remedy submitted in 2003 and in 2008 described remedy progress after 5 years and 10 years of remedy operation, respectively. This section, which describes remedy progress after 15 years of operation, focuses primarily on remedy progress that has been achieved during the past five years (2008-2013). The reader is referred to the previous reports for a detailed description of remedy progress after 5 years and 10 years of remedy operation (Landau Associates, et. al., 2003 and 2008).

6.1 Restoration Goals

The TSA remedy was designed to restore groundwater quality in the Upper TSA and the Lower TSA in the central portion of the original plume (Restoration Zone C on Figure 2-2) to MCLs by 2018 and to restore groundwater quality in the remainder of the original plume by 2008. For the most part, restoration has progressed as predicted at the time of remedy design. However, restoration of the central portion of the original plume (mound area) is unlikely to occur by 2018. In addition, some limited areas (near EW-16 and EW-23) within the remainder of the original plume have not yet been restored, although TCE concentrations are near the MCL.

6.2 TCE Concentrations Relative to the MCL

TCE concentrations in the TSA in February and March 2013 remain above the MCL (5 µg/L) in only three regions: 1) north of the Cascade property in an area known as the TSA mound area (located in the central portion of the original plume in Zone C), 2) on the Boeing property in the vicinity of EW-23 (Zone B and C boundary), and 3) in the vicinity of 207th Avenue near MW-26 (Zone D), as shown on Figures 5-1a and 5-1b. TCE concentrations are less than 10 µg/L in the latter two areas, which have limited areal extent. In the TSA mound area (Zone C), TCE concentrations exceed the MCL in an area of approximately 57 acres (less the small areas near MW-26(dg) and EW-23). This area extends for about 2,000 feet in an east-west direction just to the south of the truncation of CU1. In this area, the maximum TCE concentration at water-table monitoring well MW-18(ds) was 110 µg/L in February 2013 and 180 µg/L in March 2013. TCE concentration trends through time are discussed in Section 6.3.1, below.

6.3 TCE Occurrence and Extent

The TCE plumes in the Upper and Lower TSA have shrunk substantially in area since the onset of remedy pumping in 1998. The combined areal extents of the TCE plumes in the Upper and Lower TSA have decreased from approximately 400 acres in 1994 to about 57 acres in March 2013 (Figure 6-1). This represents an almost 90 percent reduction in the size of the plumes.

During the past five years, the footprint of the TSA plume shrank from about 80 acres in February 2008 to about 57 acres in February 2013 (Figure 6-2), or approximately 30%. Since

February 2008, cleanup goals have been achieved in much of the interpreted plume area beneath the Boeing facility. In 2008, the western extent of the plume was misunderstood due to possible leakage through well boreholes at BOP-22(ds) and BOP-60(ds). Between 2008 and 2011, both BOP-22(ds) and BOP-60(ds) were decommissioned and replacement wells BOP-22R(ds) and BOP-60(ds) were installed. TCE concentrations in both BOP-22R(ds) and BOP-60(ds) have been less than the MCLs since these replacement wells were installed.

As the footprint of the TSA plume shrunk during the past five years, a number of extraction wells met the criteria for pilot shutdown and for decommissioning (described in Section 2.1, above). As a result, total TSA extraction rates decreased from 660 gpm in March 2008 to 176 gpm in March 2013, respectively. A graph of total TSA extraction rates during the past five years is shown on Figure A-6. The extraction wells that went into pilot shutdown mode during the past five years are the following:

- EW-3 -- extraction ceased December 12, 2009;
- EW-12 – extraction ceased December 19, 2009;
- EW-13 – extraction ceased November 25, 2009;
- EW-15 – extraction ceased April 12, 2010;
- EW-16 – extraction ceased on April 12, 2010 and resumed on August 22, 2012; and
- EW-22 – extraction ceased September 29, 2008 and the well was decommissioned on March 26, 2010.

TCE rebound has been minimal in extraction wells in pilot shutdown mode, with two exceptions: EW-12 and EW-16. TCE concentrations increased after both EW-12 and EW-16 were in pilot shutdown mode. At EW-12, TCE concentrations increased to 11 µg/L in February 2011 but gradually declined to 6.0 µg/L in February 2013. EW-12 has remained in pilot shutdown mode because it is within the capture zone of nearby extraction well EW-1, but will be re-evaluated following the August 2013 sampling event. At EW-16, TCE concentrations were below the method reporting level prior to pilot shutdown in April 2010; however, concentrations rebounded to greater than the MCL following shutdown. Based on the TCE rebound, extraction from EW-16 was resumed in August 2012. TCE concentrations in the five operating extraction wells are shown in Figure C-8.

6.4 Concentration Time Trends

A comparison of the average TCE concentrations through time in the aquifer remedy zones indicates that groundwater meets the RAO goals in Zone A, is approximately 98% compliant in Zones B and D, but remains above compliance goals in Zone C.

TCE concentrations through time show a general decreasing trend over the course of the remedy (Appendix C, Figures C-1 through C-8). Over the last five years, TCE concentrations have generally decreased except at MW-18(ds) where reported concentrations have been increasing gradually since 2009 and recently increased up to 180 µg/L (March 2013), although the reported concentration in April 2013 was only 91 µg/L.

In February 2008, only four wells within the central remedy area exhibited TCE concentrations above 10 µg/L, EW-2, EW-14, EW-15, and monitoring well MW-26(dg). The maximum reported TCE concentration in February 2008 in the mound area was 18 µg/L at EW-2. Thus the interpretation in 2008 indicated that restoration of the mound area was on a trend where remediation goals would be met by 2018. Five years later, in March 2013, six wells in the central remedy area show TCE concentrations greater than 10 µg/L: EW-2 (20 µg/L), EW-14 (15 µg/L), D-17(ds) (79 µg/L), MW-10(ds) (21 µg/L), MW-17(ds) (71 µg/L), and MW-18(ds) (180 µg/L), as shown in Figures 5-1a and 5-1b. In 2008, four of these wells (D-17(ds), MW-10(ds), MW-17(ds), and MW-18(ds)) were dry and thus could not be sampled.

The water-table monitoring wells in the mound area became resaturated in late 2009 and early 2010. The magnitude of the water-table rise in the area of the mound can be estimated from groundwater elevation data from well pair D-17(ds, dg). Groundwater elevations at D-17(ds) have risen 4.9 to 8.6 feet above mean sea level (ft MSL) (November 2009 to February 2013) and at D-17(dg) have risen from 4.8 to 8.6 ft MSL during the same timeframe. The data suggests a gradual groundwater elevation gain of increase 3.5 ft since restoration. Prior to the startup of remedy pumping, groundwater elevations in the area of D-17(ds,dg) were approximately 20 ft MSL (Landau Associates and EMCON 1994).

TCE concentrations in the extraction wells have varied from sampling event to sampling event, in part as the result of varying pump rates and potential seasonal effects, however, the general trend for the wells is relatively stable to slightly increasing (Figure C-8). TCE concentrations at the monitoring wells have also varied from measurement period to measurement period. At MW-18(ds), a significant increase in TCE concentration occurred from early 2010 to March 2013. The cause of this increase is not known.

Convention has been to plot TCE concentration data separately for the TSA sandstone (Upper TSA) and the TSA conglomerate (Lower TSA). In the mound area where elevated TCE concentrations occur at the water table, the Upper TSA has limited saturation. In addition, hydraulic testing conducted in 2011 indicated that hydraulic properties of the Upper TSA and Lower TSA in mound area are similar in portions of the mound area (SSPA 2011). Therefore, additional understanding of spatial extent and magnitude of TCE concentrations in the mound area can be obtained from a map of TCE concentrations in water-table wells and a map of TCE concentrations from wells screened near the bottom of the Lower TSA. TCE concentrations

measured in the TSA in February 2013 at and near the water table in the mound area are shown on Figure 5-1a and 5-1b.

6.5 Mass Estimates and Mass Balance

The total mass of TCE removed from the TSA by the remedial systems during the past five years was approximately 32 pounds. A total of ten extraction wells operated during portions of the last five years; however most of the mass removed was from the three extraction wells located in the TSA mound area; EW-1 (6.1 pounds), EW-2 (10.4 pounds), and EW-14 (7.6 pounds). The TCE mass removed from the remaining extraction wells during the past five years was as follows: EW-3 – 2.6 pounds, EW-13 – 0.7 pounds, EW-15 – 0.8 pounds, EW-16 – less than 0.4 pounds, EW-18 – 0.2 pounds, EW-22 – less than 0.1 pounds, and EW-23 – 2.6 pounds. TCE removal over the last 5 years per well is shown in Figure E-1 and cumulative TCE removal is shown in Figure E-2.

An estimate of the total mass of TCE remaining in the mound area was calculated based on the contour plots shown on Figure 6-2 and the saturated thickness of the TSA. In these calculations a total porosity of 0.3, rather than the effective porosity of 0.15, was used. For simplicity of this calculation, we assumed TCE concentrations varied linearly with depth and that average saturated thickness was 60 feet. Based on this calculation, the estimated remaining dissolved mass is about 46 pounds. At the average mass removal rate of 4.8 pounds per year achieved over the past five years, it would take on the order of 10 years of extraction at the same rate to remove the remaining TCE. In practice, it is expected that TCE removal rates would decline with time. However, due to resumed operation of extraction well EW-16 in August 2012, TCE mass removal rates have increased in the last year relative to the previous three years when EW-16 was not operating.

It is worth noting that variations in TCE concentrations with depth are not well characterized in the mound area. During the advancement of the borehole for vapor monitoring well VW-17d-95.5 in the spring of 2012, grab groundwater samples were collected at mid-point depths of 4.5 feet, 15.5 feet and 24.5 feet below the water table. These data from this one location indicate that the highest TCE concentrations occur at the water table and that concentrations decline with depth. As a result of a limited understanding of the vertical variation in TCE with depth, there is significant uncertainty in estimate of TCE mass in the mound area.

The total amount of TCE removed from mound extraction wells EW-1, EW-2, and EW-14 during the past 15 years is calculated to be about 137 pounds. The estimated remaining mass of 46 pounds, which is about 34 percent of the TCE mass removed to date, suggests that groundwater extraction will need to continue for a significant time to achieve restoration goals.

6.6 Discussion – TCE Migration to TSA

In the ten-year evaluation of the TSA remedy (Landau Associates, Prowell Environmental, and Pegasus Geoscience 2008), it was estimated that approximately 25 pounds of TCE remained dissolved in the TSA. However, approximately 32 pounds of TCE has been removed by remedy pumping since 2008. TCE concentrations still remain above MCL, indicating that either the 2008 estimate of mass remaining was incorrect and/or that additional TCE has migrated to the TSA. Data collected during the past five years, as explained below, has indicated that limited monitoring data in the TSA mound area in 2008 provided an incomplete representation of the extent of contamination in this area and an underestimation of the amount of TCE present in 2008.

There is some uncertainty regarding whether or not significant additional TCE continues to migrate to the TSA. Soil and groundwater data collected from boring VW-17-95.5 advanced in the early 2012 adjacent to monitoring well MW-17(ds), and soil gas data from vapor wells (VW-17d-[3 depths]), indicated that downward migration of TCE to the TSA was negligible at this boring location (SSPA 2012b). Other analyses have indicated that there may be TCE migrating from the TGA over the CU1 (confining layer) truncation to the TSA (Landau Associates 2012). These recent investigation results and possible source scenarios for the increased TCE concentrations within the mound area were presented to DEQ in 2012 and early 2013. DEQ responded that “multiple transport mechanisms must be causing temporary increases in TCE concentrations in isolated parts of the mound area” and “a limited investigation of groundwater near the eastern end of the mulch bio-wall” within the TGA is warranted (DEQ 2013). A Work Plan for the additional TGA investigation is pending.

6.7 Restoration Progress

Restoration has been achieved for the SGA. Based on the results of the August 2013 groundwater monitoring event, discontinuation of SGA monitoring will be requested.

Significant progress has been made towards attainment of water-quality restoration in the TSA. The footprint of groundwater in the TSA containing TCE concentrations greater than the MCL has shrunk from approximately 400 acres in 1994 to 57 acres in 2013. In addition, groundwater extraction has removed almost 480 pounds of TCE from the TSA. On the order of 46 pounds of TCE remains in the central portion of the original TCE plume (TSA mound area), and continued operation of the existing extraction system should continue to reduce the amount of TCE in this area.

Currently, extraction rates in the mound area are increasing (over the last year); mass removal rates are increasing (over the last two years), but TCE concentrations are generally stable or increasing (over about the last three years). These trends make it difficult to predict when TSA restoration will be complete.

7.0 RECOMMENDATIONS

Water-quality restoration has been achieved in all areas of the SGA, in the Upper and Lower TSA north of Sandy Boulevard, and the western portion of the remedy area in the Upper and Lower TSA. There remains a continued focus on maintaining and improving restoration progress in the central and eastern portion of the remedy area, with emphasis on the highest TCE concentrations near the mound area. The following recommendations are proposed to improve the monitoring programs and optimize the remedy treatment and performance.

7.1 Recommendations for Remedy Operation

We recommend the continued pumping of operating extraction wells EW-1, EW-2, EW-14, EW-16, and EW-23. Extraction well EW-12 is currently a non-pumping well used for water quality monitoring purposes. TCE concentrations at EW-12 have been above the MCL in quarterly sampling results since February 2012. In accordance with the Pilot Shutdown Criteria, this well is eligible for resumed pumping. However, to minimize the potential of creating a groundwater divide with the nearby operating well EW-1, we recommend the well remain in shutdown mode.

7.1.1 Remedy Extraction/Treatment System Modifications

We recommend the continued operation of the CTS pump and treat system for the TSA remedy, and continued pumping at the current rates. Continued maintenance and scheduled cleaning of the wells will be conducted to meet target extraction pump rates. Extraction well EW-1 has a target pump rate at a minimum of 40 gpm, with the last sonar well cleaning being conducted in July 2012. Extraction well EW-2 has a target pump above 25 gpm. Since the last sonar cleaning at EW-2 in May 2012, the pump rate has gradually decreased from 38 to 34 gpm, based on this gradual decrease, a sonar cleaning event will likely be conducted in the next year or two. During this reporting period, the extraction rate at EW-14 has ranged from 19 to 22 gpm, which is near the minimum target pump rate of 20 gpm. To improve the performance of EW-14, a sonar cleaning was conducted in June 2013 (after the current reporting period). Upon the completion of the sonar cleaning, the pump rate at EW-14 increased to approximately 35 to 36 gpm. The pump rates at EW-16 ranged from 14 to 24, with minimum pump rate of 15 gpm. The EW-16 pump was replaced in February 2013 and the flow rate was 20 gpm in March 2013. Pump rates at EW-23 ranged from 28 to 33 gpm during the reporting period, approximately on target for the 30 gpm minimum pump rate.

7.1.2 Monitoring Program and Schedule Modifications

Monitoring program modifications have previously included changes in the remedy monitoring well network, such as well installations or decommissionings, in response to restoration progress and plume shrinkage. Modifications to the monitoring schedule have been proposed based on

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compliant water quality or TCE concentration trends. At this time, there is one proposed monitoring program modification: Cessation of sampling from the SGA. If results from August 2013 are consistent with past results and are below the MCLs, we recommend that SGA monitoring be discontinued. The current monitoring program is presented in Table 2-2.

7.2 Contingency Monitoring During PWB Pumping

The contingency monitoring plan for PWB pumping events was updated in 2012 (Prowell Environmental 2012). The plan provides for continuous and manual water level monitoring and water quality sampling for two separate PWB pumping scenarios. These include PWB pumping events (1) lasting more than 30 days but less than 90 days and (2) those pumping events lasting more than 90 days.

PWB contingency monitoring will be conducted at the following threshold well locations:

- Seven Upper TSA wells: BOP-20(ds), BOP-21(ds), BOP-22R(ds), BOP-44(ds), BOP-60R(ds), BOP-70(ds-215), and BOP-71(ds);
- Five Lower TSA wells: BOP-20(dg), BOP-22(dg), BOP-44(dg), EMC-2(dg), and PWB-1(lts); and
- Three SGA wells: EOP-44(usg), EMC-2(usg), and PWB-1(usg).

7.3 Other Recommendations and Future Activities

Additional corrective measures for the TSA mound area will be evaluated as monitoring data continue to be available. Based on the five year evaluation, the existing pump and treat system removed an average of approximately 6.3 pounds of TCE each year from the TSA. If the estimated remaining dissolved mass is about 46 pounds, then the existing remedy could remove the dissolved mass in approximately 10 years. The restoration timeline for the eastern portion of the remedy may be decreased with additional corrective measures. The remedy is evaluated annually for progress, efficiency, and cost-effectiveness.

To evaluate if TCE is migrating over the CU1 truncation in the eastern portion of the remedy, DEQ has requested that a well screened within the TGA be installed along the eastern extent of the mulch biowall. The well is planned to be installed along the western right-of-way for NE 201st Avenue. A limited pumping test and analytical testing will be conducted to evaluate if TCE has the potential to migrate from the eastern end of the biowall and into the utility corridor over the CU1 truncation. A work plan detailing the well design and pumping test is pending and field activities are tentatively scheduled for late summer 2013.

8.0 REFERENCES

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TABLES

**Table 2-1
TSA Remedy Timeline**

Action	Date
<i>Implemented TSA Interim Remedial Action</i>	
Entered into Order on Consent with DEQ for TSA Removal Action to control northerly plume migration (DEQ No. ECSR-NWR-93-07)	1993
Installed RPW-1 and RPW-2 and began extracting RPW-2 and treating effluent	1994
<i>Completed TSA RI/FS</i>	
Entered into Addendum to Order on Consent to complete TSA RI/FS	1994
Entered into Second Addendum to Order on Consent for NPDES discharge permit	1996
Performed and completed TSA RI/FS, including well installations, aquifer testing, model construction, evaluations, design planning, and reporting	1994 - 1996
DEQ issued TSA Remedy Record of Decision	1996
Enter into Order on Consent with DEQ for design and implementation of remedial measures (DEQ No. WMCSR-NWR-96-08)	1997
<i>Implemented TSA Remedy</i>	
Installed SGA monitoring wells to characterize water quality; decommissioned selected private SGA wells for migration pathway protection; provided replacement water supply to residences	1996-1997
Performed phased remedy implementation including: construction of monitoring and extraction wells conveyance and treatment systems, and performance/protection evaluations	1996-1998
Began phased startup of remedy extraction/treatment systems	1996-1998
Entered into Order on Consent with DEQ for remedy implementation and effluent discharge	1997

**Table 2-1
TSA Remedy Timeline**

Action	Date
Began full scale remedy implementation of GWTS (West), Central, East, North, and Far North Groundwater Treatment Systems	1998
Began operating EW-21 Treatment System for TSA Sandstone plume capture near MW-26(ds)	2000
Began operating EW-22 for TSA Sandstone plume capture near BOP-22(ds)	2003
Began operating EW-23 from Lower TSA	2007
<i>Began Remedy Modifications, Due to Restoration Progress</i>	
Decommission East Treatment System and extraction well EW-10	2005
Decommission Far North System and extraction well EW-17	2007
Decommission North Treatment System and extraction wells EW-6,-7,-9,-19,-20, and PRW-2	2008
Cessation of TSA treatment at Groundwater Treatment System (GWTS - West).	2009

Table 2-2
Performance Monitoring Schedule - 1 October 2012 through 31 March 2013
TSA Remedy - East Multnomah County

Well	Aquifer	Water Level Measurements^a	Water Quality Sampling^a	Responsibility
Groundwater Systems				
CTS Influent	—	—	Quarterly	Cascade
CTS Effluent	—	—	Quarterly	Cascade
TSA Extraction Wells				
EW-1 (on)	Lower TSA	Monthly	Quarterly	Cascade
EW-2 (on)	Lower TSA	Monthly	Quarterly	Cascade
EW-14 (on)	Lower TSA	Monthly	Quarterly	Cascade
EW-16 (on)	Lower TSA	Monthly	Quarterly	Cascade
EW-18 (pilot shutdown)	Lower TSA	Semiannually	Quarterly	Cascade
EW-23 (on)	Lower TSA	Monthly	Semiannually	Cascade
TSA Monitoring Wells				
BOP-13(ds)	Upper TSA	Quarterly	Quarterly	Boeing
BOP-13(dg)	Lower TSA	Semiannually	Annually	Boeing
BOP-20(ds)	Upper TSA	Semiannually	Annually	Boeing
BOP-20(dg)	Lower TSA	Semiannually	Annually	Boeing
BOP-21(ds)	Upper TSA	Semiannually	Annually	Boeing
BOP-22R(ds)	Upper TSA	Semiannually	Semiannually	Boeing
BOP-22(dg)	Lower TSA	Semiannually	Once per 2 Yrs	Boeing
BOP-23(dg)	Lower TSA	Semiannually	Annually	Boeing
BOP-31(ds)	Upper TSA	Quarterly	Quarterly	Boeing
BOP-31(dg)	Lower TSA	Semiannually	Semiannually	Boeing
BOP-41(ds)	Upper TSA	Semiannually	Once per 2 Yrs	Cascade
BOP-41(dg)	Lower TSA	Semiannually	Once per 2 Yrs	Cascade
BOP-42(ds)	Upper TSA	Semiannually	Annually	Boeing
BOP-42(dg)	Lower TSA	Semiannually	Annually	Boeing
BOP-44(ds)	Upper TSA	Semiannually	Annually	Cascade
BOP-44(dg)	Lower TSA	Semiannually	Once per 2 Yrs	Cascade
BOP-60R(ds)	Upper TSA	Semiannually	Semiannually	Boeing
BOP-60(dg)	Lower TSA	Semiannually	Annually	Boeing
BOP-61(ds)	Upper TSA	Semiannually	Semiannually	Boeing
BOP-61(dg)	Lower TSA	Semiannually	Semiannually	Boeing
BOP-62(ds)	Upper TSA	Semiannually	Annually	Boeing
BOP-65(ds)	Upper TSA	Semiannually	Semiannually	Boeing
BOP-66(ds)	Upper TSA	Semiannually	Semiannually	Boeing
BOP-70(ds-215)	Upper TSA	Semiannually	Semiannually	Cascade

Table 2-2
Performance Monitoring Schedule - 1 October 2012 through 31 March 2013
TSA Remedy - East Multnomah County

Well	Aquifer	Water Level Measurements^a	Water Quality Sampling^a	Responsibility
BOP-71(ds)	Upper TSA	Semiannually	Semiannually	Cascade
D-16(ds)	Upper TSA	Semiannually	Once per 2 Yrs	Cascade
D-17(ds)	Lower TSA	Quarterly	Quarterly	Cascade
D-17(dg)	Lower TSA	Semiannually	Semiannually	Cascade
D-18(ds)	Upper TSA	Semiannually	Once per 2 Yrs	Cascade
DEQ-1(dg)	Lower TSA	Semiannually	—	Cascade
DEQ-5(ds)	Upper TSA	Semiannually	—	Cascade
DEQ-5(dg)	Lower TSA	Semiannually	—	Cascade
EW-3 (monitoring only)	Upper TSA	Semiannually	Semiannually	Boeing
EW-8 (monitoring only)	Lower TSA	Semiannually	Semiannually	Cascade
EW-11 (monitoring only)	Lower TSA	Semiannually	Semiannually	Cascade
EW-12 (monitoring only)	Lower TSA	Semiannually	Quarterly	Cascade
EW-13 (monitoring only)	Lower TSA	Semiannually	Semiannually	Boeing
EW-15 (monitoring only)	Lower TSA	Semiannually	Semiannually	Cascade
MW-3	TSA	Semiannually	—	Cascade
MW-8(dg)	Lower TSA	Semiannually	Once per 2 Yrs	Cascade
MW-10(ds)	Upper TSA	Quarterly	Quarterly	Cascade
MW-10(dg)	Lower TSA	Semiannually	Annually	Cascade
MW-14R(ds)	Lower TSA	Semiannually	Quarterly	Cascade
MW-17(ds)	Upper TSA	Quarterly	Quarterly	Cascade
MW-18(ds)	Upper TSA	Quarterly	Quarterly	Cascade
MW-19(ds)	Upper TSA	Quarterly	Quarterly	Cascade
MW-20(ds)	Upper TSA	Semiannually	Annually	Cascade
MW-22(dg)	Lower TSA	Semiannually	Once per 2 Yrs	Cascade
MW-24(dg)/EW-5	Lower TSA	Semiannually	Semiannually	Cascade
MW-25(dg)	Lower TSA	Semiannually	Semiannually	Cascade
MW-26(dg)	Lower TSA	Semiannually	Quarterly	Cascade
MW-36(dg)	Lower TSA	Semiannually	Once per 2 Yrs	Cascade
PMX-167 [W. Interlachen]	Upper TSA	Semiannually	—	Cascade
PMX-196 [Andrews]	Lower TSA	Semiannually	Once per 2 Yrs	Cascade
PMX-198 [Udd]	Lower TSA	Semiannually	Annually	Cascade
PMX-208(dg) [Simpson]	Lower TSA	Semiannually	—	Cascade
PWB-1(uts)	Upper TSA	Semiannually	Once per 2 Yrs	Cascade
PWB-1(its)	Lower TSA	Semiannually	Annually	Cascade
PWB-2(its)	Lower TSA	Semiannually	—	Cascade
RPW-1(ds)	Upper TSA	Semiannually	—	Cascade

Table 2-2
Performance Monitoring Schedule - 1 October 2012 through 31 March 2013
TSA Remedy - East Multnomah County

Well	Aquifer	Water Level Measurements^a	Water Quality Sampling^a	Responsibility
SGA Monitoring Wells				
BOP-44(usg)	Upper SGA	Semiannually	Once per 2 Yrs	Cascade
EMC-2(usg)	Upper SGA	Semiannually	Once per 2 Yrs	Cascade
PWB-1(usg)	SGA	Semiannually	Once per 2 Yrs	Cascade

NOTES:

^aAnnual monitoring performed in August; semiannual in February and August; quarterly in February, May, August, and November. Two-year monitoring will be performed in August 2013.

For well monitoring frequencies that changed during the reporting period, both frequencies are shown above.

1. EW-3 was permanently converted from pilot shutdown status to monitoring well status; sampling frequency reduced to semiannual per DEQ email approval 15 April 2013.

2. D-17(ds), MW-10(ds), MW-17(ds), and MW-18(ds) have changed monitoring frequency from monthly to quarterly per DEQ email approval 15 April 2013.

Table 2-3
Significant Remedy Documents – 1 October 2012 through 31 March 2013
TSA Remedy – East Multnomah County

Date	Document Type	Submitted By	Title	Comment
10/16/12	Memorandum	Prowell Environmental	BOP-43(ds,dg) and BOP-68(usg) Well Decommissioning Completion, TSA East Multnomah County remedy	Presents well decommissioning records and summarizes methods used during the decommissioning of groundwater monitoring wells BOP-43(ds,dg) and BOP-68(usg)
11/23/12	Report	Prowell Environmental, Landau Associates, & S.S.Papadopolus	Semiannual Performance Report: April 1 through September 30, 2012, Troutdale Sandstone Aquifer Remedy, East Multnomah County, Oregon	Submitted TSA <i>Semiannual Performance Report</i> for the period April 1 through September 30, 2012
11/1/12	Memorandum	Prowell Environmental	TSA Remedy Mound Area Well Installations, TSA Remedy, East Multnomah County, Oregon	Summarizes scope of work, methods, and findings associated with installation of three wells in TSA Mound area
12/21/12	Technical Memorandum	Landau Associates	Troutdale Sandstone Aquifer-TSA Remedy Mound Area Investigation	Presents hypothesis for contaminant source for TSA mound area, provides recommendations for possible investigations.
12/21/12	Memorandum	S.S. Papadopolus	Troutdale Sandstone Aquifer TSA Remedy Mound Area Investigation, Consent Order WMCSR-NWR-96-08	Presents hypothesis for contaminant source for TSA mound area, provides recommendations for continued pump and treat.
4/3/13	Letter	Oregon Department of Environmental Quality	Boeing Portland, Cascade TGA Review and TSA Remedy Mound Area Well Installations, DEQ ECSI #635 and #1479	Provides a summary of DEQs understanding of potential sources for the TSA mound area and proposes investigation actions

Table 4-1
Well Construction Data - 1 October 2012 through 31 March 2013
TSA Remedy - East Multnomah County

Well	Aquifer Screened	X Coordinate	Y Coordinate	Elevations, ft MSL				Depth of Boring (ft)
				Ground Surface	Measuring Point	Top of Screen	Bottom of Screen	
Extraction Wells								
EW-1	Lower TSA	1,497,771.2	689,549.0	124.1	124.04	-27.8	-57.8	183
EW-2	Lower TSA	1,498,903.1	689,252.5	126.2	126.01	-6.8	-46.8	179
EW-14	Lower TSA	1,498,163.8	689,374.1	128.4	127.63	-21.9	-51.9	230
EW-16	Lower TSA	1,500,635.3	689,710.0	84.2	83.71	-40.3	-80.3	198
EW-18	Lower TSA	1,498,965.7	689,596.5	106.3	104.50	-13.3	-43.3	159
EW-23	Lower TSA	1,497,018.0	690,569.1	83.8	83.93	-26.2	-66.2	157
Monitoring Wells (& Former Extraction Wells Approved for Monitoring Use)								
BOP-13(ds)	Upper TSA	1,497,672.4	689,432.8	126.7	128.94	9.0	-1.0	132
BOP-13(dg)	Lower TSA	1,497,677.0	689,419.8	127.5	128.71	-41.0	-61.0	193
BOP-20(ds)	Upper TSA	1,496,606.5	691,086.0	78.2	77.45	9.0	-11.0	97
BOP-20(dg)	Lower TSA	1,496,592.5	691,087.0	78.1	77.32	-105.0	-125.0	209
BOP-21(ds)	Upper TSA	1,495,803.0	691,149.4	77.1	78.02	-88.0	-108.0	192
BOP-22R(ds)	Upper TSA	1,495,261.6	691,063.9	84.2	82.91	-158.8	-178.8	310
BOP-22(dg)	Lower TSA	1,495,260.1	691,137.8	81.3	81.05	-239.0	-259.0	338
BOP-23(dg)	Lower TSA	1,497,737.8	690,876.6	75.2	76.96	-26.0	-46.0	125
BOP-31(ds)	Upper TSA	1,497,533.3	690,135.0	97.1	99.04	17.0	7.0	91
BOP-31(dg)	Lower TSA	1,497,534.8	690,149.5	96.5	98.51	-34.0	-54.0	154
BOP-41(ds)	Upper TSA	1,495,162.9	689,871.4	135.7	136.74	-107.0	-127.0	262
BOP-41(dg)	Lower TSA	1,495,164.9	689,889.2	135.2	136.45	-230.0	-250.0	388
BOP-42(ds)	Upper TSA	1,496,462.1	689,632.7	129.3	130.74	-8.0	-28.0	159
BOP-42(dg)	Lower TSA	1,496,447.9	689,633.3	129.5	130.71	-92.0	-112.0	243
BOP-44(ds)	Upper TSA	1,497,206.5	691,983.0	32.5	35.24	-23.0	-43.0	76
BOP-44(dg)	Lower TSA	1,497,225.2	691,983.0	32.6	35.15	-104.0	-124.0	166
BOP-60R(ds)	Upper TSA	1,495,937.7	690,547.9	83.2	82.80	-71.8	-81.8	165
BOP-60(dg)	Lower TSA	1,495,915.9	690,414.3	93.8	93.59	-165.0	-185.0	280
BOP-61(ds)	Upper TSA	1,496,851.9	690,285.1	96.3	94.64	6.0	-4.0	100
BOP-61(dg)	Lower TSA	1,496,843.6	690,290.5	96.2	94.43	-60.0	-70.0	171
BOP-62(ds)	Upper TSA	1,496,066.6	690,031.6	112.1	112.29	-42.0	-51.9	166
BOP-65(ds)	Upper TSA	1,496,445.1	690,159.4	104.4	104.22	2.0	-8.0	113
BOP-66(ds)	Upper TSA	1,496,881.8	690,155.8	103.3	102.97	13.0	3.0	102
BOP-70(ds-215)	Upper TSA	1,495,082.9	691,532.8	65.5	65.15	-144.6	-154.6	285
BOP-71(ds)	Upper TSA	1,494,310.3	691,381.3	85.6	87.88	-185.0	-205.0	308

Table 4-1
Well Construction Data - 1 October 2012 through 31 March 2013
TSA Remedy - East Multnomah County

Well	Aquifer Screened	X Coordinate	Y Coordinate	Elevations, ft MSL				Depth of Boring (ft)
				Ground Surface	Measuring Point	Top of Screen	Bottom of Screen	
D-16(ds)	Upper TSA	1,497,497.5	693,117.3	15.4	16.91	-114.0	-134.0	152
D-16(dg)	Lower TSA	1,497,511.9	693,134.8	15.1	16.84	-206.0	-226.0	247
D-17(ds)	Lower TSA	1,498,097.3	689,575.1	121.9	123.28	12.0	2.0	121
D-17(dg)	Lower TSA	1,498,080.6	689,576.6	121.8	124.61	-30.0	-50.0	178
D-18(ds)	Upper TSA	1,495,386.1	692,820.3	18.1	18.01	-153.0	-163.0	179
D-18(dg)	Lower TSA	1,495,375.5	692,825.6	18.3	18.13	-237.0	-257.0	301
DEQ-1(dg)	Lower TSA	1,500,184.6	688,240.0	151.0	150.58	-53.0	-73.0	235
DEQ-5(ds)	Upper TSA	1,496,861.6	688,831.7	155.9	155.68	19.9	0.0	160
DEQ-5(dg)	Lower TSA	1,496,871.4	688,830.8	155.9	155.95	-58.0	-78.0	240
EW-3	Upper TSA	1,495,948.5	690,357.7	97.1	94.26	-77.9	-102.9	205
EW-8	Lower TSA	1,497,733.0	690,480.3	77.3	77.16	6.8	-33.2	163
EW-11	Lower TSA	1,500,302.8	689,236.9	115.4	114.73	-22.8	-62.8	235
EW-12	Lower TSA	1,497,744.0	690,037.2	94.4	94.14	-16.1	-46.1	197
EW-13	Lower TSA	1,496,697.5	690,134.4	104.5	103.59	-33.5	-73.5	234
EW-15	Lower TSA	1,499,970.7	689,249.7	116.7	116.21	-27.3	-57.3	186
EMC-2(dg)	Lower TSA	1,499,225.7	692,052.5	44.8	43.51	-75.0	-85.0	140
MW-3	Upper & Lower TSA	1,498,553.4	688,459.8	148.1	147.69	25.0	-53.0	209
MW-8(dg)	Lower TSA	1,498,286.8	689,072.7	137.0	136.21	-41.0	-56.0	199
MW-10(ds)	Upper TSA	1,498,811.1	688,966.5	135.2	134.54	21.0	6.0	135
MW-10(dg)	Lower TSA	1,498,800.6	688,968.3	135.3	135.05	-53.0	-68.0	210
MW-14R(ds)	Lower TSA	1,499,064.0	689,911.0	83.9	83.48	29.0	9.0	76
MW-17(ds)	Upper TSA	1,498,758.3	689,471.1	120.0	121.89	24.0	14.0	110
MW-18(ds)	Upper TSA	1,499,100.4	689,311.7	118.2	117.66	16.0	6.0	118
MW-19(ds)	Upper TSA	1,498,508.3	688,687.2	144.3	144.08	10.0	0.0	170
MW-20(ds)	Upper TSA	1,497,894.7	689,034.5	150.5	152.72	6.0	-4.0	158
MW-22(dg)	Lower TSA	1,499,756.6	689,895.1	82.1	81.65	-42.0	-52.0	142
MW-24(dg)/EW-5	Lower TSA	1,498,403.9	689,963.3	80.5	77.74	8.0	-42.1	127
MW-25(dg)	Lower TSA	1,498,008.4	690,067.2	75.7	75.28	-34.0	-44.0	131
MW-26(dg)	Lower TSA	1,501,401.0	689,348.0	106.3	108.98	-59.0	-69.0	238
MW-36(dg)	Lower TSA	1,499,600.9	690,836.8	79.1	78.84	-31.0	-41.0	162

Table 4-1
Well Construction Data - 1 October 2012 through 31 March 2013
TSA Remedy - East Multnomah County

Well	Aquifer Screened	X Coordinate	Y Coordinate	Elevations, ft MSL				Depth of Boring (ft)
				Ground Surface	Measuring Point	Top of Screen	Bottom of Screen	
PMX-167 [W. Interlachen]	Upper TSA	1,499,941.3	693,617.5	45.0	44.84	----- Not Available -----		50
PMX-196 [Andrews]	Lower TSA	1,500,927.4	689,964.2	88.3	89.27	18.0	-2.0	110
PMX-198 [Udd]	Lower TSA	1,500,285.7	689,411.6	118.9	117.54	-30.0	-80.0	192
PMX-208(dg) [Simpson]	Lower TSA	1,499,450.8	690,374.5	80.2	81.14	-15.0	-35.0	115
PWB-1(uts)	Upper TSA	1,498,555.2	692,656.5	13.9	15.98	-51.0	-71.0	86
PWB-1(lts)	Lower TSA	1,498,563.4	692,649.2	14.0	16.48	-98.0	-118.0	134
PWB-2(lts)	Lower TSA	1,499,982.2	693,633.6	45.1	44.32	-20.0	-40.0	90
RPW-1(ds)	Upper TSA	1,498,538.9	693,219.5	10.9	15.90	-63.0	-103.0	119
VW-17d-42.5	CU1	----- Not Available -----	-----	120.0	-----	82.5	77.5	45
VW-17d-75.0	Upper TSA	----- Not Available -----	-----	120.0	-----	65.0	45.0	95
VW-75d-95.5	Upper TSA	----- Not Available -----	-----	120.0	-----	44.5	24.5	130
BOP-44(usg)	SGA	1,497,207.4	691,933.2	24.6	34.25	-181.0	-191.0	219
EMC-2(usg)	SGA	1,499,258.5	691,965.1	52.9	47.15	-104.0	-114.0	175
PWB-1(usg)	SGA	1,498,550.0	692,646.6	13.7	16.59	-149.0	-169.0	183

NOTES:

1. D-16(dg) and EMC-2(dg) are monitored solely for PWB pumping events and are not included in the baseline remedy monitoring program
2. EW-3 was approved for conversion from pilot shutdown status to monitoring well status, per DEQ's approval in an April 15, 2013 email.

Table 5-1
Remedy Well Network Criteria
TSA Remedy - East Multnomah County

This table summarizes TSA remedy criteria for extraction well pilot shutdown, well and system decommissioning, monitoring well network modifications, and changes in sampling frequency. These criteria were presented in Section 5 of the eighth TSA annual performance report¹ and are summarized below for ongoing reference.

1. PILOT SHUTDOWN CRITERIA

The following criteria are for TSA extraction well(s) currently in pilot shutdown mode:

Well EW-18 - Per DEQ's November 3, 2009 approval:

- *If TCE concentrations in these pilot shutdown wells increase to levels equal to or above the MCL for two consecutive quarters, extraction at individual wells shall resume.*
 - *If TCE remains below the MCL cleanup level for 2 years, DEQ will evaluate potential decommissioning of these wells.*
-

2. MONITORING WELL NETWORK MODIFICATION

Wells may be removed from the monitoring program if a well meets one or more of the following criteria:

- *TCE concentrations have been consistently non-detectable for 2 or more years.*
 - *The well is located outside the limits of the plume and is no longer needed to monitor hydraulic plume control or restoration progress.*
 - *The location of a well duplicates another well better suited to evaluate hydraulic control and restoration progress.*
-

3. SAMPLING FREQUENCY MODIFICATIONS

The following criteria serve to standardize current and future monitoring adjustments as restoration progresses over the coming years:

Criteria for Increasing Sampling Frequency:

- *If TCE has been non-detectable for 2 or more years and increases to detectable levels for two consecutive sampling events, the sampling frequency will be increased.*
- *If TCE has been below the MCL for 2 or more years and increases above the MCL for two consecutive sampling events, the sampling frequency will be increased.*

Criteria for Reducing Sampling Frequency:

- *If TCE has been consistently non-detectable for the prior 2 years, the sampling frequency may be reduced.*
 - *If TCE has been stable to declining for the prior 2 years, the sampling frequency may be reduced.*
-

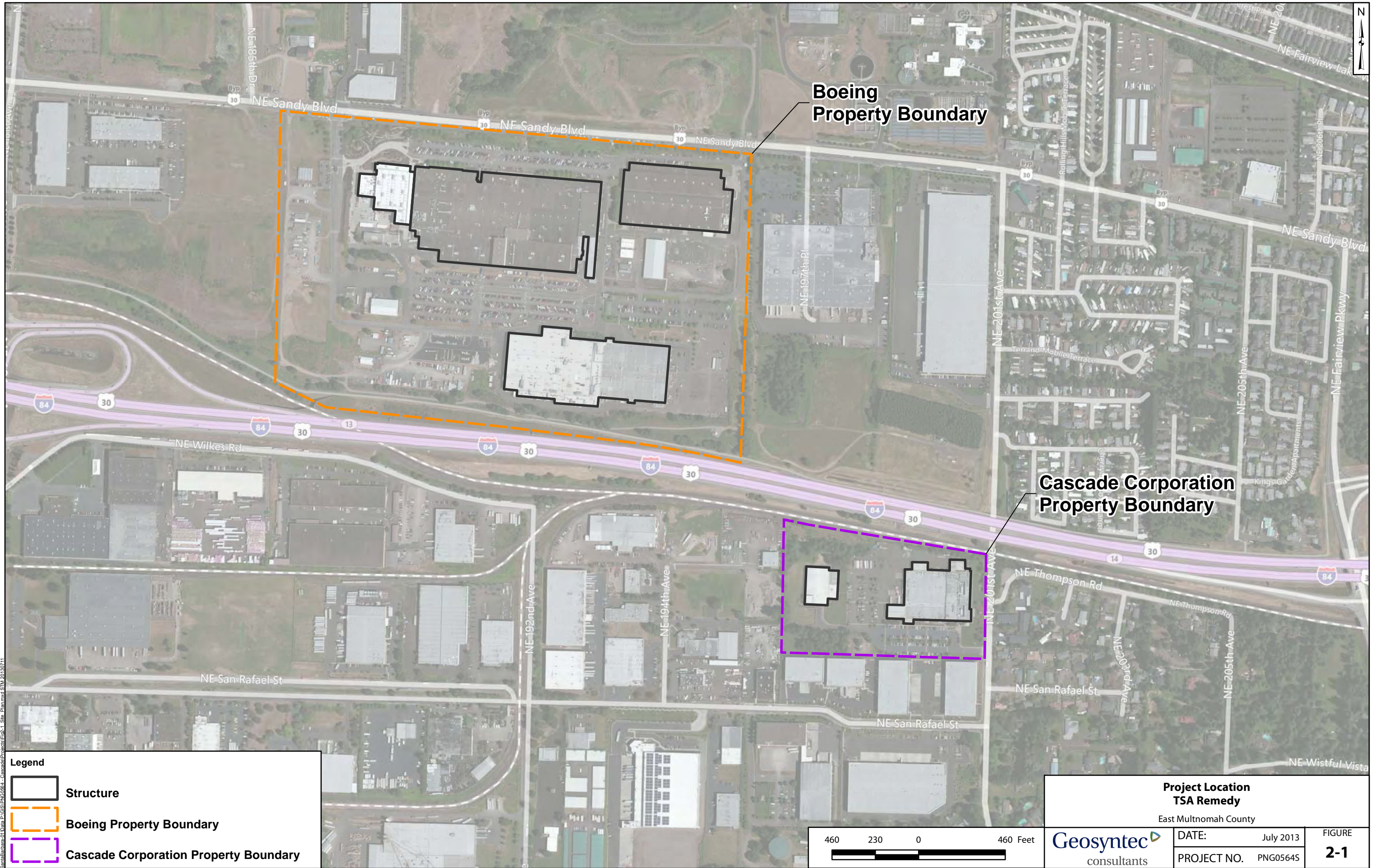
4. CRITERIA FOR WELL DECOMMISSIONINGS

Extraction and monitoring well decommissionings will be proposed to DEQ if the following criteria are met:

- *Extraction well decommissioning may be proposed to DEQ if TCE concentrations remain consistently below the MCL in that well for 2 years following pilot shutdown; two consecutive TCE detections at or above the MCL may prompt resumed operation.*
 - *Monitoring well decommissioning will be proposed to DEQ if TCE concentrations remain below the MCL during the confirmation sampling round that will be performed 2 years after a well has been removed from the remedy monitoring schedule; if TCE is detected at or above the MCL during the confirmation sampling round, additional monitoring may be required.*
-

¹Landau Associates, Prowell Environmental, Pegasus Geoscience, 2006. Troutdale Sandstone Aquifer Remedial Action Annual Performance Evaluation, April 1, 2005 through March 31, 2006. June 30.

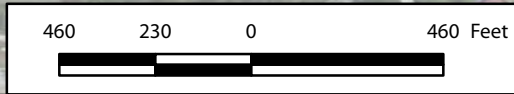
FIGURES



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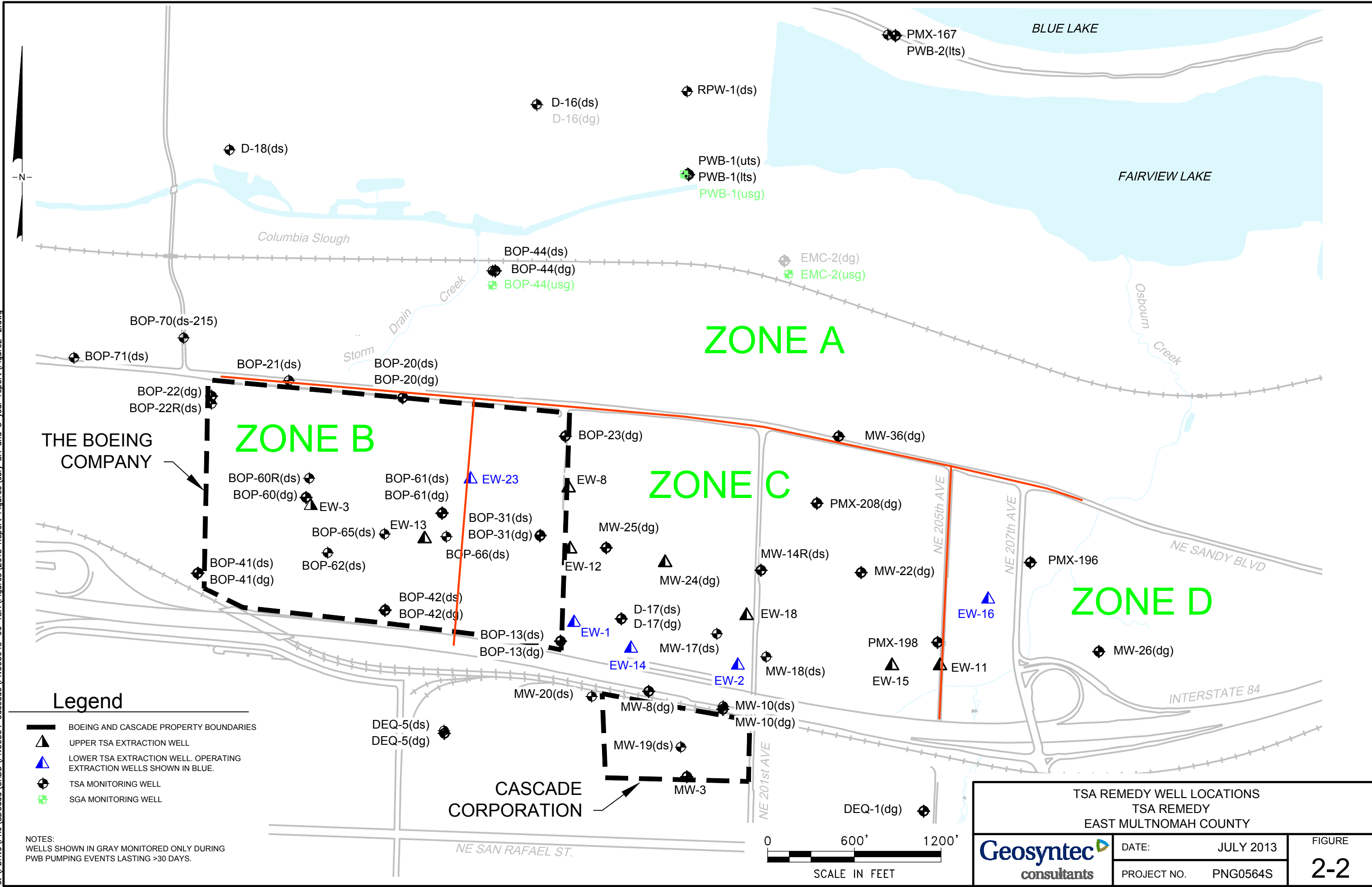
Legend

- Structure
- Boeing Property Boundary
- Cascade Corporation Property Boundary



Project Location		
TSA Remedy		
East Multnomah County		
Geosyntec consultants	DATE: July 2013	FIGURE
	PROJECT NO. PNG05645	2-1

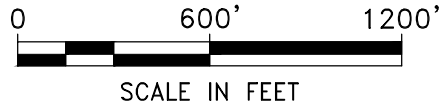
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Legend

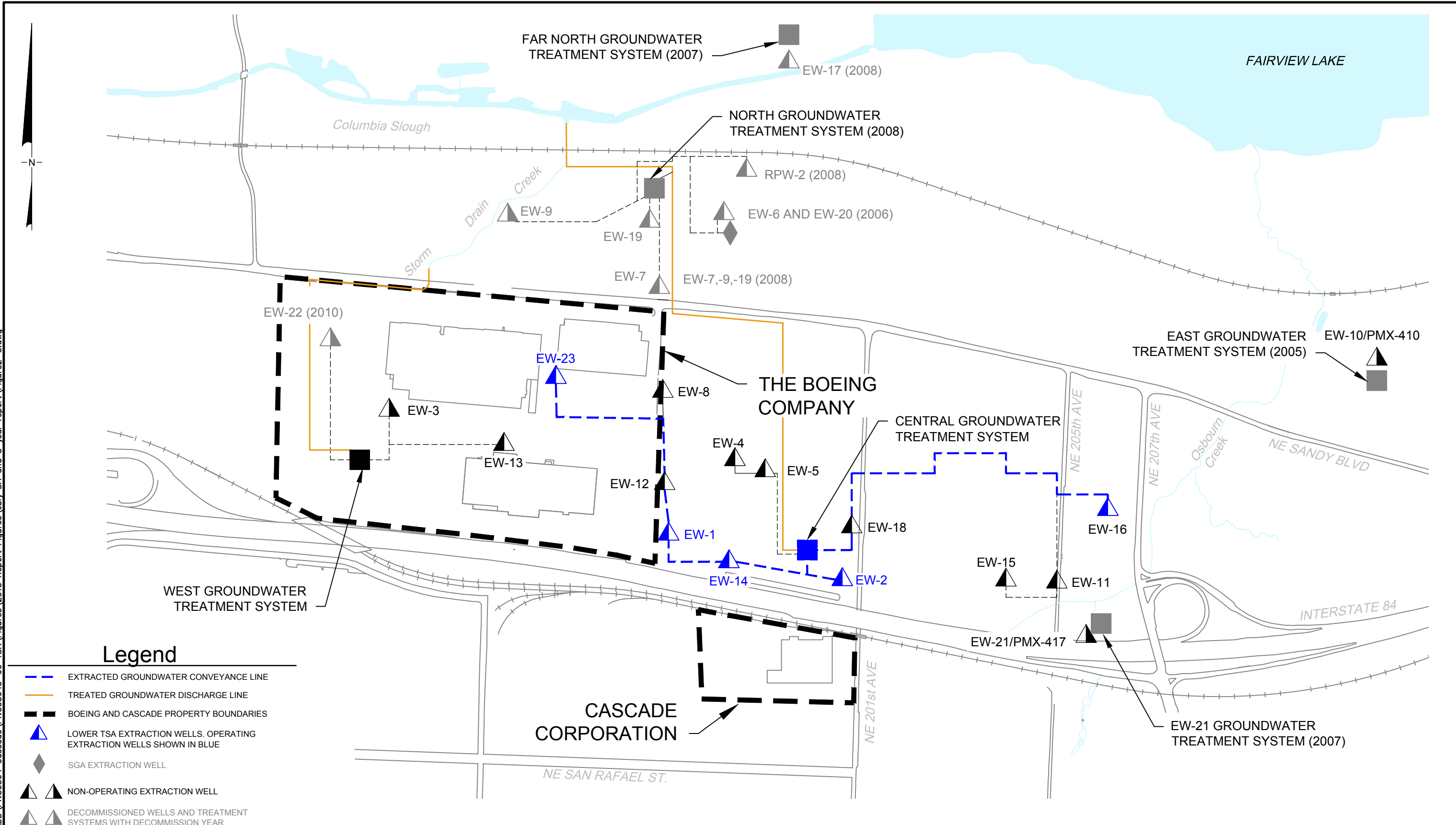
- BOEING AND CASCADE PROPERTY BOUNDARIES
- UPPER TSA EXTRACTION WELL
- LOWER TSA EXTRACTION WELL. OPERATING EXTRACTION WELLS SHOWN IN BLUE.
- TSA MONITORING WELL
- SGA MONITORING WELL

NOTES:
WELLS SHOWN IN GRAY MONITORED ONLY DURING PWB PUMPING EVENTS LASTING >30 DAYS.



TSA REMEDY WELL LOCATIONS TSA REMEDY EAST MULTNOMAH COUNTY		
	DATE: JULY 2013	FIGURE 2-2
	PROJECT NO. PNG0564S	

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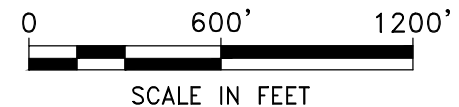


Legend

- EXTRACTED GROUNDWATER CONVEYANCE LINE
- TREATED GROUNDWATER DISCHARGE LINE
- - -** BOEING AND CASCADE PROPERTY BOUNDARIES
- ▲ LOWER TSA EXTRACTION WELLS. OPERATING EXTRACTION WELLS SHOWN IN BLUE
- ◆ SGA EXTRACTION WELL
- ▲▲ NON-OPERATING EXTRACTION WELL
- ▲▲ DECOMMISSIONED WELLS AND TREATMENT SYSTEMS WITH DECOMMISSION YEAR

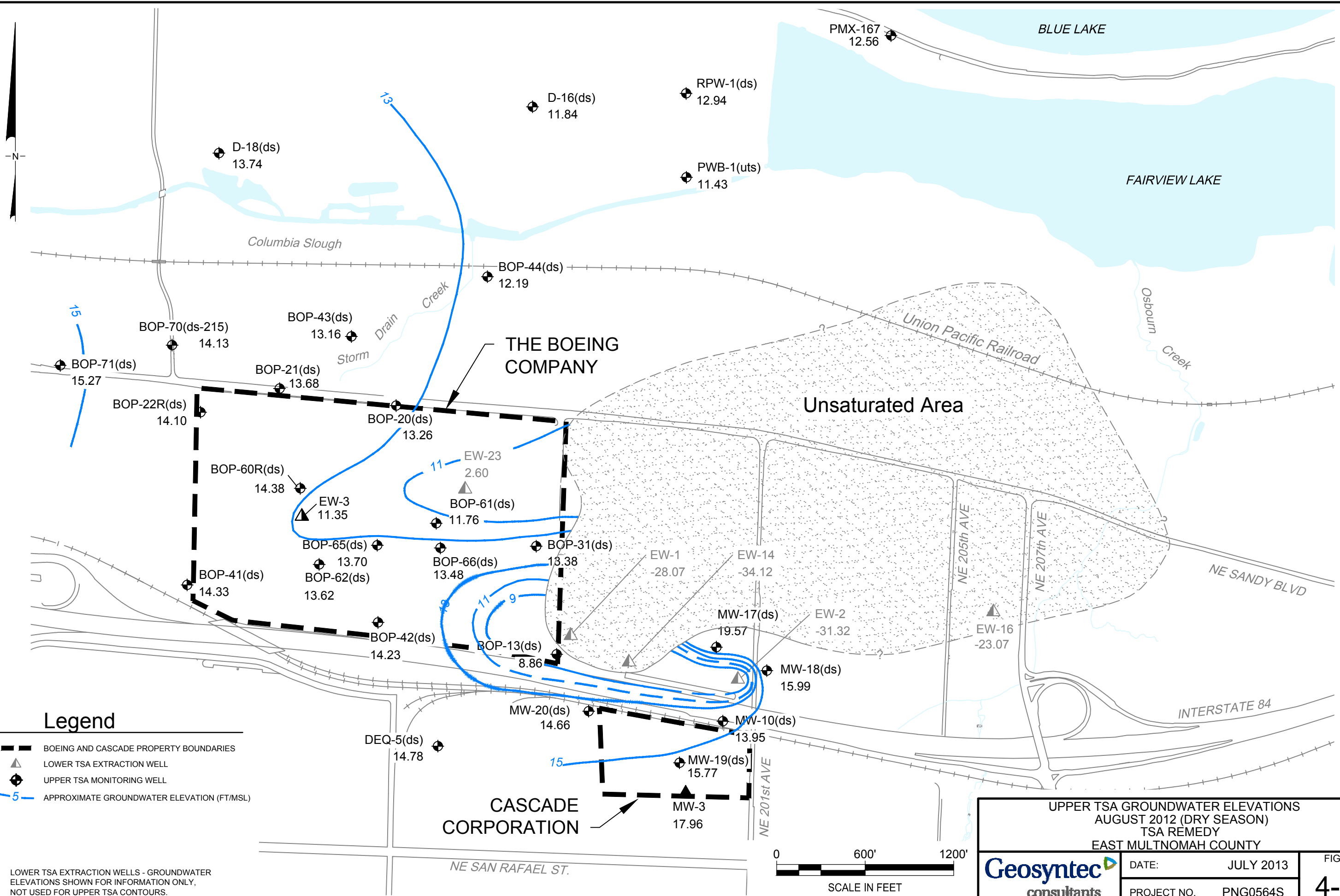
WELLS PILOT SHUTDOWN:
EW-18; NOV. 2009

WELLS CONVERTED TO MONITORING USE:
EW-5; OCT. 2008
EW-8; JUNE 2009
EW-11; NOV. 2009
EW-12; MARCH 2009
EW-13 & EW-15; AUG. 2012
EW-3; APRIL 2013

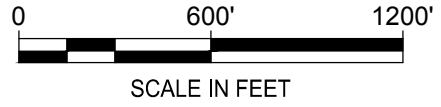


TSA REMEDIATION SYSTEM LAYOUT TSA REMEDY EAST MULTNOMAH COUNTY		
	DATE: JULY 2013	FIGURE 2-3
	PROJECT NO. PNG0564S	

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LOWER TSA EXTRACTION WELLS - GROUNDWATER ELEVATIONS SHOWN FOR INFORMATION ONLY, NOT USED FOR UPPER TSA CONTOURS.

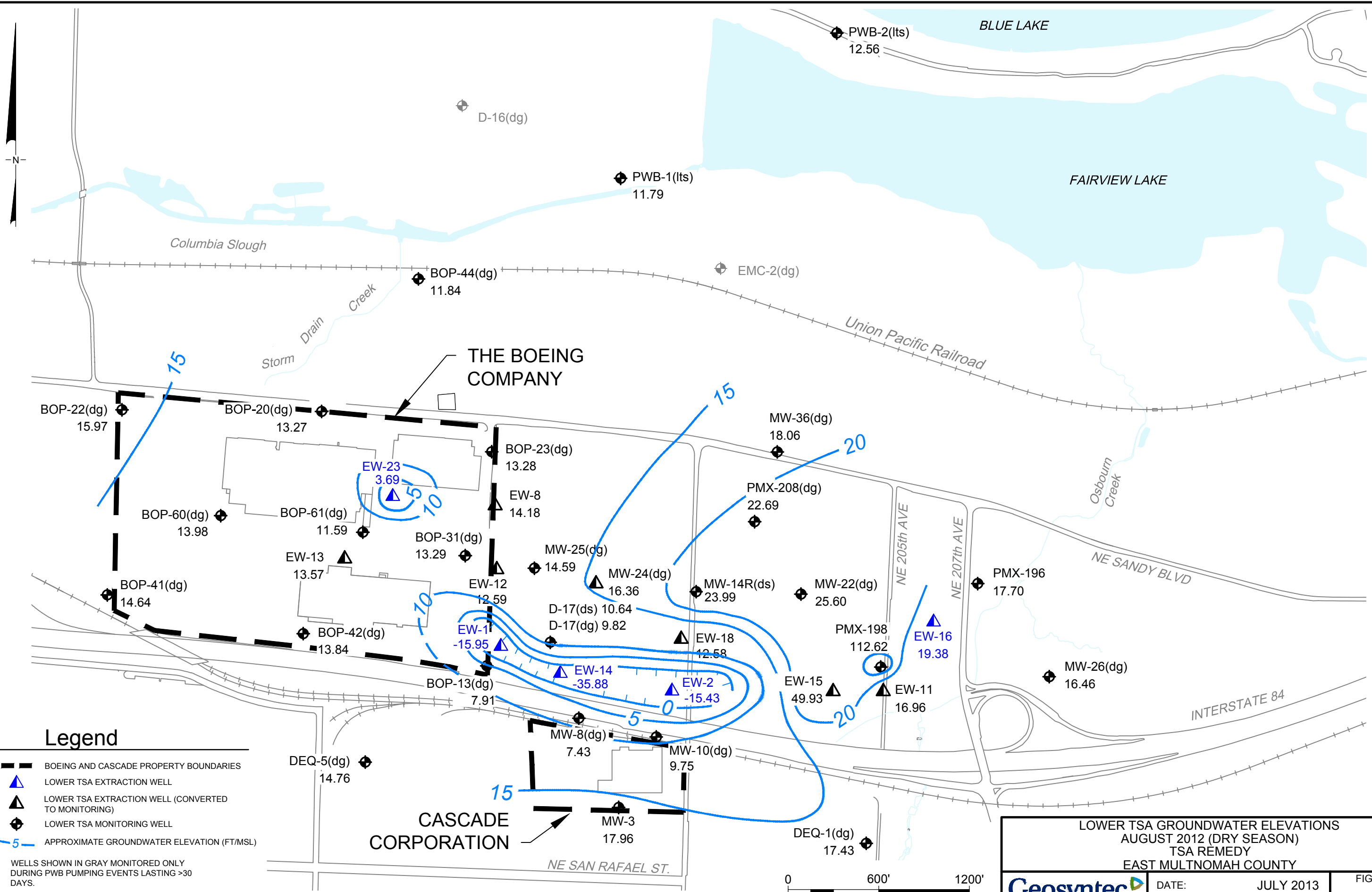


Geosyntec
consultants

DATE: JULY 2013
PROJECT NO. PNG0564S

FIGURE
4-1a

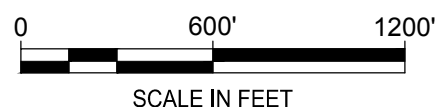
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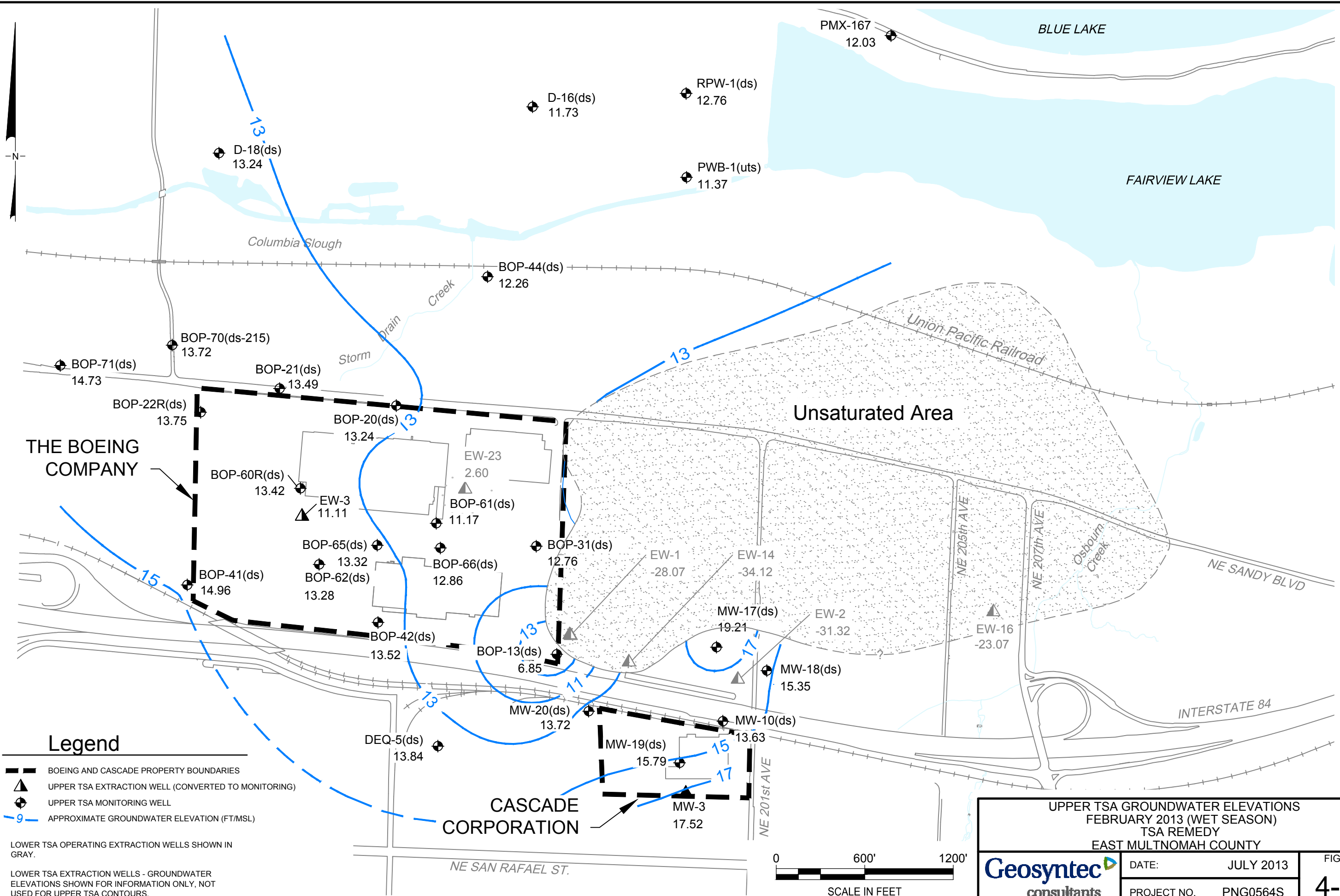
LOWER TSA GROUNDWATER ELEVATIONS
AUGUST 2012 (DRY SEASON)
TSA REMEDY
EAST MULTNOMAH COUNTY

Geosyntec consultants

DATE:	JULY 2013	FIGURE 4-1b
PROJECT NO.	PNG0564S	



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THE BOEING COMPANY

CASCADE CORPORATION

Unsaturated Area

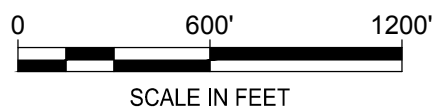
UPPER TSA GROUNDWATER ELEVATIONS
 FEBRUARY 2013 (WET SEASON)
 TSA REMEDY
 EAST MULTNOMAH COUNTY

Legend

- BOEING AND CASCADE PROPERTY BOUNDARIES
- UPPER TSA EXTRACTION WELL (CONVERTED TO MONITORING)
- UPPER TSA MONITORING WELL
- APPROXIMATE GROUNDWATER ELEVATION (FT/MSL)

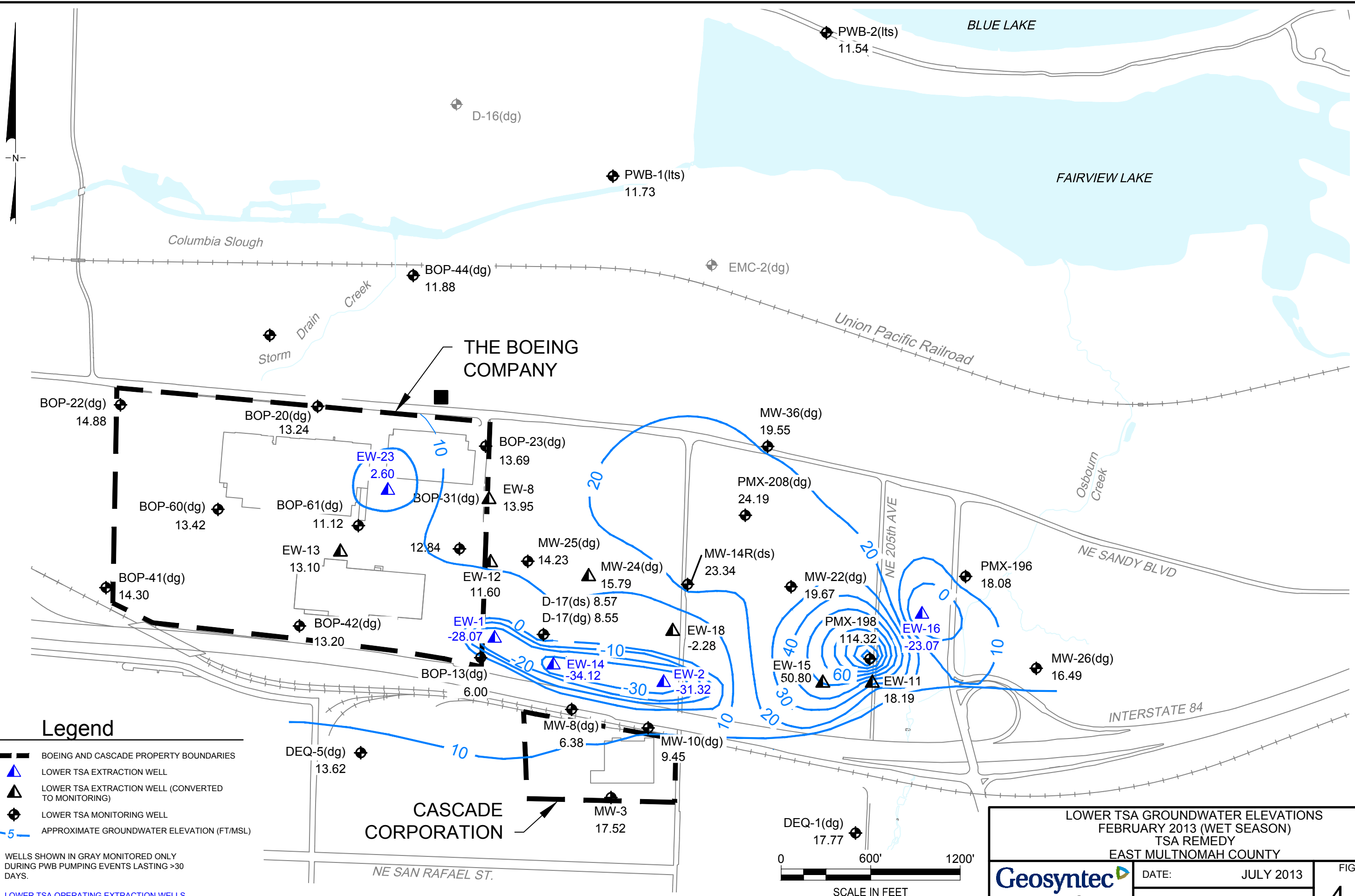
LOWER TSA OPERATING EXTRACTION WELLS SHOWN IN GRAY.

LOWER TSA EXTRACTION WELLS - GROUNDWATER ELEVATIONS SHOWN FOR INFORMATION ONLY, NOT USED FOR UPPER TSA CONTOURS.



	DATE: JULY 2013	FIGURE 4-2a
	PROJECT NO. PNG0564S	

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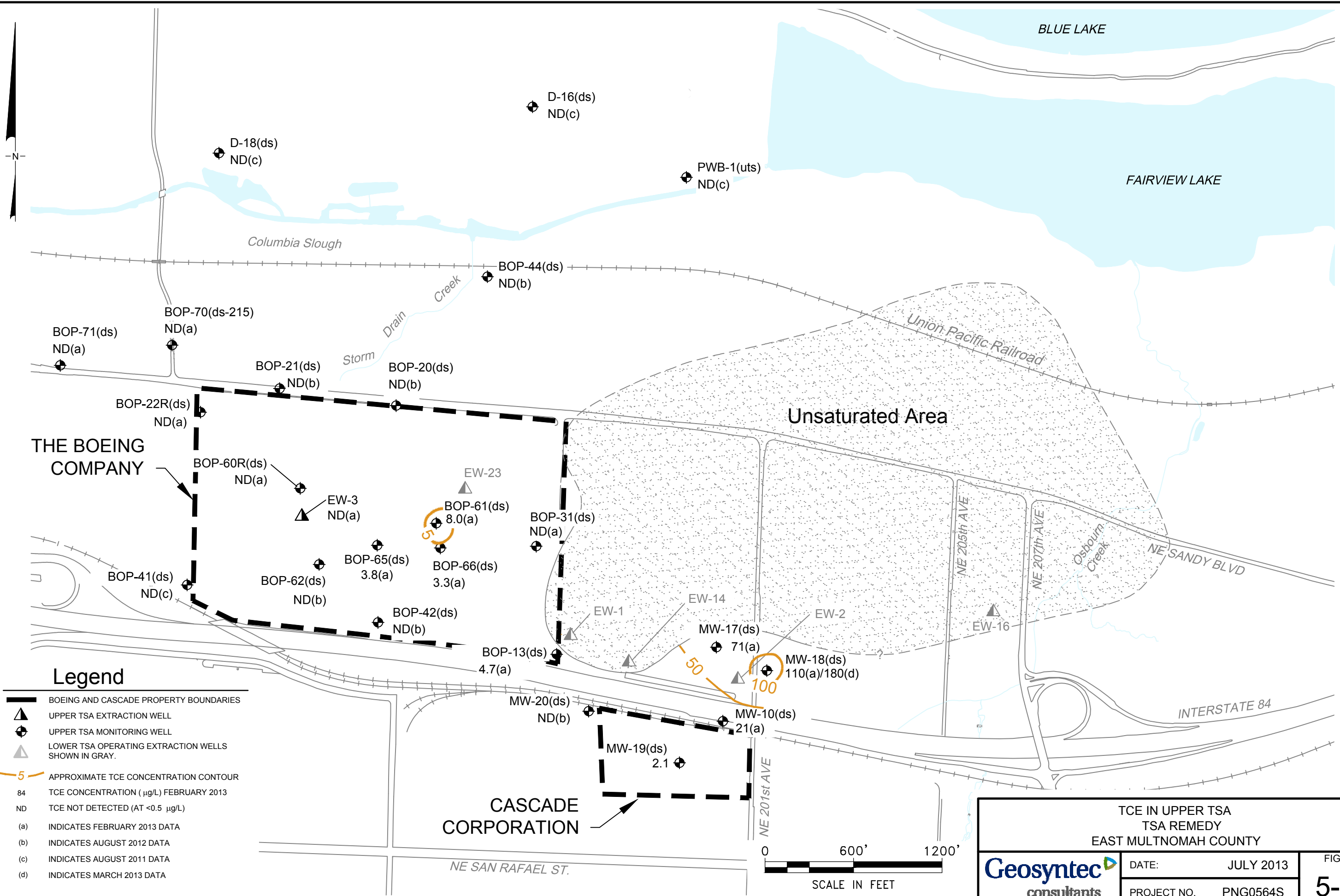


Legend

- BOEING AND CASCADE PROPERTY BOUNDARIES
 - LOWER TSA EXTRACTION WELL
 - LOWER TSA EXTRACTION WELL (CONVERTED TO MONITORING)
 - LOWER TSA MONITORING WELL
 - APPROXIMATE GROUNDWATER ELEVATION (FT/MSL)
- WELLS SHOWN IN GRAY MONITORED ONLY DURING PWB PUMPING EVENTS LASTING >30 DAYS.
- LOWER TSA OPERATING EXTRACTION WELLS SHOWN IN BLUE.

LOWER TSA GROUNDWATER ELEVATIONS FEBRUARY 2013 (WET SEASON) TSA REMEDY EAST MULTNOMAH COUNTY		
	DATE:	JULY 2013
	PROJECT NO.	PNG0564S
		FIGURE 4-2b

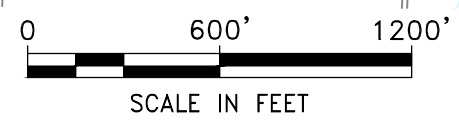
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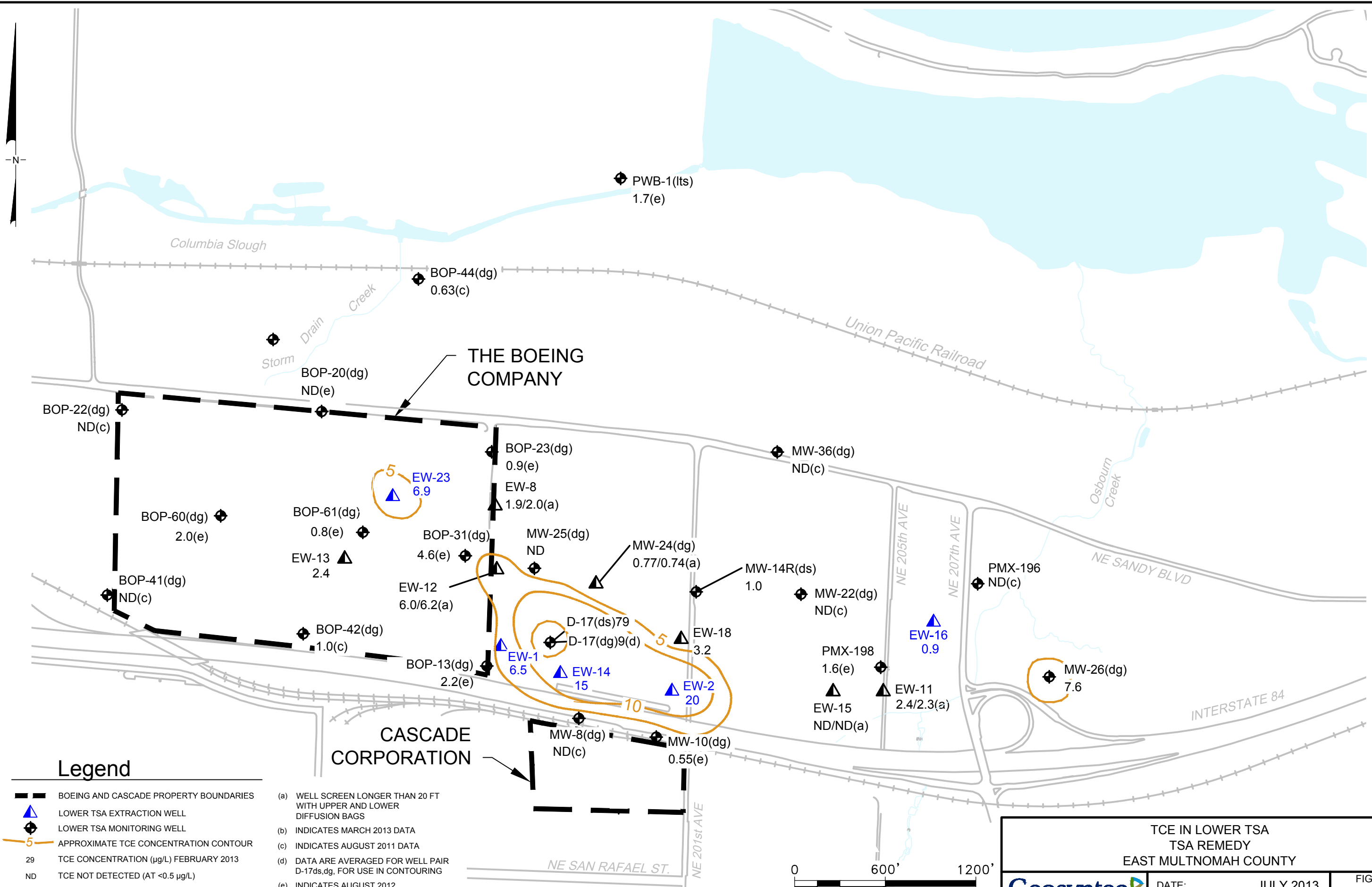
Legend

- BOEING AND CASCADE PROPERTY BOUNDARIES
- UPPER TSA EXTRACTION WELL
- UPPER TSA MONITORING WELL
- LOWER TSA OPERATING EXTRACTION WELLS SHOWN IN GRAY.
- APPROXIMATE TCE CONCENTRATION CONTOUR
- 84 TCE CONCENTRATION (µg/L) FEBRUARY 2013
- ND TCE NOT DETECTED (AT <0.5 µg/L)
- (a) INDICATES FEBRUARY 2013 DATA
- (b) INDICATES AUGUST 2012 DATA
- (c) INDICATES AUGUST 2011 DATA
- (d) INDICATES MARCH 2013 DATA

TCE IN UPPER TSA TSA REMEDY EAST MULTNOMAH COUNTY		
Geosyntec consultants	DATE: JULY 2013	FIGURE
	PROJECT NO. PNG0564S	5-1a



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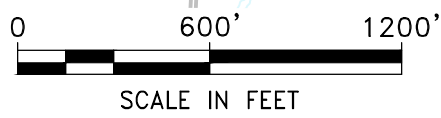


Legend

- BOEING AND CASCADE PROPERTY BOUNDARIES
- LOWER TSA EXTRACTION WELL
- LOWER TSA MONITORING WELL
- APPROXIMATE TCE CONCENTRATION CONTOUR
- 29 TCE CONCENTRATION (µg/L) FEBRUARY 2013
- ND TCE NOT DETECTED (AT <0.5 µg/L)

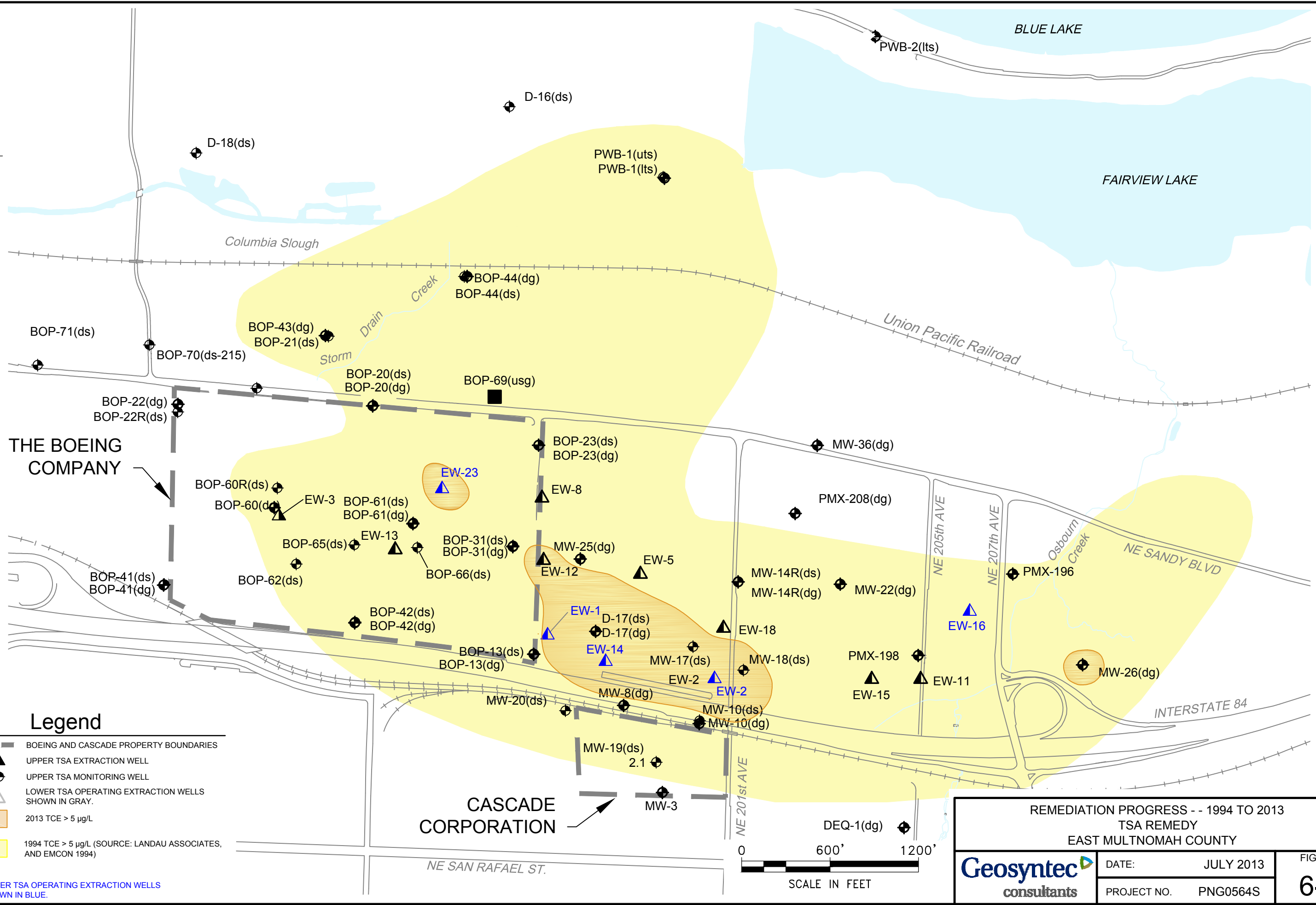
- (a) WELL SCREEN LONGER THAN 20 FT WITH UPPER AND LOWER DIFFUSION BAGS
- (b) INDICATES MARCH 2013 DATA
- (c) INDICATES AUGUST 2011 DATA
- (d) DATA ARE AVERAGED FOR WELL PAIR D-17ds,dg, FOR USE IN CONTOURING
- (e) INDICATES AUGUST 2012
- (f) INDICATES OCTOBER 2012

NOTE:
OPERATING EXTRACTION WELLS SHOWN IN BLUE.



TCE IN LOWER TSA TSA REMEDY EAST MULTNOMAH COUNTY		
	DATE:	JULY 2013
	PROJECT NO.	PNG0564S
		FIGURE 5-1b

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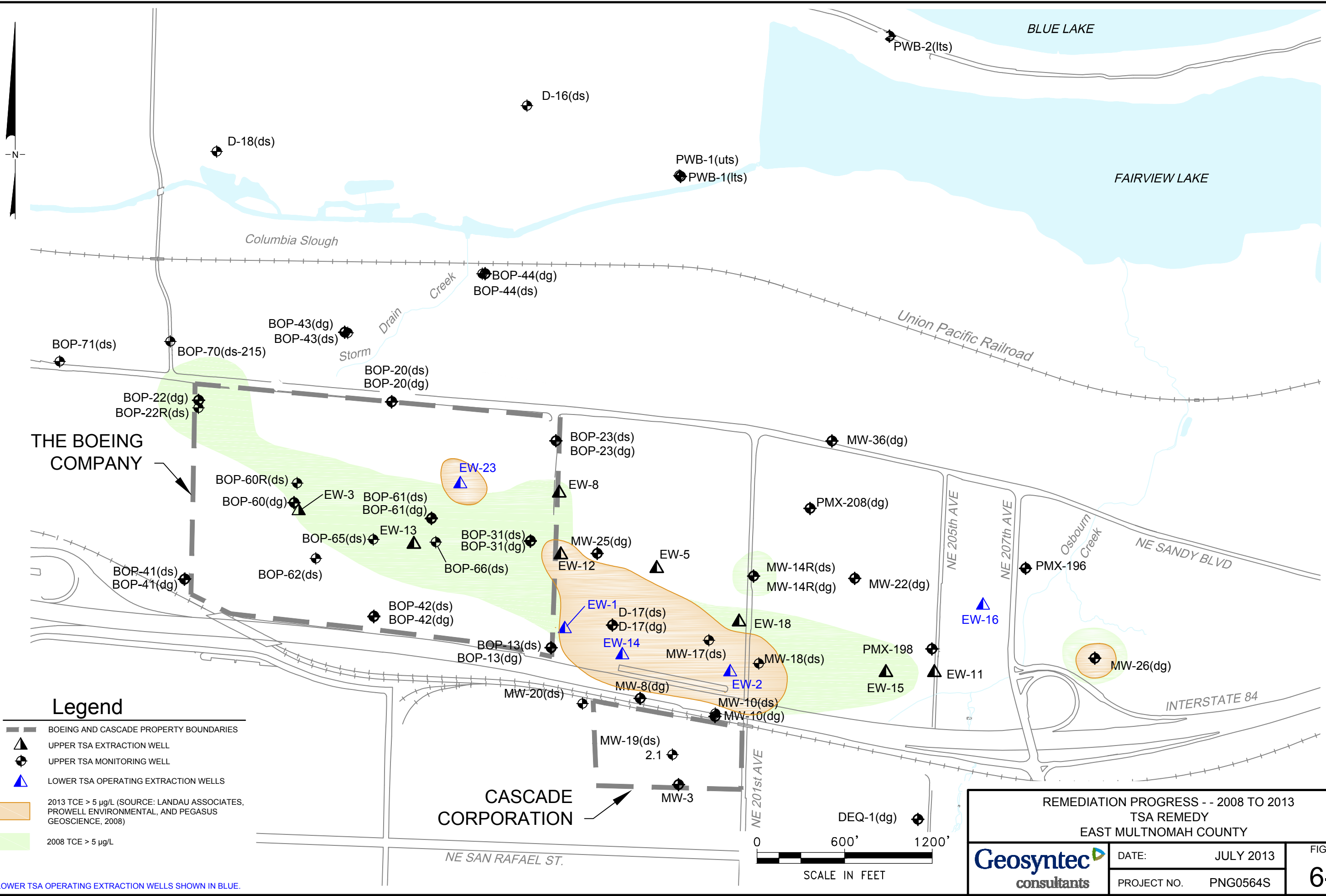


Legend

- BOEING AND CASCADE PROPERTY BOUNDARIES
- UPPER TSA EXTRACTION WELL
- UPPER TSA MONITORING WELL
- LOWER TSA OPERATING EXTRACTION WELLS SHOWN IN GRAY.
- 2013 TCE > 5 µg/L
- 1994 TCE > 5 µg/L (SOURCE: LANDAU ASSOCIATES, AND EMCON 1994)
- LOWER TSA OPERATING EXTRACTION WELLS SHOWN IN BLUE.

REMEDATION PROGRESS -- 1994 TO 2013 TSA REMEDY EAST MULTNOMAH COUNTY		
	DATE: JULY 2013	FIGURE 6-1
	PROJECT NO. PNG0564S	

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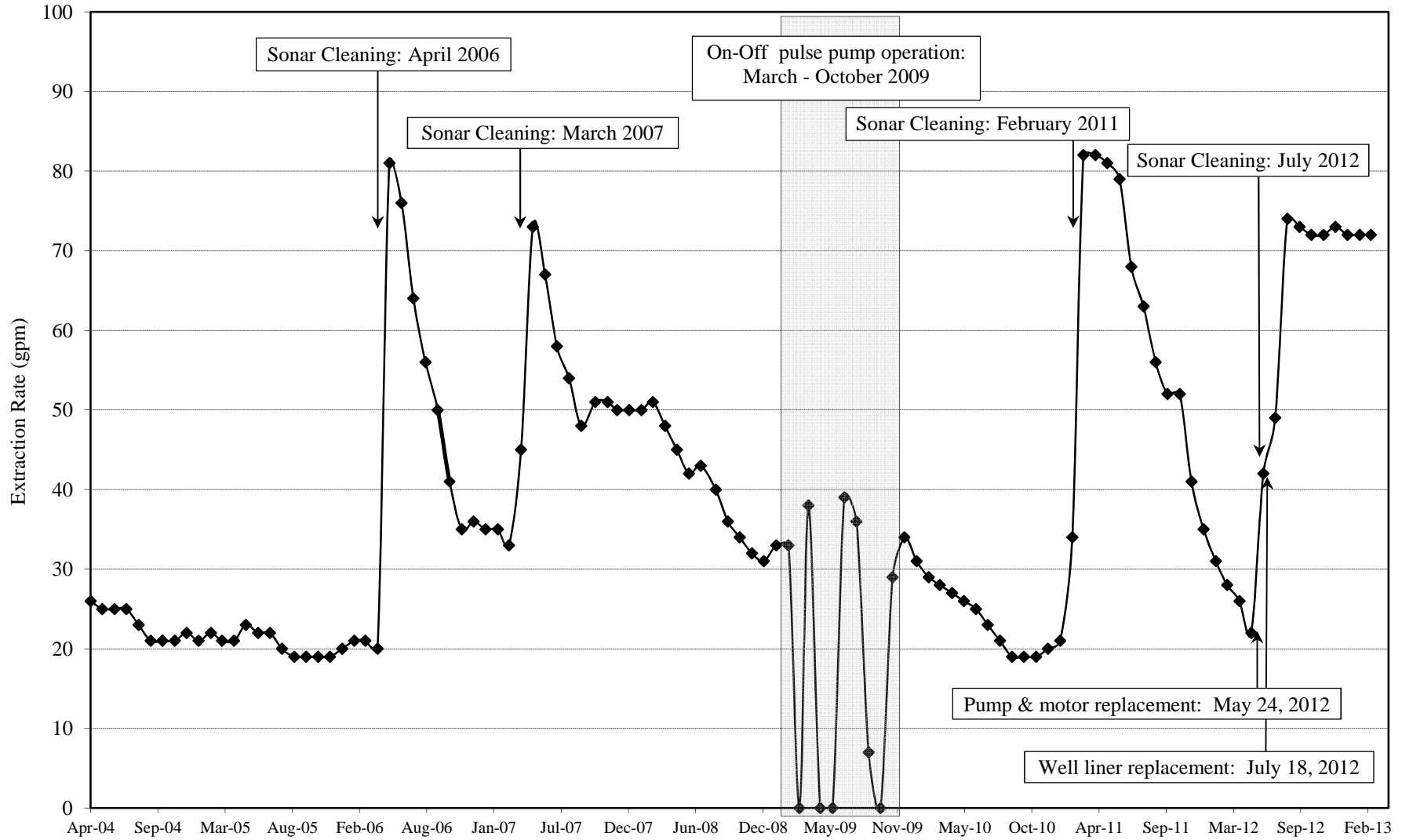
REMEDATION PROGRESS -- 2008 TO 2013 TSA REMEDY EAST MULTNOMAH COUNTY		
	DATE: JULY 2013	FIGURE 6-2
	PROJECT NO. PNG0564S	

LOWER TSA OPERATING EXTRACTION WELLS SHOWN IN BLUE.

APPENDIX A

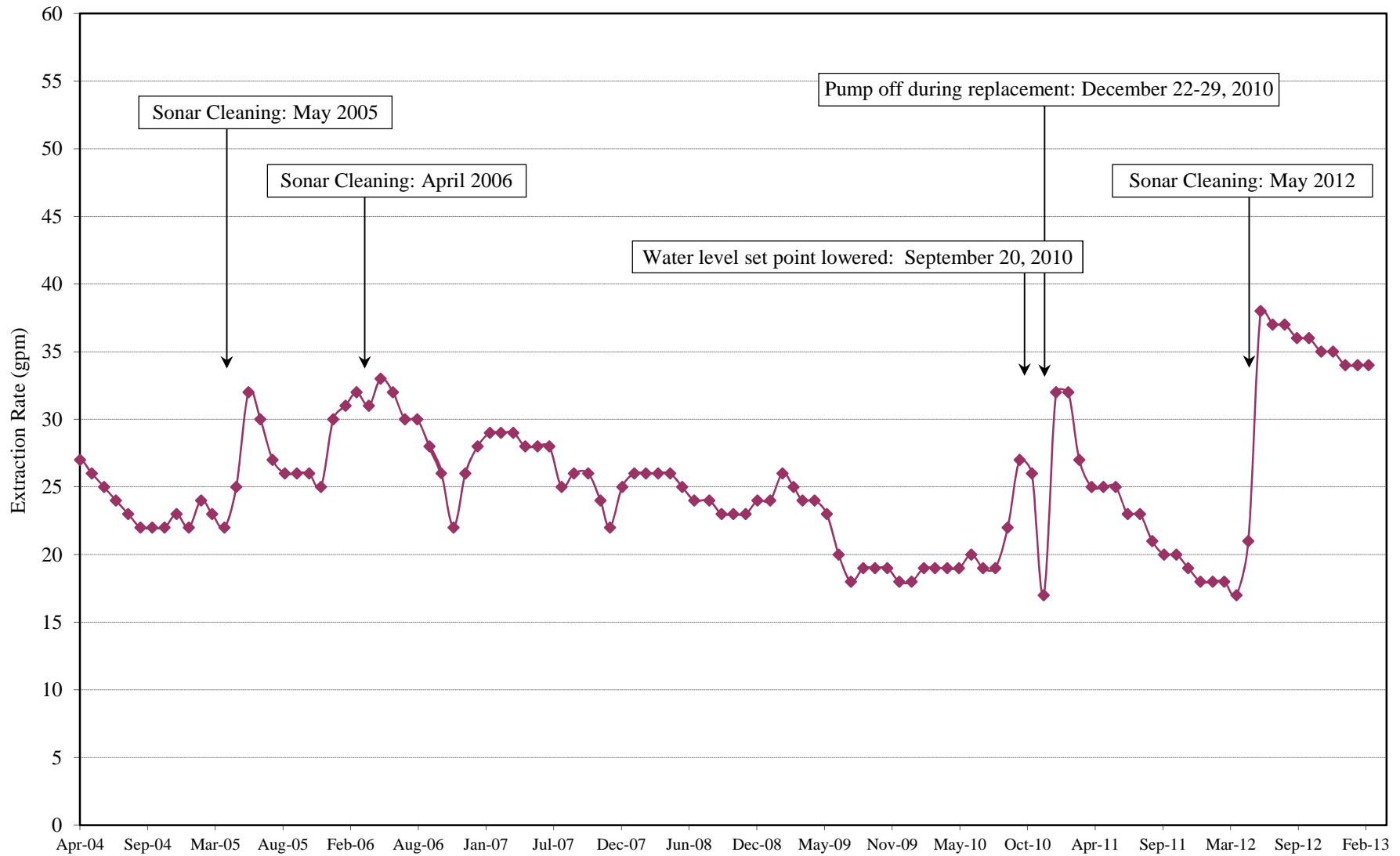
Extraction Rate Profiles

Figure A-1
EW-1 Monthly Average Extraction Rate Profile
TSA Remedy - East Multnomah County



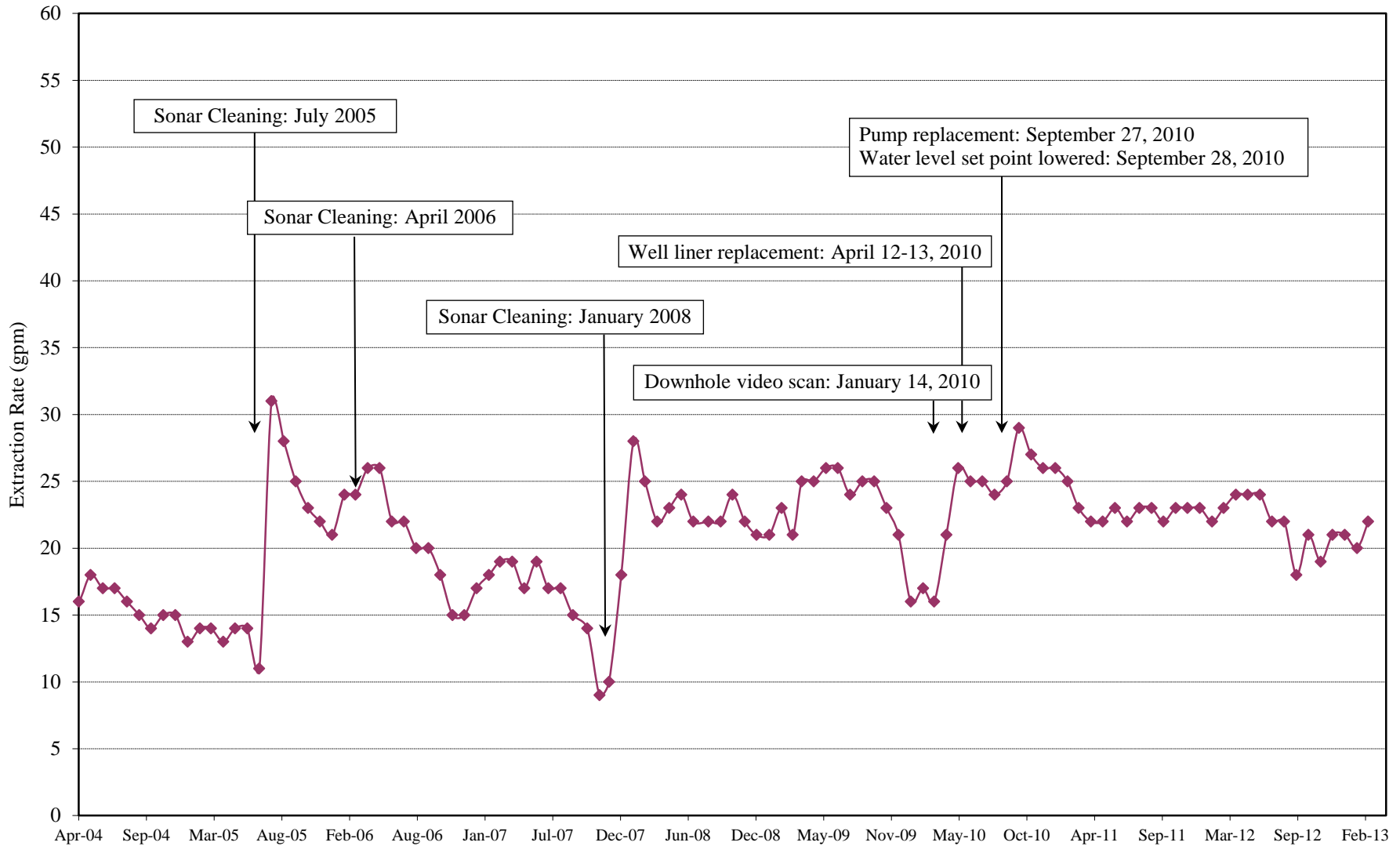
Figs A-1, -2, -3, -4, -5 EW-1, -2, -14, -16, -23 Mo. Avg Extr Profiles

Figure A-2
EW-2 Monthly Average Extraction Rate Profile
TSA Remedy - East Multnomah County



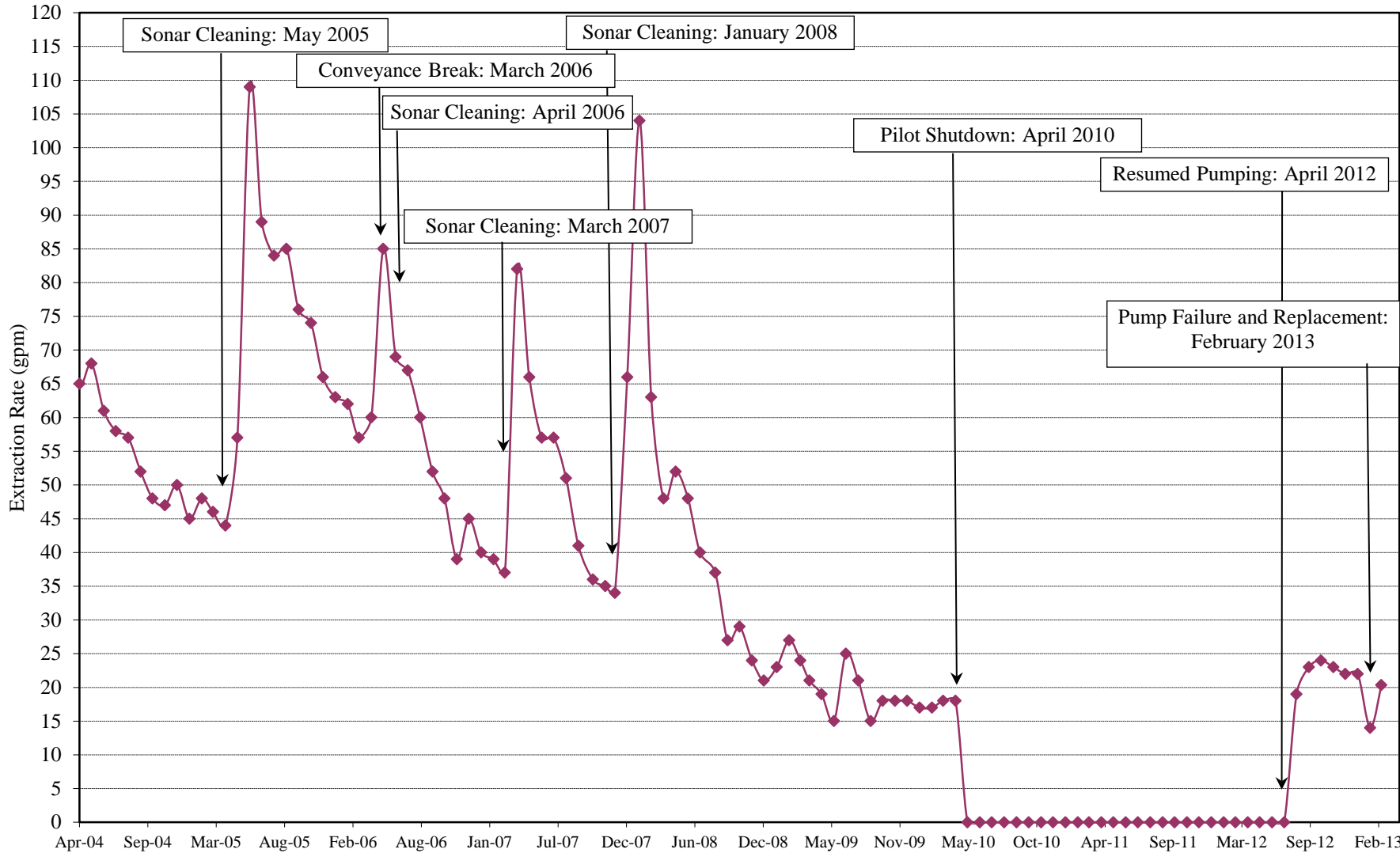
Figs A-1, -2, -3, -4, -5 EW-1, -2, -14, -16, -23 Mo. Avg Extr Profiles

Figure A-3
EW-14 Monthly Average Extraction Rate Profile
TSA Remedy - East Multnomah County



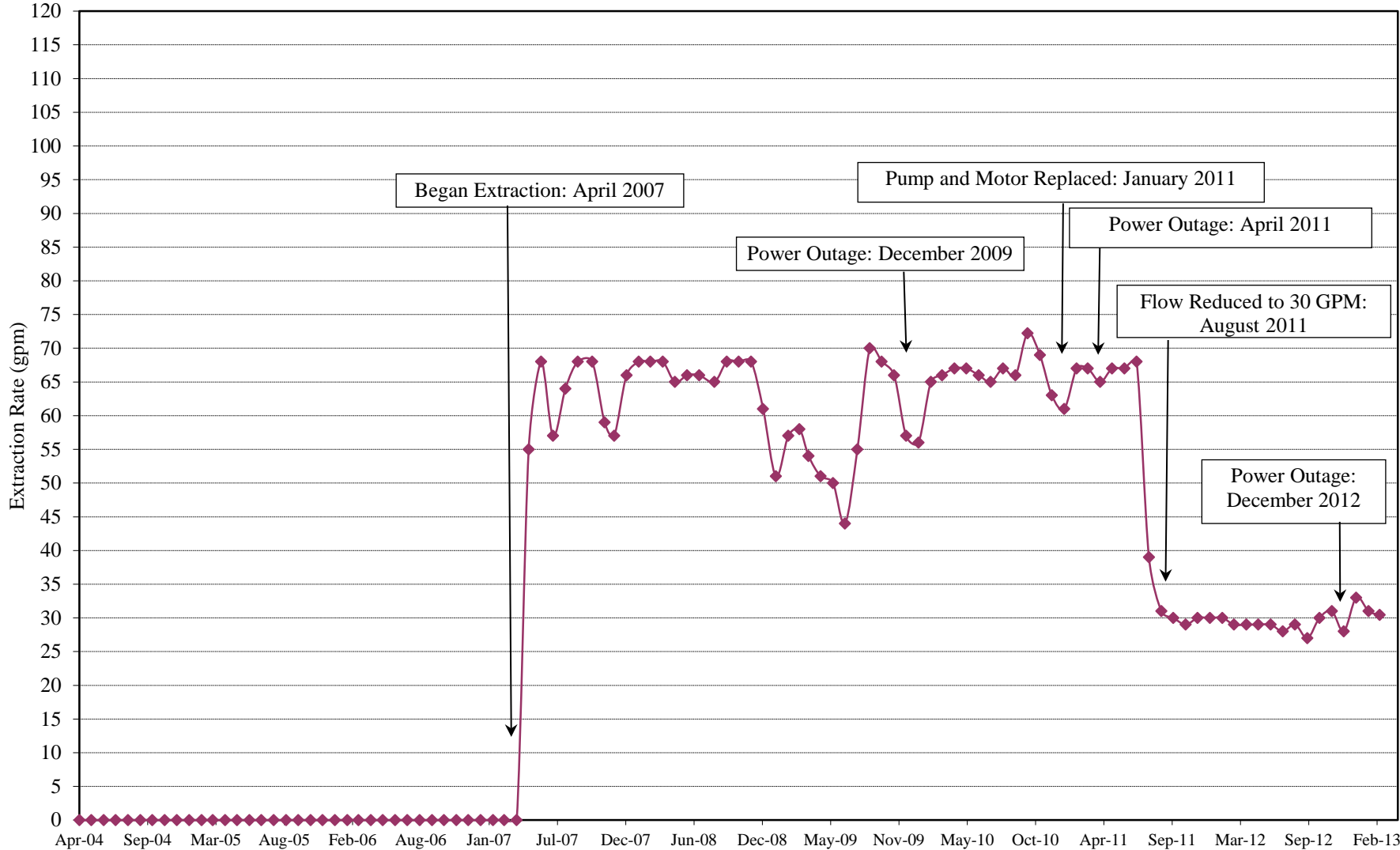
Figs A-1, -2, -3, -4, -5 EW-1, -2, -14, -16, -23 Mo. Avg Extr Profiles

Figure A-4
EW-16 Monthly Average Extraction Rate Profile
TSA Remedy - East Multnomah County



Figs A-1, -2, -3, -4, -5 EW-1, -2, -14, -16, -23 Mo. Avg Extr Profiles

Figure A-5
EW-23 Monthly Average Extraction Rate Profile
TSA Remedy - East Multnomah County



Figs A-1, -2, -3, -4, -5 EW-1, -2, -14, -16, -23 Mo. Avg Extr Profiles

Figure A-6
TSA Remedy Extraction Rates- January 2008 through March 2013
TSA Remedy - East Multnomah County

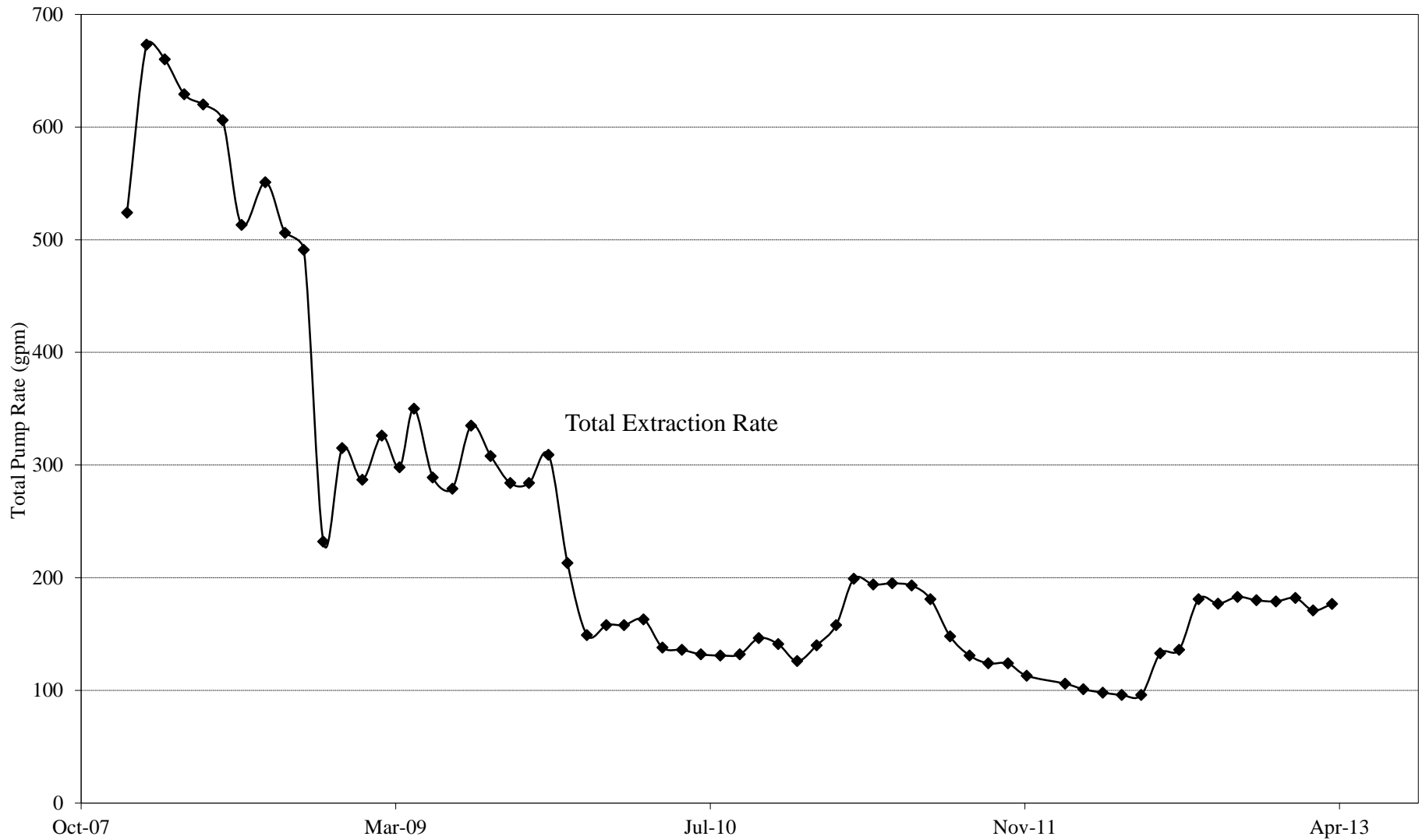


Table A-1
TSA Extraction Rates and 12-Month Averages - through 31 March 2013
TSA Remedy - East Multnomah County

Zone	12-Mo. Avg.	Apr-12	May-12	Jun-12	Jul-12	Aug-12	Sep-12	Oct-12	Nov-12	Dec-12	Jan-13	Feb-13	Mar-13
<i>Zone B</i>	30	29	29	29	28	29	27	30	31	28	33	31	30
EW-23	30	29	29	29	28	29	27	30	31	28	33	31	30
<i>Zone C</i>	114	67	67	104	108	133	127	129	126	129	127	126	126
EW-1	60	26	22	42	49	74	73	72	72	73	72	72	72
EW-2	33	17	21	38	37	37	36	36	35	35	34	34	32
EW-14	22	24	24	24	22	22	18	21	19	21	21	20	22
<i>Zone D</i>	14	0	0	0	0	19	23	24	23	22	22	14	20
EW-16	14	0	0	0	0	19	23	24	23	22	22	14	20
TSA Cong	157	96	96	133	136	181	177	183	180	179	182	171	176

NOTES:

Monthly average flow rates are shown in gallons per minute for each well.

Wells that have not operated during the last 12 months are not shown.

EW-1 offline 5/21/12 to 5/24/12 for video scan and pump replacement; EW-1 offline 7/18/12 to 7/20/12 for liner installation, video scan, sonar cleaning, and re-development.

EW-2 offline 5/21/12 through 5/23/12 for video scan, sonar cleaning, and re-development.

EW-14 offline 10/13/12 to 10/15/12 and 11/10/12 to 11/12/12 due to low in-well water levels causing auto-shutdown; pump rate adjusted and resumed operation.

EW-16 pilot shutdown moded ceased 8/22/12, when active operation resumed.

EW-16 offline from 2/15/13 to 2/26/13, due to pump failure; pump replaced and operation resumed 2/26/13.

EW-23 offline 9/1/12 to 9/3/12 and 12/22/12 to 12/24/12, due to power outages.

Table A-2
Discharge Monitoring Summary - 1 October 2012 through 31 March 2013
TSA Remedy - East Multnomah County

Parameter	Discharge Limitations ^a	Unit	Sample Date	System Discharge			Number of Exceedances	Sample Frequency
				Min	Avg	Max		
Central Treatment System								
October 2012								
pH	6.0 – 9.0	su	—	8	8.0	8.0	0	Weekly
Temperature	—	°F	—	—	60	—	—	Weekly
Flow	—	gpm	—	158	181	185	—	Daily
November 2012								
Trichloroethene	5.0	µg/L	11/7/12	<0.5	<0.5	<0.5	0	Quarterly
1,1-Dichloroethene	7.0	µg/L	11/7/12	<0.5	<0.5	<0.5	0	Quarterly
cis-1,2-Dichloroether	70	µg/L	11/7/12	<0.5	<0.5	<0.5	0	Quarterly
Tetrachloroethene	5.0	µg/L	11/7/12	<0.5	<0.5	<0.5	0	Quarterly
Vinyl Chloride	2.0	µg/L	11/7/12	<0.5	<0.5	<0.5	0	Quarterly
pH	6.0 – 9.0	su	—	7.9	8.0	8.0	0	Weekly
Temperature	—	°F	—	—	60	—	—	Weekly
Flow	—	gpm	—	162	181	187	—	Daily
December 2012								
pH	6.0 – 9.0	su	—	7.8	7.9	7.9	0	Weekly
Temperature	—	°F	—	—	59	—	—	Weekly
Flow	—	gpm	—	150	179	185	—	Daily
January 2013								
pH	6.0 – 9.0	su	—	7.9	7.9	7.9	0	Weekly
Temperature	—	°F	—	—	57	—	—	Weekly
Flow	—	gpm	—	181	183	184	—	Daily
February 2013								
Trichloroethene	5.0	µg/L	2/13/13	<0.5	<0.5	<0.5	0	Quarterly
1,1-Dichloroethene	7.0	µg/L	2/13/13	<0.5	<0.5	<0.5	0	Quarterly
cis-1,2-Dichloroether	70	µg/L	2/13/13	<0.5	<0.5	<0.5	0	Quarterly
Tetrachloroethene	5.0	µg/L	2/13/13	<0.5	<0.5	<0.5	0	Quarterly
Vinyl Chloride	2.0	µg/L	2/13/13	<0.5	<0.5	<0.5	0	Quarterly
pH	6.0 – 9.0	su	—	7.9	7.9	7.9	0	Weekly
Temperature	—	°F	—	—	55	—	—	Weekly
Flow	—	gpm	—	155	171	183	—	Daily
March 2013								
pH	6.0 – 9.0	su	—	7.8	7.9	7.9	0	Weekly
Temperature	—	°F	—	—	54	—	—	Weekly
Flow	—	gpm	—	156	176	181	—	Daily

NOTES:

^aDischarge limitations for the CTS are per Attachment C to DEQ Consent Order No. WMCSR-NWR-96-08 dated 2/14/97.

µg/L = micrograms/liter; °F = degrees Fahrenheit; gpm = gallons per minute; su = standard units.

**Table A-3
TSA Extraction Well
Monthly Average Flow and Total**

Month	Average Flow Rate (gallons per minute)											Total
	Sandstone		Zone B	Zone B/C	TSA Cong – Zone C					TSA Cong – Zone D		
	EW-3	EW-22	EW-13	EW-23	EW-1	EW-2	EW-14	EW-15	EW-18	EW-11	EW-16	
Jan-08	137	135	13	66	50	25	18	14	0	0	66	524
Feb-08	130	240	13	68	50	26	28	14	0	0	104	673
Mar-08	129	242	26	68	51	26	25	14	16	0	63	660
Apr-08	129	241	23	68	48	26	22	14	10	0	48	629
May-08	130	241	22	65	45	26	23	16	0	0	52	620
Jun-08	130	236	20	66	42	25	24	15	0	0	48	606
Jul-08	113	165	13	66	43	24	22	14	13	0	40	513
Aug-08	123	195	14	65	40	24	22	15	16	0	37	551
Sep-08	122	186	9	68	36	23	22	13	0	0	27	506
Oct-08	114	172	15	68	34	23	24	12	0	0	29	491
Nov-08	28	—	13	68	32	23	22	12	10	0	24	232
Dec-08	123	—	12	61	31	24	21	12	10	0	21	315
Jan-09	113	—	10	51	33	24	21	12	0	0	23	287
Feb-09	136	—	13	57	33	26	23	11	0	0	27	326
Mar-09	142	—	13	58	0	25	21	13	2	0	24	298
Apr-09	142	—	13	54	38	24	25	17	16	0	21	350
May-09	142	—	13	51	0	24	25	15	0	0	19	289
Jun-09	141	—	12	50	0	23	26	12	0	0	15	279
Jul-09	140	—	11	44	39	20	26	15	15	0	25	335
Aug-09	115	—	11	55	36	18	24	12	16	0	21	308
Sep-09	125	—	12	70	7	19	25	8	3	0	15	284
Oct-09	131	—	12	68	0	19	25	11	0	0	18	284
Nov-09	133	—	10	66	29	19	23	11	0	—	18	309
Dec-09	54	—	0	57	34	18	21	11	—	—	18	213
Jan-10	0	—	0	56	31	18	16	11	—	—	17	149
Feb-10	0	—	0	65	29	19	17	11	—	—	17	158
Mar-10	0	—	0	66	28	19	16	11	—	—	18	158
Apr-10	0	—	0	67	27	19	21	11	—	—	18	163
May-10	0	—	0	67	26	19	26	—	—	—	—	138
Jun-10	0	—	0	66	25	20	25	—	—	—	—	136
Jul-10	0	—	0	65	23	19	25	—	—	—	—	132
Aug-10	0	—	0	67	21	19	24	—	—	—	—	131
Sep-10	0	—	0	66	19	22	25	—	—	—	—	132
Oct-10	0	—	0	72	19	27	29	—	—	—	—	146
Nov-10	0	—	0	69	19	26	27	—	—	—	—	141
Dec-10	0	—	0	63	20	17	26	—	—	—	—	126
Jan-11	0	—	0	61	21	32	26	—	—	—	—	140
Feb-11	0	—	0	67	34	32	25	—	—	—	—	158
Mar-11	0	—	0	67	82	27	23	—	—	—	—	199
Apr-11	0	—	0	65	82	25	22	—	—	—	—	194
May-11	0	—	0	67	81	25	22	—	—	—	—	195
Jun-11	0	—	0	67	79	25	22	—	—	—	—	193
Jul-11	0	—	0	68	68	23	22	—	—	—	—	181
Aug-11	0	—	0	39	63	23	23	—	—	—	—	148
Sep-11	0	—	0	31	56	21	23	—	—	—	—	131
Oct-11	0	—	0	30	52	20	22	—	—	—	—	124

Table A-3
TSA Extraction Well
Monthly Average Flow and Total

Month	Average Flow Rate (gallons per minute)											Total
	Sandstone		Zone B	Zone B/C	TSA Cong – Zone C					TSA Cong – Zone D		
	EW-3	EW-22	EW-13	EW-23	EW-1	EW-2	EW-14	EW-15	EW-18	EW-11	EW-16	
Nov-11	0	—	0	29	52	20	23	—	—	—	—	124
Dec-11	0	—	0	30	41	19	23	—	—	—	—	113
Jan-12	0	—	0	30	35	18	23	—	—	—	—	106
Feb-12	0	—	0	30	31	18	22	—	—	—	—	101
Mar-12	0	—	0	29	28	18	23	—	—	—	—	98
Apr-12	0	—	0	29	26	17	24	—	—	—	—	96
May-12	0	—	0	29	22	21	24	—	—	—	—	96
Jun-12	0	—	0	29	42	38	24	—	—	—	—	133
Jul-12	0	—	0	28	49	37	22	—	—	—	—	136
Aug-12	0	—	0	29	74	37	22	—	—	—	19	181
Sep-12	0	—	0	27	73	36	18	—	—	—	23	177
Oct-12	0	—	0	30	72	36	21	—	—	—	24	183
Nov-12	0	—	0	31	72	35	19	—	—	—	23	180
Dec-12	0	—	0	28	73	35	21	—	—	—	22	179
Jan-13	0	—	0	33	72	34	21	—	—	—	22	182
Feb-13	0	—	0	31	72	34	20	—	—	—	14	171
Mar-13	0	—	0	30	72	32	22	—	—	—	20	177
Reporting period average:			—	31	72	34	21	—	—	—	21	179

NOTES:

Data shown submitted to DEQ in monthly progress and/or quarterly data reports.

Average flow rates above are based on PLC electronic records, except where short term electronic data is not available; for these instances manual flow rates are used.

"—" = well permanently removed from remedy extraction network (i.e., converted to monitoring use or decommissioned)

APPENDIX B

Groundwater Elevation Data

Table B-1
Groundwater Elevations - 1 October 2012 through 31 March 2013
TSA Remedy - East Multnomah County

Well	Measuring Point Elevation (ft, MSL)	Date	Time	Depth to Water (ft, MPE)	Groundwater Elevation (ft, MSL)
TSA Extraction Wells					
EW-1	124.04	10/4/12	13:54	146.81	-22.77
EW-1	124.04	11/1/12	9:50	150.27	-26.23
EW-1	124.04	12/6/12	13:41	151.58	-27.54
EW-1	124.04	1/3/13	14:58	150.79	-26.75
EW-1	124.04	2/7/13	9:31	152.11	-28.07
EW-1	124.04	3/7/13	14:33	153.73	-29.69
EW-2	126.01	10/4/12	13:48	149.22	-23.21
EW-2	126.01	11/1/12	10:03	152.81	-26.80
EW-2	126.01	12/6/12	13:34	155.82	-29.81
EW-2	126.01	1/3/13	14:52	156.45	-30.44
EW-2	126.01	2/7/13	9:46	157.33	-31.32
EW-2	126.01	3/7/13	14:08	157.74	-31.73
EW-14	127.63	10/4/12	13:58	164.04	-36.41
EW-14	127.63	11/1/12	9:56	163.11	-35.48
EW-14	127.63	12/6/12	13:46	163.27	-35.64
EW-14	127.63	1/3/13	15:04	163.10	-35.47
EW-14	127.63	2/7/13	9:37	161.75	-34.12
EW-14	127.63	3/7/13	14:39	163.01	-35.38
EW-16	83.71	10/4/12	13:40	94.67	-10.96
EW-16	83.71	11/1/12	10:09	95.37	-11.66
EW-16	83.71	12/6/12	13:28	96.48	-12.77
EW-16	83.71	1/3/13	14:33	102.78	-19.07
EW-16	83.71	2/7/13	9:53	106.78	-23.07
EW-16	83.71	3/7/13	9:53	106.78	-23.07
EW-18 (Pilot Shutdown)	104.50	2/7/13	9:53	106.78	-2.28
EW-23	83.93	10/4/12	13:31	82.05	1.88
EW-23	83.93	11/1/12	10:27	82.54	1.39
EW-23	83.93	12/6/12	13:18	81.58	2.35
EW-23	83.93	1/3/13	14:42	80.68	3.25
EW-23	83.93	2/7/13	10:02	81.33	2.60
EW-23	83.93	3/7/13	13:46	81.14	2.79
TSA Monitoring Wells & Former Extraction Wells Approved for Monitoring Use					
BOP-13(ds)	128.94	11/7/12	10:08	123.35	5.59
BOP-13(ds)	128.94	2/1/13	9:13	122.09	6.85
BOP-13(dg)	128.71	2/1/13	9:11	122.71	6.00
BOP-20(ds)	77.45	2/1/13	9:30	64.21	13.24
BOP-20(dg)	77.32	2/1/13	9:34	64.08	13.24
BOP-21(ds)	78.02	2/1/13	8:45	64.53	13.49
BOP-22R(ds)	82.91	2/1/13	8:22	69.16	13.75
BOP-22(dg)	81.05	2/1/13	8:28	66.17	14.88
BOP-23(dg)	76.96	2/1/13	9:27	63.27	13.69
BOP-31(ds)	99.04	11/1/12	10:28	88.38	10.66

Table B-1
Groundwater Elevations - 1 October 2012 through 31 March 2013
TSA Remedy - East Multnomah County

Well	Measuring Point Elevation (ft, MSL)	Date	Time	Depth to Water (ft, MPE)	Groundwater Elevation (ft, MSL)
BOP-31(ds)	99.04	2/1/13	9:20	86.28	12.76
BOP-31(dg)	98.51	2/1/13	9:18	85.67	12.84
BOP-41(ds)	136.74	2/13/13	12:10	121.78	14.96
BOP-41(dg)	136.45	2/13/13	12:00	122.15	14.30
BOP-42(ds)	130.74	2/1/13	9:07	117.22	13.52
BOP-42(dg)	130.71	2/1/13	9:05	117.51	13.20
BOP-44(ds)	35.24	2/13/13	10:08	22.98	12.26
BOP-44(dg)	35.15	2/13/13	10:05	23.27	11.88
BOP-60R(ds)	82.80	2/1/13	10:07	69.38	13.42
BOP-60(dg)	93.59	2/1/13	10:13	80.17	13.42
BOP-61(ds)	94.64	2/1/13	10:44	83.47	11.17
BOP-61(dg)	94.43	2/1/13	10:41	83.31	11.12
BOP-62(ds)	112.29	2/1/13	11:27	99.01	13.28
BOP-65(ds)	104.22	2/1/13	11:18	90.90	13.32
BOP-66(ds)	102.97	2/1/13	11:00	90.11	12.86
BOP-70(ds-215)	65.15	2/13/13	11:10	51.43	13.72
BOP-71(ds)	87.88	2/13/13	11:32	73.15	14.73
D-16(ds)	16.91	2/13/13	13:20	5.18	11.73
D-17(ds)	123.28	10/8/12	10:25	114.89	8.39
D-17(ds)	123.28	11/7/12	11:32	115.46	7.82
D-17(ds)	123.28	12/5/12	11:35	115.10	8.18
D-17(ds)	123.28	1/10/13	12:47	115.22	8.06
D-17(ds)	123.28	2/13/13	9:06	114.71	8.57
D-17(ds)	123.28	3/13/13	11:40	114.89	8.39
D-17(dg)	124.61	2/13/13	8:59	116.06	8.55
D-18(ds)	18.01	2/13/13	13:06	4.77	13.24
DEQ-1(dg)	150.58	2/13/13	9:33	132.81	17.77
DEQ-5(ds)	155.68	2/13/13	9:42	141.84	13.84
DEQ-5(dg)	155.95	2/13/13	9:46	142.33	13.62
EW-3	94.26	2/1/13	10:29	83.15	11.11
EW-8	77.16	2/13/13	10:36	63.21	13.95
EW-11	114.73	2/14/13	14:52	96.54	18.19
EW-12	94.14	2/13/13	9:18	82.54	11.60
EW-13	103.59	2/1/13	11:08	90.49	13.10
EW-15	116.21	2/13/13	11:16	65.41	50.80
MW-3	147.69	2/13/13	10:11	130.17	17.52
MW-8(dg)	136.21	2/13/13	10:56	129.83	6.38
MW-10(ds)	134.54	10/8/12	14:30	121.14	13.40
MW-10(ds)	134.54	11/7/12	12:55	120.96	13.58
MW-10(ds)	134.54	12/5/12	12:25	120.14	14.40
MW-10(ds)	134.54	1/10/13	13:42	120.98	13.56
MW-10(ds)	134.54	2/13/13	10:38	120.91	13.63
MW-10(ds)	134.54	3/13/13	13:00	121.08	13.46
MW-10(dg)	135.05	2/13/13	10:44	125.60	9.45
MW-14R(ds)	83.48	2/13/13	12:25	60.14	23.34
MW-17(ds)	121.89	10/8/12	9:30	102.41	19.48

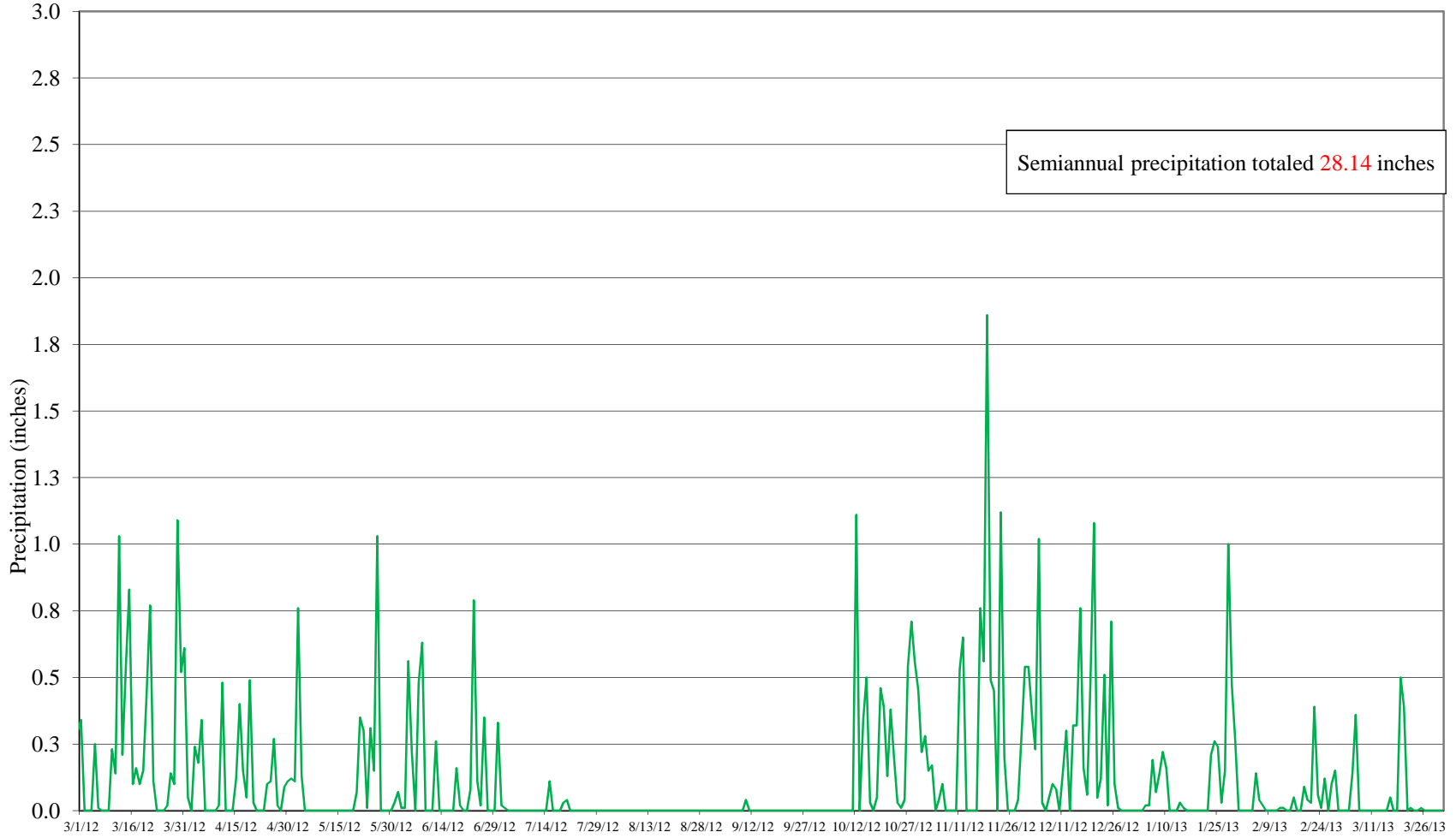
Table B-1
Groundwater Elevations - 1 October 2012 through 31 March 2013
TSA Remedy - East Multnomah County

Well	Measuring Point Elevation (ft, MSL)	Date	Time	Depth to Water (ft, MPE)	Groundwater Elevation (ft, MSL)
MW-17(ds)	121.89	11/7/12	10:55	102.48	19.41
MW-17(ds)	121.89	12/5/12	10:36	102.36	19.53
MW-17(ds)	121.89	1/10/13	10:45	102.72	19.17
MW-17(ds)	121.89	2/13/13	8:50	102.68	19.21
MW-17(ds)	121.89	3/13/13	10:30	102.76	19.13
MW-18(ds)	117.66	10/8/12	12:15	102.11	15.55
MW-18(ds)	117.66	11/7/12	13:00	102.27	15.39
MW-18(ds)	117.66	12/5/12	10:30	102.92	14.74
MW-18(ds)	117.66	1/10/13	13:35	102.40	15.26
MW-18(ds)	117.66	2/13/13	12:41	102.31	15.35
MW-18(ds)	117.66	3/13/13	12:40	102.40	15.26
MW-19(ds)	144.08	11/7/12	12:50	128.30	15.78
MW-19(ds)	144.08	2/13/13	10:22	128.29	15.79
MW-20(ds)	152.72	2/13/13	9:59	139.00	13.72
MW-22(dg)	81.65	2/13/13	9:56	61.98	19.67
MW-24(dg)/EW-5	77.74	2/13/13	12:06	61.95	15.79
MW-25(dg)	75.28	2/13/13	11:43	61.05	14.23
MW-26(dg)	108.98	2/13/13	9:20	92.49	16.49
MW-36(dg)	78.84	2/13/13	9:03	59.29	19.55
PMX-167 [W. Interlachen]	44.84	2/13/13	13:51	32.81	12.03
PMX-196 [Andrews]	89.27	2/13/13	9:12	71.19	18.08
PMX-198 [Udd]	117.54	2/13/13	11:31	3.22	114.32
PMX-208(dg) [Simpson]	81.14	2/13/13	9:51	56.95	24.19
PWB-1(uts)	15.98	2/13/13	13:38	4.61	11.37
PWB-1(lts)	16.48	2/13/13	13:34	4.75	11.73
PWB-2(lts)	44.32	2/13/13	13:47	32.78	11.54
RPW-1(ds)	15.90	2/13/13	13:29	3.14	12.76
SGA Monitoring Wells					
BOP-44(usg)	34.25	2/13/13	10:12	24.48	9.77
EMC-2(usg)	47.15	2/13/13	14:01	36.41	10.74
PWB-1(usg)	16.59	2/13/13	13:36	6.54	10.05

NOTES:

ft, MSL = feet above mean sea level; ft, MPE = feet below measuring point elevation.

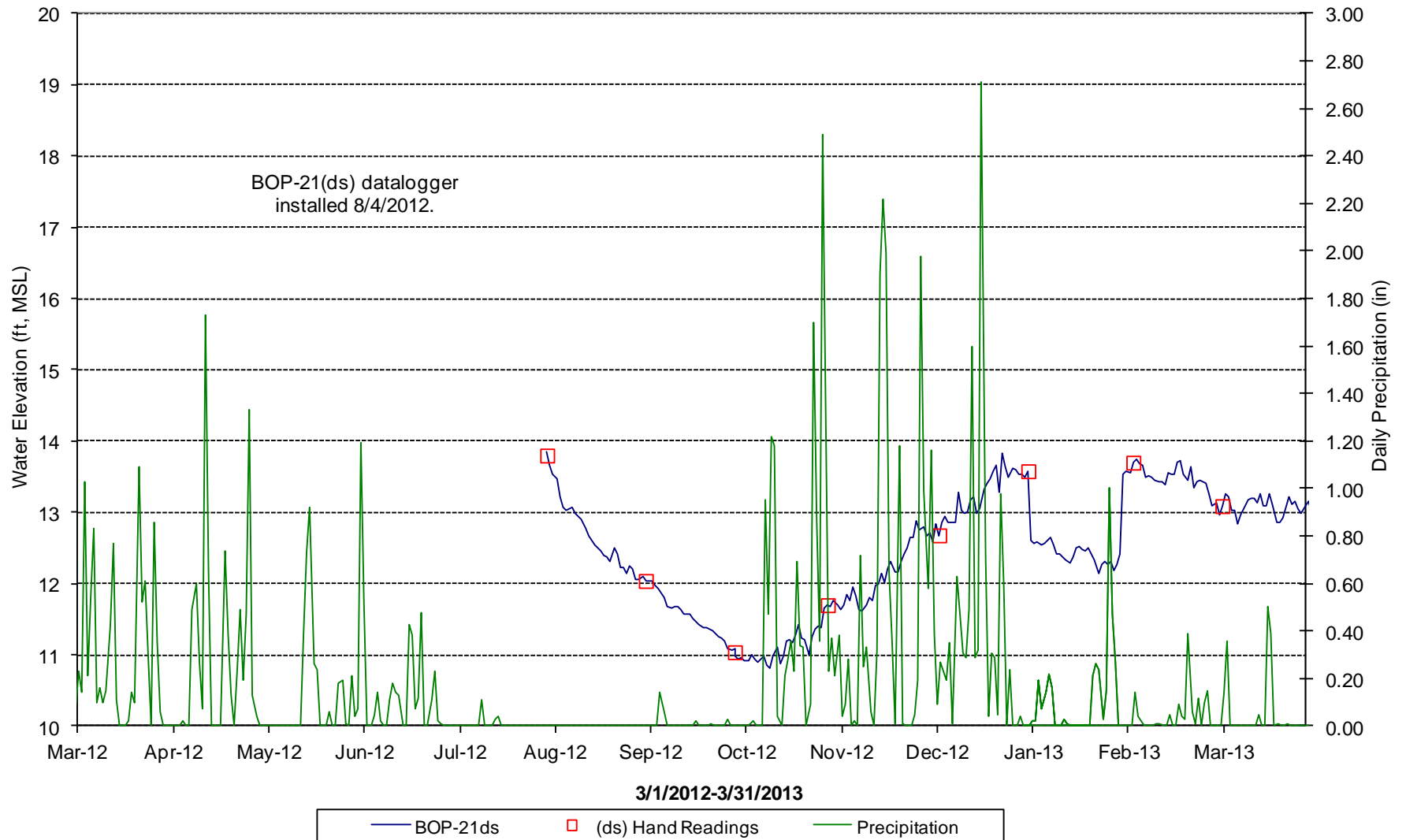
1. D-17(ds), MW-10(ds), MW-17(ds), and MW-18(ds) were measured monthly to assess mound area trends. They were changed to quarterly per DEQ approval on April 15, 2013.
2. EW-3 was approved for conversion from pilot shutdown status to monitoring well status, per DEQ's approval in an April 15, 2013 email.
3. BOP-13(ds) and BOP-31(ds) were measured quarterly to assess reduced pumping and rising water levels.



NOTE: Data from NOAA (WS Form F-6); readings taken at Portland International Airport.



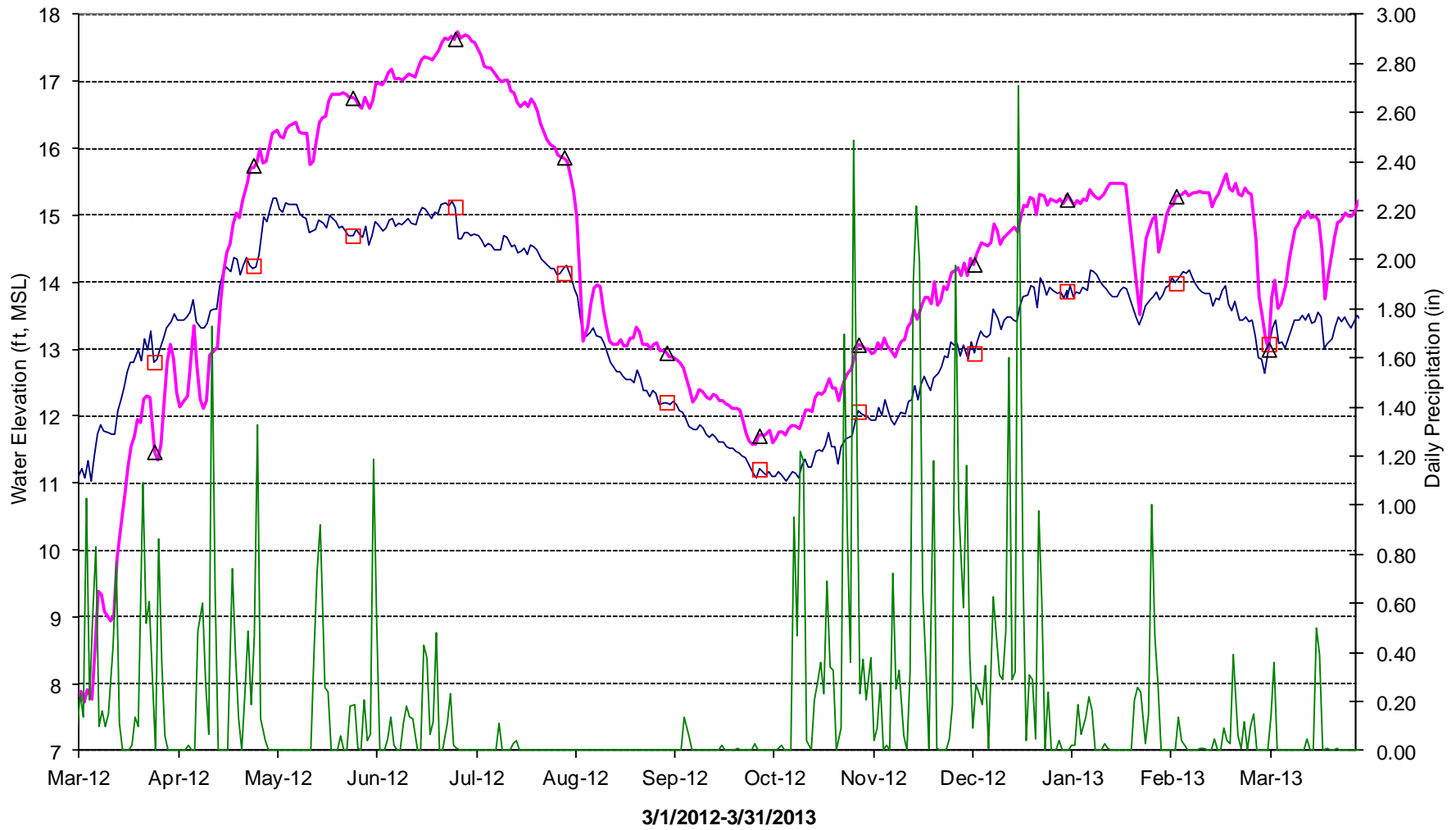
Cascade Corporation Gresham, Oregon	Precipitation Graph March 1, 2012 through March 31, 2013	Figure B-1
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Boeing Portland
Gresham, Oregon

Hydrograph for TSA Well
BOP-21(ds)

Figure
B-2



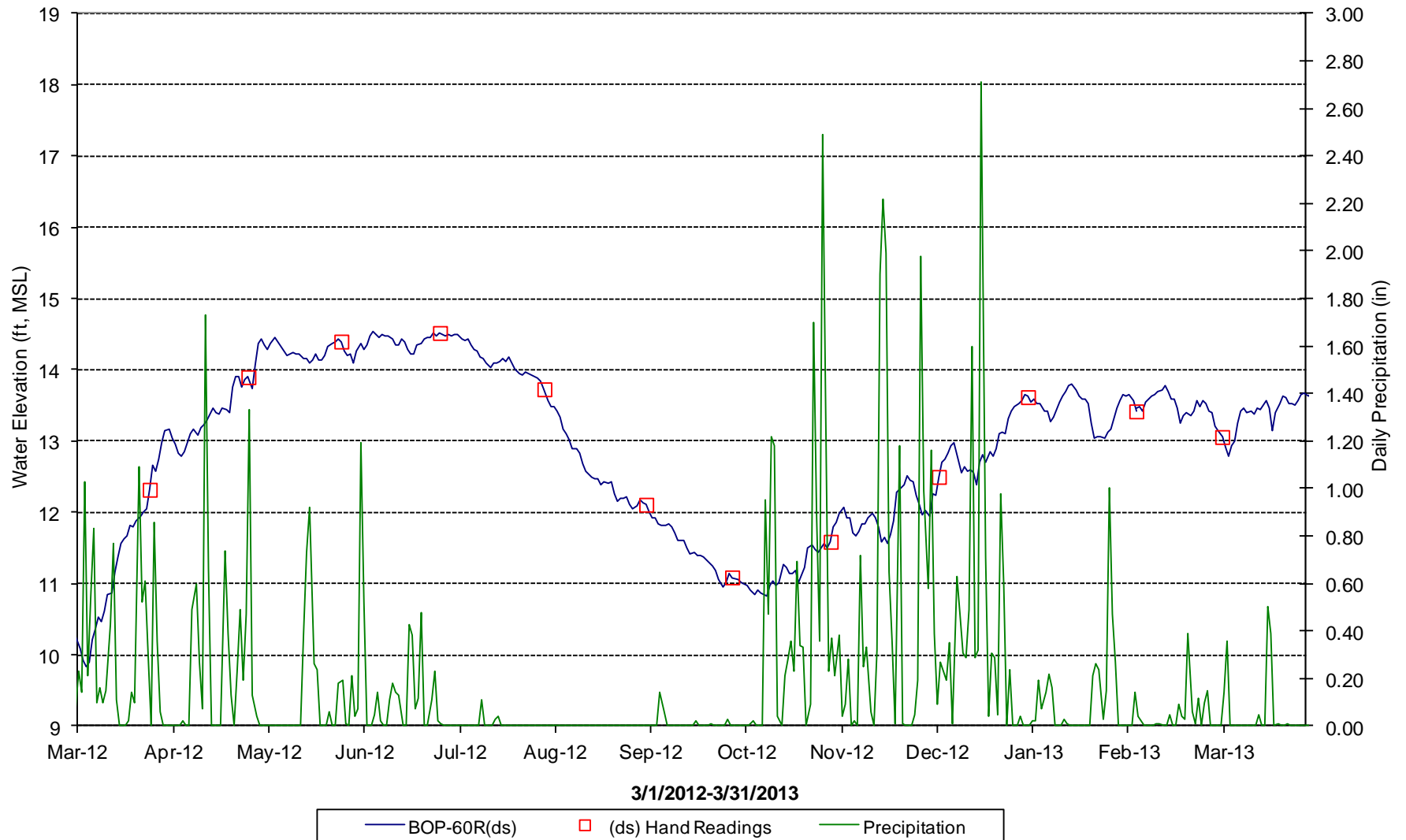
— BOP-22R(ds) — BOP-22(dg) □ (ds) Hand Readings △ (dg) Hand Readings — Precipitation



Boeing Portland
Gresham, Oregon

**Hydrograph for TSA Wells
BOP-22R(ds) and BOP-22(dg)**

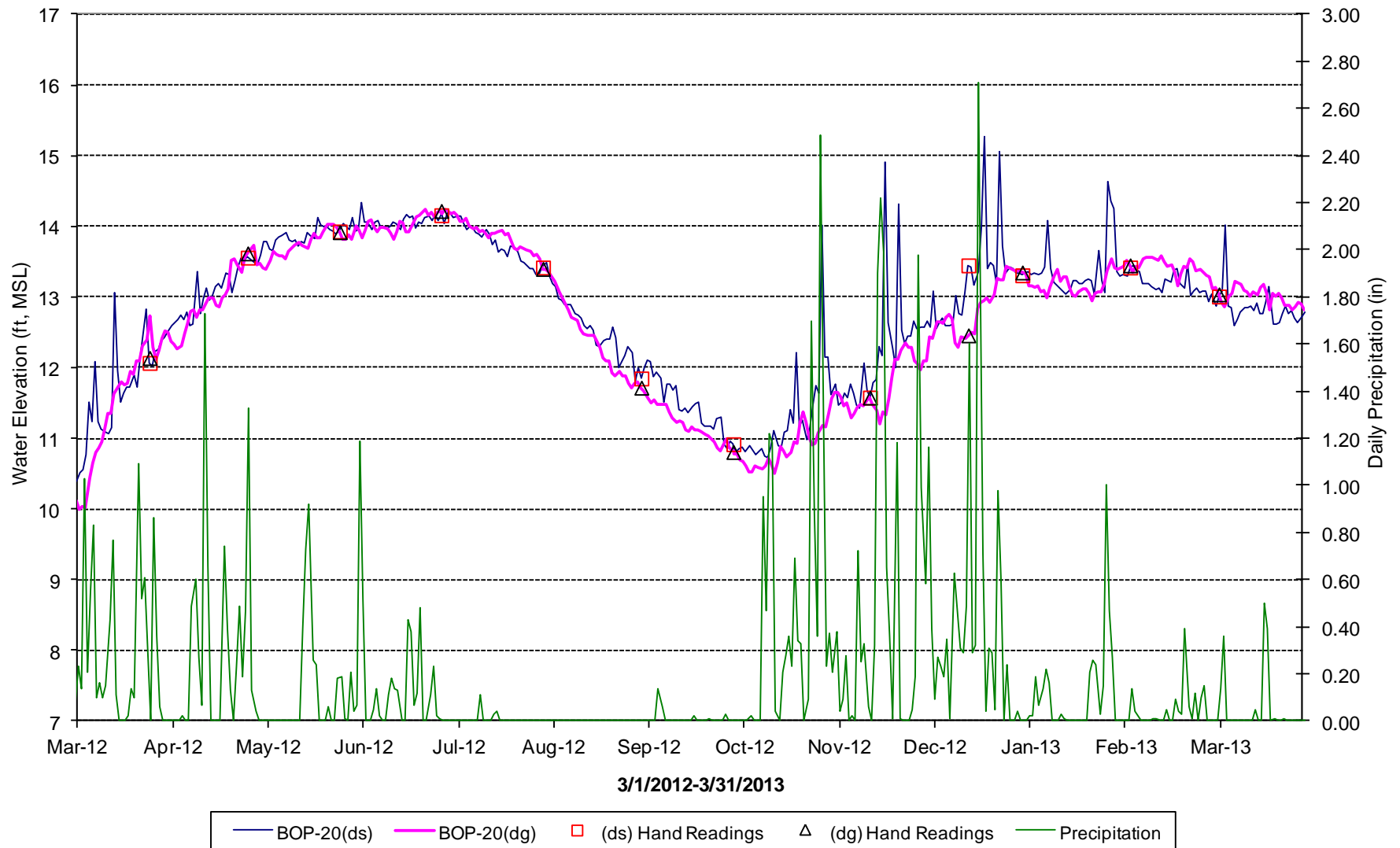
Figure
B-3



Boeing Portland
Gresham, Oregon

**Hydrograph for TSA Well
BOP-60R(ds)**

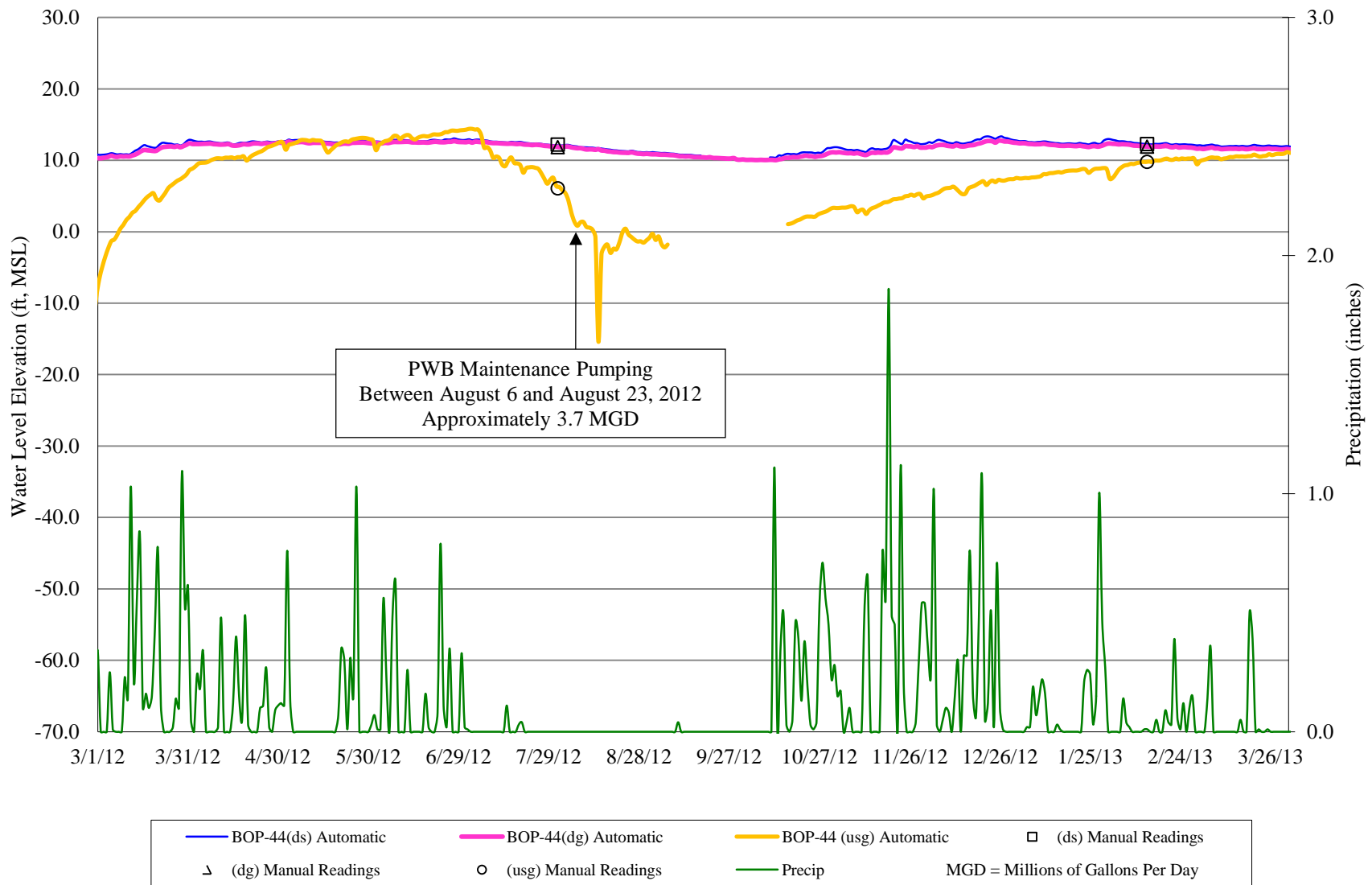
Figure
B-4

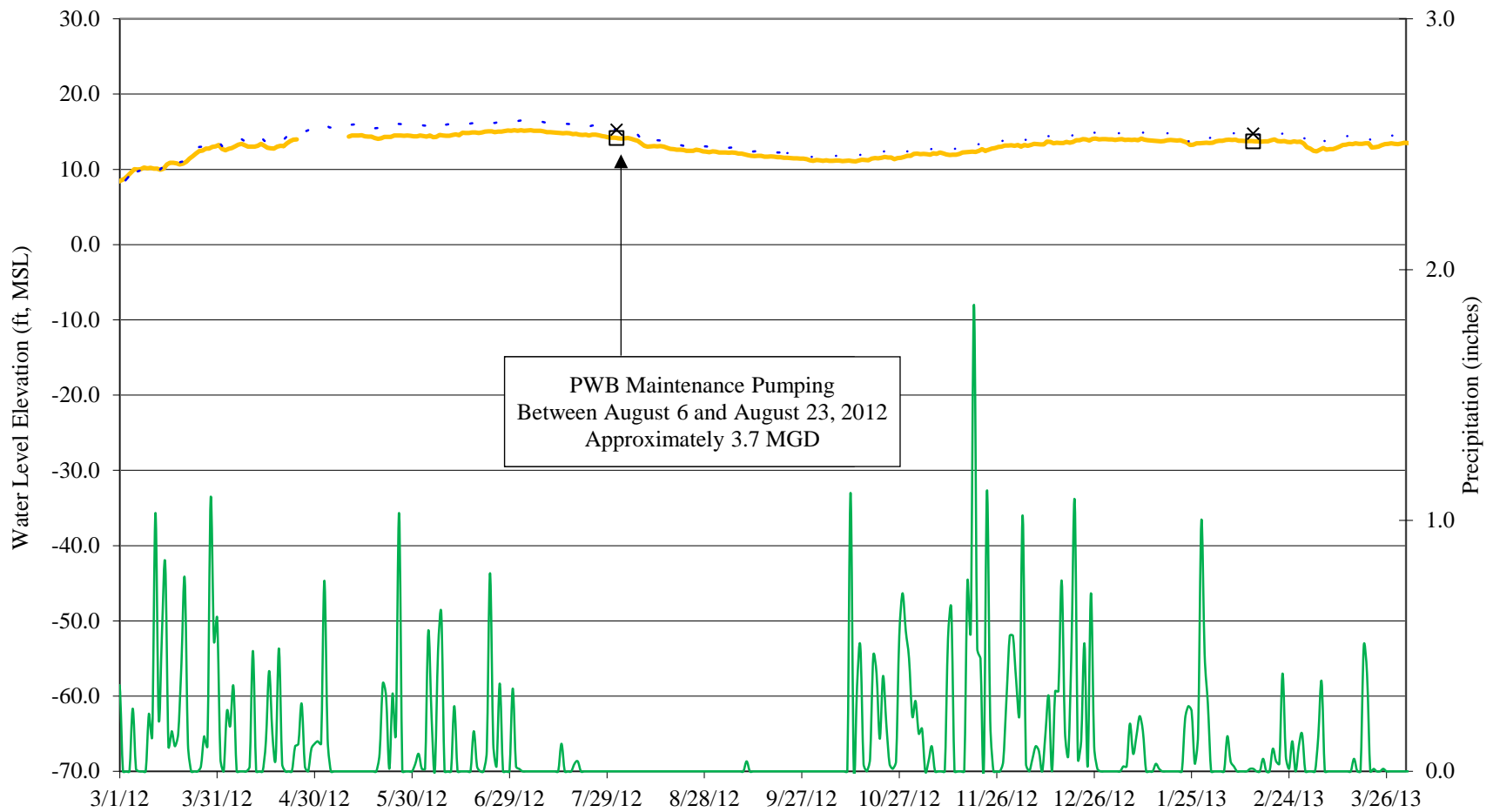


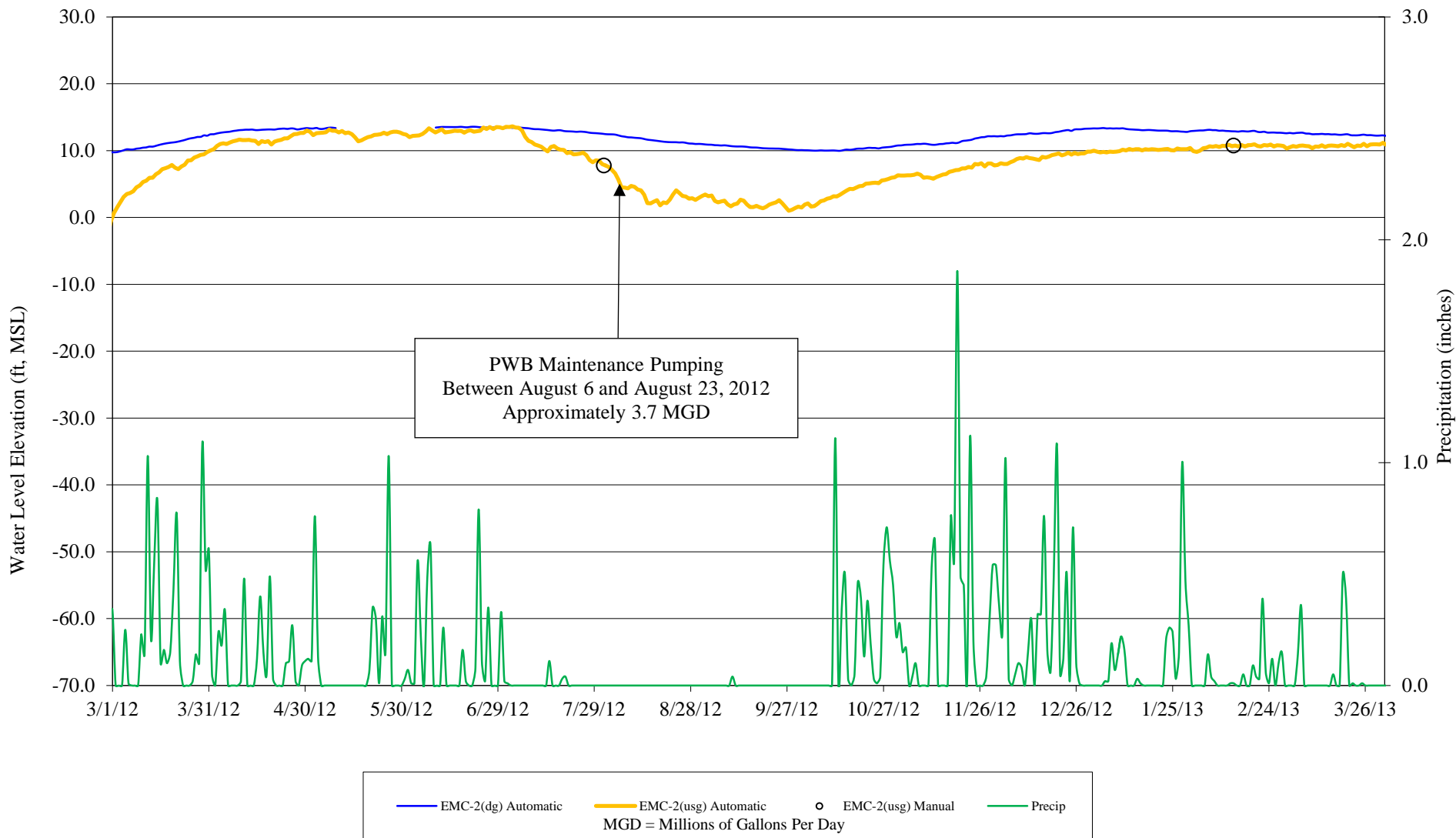
Boeing Portland
Gresham, Oregon

**Hydrograph for TSA Well
BOP-20(ds, dg)**

Figure
B-5







APPENDIX C

Groundwater Quality Data

Table C-1
Groundwater Analytical Results - 1 October 2012 through 31 March 2013
TSA Remedy - East Multnomah County

Well No. or Sample Station	Sample Type	Sample Date	TCE	<i>cis</i> -1,2- DCE	PCE	1,1-DCE	VC		
			µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	
CTS System and Extraction Wells									
Influent	Grab	11/7/12	10	1.3	0.64	0.5	U	0.5	U
Influent	Grab	2/13/13	8.3	1.0	0.5	U	0.5	U	0.5
EW-1 (On)	Grab	11/7/12	7.5	1.5	0.5	U	0.5	U	0.5
EW-1 (On)	Grab	2/14/13	6.5	1.3	0.5	U	0.5	U	0.5
EW-2 (On)	Grab	11/7/12	22	1.8	1.3	0.5	U	0.5	U
EW-2 (On)	Grab	2/14/13	20	1.7	1.3	0.5	U	0.5	U
EW-14 (On)	Grab	11/7/12	16	2.0	0.91	0.5	U	0.5	U
EW-14 (On)	Grab	2/14/13	15	1.8	0.84	0.5	U	0.5	U
EW-14 (On) Dup	Grab	2/14/13	14	2.1	0.95	0.5	U	0.5	U
EW-16 (On)	Purge	11/7/12	2.4	0.5	U	0.5	U	0.5	U
EW-16 (On) Dup	Purge	11/7/12	2.4	0.5	U	0.5	U	0.5	U
EW-16 (On)	Purge	2/14/13	0.9	0.5	U	0.5	U	0.5	U
EW-18 (Pilot Shutdown)	Upper Diff	11/7/12	3.0	0.5	U	0.5	U	0.5	U
EW-18 (Pilot Shutdown)	Lower Diff	11/7/12	3.1	0.5	U	0.5	U	0.5	U
EW-18 (Pilot Shutdown)	Upper Diff	2/14/13	3.2	0.5	U	0.5	U	0.5	U
EW-18 (Pilot Shutdown)	Lower Diff	2/14/13	3.2	0.5	U	0.5	U	0.5	U
EW-23 (On)	Grab	2/14/13	6.9	0.5	U	0.5	U	0.5	U

Table C-1
Groundwater Analytical Results - 1 October 2012 through 31 March 2013
TSA Remedy - East Multnomah County

Well No. or Sample Station	Sample Type	Sample Date	TCE		<i>cis</i> -1,2- DCE		PCE	1,1-DCE		VC		
			µg/L		µg/L		µg/L	µg/L	µg/L			
TSA Monitoring Wells (& Former Extraction Wells Approved for Monitoring Use)												
BOP-13(ds)	Purge	11/7/12	9.4		1.5		0.4		0.2	U	0.2	U
BOP-13(ds) split	Purge	11/7/12	8.7		1.3		0.5	U	0.5	U	0.5	U
BOP-13(ds)	Purge	2/7/13	3.6		0.5		0.2	U	0.2	U	0.2	U
BOP-13(ds)-Dup	Purge	2/7/13	3.5		0.5		0.2	U	0.2	U	0.2	U
BOP-13(ds) split	Purge	2/7/13	4.7		0.68		0.5	U	0.5	U	0.5	U
BOP-22R(ds)	Diff	2/5/13	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U
BOP-31(ds)	Purge	11/7/12	0.4		0.2	U	0.2	U	0.2	U	0.2	U
BOP-31(ds) split	Purge	11/7/12	0.59		0.5	U	0.5	U	0.5	U	0.5	U
BOP-31(ds)	Purge	2/7/13	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U
BOP-31(ds) split	Purge	2/7/13	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
BOP-31(dg)	Diff	2/7/13	4.6		0.5		0.4		0.2	U	0.2	U
BOP-60R(ds)	Diff	2/5/13	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U
BOP-61(ds)	Purge	2/7/13	8.0		1.2		0.3		0.2	U	0.2	U
BOP-61(dg)	Diff	2/7/13	0.8		0.2	U	0.2	U	0.2	U	0.2	U
BOP-65(ds)	Purge	2/7/13	3.8		1.1		0.2	U	0.2	U	0.2	U
BOP-66(ds)	Purge	2/7/13	3.3		0.2	U	0.2	U	0.2	U	0.2	U
BOP-70(ds-215)	Diff	2/13/13	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
BOP-71(ds)	Diff	2/13/13	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U

Table C-1
Groundwater Analytical Results - 1 October 2012 through 31 March 2013
TSA Remedy - East Multnomah County

Well No. or Sample Station	Sample Type	Sample Date	TCE		<i>cis</i> -1,2- DCE		PCE		1,1-DCE		VC	
			µg/L		µg/L		µg/L		µg/L		µg/L	
D-17(ds)	Purge	10/8/12	73		17		2.0		0.5	U	0.5	U
D-17(ds) Dup	Purge	10/8/12	72		17		2.0		0.5	U	0.5	U
D-17(ds)	Purge	11/7/12	76		17		2.1		0.5	U	0.5	U
D-17(ds)	Purge	12/5/12	62		16		1.8		0.5	U	0.5	U
D-17(ds) Dup	Purge	12/5/12	63		16		1.8		0.5	U	0.5	U
D-17(ds)	Purge	1/10/13	65		16		1.9		0.5	U	0.5	U
D-17(ds) Dup	Purge	1/10/13	67		17		1.9		0.5	U	0.5	U
D-17(ds)	Purge	2/14/13	79		19		2.1		0.5	U	0.5	U
D-17(ds)	Purge	3/13/13	72		18		1.7		0.5	U	0.5	U
D-17(ds) Dup	Purge	3/13/13	68		17		1.6		0.5	U	0.5	U
D-17(dg)	Diff	2/14/13	9.0		1.7		0.5	U	0.5	U	0.5	U
EW-3	Purge	11/7/12	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U
EW-3	Purge	2/7/13	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U
EW-8	Upper Diff	2/13/13	1.9		0.5	U	0.5	U	0.5	U	0.5	U
EW-8	Lower Diff	2/13/13	2.0		0.5	U	0.5	U	0.5	U	0.5	U
EW-11	Upper Diff	2/14/13	2.4		0.5	U	0.5	U	0.5	U	0.5	U
EW-11	Lower Diff	2/14/13	2.3		0.5	U	0.5	U	0.5	U	0.5	U
EW-12	Upper Diff	11/7/12	7.6		0.78		0.51		0.5	U	0.5	U
EW-12	Lower Diff	11/7/12	7.5		0.77		0.52		0.5	U	0.5	U
EW-12	Upper Diff	2/14/13	6.0		0.70		0.51		0.5	U	0.5	U
EW-12	Lower Diff	2/14/13	6.2		0.71		0.52		0.5	U	0.5	U
EW-13	Purge	2/7/13	2.4		0.6		0.2	U	0.2	U	0.2	U
EW-15	Upper Diff	2/14/13	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
EW-15	Lower Diff	2/14/13	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U

Table C-1
Groundwater Analytical Results - 1 October 2012 through 31 March 2013
TSA Remedy - East Multnomah County

Well No. or Sample Station	Sample Type	Sample Date	TCE	<i>cis</i> -1,2- DCE		PCE	1,1-DCE		VC	
			µg/L	µg/L	µg/L	µg/L	µg/L			
MW-10(ds)	Purge	10/8/12	25	0.60		1.2	0.5	U	0.5	U
MW-10(ds)	Purge	11/7/12	27	0.64		1.3	0.5	U	0.5	U
MW-10(ds)	Purge	12/5/12	21	0.50		1.1	0.5	U	0.5	U
MW-10(ds)	Purge	1/10/13	19	0.5	U	0.85	0.5	U	0.5	U
MW-10(ds)	Purge	2/14/13	21	0.5	U	1.1	0.5	U	0.5	U
MW-10(ds)	Purge	3/13/13	19	0.50	U	0.8	0.5	U	0.5	U
MW-14R(ds)	Diff	11/7/12	1.1	0.5	U	0.5	U	0.5	U	U
MW-14R(ds)	Diff	2/13/13	1.0	0.5	U	0.5	U	0.5	U	U
MW-17(ds)	Purge	10/8/12	59	8.2		2.9	0.5	U	0.5	U
MW-17(ds)	Purge	11/7/12	60	8.2		2.9	0.5	U	0.5	U
MW-17(ds)	Purge	12/5/12	56	8.7		2.9	0.5	U	0.5	U
MW-17(ds)	Purge	1/10/13	61	9.0		3.0	0.5	U	0.5	U
MW-17(ds)	Purge	2/14/13	72	9.7		3.2	0.5	U	0.5	U
MW-17(ds) DUP	Purge	2/14/13	71	9.4		3.1	0.5	U	0.5	U
MW-17(ds)	Purge	3/13/13	68	9.6		2.8	0.5	U	0.5	U
MW-18(ds)	Diff	10/8/12	98	D	15	3.7	0.5	U	0.5	U
MW-18(ds)	Diff	11/7/12	120	D	16	4.4	0.5	U	0.5	U
MW-18(ds)	Diff	12/5/12	89	D	12	3.8	0.5	U	0.5	U
MW-18(ds)	Diff	1/10/13	110	D	13	4.1	0.5	U	0.5	U
MW-18(ds)	Diff	2/14/13	110	D	16	4.6	0.5	U	0.5	U
MW-18(ds)	Diff	3/13/13	180	D	14	3.6	0.5	U	0.5	U

Table C-1
Groundwater Analytical Results - 1 October 2012 through 31 March 2013
TSA Remedy - East Multnomah County

Well No. or Sample Station	Sample Type	Sample Date	TCE		<i>cis</i> -1,2- DCE		PCE		1,1-DCE		VC	
			µg/L		µg/L		µg/L		µg/L		µg/L	
MW-19(ds)	Diff	11/7/12	2.0		0.5	U	0.5	U	0.5	U	0.5	U
MW-19(ds)	Diff	2/14/13	2.1		0.5	U	0.5	U	0.5	U	0.5	U
MW-24(dg)/EW-5	Upper Diff	2/13/13	0.77		0.5	U	0.5	U	0.5	U	0.5	U
MW-24(dg)/EW-5	Lower Diff	2/13/13	0.74		0.5	U	0.5	U	0.5	U	0.5	U
MW-25(dg)	Diff	2/13/13	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
MW-26(dg)	Diff	11/7/12	6.6		0.5	U	0.51		0.5	U	0.5	U
MW-26(dg) Dup	Diff	11/7/12	6.3		0.5	U	0.5	U	0.5	U	0.5	U
MW-26(dg)	Diff	2/13/13	7.5		0.5	U	0.5	U	0.5	U	0.5	U
MW-26(dg) Dup	Diff	2/13/13	7.6		0.5	U	0.5	U	0.5	U	0.5	U

NOTES:

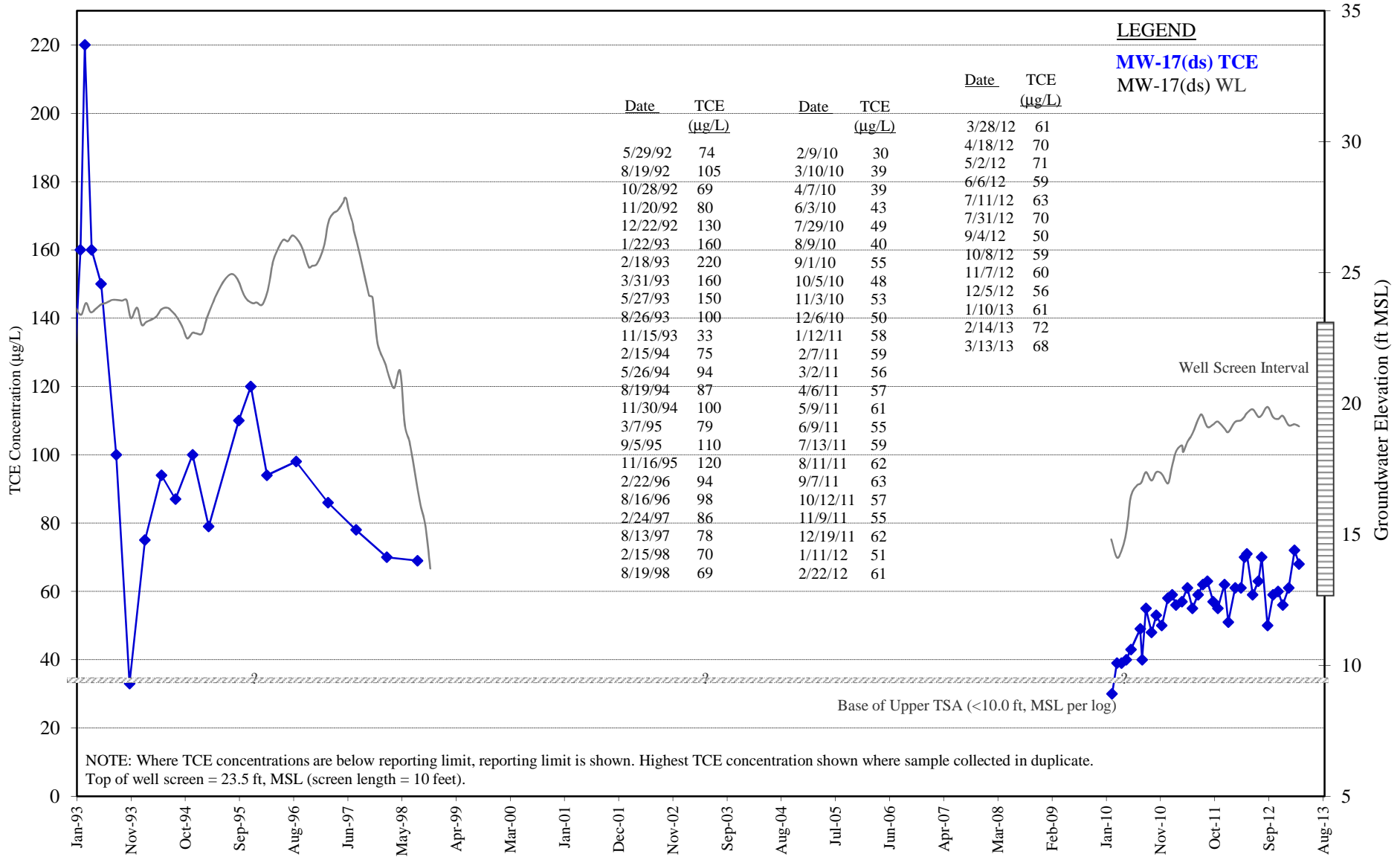
Analytical results shown for chemicals of potential concern identified in Table 6-1, TSA Record of Decision (DEQ, 1996).

µg/L = micrograms per liter; Diff = diffusion bag sample; Dup = duplicate sample;
U = compound was not detected above the reporting limit.

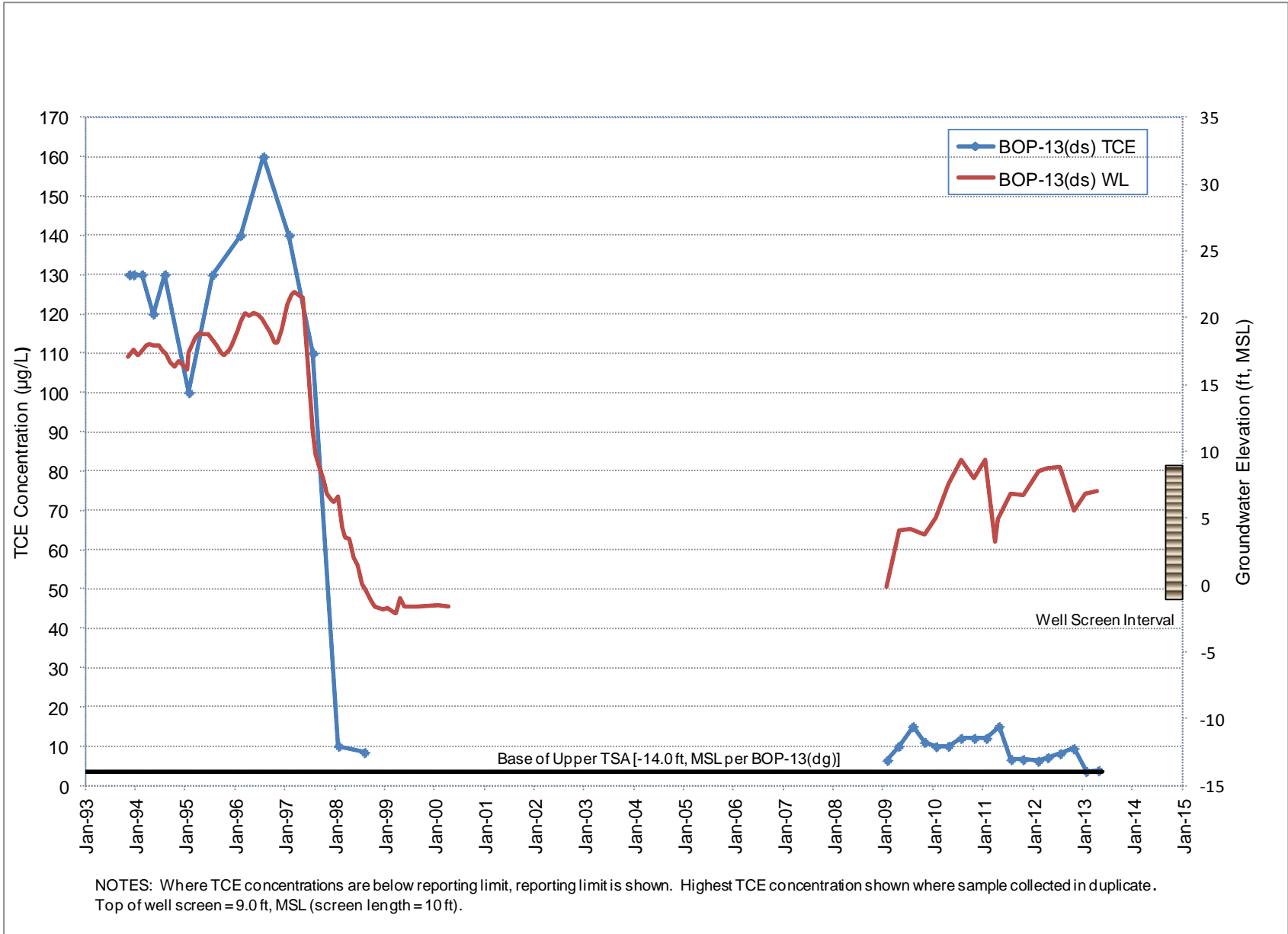
Samples analyzed using EPA Method 8260C and results shown above have been validated, with applicable qualifiers shown.

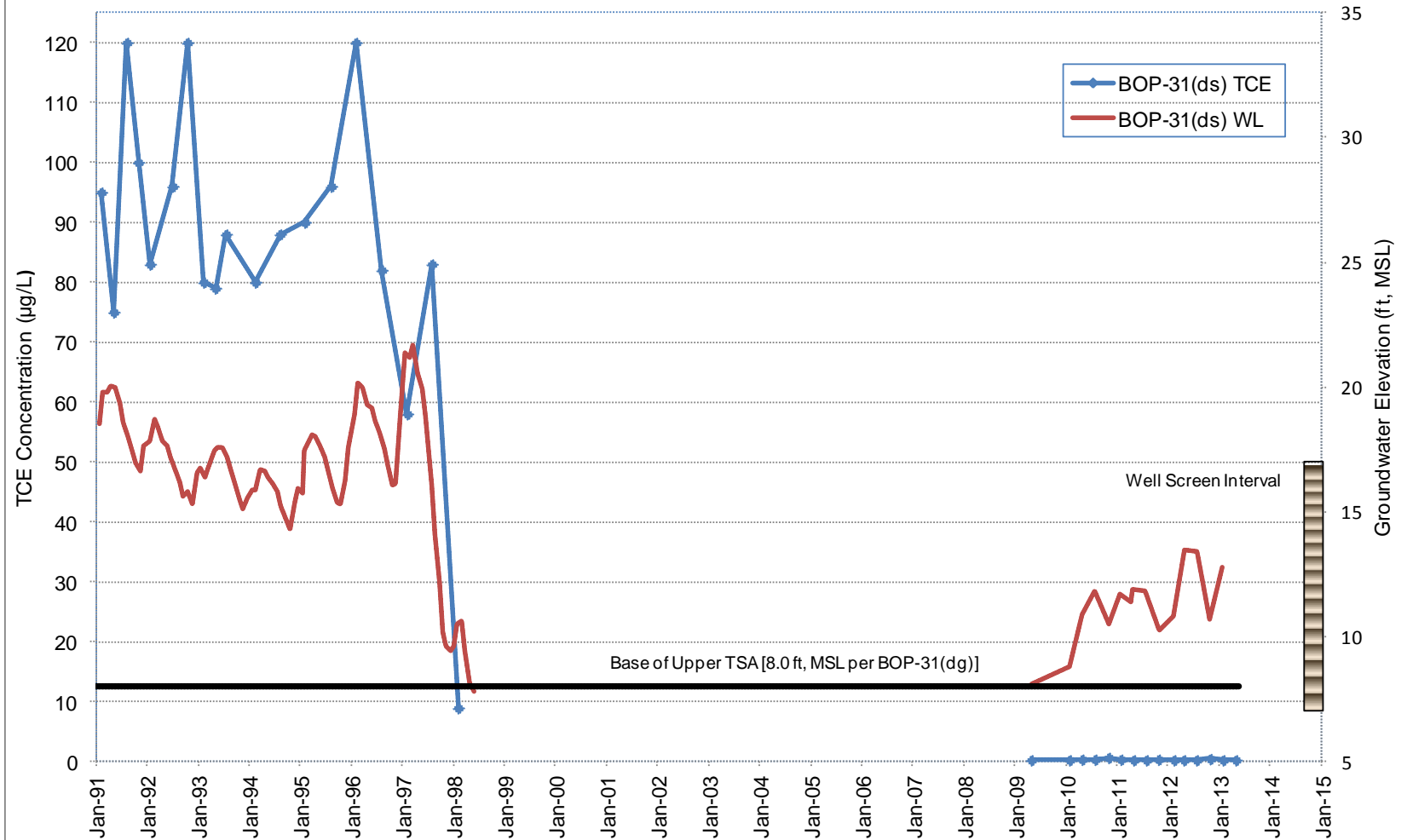
Laboratory and validation reports for above listed samples are presented on disc in Appendix D.

1. D-17(ds), MW-10(ds), MW-17(ds), and MW-18(ds) monthly sampling to assess mound area trends; BOP-13(ds) and BOP-31(ds) sampled quarterly to assess water quality near the mound area.
2. EW-3 was approved for conversion from pilot shutdown status to monitoring well status, per DEQ's approval in an 15 April 2013 email.

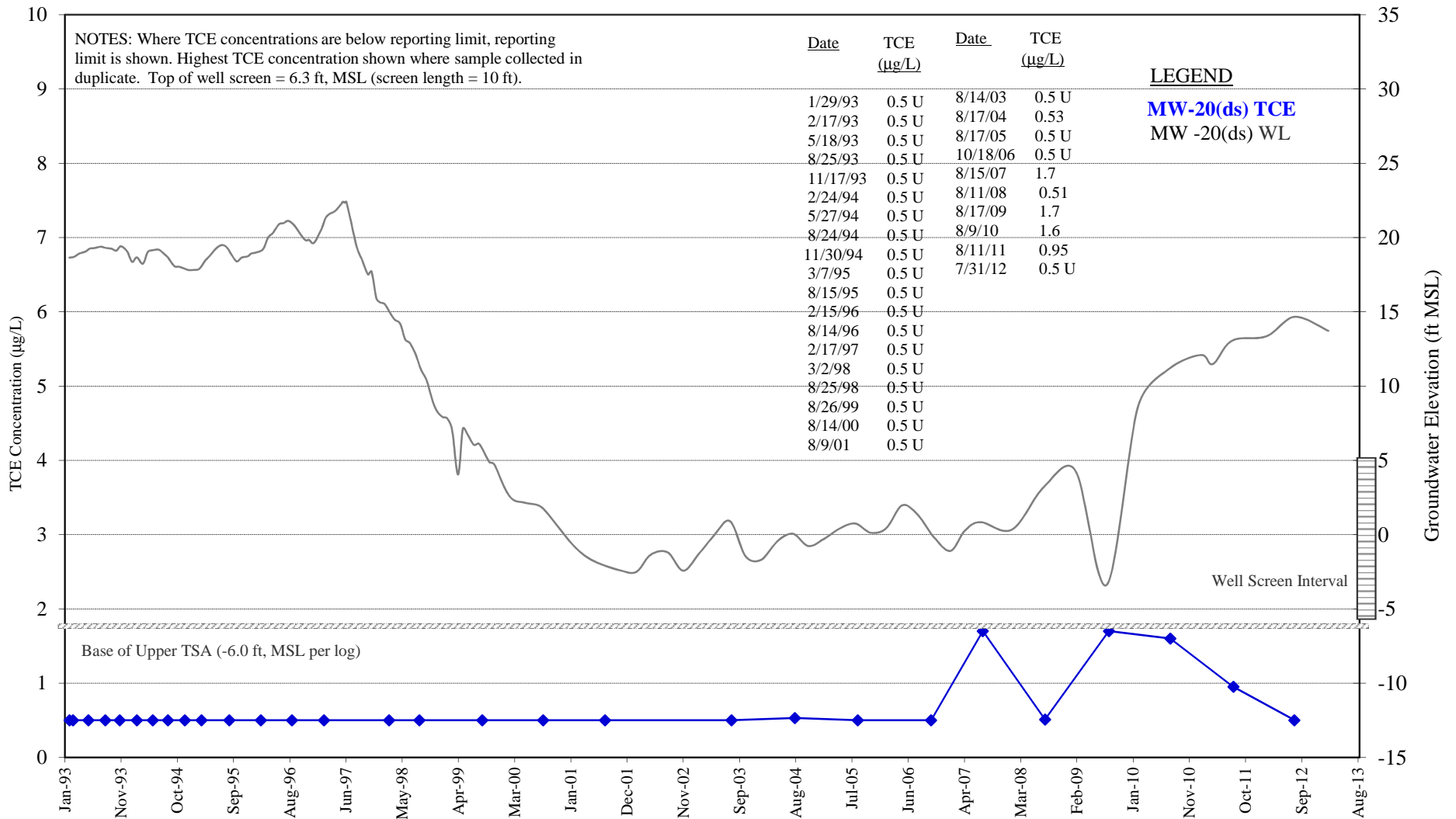


Cascade Corporation Gresham, Oregon	TCE Concentration Profile MW-17(ds) TSA Remedy	Figure C-1
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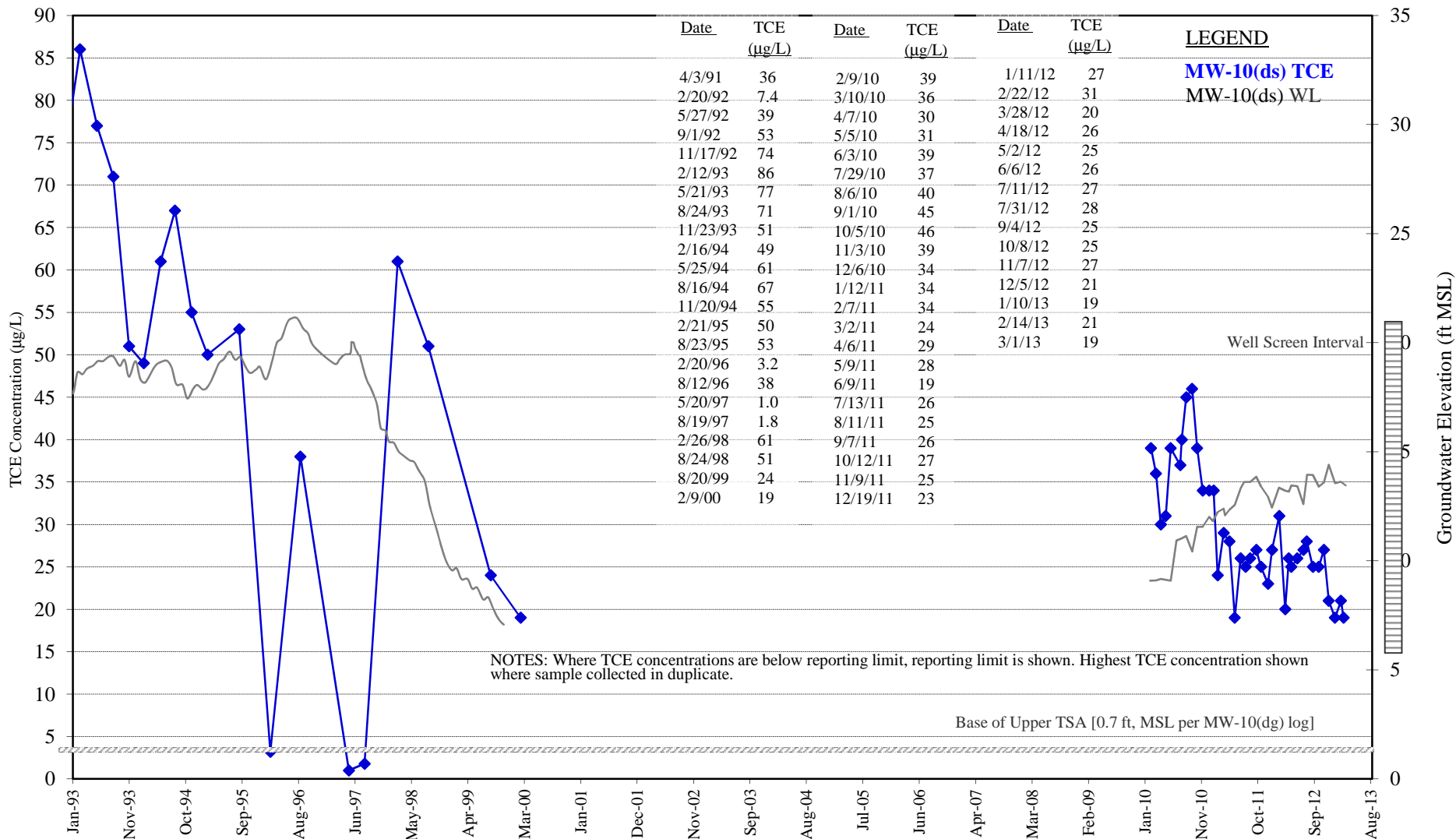


NOTES: Where TCE concentrations are below reporting limit, reporting limit is shown. Highest TCE concentration shown where sample collected in duplicate. Top of well screen = 17.0 ft, MSL (screen length = 10 ft).



Cascade Corporation Gresham, Oregon	TCE Concentration Profile MW-20(ds) TSA Remedy	Figure C-4
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Figs C-1 thru C-8 Mound Area TCE Profiles



NOTES: Where TCE concentrations are below reporting limit, reporting limit is shown. Highest TCE concentration shown where sample collected in duplicate.

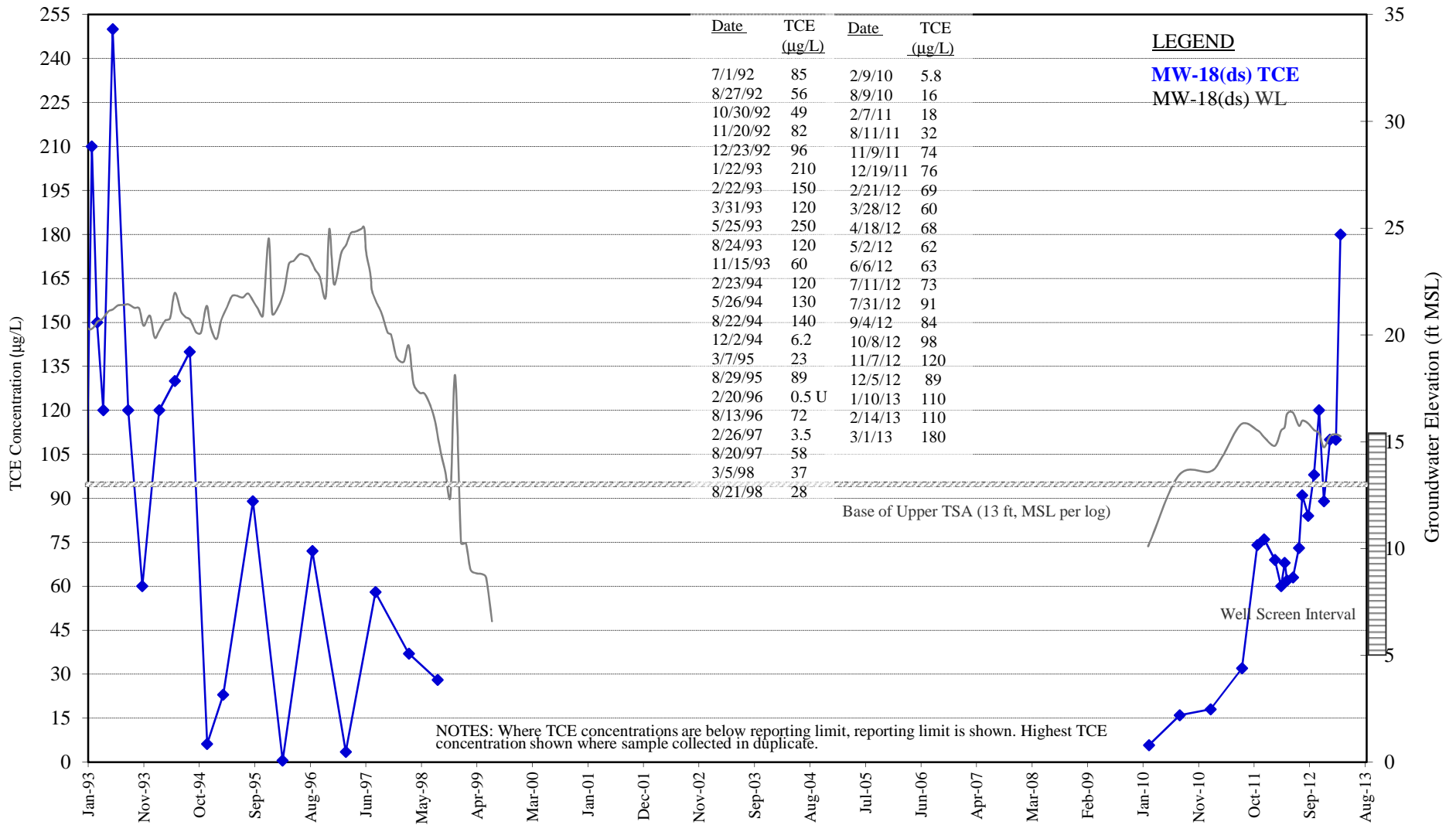
Base of Upper TSA [0.7 ft, MSL per MW-10(dg) log]



Cascade Corporation
Gresham, Oregon

TCE Concentration Profile MW-10(ds)
TSA Remedy

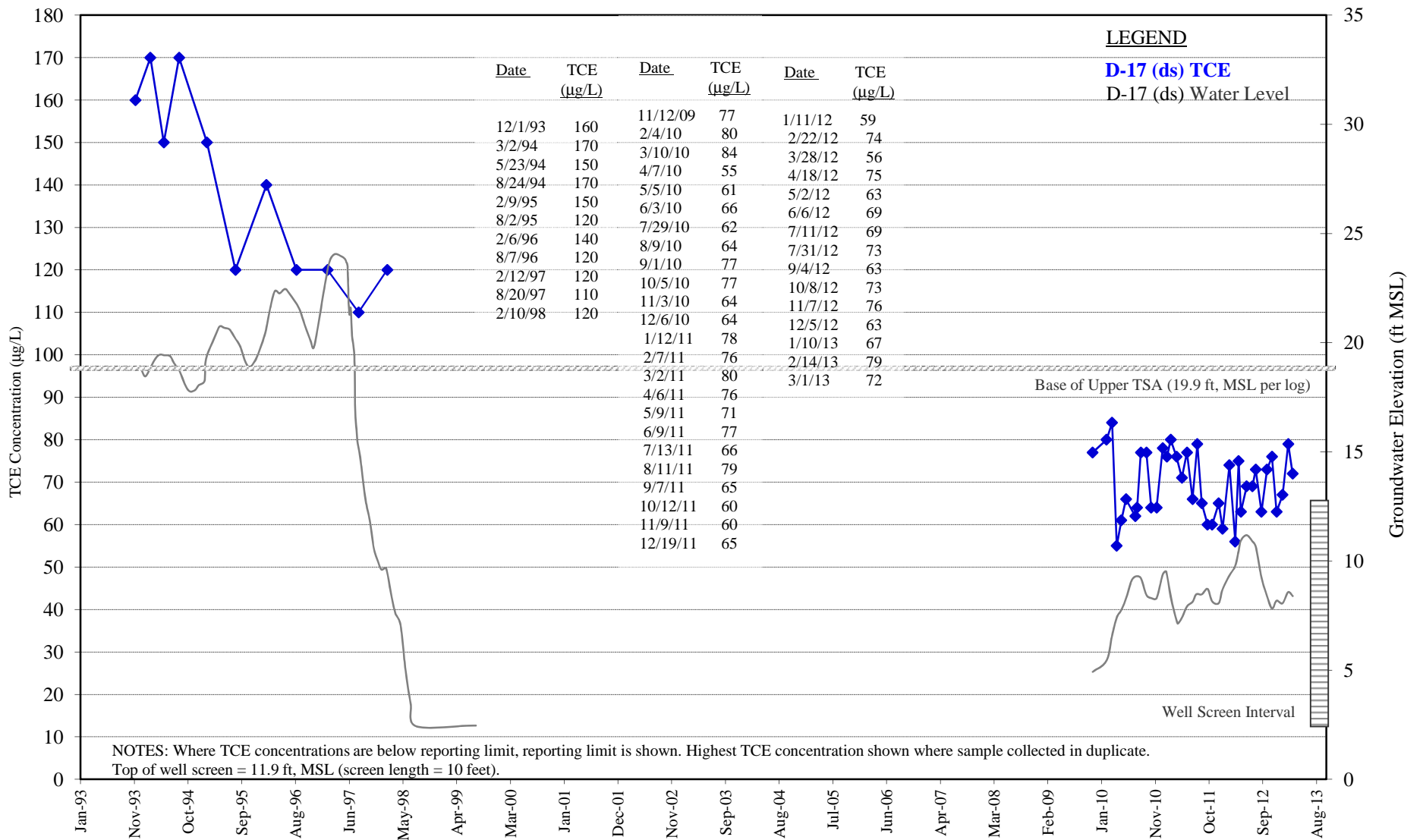
Figure
C-5



Cascade Corporation
 Gresham, Oregon

TCE Concentration Profile MW-18(ds)
 TSA Remedy

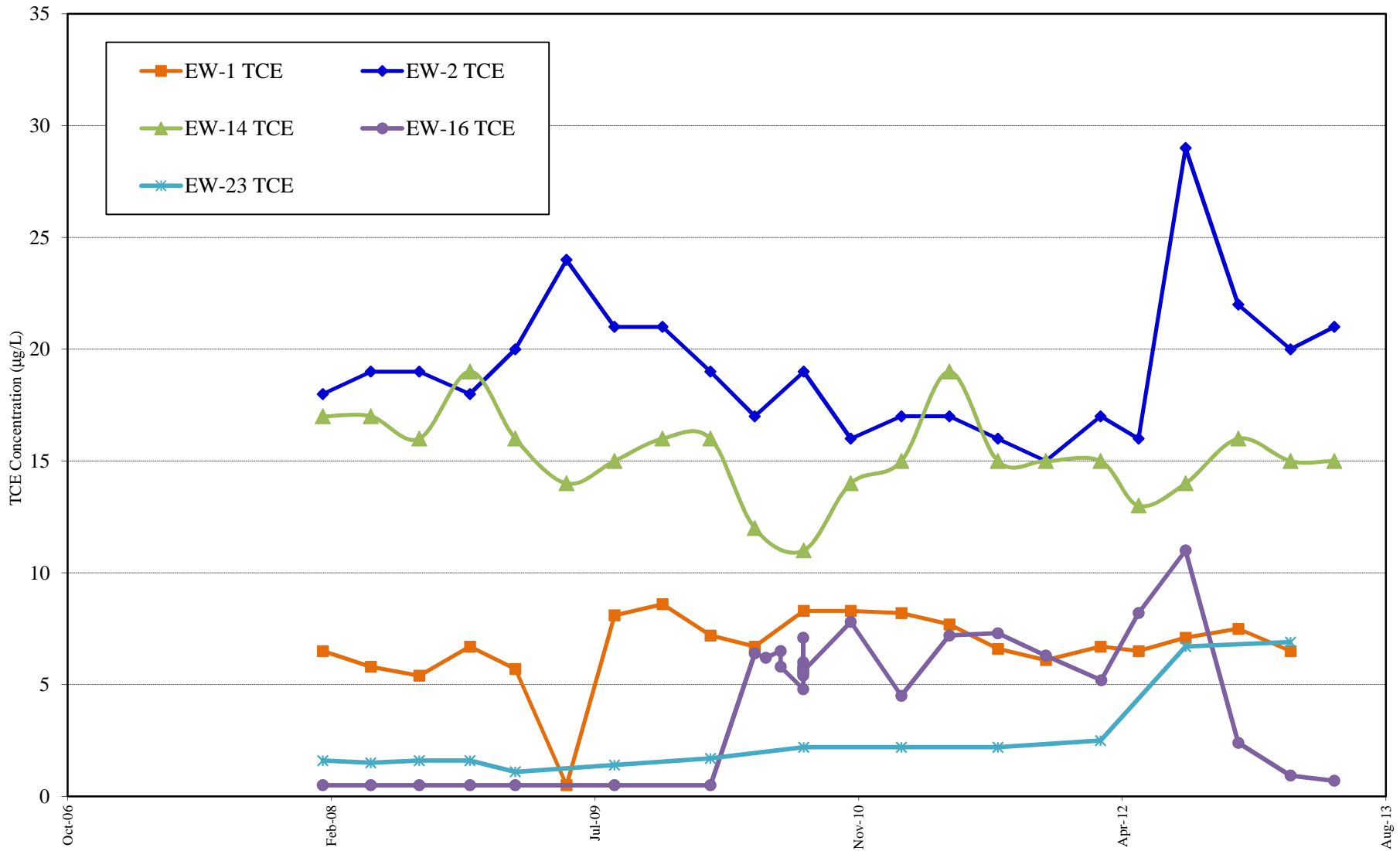
Figure
 C-6



Cascade Corporation
Gresham, Oregon

TCE Concentration Profile MW-17(ds)
TSA Remedy

Figure
C-7



Cascade Corporation Gresham, Oregon	Operating Extraction Well TCE Concentration Profile TSA Remedy	Figure C-8
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Figs C-1 thru C-8 Mound Area TCE Profiles

APPENDIX D

Laboratory Reports (CD) and Data Validation
Memoranda, Semi-Annual Reporting Period and
5-Year Historical Data Set

APPENDIX D
Volatile Organic Compound COPCs — TSA Wells
Cascade Corporation

Well Name	Sample Method	PMX No.	Sample Date	Trichloroethene (TCE)		<i>cis</i> -1,2-Dichloroethene		Tetrachloroethene (PCE)		1,1-Dichloroethene		Vinyl Chloride	
				(µg/L)		(µg/L)		(µg/L)		(µg/L)		(µg/L)	
BOP-41(ds)	Diff	543	8/12/2008	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
BOP-41(ds)	Diff	543	8/13/2009	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
BOP-41(ds)	Diff	543	8/8/2011	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
BOP-41(dg)	Diff	542	8/12/2008	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
BOP-41(dg)	Diff	542	8/13/2009	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
BOP-41(dg)	Diff	542	8/8/2011	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
BOP-44(ds)	Diff	591	2/6/2008	1.3		0.5	U	0.5	U	0.5	U	0.5	U
BOP-44(ds)	Diff	591	8/11/2008	0.72		0.5	U	0.5	U	0.5	U	0.5	U
BOP-44(ds)	Diff	591	8/13/2009	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
BOP-44(ds)	Diff	591	8/9/2010	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
BOP-44(ds)	Diff	591	8/8/2011	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
BOP-44(ds)	Diff	591	7/30/2012	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
BOP-44(dg)	Diff	592	8/11/2008	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
BOP-44(dg)	Diff	592	8/13/2009	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
BOP-44(dg)	Diff	592	8/8/2011	0.63		0.5	U	0.5	U	0.5	U	0.5	U
BOP-70(ds)-215	Diff		2/7/2008	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
BOP-70(ds)-215	Diff		5/7/2008	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
BOP-70(ds)-215	Diff		8/12/2008	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
BOP-70(ds)-215	Diff		11/11/2008	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
BOP-70(ds)-215	Diff		2/9/2009	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
BOP-70(ds)-215	Diff		5/13/2009	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
BOP-70(ds)-215	Diff		8/13/2009	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
BOP-70(ds)-215	Diff		2/10/2010	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
BOP-70(ds)-215	Diff		8/10/2010	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
BOP-70(ds)-215	Diff		2/8/2011	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
BOP-70(ds)-215	Diff		8/8/2011	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
BOP-70(ds)-215	Diff		2/22/2012	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
BOP-70(ds)-215	Diff		7/30/2012	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
BOP-70(ds)-215	Diff		2/13/2013	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
BOP-71(ds)	Diff		2/7/2008	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
BOP-71(ds)	Diff		5/7/2008	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
BOP-71(ds)	Diff		8/12/2008	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
BOP-71(ds)	Diff		11/11/2008	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
BOP-71(ds)	Diff		2/9/2009	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
BOP-71(ds)	Diff		5/13/2009	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
BOP-71(ds)	Diff		8/13/2009	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
BOP-71(ds)	Diff		2/10/2010	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
BOP-71(ds)	Diff		8/10/2010	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
BOP-71(ds)	Diff		2/8/2011	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
BOP-71(ds)	Diff		8/8/2011	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
BOP-71(ds)	Diff		2/22/2012	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
BOP-71(ds)	Diff		7/30/2012	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
BOP-71(ds)	Diff		2/13/2013	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
D-16(ds)	Diff	593	8/11/2008	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
D-16(ds)	Diff	593	8/13/2009	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
D-16(ds)	Diff	593	8/10/2011	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
D-17(ds)	Purge	466	11/12/2009	77	D	23		2.4		0.5	U	0.5	U
D-17(ds)	Purge	466	2/4/2010	80	D	26		2.6		0.5	U	0.5	U
D-17(ds)	Purge	466	3/10/2010	76	D	26		2.7		0.5	U	0.5	U
D-17(ds) Dup	Purge	466	3/10/2010	84	D	26		2.8		0.5	U	0.5	U

APPENDIX D
Volatile Organic Compound COPCs — TSA Wells
Cascade Corporation

Well Name	Sample Method	PMX No.	Sample Date	Trichloro-ethene (TCE)		<i>cis</i> -1,2-Dichloro-ethene		Tetrachloro-ethene (PCE)		1,1-Dichloro-ethene		Vinyl Chloride	
				(µg/L)		(µg/L)		(µg/L)		(µg/L)		(µg/L)	
D-17(ds)	Purge	466	4/7/2010	55		13		1.5		0.5	U	0.5	U
D-17(ds) Dup	Purge	466	4/7/2010	52		12		1.5		0.5	U	0.5	U
D-17(ds)	Purge	466	5/5/2010	61		14		1.6		0.5	U	0.5	U
D-17(ds)	Purge	466	6/3/2010	64		11		1.6		0.5	U	0.5	U
D-17(ds) Dup	Purge	466	6/3/2010	66		11		1.7		0.5	U	0.5	U
D-17(ds)	Purge	466	7/29/2010	62	D	15		1.8		0.5	U	0.5	U
D-17(ds)	Purge	466	8/9/2010	64		15		1.6		0.5	U	0.5	U
D-17(ds)	Purge	466	9/1/2010	74	D	18		2.0		0.5	U	0.5	U
D-17(ds) Dup	Purge	466	9/1/2010	77	D	20		2.3		0.5	U	0.5	U
D-17(ds)	Purge	466	10/5/2010	77	D	20		1.9		0.5	U	0.5	U
D-17(ds) Dup	Purge	466	10/5/2010	71	D	18		1.8		0.5	U	0.5	U
D-17(ds)	Purge	466	11/3/2010	64	D	17		2.0		0.5	U	0.5	U
D-17(ds)	Purge	466	12/6/2010	64	D	17		2.3		0.5	U	0.5	U
D-17(ds) Dup	Purge	466	12/6/2010	63	D	16		2.2		0.5	U	0.5	U
D-17(ds)	Purge	466	1/12/2011	78	D	22		2.2		0.5	U	0.5	U
D-17(ds) Dup	Purge	466	1/12/2011	74	D	22		2.0		0.5	U	0.5	U
D-17(ds)	Purge	466	2/7/2011	76	D	23		2.3		0.5	U	0.5	U
D-17(ds)	Purge	466	3/2/2011	57	D	23		2.4		0.5	U	0.5	U
D-17(ds) Dup	Purge	466	3/2/2011	80		20		2.2		0.5	U	0.5	U
D-17(ds)	Purge	466	4/6/2011	76		20		2.2		0.5	U	0.5	U
D-17(ds) Dup	Purge	466	4/6/2011	68		18		2.0		0.5	U	0.5	U
D-17(ds)	Purge	466	5/9/2011	71	D	21		2.1		0.5	U	0.5	U
D-17(ds)	Purge	466	6/9/2011	74		19		2.1		0.5	U	0.5	U
D-17(ds) Dup	Purge	466	6/9/2011	77		20		2.1		0.5	U	0.5	U
D-17(ds)	Purge	466	7/13/2011	65		17		2.1		0.5	U	0.5	U
D-17(ds) Dup	Purge	466	7/13/2011	66		17		2.1		0.5	U	0.5	U
D-17(ds)	Purge	466	8/11/2011	79		18		2.2		0.5	U	0.5	U
D-17(ds)	Purge	466	9/7/2011	65		17		2.0		0.5	U	0.5	U
D-17(ds) Dup	Purge	466	9/7/2011	59		17		1.7		0.5	U	0.5	U
D-17(ds)	Purge	466	10/12/2011	60		16		1.5		0.5	U	0.5	U
D-17(ds) Dup	Purge	466	10/12/2011	57		16		1.5		0.5	U	0.5	U
D-17(ds)	Purge	466	11/9/2011	60		16		1.6		0.5	U	0.5	U
D-17(ds)	Purge	466	12/19/2011	65		17		2.0		0.5	U	0.5	U
D-17(ds) Dup	Purge	466	12/19/2011	64		18		1.9		0.5	U	0.5	U
D-17(ds)	Purge	466	1/11/2012	59		16		1.7		0.5	U	0.5	U
D-17(ds) Dup	Purge	466	1/11/2012	59		16		1.7		0.5	U	0.5	U
D-17(ds)	Purge	466	2/22/2012	74		18		2.1		0.5	U	0.5	U
D-17(ds)	Purge	466	3/28/2012	56		17		1.6		0.5	U	0.5	U
D-17(ds) Dup	Purge	466	3/28/2012	56		17		1.6		0.5	U	0.5	U
D-17(ds)	Purge	466	4/18/2012	74		19		2.2		0.5	U	0.5	U
D-17(ds) Dup	Purge	466	4/18/2012	75		19		2.1		0.5	U	0.5	U
D-17(ds)	Purge	466	5/2/2012	63		17		1.8		0.5	U	0.5	U
D-17(ds)	Purge	466	6/6/2012	69		18		2.1		0.5	U	0.5	U
D-17(ds) Dup	Purge	466	6/6/2012	63		17		1.9		0.5	U	0.5	U
D-17(ds)	Purge	466	7/11/2012	69		19		1.9		0.5	U	0.5	U
D-17(ds) Dup	Purge	466	7/11/2012	69		19		1.9		0.5	U	0.5	U
D-17(ds)	Purge	466	7/31/2012	73	D	21		2.2		0.5	U	0.5	U
D-17(ds)	Purge	466	9/4/2012	63		17		1.8		0.5	U	0.5	U
D-17(ds) Dup	Purge	466	9/4/2012	54		15		1.6		0.5	U	0.5	U
D-17(ds)	Purge	466	10/8/2012	73		17		2.0		0.5	U	0.5	U
D-17(ds) Dup	Purge	466	10/8/2012	72		17		2.0		0.5	U	0.5	U
D-17(ds)	Purge	466	11/7/2012	76		17		2.1		0.5	U	0.5	U
D-17(ds)	Purge	466	12/5/2012	62		16		1.8		0.5	U	0.5	U
D-17(ds) Dup	Purge	466	12/5/2012	63		16		1.8		0.5	U	0.5	U
D-17(ds)	Purge	466	1/10/2013	65		16		1.9		0.5	U	0.5	U
D-17(ds) Dup	Purge	466	1/10/2013	67		17		1.9		0.5	U	0.5	U
D-17(ds)	Purge	466	2/14/2013	79		19		2.1		0.5	U	0.5	U

APPENDIX D
Volatile Organic Compound COPCs — TSA Wells
Cascade Corporation

Well Name	Sample Method	PMX No.	Sample Date	Trichloroethene (TCE)		<i>cis</i> -1,2-Dichloroethene		Tetrachloroethene (PCE)		1,1-Dichloroethene		Vinyl Chloride	
				(µg/L)		(µg/L)		(µg/L)		(µg/L)		(µg/L)	
D-17(ds)	Purge	466	3/13/2013	72		18		1.7		0.5	U	0.5	U
D-17(ds) Dup	Purge	466	3/13/2013	68		17		1.6		0.5	U	0.5	U
D-17(dg)	Diff	467	2/6/2008	5.8		0.75		0.67		0.5	U	0.5	U
D-17(dg)	Diff	467	8/12/2008	4.6		0.54		0.57		0.5	U	0.5	U
D-17(dg) Dup	Diff	467	8/12/2008	4.5		0.53		0.55		0.5	U	0.5	U
D-17(dg)	Diff	467	2/9/2009	5.1		0.89		0.52		0.5	U	0.5	U
D-17(dg)	Diff	467	8/12/2009	5.2		0.88		0.51		0.5	U	0.5	U
D-17(dg) Dup	Diff	467	8/12/2009	5.2		0.86		0.5	U	0.5	U	0.5	U
D-17(dg)	Diff	467	2/9/2010	7.6		2.0		0.58		0.5	U	0.5	U
D-17(dg)	Diff	467	8/9/2010	5.8		1.3		0.5	U	0.5	U	0.5	U
D-17(dg) Dup	Diff	467	8/9/2010	5.7		1.4		0.5	U	0.5	U	0.5	U
D-17(dg)	Diff	467	2/7/2011	9.5		2.3		0.5	U	0.5	U	0.5	U
D-17(dg)	Diff	467	8/10/2011	7.2		1.4		0.5	U	0.5	U	0.5	U
D-17(dg) Dup	Diff	467	8/10/2011	7.2		1.4		0.5	U	0.5	U	0.5	U
D-17(dg)	Diff	467	2/21/2012	7.4		1.3		0.5	U	0.5	U	0.5	U
D-17(dg)	Diff	467	7/31/2012	6.8		1.2		0.5	U	0.5	U	0.5	U
D-17(dg) Dup	Diff	467	7/31/2012	7.1		1.3		0.5	U	0.5	U	0.5	U
D-17(dg)	Diff	467	2/14/2013	9.0		1.7		0.5	U	0.5	U	0.5	U
D-18(ds)	Diff		8/11/2008	0.54		0.5	U	0.5	U	0.5	U	0.5	U
D-18(ds)	Diff		8/13/2009	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
D-18(ds)	Diff		8/10/2010	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
D-18(ds)	Diff		8/10/2011	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
EW-1	Grab		2/6/2008	6.5		1.4		0.5	U	0.5	U	0.5	U
EW-1	Grab		5/7/2008	5.8		1.3		0.5	U	0.5	U	0.5	U
EW-1	Grab		8/7/2008	5.4		1.1		0.5	U	0.5	U	0.5	U
EW-1	Grab		11/11/2008	6.7		1.3		0.5	U	0.5	U	0.5	U
EW-1	Grab		2/5/2009	5.7		1.1		0.5	U	0.5	U	0.5	U
EW-1	Grab		5/13/2009	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
EW-1	Grab		8/12/2009	8.1		1.7		0.5	U	0.5	U	0.5	U
EW-1	Grab		11/11/2009	8.6		1.7		0.51		0.5	U	0.5	U
EW-1	Grab		2/10/2010	7.2		1.4		0.5	U	0.5	U	0.5	U
EW-1	Grab		5/5/2010	6.7		1.4		0.5	U	0.5	U	0.5	U
EW-1	Grab		8/6/2010	8.3		1.7		0.5	U	0.5	U	0.5	U
EW-1	Grab		11/3/2010	8.3		1.7		0.5	U	0.5	U	0.5	U
EW-1	Grab		2/7/2011	8.2		1.5		0.5	U	0.5	U	0.5	U
EW-1	Grab		5/9/2011	7.7		1.4		0.5	U	0.5	U	0.5	U
EW-1	Grab		8/9/2011	6.6		1.3		0.5	U	0.5	U	0.5	U
EW-1	Grab		11/8/2011	6.1		1.2		0.5	U	0.5	U	0.5	U
EW-1	Grab		2/20/2012	6.7		1.3		0.5	U	0.5	U	0.5	U
EW-1	Grab		5/2/2012	6.5		1.2		0.5	U	0.5	U	0.5	U
EW-1	Grab		7/30/2012	7.1		1.4		0.5	U	0.5	U	0.5	U
EW-1	Grab		11/7/2012	7.5		1.5		0.5	U	0.5	U	0.5	U
EW-1	Grab		2/14/2013	6.5		1.3		0.5	U	0.5	U	0.5	U
EW-2	Grab		2/6/2008	18		2.2		1.2		0.5	U	0.5	U
EW-2	Grab		5/7/2008	19		2.1		1.5		0.5	U	0.5	U
EW-2	Grab		8/7/2008	19		1.8		1.4		0.5	U	0.5	U
EW-2	Grab		11/11/2008	18		1.8		1.4		0.5	U	0.5	U
EW-2	Grab		2/5/2009	20		1.9		1.5		0.5	U	0.5	U
EW-2	Grab		5/13/2009	24		2.3		1.9		0.5	U	0.5	U
EW-2	Grab		8/12/2009	21		2.0		1.6		0.5	U	0.5	U
EW-2	Grab		11/11/2009	21		1.8		1.7		0.5	U	0.5	U
EW-2	Grab		2/10/2010	19		2.0		1.4		0.5	U	0.5	U
EW-2	Grab		5/5/2010	17		1.7		1.2		0.5	U	0.5	U

APPENDIX D
Volatile Organic Compound COPCs — TSA Wells
Cascade Corporation

Well Name	Sample Method	PMX No.	Sample Date	Trichloroethene (TCE)		<i>cis</i> -1,2-Dichloroethene		Tetrachloroethene (PCE)		1,1-Dichloroethene		Vinyl Chloride	
				(µg/L)		(µg/L)		(µg/L)		(µg/L)		(µg/L)	
EW-2	Grab		8/6/2010	19		1.9		1.3		0.5	U	0.5	U
EW-2	Grab		11/3/2010	16		1.5		1.3		0.5	U	0.5	U
EW-2	Grab		2/7/2011	17		1.5		1.3		0.5	U	0.5	U
EW-2	Grab		5/9/2011	17		1.7		1.3		0.5	U	0.5	U
EW-2	Grab		8/9/2011	16		1.5		1.3		0.5	U	0.5	U
EW-2	Grab		11/8/2011	15		1.4		1.1		0.5	U	0.5	U
EW-2	Grab		2/20/2012	17		1.7		1.3		0.5	U	0.5	U
EW-2	Grab		5/2/2012	16		1.6		1.3		0.5	U	0.5	U
EW-2	Grab		7/30/2012	29		2.3		1.7		0.5	U	0.5	U
EW-2	Grab		11/7/2012	22		1.8		1.3		0.5	U	0.5	U
EW-2	Grab		2/14/2013	20		1.7		1.3		0.5	U	0.5	U
EW-8	Purge		2/7/2008	5.2		0.88		0.5	U	0.5	U	0.5	U
EW-8	Purge		5/7/2008	5.4		1.0		0.5	U	0.5	U	0.5	U
EW-8	Purge		8/7/2008	5.5		0.87		0.5	U	0.5	U	0.5	U
EW-8	Purge		11/11/2008	7.0		1.1		0.62		0.5	U	0.5	U
EW-8	Purge		2/5/2009	1.6		0.5	U	0.5	U	0.5	U	0.5	U
EW-8	Purge		5/13/2009	4.7		0.66		0.5	U	0.5	U	0.5	U
			Converted to Monitoring Well June 17, 2009										
EW-8	Purge		8/12/2009	2.0		0.5	U	0.5	U	0.5	U	0.5	U
EW-8	Upper Diff		2/10/2010	5.4		0.60		0.52		0.5	U	0.5	U
EW-8	Lower Diff		2/10/2010	6.5		0.84		0.55		0.5	U	0.5	U
EW-8	Upper Diff		5/5/2010	3.8		0.5	U	0.5	U	0.5	U	0.5	U
EW-8	Lower Diff		5/5/2010	3.9		0.5	U	0.5	U	0.5	U	0.5	U
EW-8	Upper Diff		8/6/2010	2.3		0.5	U	0.5	U	0.5	U	0.5	U
EW-8	Lower Diff		8/6/2010	2.8		0.5	U	0.5	U	0.5	U	0.5	U
EW-8	Upper Diff		2/8/2011	3.3		0.5	U	0.5	U	0.5	U	0.5	U
EW-8	Lower Diff		2/8/2011	3.1		0.5	U	0.5	U	0.5	U	0.5	U
EW-8	Upper Diff		8/9/2011	2.5		0.5	U	0.5	U	0.5	U	0.5	U
EW-8	Lower Diff		8/9/2011	2.5		0.5	U	0.5	U	0.5	U	0.5	U
EW-8	Upper Diff		2/21/2012	2.3		0.5	U	0.5	U	0.5	U	0.5	U
EW-8	Lower Diff		2/21/2012	2.3		0.5	U	0.5	U	0.5	U	0.5	U
EW-8	Upper Diff		7/31/2012	2.5		0.5	U	0.5	U	0.5	U	0.5	U
EW-8	Lower Diff		7/31/2012	2.5		0.5	U	0.5	U	0.5	U	0.5	U
EW-8	Upper Diff		2/13/2013	1.9		0.5	U	0.5	U	0.5	U	0.5	U
EW-8	Lower Diff		2/13/2013	2.0		0.5	U	0.5	U	0.5	U	0.5	U
EW-11	Purge		2/6/2008	3.5		0.5	U	0.5	U	0.5	U	0.5	U
EW-11	Purge		5/7/2008	1.9		0.5	U	0.5	U	0.5	U	0.5	U
EW-11	Purge		8/7/2008	7.1		0.5	U	0.5	U	0.5	U	0.5	U
EW-11	Purge		11/11/2008	7.4		0.5	U	0.51		0.5	U	0.5	U
EW-11	Purge		2/5/2009	6.1		0.5	U	0.5	U	0.5	U	0.5	U
EW-11	Purge		5/13/2009	6.4		0.5	U	0.50		0.5	U	0.5	U
EW-11	Upper Diff		5/13/2009	3.6		0.5	U	0.5	U	0.5	U	0.5	U
EW-11	Lower Diff		5/13/2009	5.0		0.5	U	0.5	U	0.5	U	0.5	U
EW-11	Purge		8/12/2009	5.9		0.5	U	0.5	U	0.5	U	0.5	U
EW-11	Upper Diff		9/22/2009	2.7		0.5	U	0.5	U	0.5	U	0.5	U
EW-11	Lower Diff		9/22/2009	2.4		0.5	U	0.5	U	0.5	U	0.5	U
EW-11	Upper Diff		11/11/2009	3.5		0.5	U	0.5	U	0.5	U	0.5	U
EW-11	Lower Diff		11/11/2009	2.7		0.5	U	0.5	U	0.5	U	0.5	U
EW-11	Upper Diff		2/10/2010	2.7		0.5	U	0.5	U	0.5	U	0.5	U
EW-11	Lower Diff		2/10/2010	2.7		0.5	U	0.5	U	0.5	U	0.5	U
EW-11	Upper Diff		8/9/2010	2.0		0.5	U	0.5	U	0.5	U	0.5	U
EW-11	Lower Diff		8/9/2010	2.1		0.5	U	0.5	U	0.5	U	0.5	U
EW-11	Upper Diff		2/8/2011	2.2		0.5	U	0.5	U	0.5	U	0.5	U
EW-11	Lower Diff		2/8/2011	2.2		0.5	U	0.5	U	0.5	U	0.5	U

APPENDIX D
Volatile Organic Compound COPCs — TSA Wells
Cascade Corporation

Well Name	Sample Method	PMX No.	Sample Date	Trichloroethene (TCE)		<i>cis</i> -1,2-Dichloroethene		Tetrachloroethene (PCE)		1,1-Dichloroethene		Vinyl Chloride	
				(µg/L)		(µg/L)		(µg/L)		(µg/L)		(µg/L)	
EW-11	Upper Diff		8/9/2011	2.2		0.5	U	0.5	U	0.5	U	0.5	U
EW-11	Lower Diff		8/9/2011	2.1		0.5	U	0.5	U	0.5	U	0.5	U
EW-11	Upper Diff		2/21/2012	2.4		0.5	U	0.5	U	0.5	U	0.5	U
EW-11	Lower Diff		2/21/2012	2.5		0.5	U	0.5	U	0.5	U	0.5	U
EW-11	Upper Diff		7/31/2012	2.7		0.5	U	0.5	U	0.5	U	0.5	U
EW-11	Lower Diff		7/31/2012	2.5		0.5	U	0.5	U	0.5	U	0.5	U
EW-11	Upper Diff		2/14/2013	2.4		0.5	U	0.5	U	0.5	U	0.5	U
EW-11	Lower Diff		2/14/2013	2.3		0.5	U	0.5	U	0.5	U	0.5	U
EW-12	Purge		2/6/2008	5.3		0.5	U	0.5	U	0.5	U	0.5	U
EW-12	Purge		5/7/2008	5.4		0.5	U	0.61		0.5	U	0.5	U
EW-12	Purge		8/7/2008	5.2		0.5	U	0.52		0.5	U	0.5	U
EW-12	Purge		11/11/2008	5.6		0.5	U	0.61		0.5	U	0.5	U
EW-12	Purge		2/5/2009	5.1		0.63		0.5	U	0.5	U	0.5	U
			Well converted to monitoring well March 11, 2009										
EW-12	Upper Diff		8/12/2009	2.4		0.5	U	0.5	U	0.5	U	0.5	U
EW-12	Lower Diff		8/12/2009	2.8		0.5	U	0.5	U	0.5	U	0.5	U
EW-12	Upper Diff		2/10/2010	1.4		0.5	U	0.5	U	0.5	U	0.5	U
EW-12	Lower Diff		2/10/2010	1.5		0.5	U	0.5	U	0.5	U	0.5	U
EW-12	Upper Diff		8/6/2010	4.3		0.56		0.5	U	0.5	U	0.5	U
EW-12	Lower Diff		8/6/2010	4.0		0.55		0.5	U	0.5	U	0.5	U
EW-12	Upper Diff		2/8/2011	11		1.6		0.67		0.5	U	0.5	U
EW-12	Lower Diff		2/8/2011	11		1.5		0.65		0.5	U	0.5	U
EW-12	Upper Diff		3/8/2011	11		1.6		0.68		0.5	U	0.5	U
EW-12	Lower Diff		3/8/2011	10		1.3		0.64		0.5	U	0.5	U
EW-12	Upper Diff		5/9/2011	10		1.3		0.62		0.5	U	0.5	U
EW-12	Lower Diff		5/9/2011	9.8		1.3		0.61		0.5	U	0.5	U
EW-12	Upper Diff		8/9/2011	8.4		0.99		0.59		0.5	U	0.5	U
EW-12	Lower Diff		8/9/2011	8.3		0.90		0.59		0.5	U	0.5	U
EW-12	Upper Diff		11/8/2011	6.6		0.80		0.5	U	0.5	U	0.5	U
EW-12	Lower Diff		11/8/2011	6.7		0.80		0.5	U	0.5	U	0.5	U
EW-12	Upper Diff		2/21/2012	7.5		0.80		0.54		0.5	U	0.5	U
EW-12	Lower Diff		2/21/2012	7.1		0.75		0.59		0.5	U	0.5	U
EW-12	Upper Diff		5/2/2012	7.6		0.77		0.60		0.5	U	0.5	U
EW-12	Lower Diff		5/2/2012	7.6		0.79		0.60		0.5	U	0.5	U
EW-12	Upper Diff		7/31/2012	7.3		0.75		0.54		0.5	U	0.5	U
EW-12	Lower Diff		7/31/2012	7.2		0.70		0.53		0.5	U	0.5	U
EW-12	Upper Diff		11/7/2012	7.6		0.78		0.51		0.5	U	0.5	U
EW-12	Lower Diff		11/7/2012	7.5		0.77		0.52		0.5	U	0.5	U
EW-12	Upper Diff		2/14/2013	6.0		0.70		0.51		0.5	U	0.5	U
EW-12	Lower Diff		2/14/2013	6.2		0.71		0.52		0.5	U	0.5	U
EW-14	Grab		2/6/2008	17		2.4		0.97		0.5	U	0.5	U
EW-14	Grab		5/7/2008	17		2.4		1.1		0.5	U	0.5	U
EW-14	Grab		8/7/2008	16		2.1		0.97		0.5	U	0.5	U
EW-14	Grab		11/11/2008	19		2.4		1.3		0.5	U	0.5	U
EW-14	Grab		2/5/2009	16		2.1		0.95		0.5	U	0.5	U
EW-14	Grab		5/13/2009	14		2.0		0.86		0.5	U	0.5	U
EW-14	Grab		8/12/2009	15		2.2		0.92		0.5	U	0.5	U
EW-14	Grab		11/11/2009	16		2.2		1.0		0.5	U	0.5	U
EW-14	Grab		2/10/2010	16		2.5		0.96		0.5	U	0.5	U
EW-14	Grab		5/5/2010	12		1.9		0.69		0.5	U	0.5	U
EW-14	Grab		8/6/2010	11		1.5		0.64		0.5	U	0.5	U
EW-14	Grab		11/3/2010	14		2.0		0.76		0.5	U	0.5	U
EW-14	Grab		2/7/2011	15		2.0		0.77		0.5	U	0.5	U
EW-14	Grab		5/9/2011	19		2.4		0.95		0.5	U	0.5	U
EW-14	Grab		8/9/2011	15		2.0		0.83		0.5	U	0.5	U

APPENDIX D
Volatile Organic Compound COPCs — TSA Wells
Cascade Corporation

Well Name	Sample Method	PMX No.	Sample Date	Trichloroethene (TCE)		cis -1,2-Dichloroethene		Tetrachloroethene (PCE)		1,1-Dichloroethene		Vinyl Chloride	
				(µg/L)		(µg/L)		(µg/L)		(µg/L)		(µg/L)	
EW-14	Grab		11/8/2011	15		1.9		0.83		0.5	U	0.5	U
EW-14	Grab		2/20/2012	15		1.8		0.84		0.5	U	0.5	U
EW-14	Grab		5/2/2012	13		1.7		0.79		0.5	U	0.5	U
EW-14	Grab		7/30/2012	14		1.9		0.75		0.5	U	0.5	U
EW-14	Grab		11/7/2012	16		2.0		0.91		0.5	U	0.5	U
EW-14	Grab		2/14/2013	15		1.8		0.84		0.5	U	0.5	U
EW-14 Dup	Grab		2/14/2013	14		2.1		0.95		0.5	U	0.5	U
EW-15	Grab		2/6/2008	12		1.3		0.60		0.5	U	0.5	U
EW-15 Dup	Grab		2/6/2008	12		1.3		0.63		0.5	U	0.5	U
EW-15	Grab		5/7/2008	11		1.1		0.76		0.5	U	0.5	U
EW-15 Dup	Grab		5/7/2008	11		1.0		0.71		0.5	U	0.5	U
EW-15	Grab		8/7/2008	10		0.93		0.55		0.5	U	0.5	U
EW-15 Dup	Grab		8/7/2008	10		0.87		0.63		0.5	U	0.5	U
EW-15	Grab		11/11/2008	11		1.1		0.70		0.5	U	0.5	U
EW-15	Grab		2/5/2009	8.4		0.81		0.5	U	0.5	U	0.5	U
EW-15	Grab		5/13/2009	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
EW-15	Grab		8/12/2009	5.7		0.54		0.5	U	0.5	U	0.5	U
EW-15 Dup	Grab		8/12/2009	5.9		0.56		0.5	U	0.5	U	0.5	U
EW-15	Grab		11/11/2009	4.9		0.5	U	0.5	U	0.5	U	0.5	U
EW-15	Grab		2/10/2010	3.3		0.5	U	0.5	U	0.5	U	0.5	U
			Well Pilot Shutdown April 12, 2010										
EW-15	Grab		5/5/2010	3.5		0.5	U	0.5	U	0.5	U	0.5	U
EW-15	Purge		8/5/2010	4.4		0.5	U	0.5	U	0.5	U	0.5	U
EW-15 Dup	Purge		8/5/2010	4.5		0.5	U	0.5	U	0.5	U	0.5	U
EW-15	Upper Diff		11/22/2010	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
EW-15	Lower Diff		11/22/2010	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
EW-15	Upper Diff		2/8/2011	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
EW-15	Lower Diff		2/8/2011	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
EW-15	Upper Diff		5/9/2011	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
EW-15	Lower Diff		5/9/2011	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
EW-15	Upper Diff		8/9/2011	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
EW-15	Lower Diff		8/9/2011	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
EW-15	Upper Diff		11/8/2011	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
EW-15	Lower Diff		11/8/2011	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
EW-15	Upper Diff		2/21/2012	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
EW-15	Lower Diff		2/21/2012	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
EW-15	Upper Diff		5/2/2012	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
EW-15	Lower Diff		5/2/2012	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
EW-15	Upper Diff		7/31/2012	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
EW-15	Lower Diff		7/31/2012	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
			Converted to Monitoring Well August 1, 2012										
EW-15	Upper Diff		2/14/2013	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
EW-15	Lower Diff		2/14/2013	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
EW-16	Grab		2/6/2008	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
EW-16	Grab		5/7/2008	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
EW-16	Grab		8/7/2008	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
EW-16	Grab		11/11/2008	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
EW-16	Grab		2/5/2009	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
EW-16	Grab		8/12/2009	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
EW-16	Grab		2/10/2010	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
			Well Pilot Shutdown April 12, 2010										
EW-16	Grab		5/5/2010	6.4		0.86		0.5	U	0.5	U	0.5	U
EW-16	Purge		5/26/2010	6.2		0.78		0.5	U	0.5	U	0.5	U
EW-16	Diff @ 137.6		6/23/2010	6.5		0.75		0.50		0.5	U	0.5	U
EW-16	Diff @ 157.6		6/23/2010	5.8		0.69		0.5	U	0.5	U	0.5	U

APPENDIX D
Volatile Organic Compound COPCs — TSA Wells
Cascade Corporation

Well Name	Sample Method	PMX No.	Sample Date	Trichloroethene (TCE)		<i>cis</i> -1,2-Dichloroethene		Tetrachloroethene (PCE)		1,1-Dichloroethene		Vinyl Chloride	
				(µg/L)		(µg/L)		(µg/L)		(µg/L)		(µg/L)	
EW-16	Purge		8/5/2010	4.8		0.67		0.5	U	0.5	U	0.5	U
EW-16	Diff @ 129.5		8/5/2010	6.0		0.62		0.5	U	0.5	U	0.5	U
EW-16	Diff @ 134.5		8/5/2010	5.8		0.59		0.5	U	0.5	U	0.5	U
EW-16	Diff @ 139.5		8/5/2010	7.1		0.78		0.5	U	0.5	U	0.5	U
EW-16	Diff @ 144.5		8/5/2010	5.4		0.58		0.5	U	0.5	U	0.5	U
EW-16	Diff @ 149.5		8/5/2010	5.5		0.58		0.5	U	0.5	U	0.5	U
EW-16	Diff @ 154.5		8/5/2010	5.7		0.61		0.5	U	0.5	U	0.5	U
EW-16	Diff @ 159.5		8/5/2010	5.6		0.58		0.5	U	0.5	U	0.5	U
EW-16	Purge		11/3/2010	7.8		0.94		0.55		0.5	U	0.5	U
EW-16	Purge		2/7/2011	4.5		0.59		0.5	U	0.5	U	0.5	U
EW-16	Purge		5/9/2011	7.2		1.1		0.5	U	0.5	U	0.5	U
EW-16 Dup	Purge		5/9/2011	7.3		1.0		0.5	U	0.5	U	0.5	U
EW-16	Purge		8/9/2011	7.3		0.99		0.50		0.5	U	0.5	U
EW-16	Purge		11/8/2011	6.3		0.89		0.5	U	0.5	U	0.5	U
EW-16 Dup	Purge		11/8/2011	6.3		0.87		0.5	U	0.5	U	0.5	U
EW-16	Purge		2/21/2012	5.2		0.80		0.5	U	0.5	U	0.5	U
EW-16	Purge		5/2/2012	8.2		1.1		0.62		0.5	U	0.5	U
EW-16 Dup	Purge		5/2/2012	8.3		1.1		0.57		0.5	U	0.5	U
EW-16	Purge		7/30/2012	11		1.2		0.57		0.5	U	0.5	U
EW-16	Grab		11/7/2012	2.4		0.5	U	0.5	U	0.5	U	0.5	U
EW-16 Dup	Grab		11/7/2012	2.4		0.5	U	0.5	U	0.5	U	0.5	U
EW-16	Grab		2/14/2013	0.9		0.5	U	0.5	U	0.5	U	0.5	U
EW-18	Grab		1/3/2008	5.4		0.88		0.76		0.5	U	0.5	U
EW-18	Purge		3/3/2008	4.4		0.5	U	0.54		0.5	U	0.5	U
EW-18	Purge/Grab		5/1/2008	5.0		0.81		0.90		0.5	U	0.5	U
EW-18	Grab		7/1/2008	4.1		0.5	U	0.53		0.5	U	0.5	U
EW-18	Purge/Grab		9/2/2008	5.2		0.78		0.90		0.5	U	0.5	U
EW-18	Grab		11/3/2008	5.2		0.5	U	1.1		0.5	U	0.5	U
EW-18	Purge/Grab		1/5/2009	4.6		0.74		0.82		0.5	U	0.5	U
EW-18	Grab		3/4/2009	4.1		0.5	U	0.50		0.5	U	0.5	U
EW-18	Grab		5/13/2009	4.0		0.5	U	0.5	U	0.5	U	0.5	U
EW-18 Dup	Grab		5/13/2009	3.9		0.5	U	0.5	U	0.5	U	0.5	U
EW-18	Grab		8/12/2009	4.5		0.67		0.88		0.5	U	0.5	U
EW-18	Purge		11/11/2009	3.7		0.5	U	0.5	U	0.5	U	0.5	U
EW-18 Dup	Purge		11/11/2009	3.8		0.5	U	0.5	U	0.5	U	0.5	U
EW-18	Purge		2/10/2010	3.9		0.5	U	0.76		0.5	U	0.5	U
EW-18	Purge		5/5/2010	2.5		0.5	U	0.5	U	0.5	U	0.5	U
EW-18 Dup	Purge		5/5/2010	2.6		0.5	U	0.5	U	0.5	U	0.5	U
EW-18	Purge		8/6/2010	3.5		0.5	U	0.5	U	0.5	U	0.5	U
EW-18 Dup	Purge		8/6/2010	2.7		0.5	U	0.5	U	0.5	U	0.5	U
EW-18	Upper Diff		11/22/2010	3.5		0.5	U	0.5	U	0.5	U	0.5	U
EW-18	Lower Diff		11/22/2010	3.5		0.5	U	0.5	U	0.5	U	0.5	U
EW-18 Dup	Lower Diff		11/22/2010	3.4		0.5	U	0.5	U	0.5	U	0.5	U
EW-18	Upper Diff		2/8/2011	3.3		0.5	U	0.5	U	0.5	U	0.5	U
EW-18	Lower Diff		2/8/2011	3.3		0.5	U	0.5	U	0.5	U	0.5	U
EW-18	Upper Diff		5/9/2011	3.4		0.5	U	0.5	U	0.5	U	0.5	U
EW-18	Lower Diff		5/9/2011	3.4		0.5	U	0.5	U	0.5	U	0.5	U
EW-18	Upper Diff		8/9/2011	3.1		0.5	U	0.5	U	0.5	U	0.5	U
EW-18	Lower Diff		8/9/2011	3.1		0.5	U	0.5	U	0.5	U	0.5	U
EW-18	Upper Diff		11/8/2011	3.3		0.5	U	0.5	U	0.5	U	0.5	U
EW-18	Lower Diff		11/8/2011	3.2		0.5	U	0.5	U	0.5	U	0.5	U
EW-18	Upper Diff		2/20/2012	3.3		0.5	U	0.5	U	0.5	U	0.5	U
EW-18	Lower Diff		2/20/2012	3.3		0.5	U	0.5	U	0.5	U	0.5	U
EW-18	Upper Diff		5/2/2012	3.0		0.5	U	0.5	U	0.5	U	0.5	U
EW-18	Lower Diff		5/2/2012	3.0		0.5	U	0.5	U	0.5	U	0.5	U

APPENDIX D
Volatile Organic Compound COPCs — TSA Wells
Cascade Corporation

Well Name	Sample Method	PMX No.	Sample Date	Trichloroethene (TCE)		<i>cis</i> -1,2-Dichloroethene		Tetrachloroethene (PCE)		1,1-Dichloroethene		Vinyl Chloride	
				(µg/L)		(µg/L)		(µg/L)		(µg/L)		(µg/L)	
EW-18	Upper Diff		7/30/2012	3.0		0.5	U	0.5	U	0.5	U	0.5	U
EW-18	Lower Diff		7/30/2012	2.9		0.5	U	0.5	U	0.5	U	0.5	U
EW-18	Upper Diff		11/7/2012	3.0		0.5	U	0.5	U	0.5	U	0.5	U
EW-18	Lower Diff		11/7/2012	3.1		0.5	U	0.5	U	0.5	U	0.5	U
EW-18	Upper Diff		2/14/2013	3.2		0.5	U	0.5	U	0.5	U	0.5	U
EW-18	Lower Diff		2/14/2013	3.2		0.5	U	0.5	U	0.5	U	0.5	U
EW-23	Grab		2/6/2008	1.6		0.5	U	0.5	U	0.5	U	0.5	U
EW-23-Dup	Grab		2/6/2008	1.6		0.5	U	0.5	U	0.5	U	0.5	U
EW-23	Grab		5/7/2008	1.5		0.5	U	0.5	U	0.5	U	0.5	U
EW-23	Grab		8/7/2008	1.6		0.5	U	0.5	U	0.5	U	0.5	U
EW-23	Grab		11/11/2008	1.6		0.5	U	0.5	U	0.5	U	0.5	U
EW-23	Grab		2/5/2009	1.1		0.5	U	0.5	U	0.5	U	0.5	U
EW-23 Dup	Grab		2/5/2009	1.2		0.5	U	0.5	U	0.5	U	0.5	U
EW-23	Grab		8/12/2009	1.4		0.5	U	0.5	U	0.5	U	0.5	U
EW-23	Grab		2/10/2010	1.7		0.5	U	0.5	U	0.5	U	0.5	U
EW-23 Dup	Grab		2/10/2010	1.8		0.5	U	0.5	U	0.5	U	0.5	U
EW-23	Grab		8/6/2010	2.2		0.5	U	0.5	U	0.5	U	0.5	U
EW-23	Grab		2/7/2011	2.2		0.5	U	0.5	U	0.5	U	0.5	U
EW-23 Dup	Grab		2/7/2011	2.0		0.5	U	0.5	U	0.5	U	0.5	U
EW-23	Grab		8/9/2011	2.2		0.5	U	0.5	U	0.5	U	0.5	U
EW-23	Grab		2/20/2012	2.5		0.5	U	0.5	U	0.5	U	0.5	U
EW-23 Dup	Grab		2/20/2012	2.6		0.5	U	0.5	U	0.5	U	0.5	U
EW-23	Grab		7/30/2012	6.7		0.5	U	0.64		0.5	U	0.5	U
EW-23	Grab		2/14/2013	6.9		0.5	U	0.70		0.5	U	0.5	U
MW-8(dg)	Diff	811	8/12/2008	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
MW-8(dg)	Diff	811	8/18/2009	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
MW-8(dg)	Diff	811	8/10/2011	0.5	U	0.72		0.5	U	0.5	U	0.5	U
MW-10(ds)	Purge	821	2/9/2010	39		0.84		1.6		0.5	U	0.5	U
MW-10(ds)	Purge	821	3/10/2010	36		0.70		1.2		0.5	U	0.5	U
MW-10(ds)	Purge	821	4/7/2010	30		0.61		1.2		0.5	U	0.5	U
MW-10(ds)	Purge	821	5/5/2010	31		0.67		1.0		0.5	U	0.5	U
MW-10(ds)	Purge	821	6/3/2010	39		0.75		1.3		0.5	U	0.5	U
MW-10(ds)	Purge	821	7/29/2010	37		0.98		1.5		0.5	U	0.5	U
MW-10(ds)	Purge	821	8/6/2010	40		1.0		1.5		0.5	U	0.5	U
MW-10(ds)	Purge	821	9/1/2010	45		0.99		1.7		0.5	U	0.5	U
MW-10(ds)	Purge	821	10/5/2010	46		0.96		1.6		0.5	U	0.5	U
MW-10(ds)	Purge	821	11/3/2010	39		0.85		1.4		0.5	U	0.5	U
MW-10(ds)	Purge	821	12/6/2010	34		0.73		1.5		0.5	U	0.5	U
MW-10(ds)	Purge	821	1/12/2011	34		0.74		1.3		0.5	U	0.5	U
MW-10(ds)	Purge	821	2/7/2011	34		0.67		1.4		0.5	U	0.5	U
MW-10(ds)	Purge	821	3/2/2011	24		0.59		1.1		0.5	U	0.5	U
MW-10(ds)	Purge	821	4/6/2011	29		0.66		1.2		0.5	U	0.5	U
MW-10(ds)	Purge	821	5/9/2011	28		0.63		1.2		0.5	U	0.5	U
MW-10(ds)	Purge	821	6/9/2011	19		0.5	U	0.89		0.5	U	0.5	U
MW-10(ds)	Purge	821	7/13/2011	26		0.58		1.2		0.5	U	0.5	U
MW-10(ds)	Purge	821	8/11/2011	25		0.5	U	1.1		0.5	U	0.5	U
MW-10(ds)	Purge	821	9/7/2011	26		0.58		1.1		0.5	U	0.5	U
MW-10(ds)	Purge	821	10/12/2011	27		0.53		1.1		0.5	U	0.5	U
MW-10(ds)	Purge	821	11/9/2011	25		0.58		0.97		0.5	U	0.5	U
MW-10(ds)	Purge	821	12/19/2011	23		0.57		1.1		0.5	U	0.5	U
MW-10(ds)	Purge	821	1/11/2012	27		0.63		1.1		0.5	U	0.5	U
MW-10(ds)	Purge	821	2/22/2012	31		0.62		1.3		0.5	U	0.5	U
MW-10(ds)	Purge	821	3/28/2012	20		0.52		0.88		0.5	U	0.5	U
MW-10(ds)	Purge	821	4/18/2012	26		0.66		1.2		0.5	U	0.5	U

APPENDIX D
Volatile Organic Compound COPCs — TSA Wells
Cascade Corporation

Well Name	Sample Method	PMX No.	Sample Date	Trichloroethene (TCE)		cis -1,2-Dichloroethene		Tetrachloroethene (PCE)		1,1-Dichloroethene		Vinyl Chloride	
				(µg/L)		(µg/L)		(µg/L)		(µg/L)		(µg/L)	
MW-10(ds)	Purge	821	5/2/2012	25		0.65		1.2		0.5	U	0.5	U
MW-10(ds)	Purge	821	6/6/2012	26		0.70		1.2		0.5	U	0.5	U
MW-10(ds)	Purge	821	7/11/2012	27		0.75		1.3		0.5	U	0.5	U
MW-10(ds)	Purge	821	7/31/2012	28		0.90		1.2		0.5	U	0.5	U
MW-10(ds)	Purge	821	9/4/2012	25		0.67		1.1		0.5	U	0.5	U
MW-10(ds)	Purge	821	10/8/2012	25		0.60		1.2		0.5	U	0.5	U
MW-10(ds)	Purge	821	11/7/2012	27		0.64		1.3		0.5	U	0.5	U
MW-10(ds)	Purge	821	12/5/2012	21		0.50		1.1		0.5	U	0.5	U
MW-10(ds)	Purge	821	1/10/2013	19		0.5	U	0.85		0.5	U	0.5	U
MW-10(ds)	Purge	821	2/14/2013	21		0.5	U	1.1		0.5	U	0.5	U
MW-10(ds)	Purge	821	3/13/2013	19		0.5	U	0.76		0.5	U	0.5	U
MW-10(dg)	Diff	816	8/12/2008	0.71		0.5	U	0.5	U	0.5	U	0.5	U
MW-10(dg)	Diff	816	8/18/2009	0.69		0.5	U	0.5	U	0.5	U	0.5	U
MW-10(dg)	Diff	816	8/6/2010	0.65		0.5	U	0.5	U	0.5	U	0.5	U
MW-10(dg)	Diff	816	8/10/2011	0.53		0.5	U	0.5	U	0.5	U	0.5	U
MW-10(dg)	Diff	816	7/31/2012	0.55		0.5	U	0.5	U	0.5	U	0.5	U
MW-14R(ds)	Purge		3/3/2008	7.6		1.6		0.86		0.5	U	0.5	U
MW-14R(ds)	Purge		5/1/2008	7.6		1.5		1.1		0.5	U	0.5	U
MW-14R(ds)	Purge		7/1/2008	7.4		1.3		1.0		0.5	U	0.5	U
MW-14R(ds)	Purge		9/2/2008	5.3		0.74		0.81		0.5	U	0.5	U
MW-14R(ds)	Purge		11/3/2008	6.1		0.94		1.0		0.5	U	0.5	U
MW-14R(ds)	Purge		1/5/2009	4.8		0.96		0.68		0.5	U	0.5	U
MW-14R(ds)	Purge		3/4/2009	4.2		0.64		0.57		0.5	U	0.5	U
MW-14R(ds)	Purge		5/13/2009	3.9		0.50		0.80		0.5	U	0.5	U
MW-14R(ds)	Purge		8/18/2009	3.8		0.55		0.62		0.5	U	0.5	U
MW-14R(ds)	Purge		11/11/2009	3.0		0.5	U	0.57		0.5	U	0.5	U
MW-14R(ds)	Purge		2/9/2010	1.9		0.5	U	0.5	U	0.5	U	0.5	U
MW-14R(ds) Dup	Purge		2/9/2010	1.8		0.5	U	0.5	U	0.5	U	0.5	U
MW-14R(ds)	Purge		5/5/2010	2.3		0.5	U	0.5	U	0.5	U	0.5	U
MW-14R(ds)	Diff		8/10/2010	1.2		0.5	U	0.5	U	0.5	U	0.5	U
MW-14R(ds)	Diff		11/3/2010	1.6		0.5	U	0.5	U	0.5	U	0.5	U
MW-14R(ds)	Diff		2/7/2011	1.1		0.5	U	0.5	U	0.5	U	0.5	U
MW-14R(ds) Dup	Diff		2/7/2011	1.1		0.5	U	0.5	U	0.5	U	0.5	U
MW-14R(ds)	Diff		5/9/2011	0.91		0.5	U	0.5	U	0.5	U	0.5	U
MW-14R(ds)	Diff		8/10/2011	1.5		0.5	U	0.5	U	0.5	U	0.5	U
MW-14R(ds)	Diff		11/9/2011	1.1		0.5	U	0.5	U	0.5	U	0.5	U
MW-14R(ds)	Diff		2/21/2012	1.3		0.5	U	0.5	U	0.5	U	0.5	U
MW-14R(ds) Dup	Diff		2/21/2012	1.3		0.5	U	0.5	U	0.5	U	0.5	U
MW-14R(ds)	Diff		5/2/2012	1.1		0.5	U	0.5	U	0.5	U	0.5	U
MW-14R(ds)	Diff		7/30/2012	0.79		0.5	U	0.5	U	0.5	U	0.5	U
MW-14R(ds)	Diff		11/7/2012	1.1		0.5	U	0.5	U	0.5	U	0.5	U
MW-14R(ds)	Diff		2/13/2013	1.0		0.5	U	0.5	U	0.5	U	0.5	U
MW-17(ds)	Purge	833	2/9/2010	30		4.9		1.4		0.5	U	0.5	U
MW-17(ds)	Purge	833	3/10/2010	39		6.7		1.8		0.5	U	0.5	U
MW-17(ds)	Purge	833	4/7/2010	39		6.1		1.8		0.5	U	0.5	U
MW-17(ds)	Purge	833	5/5/2010	40		6.1		1.7		0.5	U	0.5	U
MW-17(ds)	Purge	833	6/3/2010	43		6.3		1.8		0.5	U	0.5	U
MW-17(ds)	Purge	833	7/29/2010	48		7.3		2.1		0.5	U	0.5	U
MW-17(ds) Dup	Purge	833	7/29/2010	49		7.3		2.1		0.5	U	0.5	U
MW-17(ds)	Purge	833	8/9/2010	40		5.5		1.8		0.5	U	0.5	U
MW-17(ds)	Purge	833	9/1/2010	55		7.8		2.5		0.5	U	0.5	U
MW-17(ds)	Purge	833	10/5/2010	48		6.9		1.9		0.5	U	0.5	U
MW-17(ds)	Purge	833	11/3/2010	53		7.6		2.4		0.5	U	0.5	U
MW-17(ds)	Purge	833	12/6/2010	50		7.2		2.6		0.5	U	0.5	U

APPENDIX D
Volatile Organic Compound COPCs — TSA Wells
Cascade Corporation

Well Name	Sample Method	PMX No.	Sample Date	Trichloroethene (TCE)		<i>cis</i> -1,2-Dichloroethene		Tetrachloroethene (PCE)		1,1-Dichloroethene		Vinyl Chloride	
				(µg/L)		(µg/L)		(µg/L)		(µg/L)		(µg/L)	
MW-17(ds)	Purge	833	1/12/2011	58		8.5		2.6		0.5	U	0.5	U
MW-17(ds)	Purge	833	2/7/2011	59		8.2		2.8		0.5	U	0.5	U
MW-17(ds)	Purge	833	3/2/2011	56		8.2		2.8		0.5	U	0.5	U
MW-17(ds)	Purge	833	4/6/2011	57		8.1		2.8		0.5	U	0.5	U
MW-17(ds)	Purge	833	5/9/2011	61		8.6		2.9		0.5	U	0.5	U
MW-17(ds)	Purge	833	6/9/2011	55		7.8		2.7		0.5	U	0.5	U
MW-17(ds)	Purge	833	7/13/2011	59		8.3		3.4		0.5	U	0.5	U
MW-17(ds)	Purge	833	8/11/2011	62		8.3		2.8		0.5	U	0.5	U
MW-17(ds)	Purge	833	9/7/2011	63		9.1		3.4		0.5	U	0.5	U
MW-17(ds)	Purge	833	10/12/2011	57		8.6		2.8		0.5	U	0.5	U
MW-17(ds)	Purge	833	11/9/2011	55		8.3		2.6		0.5	U	0.5	U
MW-17(ds)	Purge	833	12/19/2011	62		9.8		3.2		0.5	U	0.5	U
MW-17(ds)	Purge	833	1/11/2012	51		8.2		2.6		0.5	U	0.5	U
MW-17(ds)	Purge	833	2/22/2012	61	D	10		3.3		0.5	U	0.5	U
MW-17(ds)	Purge	833	3/28/2012	61		9.6		3.0		0.5	U	0.5	U
MW-17(ds)	Purge	833	4/18/2012	70		9.8		3.4		0.5	U	0.5	U
MW-17(ds)	Purge	833	5/2/2012	71		9.9		3.8		0.5	U	0.5	U
MW-17(ds)	Purge	833	6/6/2012	59		8.4		3.1		0.5	U	0.5	U
MW-17(ds)	Purge	833	7/11/2012	63		8.7		3.3		0.5	U	0.5	U
MW-17(ds)	Purge	833	7/31/2012	70		9.6		3.3		0.5	U	0.5	U
MW-17(ds)	Purge	833	9/4/2012	50		7.5		2.6		0.5	U	0.5	U
MW-17(ds)	Purge	833	10/8/2012	59		8.2		2.9		0.5	U	0.5	U
MW-17(ds)	Purge	833	11/7/2012	60		8.2		2.9		0.5	U	0.5	U
MW-17(ds)	Purge	833	12/5/2012	56		8.7		2.9		0.5	U	0.5	U
MW-17(ds)	Purge	833	1/10/2013	61		9.0		3.0		0.5	U	0.5	U
MW-17(ds)	Purge	833	2/14/2013	72		9.7		3.2		0.5	U	0.5	U
MW-17(ds) Dup	Purge	833	2/14/2013	71		9.4		3.1		0.5	U	0.5	U
MW-17(ds)	Purge	833	3/13/2013	68		9.6		2.8		0.5	U	0.5	U
MW-18(ds)	Purge	834	2/9/2010	5.8		0.5	U	0.5	U	0.5	U	0.5	U
MW-18(ds)	Purge	834	8/9/2010	16		1.2		0.52		0.5	U	0.5	U
MW-18(ds) Dup	Purge	834	8/9/2010	16		1.2		0.54		0.5	U	0.5	U
MW-18(ds)	Purge	834	2/7/2011	18		1.1		0.54		0.5	U	0.5	U
MW-18(ds)	Purge	834	8/11/2011	32		3.3		0.86		0.5	U	0.5	U
MW-18(ds) Dup	Purge	834	8/11/2011	30		3.2		0.96		0.5	U	0.5	U
MW-18(ds)	Purge	834	11/9/2011	74		8.9		2.3		0.5	U	0.5	U
MW-18(ds)	Purge	834	12/19/2011	74	D	11		3.0		0.5	U	0.5	U
MW-18(ds)	Diff	834	12/19/2011	76	D	12		1.2		0.5	U	0.5	U
MW-18(ds)	Diff	834	2/21/2012	69	D	8.8		2.3		0.5	U	0.5	U
MW-18(ds)	Diff	834	3/28/2012	60		7.6		1.8		0.5	U	0.5	U
MW-18(ds)	Diff	834	4/18/2012	68		7.3		1.8		0.5	U	0.5	U
MW-18(ds)	Diff	834	5/2/2012	62		6.8		1.4		0.5	U	0.5	U
MW-18(ds)	Diff	834	6/6/2012	63		6.6		1.6		0.5	U	0.5	U
MW-18(ds)	Diff	834	7/11/2012	73	D	10		2.2		0.5	U	0.5	U
MW-18(ds)	Diff	834	7/31/2012	91	D	12		2.6		0.5	U	0.5	U
MW-18(ds) Dup	Diff	834	7/31/2012	90	D	11		2.4		0.5	U	0.5	U
MW-18(ds)	Diff	834	9/4/2012	84	D	12		3.0		0.5	U	0.5	U
MW-18(ds)	Diff	834	10/8/2012	98	D	15		3.7		0.5	U	0.5	U
MW-18(ds)	Diff	834	11/7/2012	120	D	16		4.4		0.5	U	0.5	U
MW-18(ds)	Diff	834	12/5/2012	89	D	12		3.8		0.5	U	0.5	U
MW-18(ds)	Diff	834	1/10/2013	110	D	13		4.1		0.5	U	0.5	U
MW-18(ds)	Diff	834	2/14/2013	110	D	16		4.6		0.5	U	0.5	U
MW-18(ds)	Diff	834	3/13/2013	180	D	14		3.6		0.5	U	0.5	U
MW-19(ds)	Purge	835	2/7/2008	4.2		0.5	U	0.5	U	0.5	U	0.5	U
MW-19(ds)	Purge	835	8/11/2008	6.4		0.5	U	0.55		0.5	U	0.5	U
MW-19(ds)	Purge	835	2/10/2009	5.3		0.5	U	0.5	U	0.5	U	0.5	U

APPENDIX D
Volatile Organic Compound COPCs — TSA Wells
Cascade Corporation

Well Name	Sample Method	PMX No.	Sample Date	Trichloroethene (TCE)		cis -1,2-Dichloroethene		Tetrachloroethene (PCE)		1,1-Dichloroethene		Vinyl Chloride	
				(µg/L)		(µg/L)		(µg/L)		(µg/L)		(µg/L)	
MW-19(ds)	Purge	835	8/17/2009	7.9		0.5	U	0.71		0.5	U	0.5	U
MW-19(ds)	Diff	835	11/11/2009	13		0.5	U	0.81		0.5	U	0.5	U
MW-19(ds)	Diff	835	2/9/2010	8.5		0.5	U	0.80		0.5	U	0.5	U
MW-19(ds)	Purge	835	3/10/2010	7.5		0.5	U	0.69		0.5	U	0.5	U
MW-19(ds)	Purge	835	4/7/2010	4.4		0.5	U	0.5	U	0.5	U	0.5	U
MW-19(ds)	Purge	835	5/5/2010	5.6		0.5	U	0.56		0.5	U	0.5	U
MW-19(ds)	Purge	835	6/3/2010	4.4		0.5	U	0.5	U	0.5	U	0.5	U
MW-19(ds)	Diff	835	6/14/2010	7.1		0.5	U	0.64		0.5	U	0.5	U
MW-19(ds)	Purge	835	8/6/2010	1.7		0.5	U	0.5	U	0.5	U	0.5	U
MW-19(ds)	Dif @ 135.0	835	8/6/2010	1.7		0.5	U	0.5	U	0.5	U	0.5	U
MW-19(ds)	Dif @ 136.7	835	8/6/2010	1.9		0.5	U	0.5	U	0.5	U	0.5	U
MW-19(ds)	Dif @ 138.4	835	8/6/2010	1.8		0.5	U	0.5	U	0.5	U	0.5	U
MW-19(ds)	Dif @ 140.1	835	8/6/2010	1.7		0.5	U	0.5	U	0.5	U	0.5	U
MW-19(ds)	Dif @ 141.8	835	8/6/2010	1.9		0.5	U	0.5	U	0.5	U	0.5	U
MW-19(ds)	Dif @ 143.5	835	8/6/2010	2.6		0.5	U	0.5	U	0.5	U	0.5	U
MW-19(ds)	Diff	835	9/1/2010	2.6		0.5	U	0.5	U	0.5	U	0.5	U
MW-19(ds)	Diff	835	10/5/2010	5.9		0.5	U	0.5	U	0.5	U	0.5	U
MW-19(ds)	Diff	835	11/3/2010	5.0		0.5	U	0.5	U	0.5	U	0.5	U
MW-19(ds)	Diff	835	12/6/2010	4.1		0.5	U	0.53		0.5	U	0.5	U
MW-19(ds)	Diff	835	1/12/2011	6.3		0.5	U	0.60		0.5	U	0.5	U
MW-19(ds)	Diff	835	2/8/2011	6.2		0.5	U	0.57		0.5	U	0.5	U
MW-19(ds)	Diff	835	3/2/2011	8.6		0.5	U	0.90		0.5	U	0.5	U
MW-19(ds)	Diff	835	4/6/2011	7.4		0.5	U	0.87		0.5	U	0.5	U
MW-19(ds)	Diff	835	5/9/2011	7.4		0.5	U	0.76		0.5	U	0.5	U
MW-19(ds)	Diff	835	6/9/2011	2.2		0.5	U	0.5	U	0.5	U	0.5	U
MW-19(ds)	Diff	835	7/13/2011	1.1		0.5	U	0.5	U	0.5	U	0.5	U
MW-19(ds)	Diff	835	8/10/2011	1.2		0.5	U	0.5	U	0.5	U	0.5	U
MW-19(ds)	Diff	835	9/7/2011	1.2		0.5	U	0.5	U	0.5	U	0.5	U
MW-19(ds)	Diff	835	10/12/2011	2.8		0.5	U	0.5	U	0.5	U	0.5	U
MW-19(ds)	Diff	835	11/9/2011	3.1		0.5	U	0.5	U	0.5	U	0.5	U
MW-19(ds)	Diff	835	12/19/2011	3.0		0.5	U	0.5	U	0.5	U	0.5	U
MW-19(ds)	Diff	835	1/11/2012	2.9		0.5	U	0.5	U	0.5	U	0.5	U
MW-19(ds)	Diff	835	2/22/2012	3.3		0.5	U	0.5	U	0.5	U	0.5	U
MW-19(ds)	Diff	835	3/28/2012	3.7		0.5	U	0.5	U	0.5	U	0.5	U
MW-19(ds)	Diff	835	4/18/2012	3.4		0.5	U	0.5	U	0.5	U	0.5	U
MW-19(ds)	Diff	835	5/2/2012	3.3		0.5	U	0.5	U	0.5	U	0.5	U
MW-19(ds)	Diff	835	6/6/2012	2.6		0.5	U	0.29	J	0.5	U	0.5	U
MW-19(ds)	Diff	835	7/11/2012	2.0		0.5	U	0.5	U	0.5	U	0.5	U
MW-19(ds)	Diff	835	7/31/2012	1.6		0.5	U	0.5	U	0.5	U	0.5	U
MW-19(ds)	Diff	835	11/7/2012	2.0		0.5	U	0.5	U	0.5	U	0.5	U
MW-19(ds)	Diff	835	2/14/2013	2.1		0.5	U	0.5	U	0.5	U	0.5	U
MW-20(ds)	Purge	850	8/11/2008	0.51		0.5	U	0.5	U	0.5	U	0.5	U
MW-20(ds)	Purge	850	8/17/2009	1.7		0.5	U	0.5	U	0.5	U	0.5	U
MW-20(ds)	Purge	850	8/9/2010	1.6		0.5	U	0.5	U	0.5	U	0.5	U
MW-20(ds)	Purge	850	8/11/2011	0.95		0.5	U	0.5	U	0.5	U	0.5	U
MW-20(ds)	Purge	850	7/31/2012	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
MW-22(dg)	Diff	855	8/12/2008	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
MW-22(dg)	Diff	855	8/17/2009	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
MW-22(dg)	Diff	855	8/10/2011	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
EW-5	Upper Diff	847	2/6/2008	4.5		1.4		0.5	U	0.5	U	0.5	U
EW-5	Lower Diff	847	2/6/2008	4.4		1.4		0.5	U	0.5	U	0.5	U
EW-5	Upper Diff	847	8/7/2008	2.2		0.5	U	0.5	U	0.5	U	0.5	U
EW-5	Lower Diff	847	8/7/2008	4.4		1.1		0.5	U	0.5	U	0.5	U
EW-5	Upper Diff	847	2/5/2009	2.6		0.51		0.5	U	0.5	U	0.5	U

APPENDIX D
Volatile Organic Compound COPCs — TSA Wells
Cascade Corporation

Well Name	Sample Method	PMX No.	Sample Date	Trichloroethene (TCE)		cis -1,2-Dichloroethene		Tetrachloroethene (PCE)		1,1-Dichloroethene		Vinyl Chloride	
				(µg/L)		(µg/L)		(µg/L)		(µg/L)		(µg/L)	
EW-5	Lower Diff	847	2/5/2009	3.1		0.64		0.5	U	0.5	U	0.5	U
MW-24(dg)/EW-5	Upper Diff	847	8/18/2009	3.7		0.87		0.5	U	0.5	U	0.5	U
MW-24(dg)/EW-5	Lower Diff	847	8/18/2009	3.9		0.91		0.5	U	0.5	U	0.5	U
MW-24(dg)/EW-5	Upper Diff	847	2/9/2010	2.6		0.51		0.5	U	0.5	U	0.5	U
MW-24(dg)/EW-5	Lower Diff	847	2/9/2010	2.7		0.50		0.5	U	0.5	U	0.5	U
MW-24(dg)/EW-5	Upper Diff	847	8/6/2010	2.1		0.5	U	0.5	U	0.5	U	0.5	U
MW-24(dg)/EW-5	Lower Diff	847	8/6/2010	2.0		0.5	U	0.5	U	0.5	U	0.5	U
MW-24(dg)/EW-5	Upper Diff	847	2/8/2011	1.6		0.5	U	0.5	U	0.5	U	0.5	U
MW-24(dg)/EW-5	Lower Diff	847	2/8/2011	1.6		0.5	U	0.5	U	0.5	U	0.5	U
MW-24(dg)/EW-5	Upper Diff	847	8/9/2011	1.2		0.5	U	0.5	U	0.5	U	0.5	U
MW-24(dg)/EW-5	Lower Diff	847	8/9/2011	1.3		0.5	U	0.5	U	0.5	U	0.5	U
MW-24(dg)/EW-5	Upper Diff	847	2/21/2012	0.90		0.5	U	0.5	U	0.5	U	0.5	U
MW-24(dg)/EW-5	Lower Diff	847	2/21/2012	0.86		0.5	U	0.5	U	0.5	U	0.5	U
MW-24(dg)/EW-5	Upper Diff	847	7/31/2012	0.96		0.5	U	0.5	U	0.5	U	0.5	U
MW-24(dg)/EW-5	Lower Diff	847	7/31/2012	0.91		0.5	U	0.5	U	0.5	U	0.5	U
MW-24(dg)/EW-5	Upper Diff	847	2/13/2013	0.77		0.5	U	0.5	U	0.5	U	0.5	U
MW-24(dg)/EW-5	Lower Diff	847	2/13/2013	0.74		0.5	U	0.5	U	0.5	U	0.5	U
MW-25(dg)	Diff	848	2/7/2008	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
MW-25(dg)	Diff	848	8/7/2008	5.0		0.5	U	0.62		0.5	U	0.5	U
MW-25(dg)	Diff	848	2/9/2009	4.1		0.5	U	0.50		0.5	U	0.5	U
MW-25(dg)	Diff	848	8/17/2009	2.8		0.5	U	0.54		0.5	U	0.5	U
MW-25(dg)	Diff	848	2/9/2010	1.9		0.5	U	0.5	U	0.5	U	0.5	U
MW-25(dg)	Diff	848	8/31/2010	2.0		0.5	U	0.5	U	0.5	U	0.5	U
MW-25(dg)	Diff	848	2/8/2011	2.8		0.5	U	0.5	U	0.5	U	0.5	U
MW-25(dg)	Diff	848	8/9/2011	2.0		0.5	U	0.5	U	0.5	U	0.5	U
MW-25(dg)	Diff	848	2/21/2012	1.6		0.5	U	0.5	U	0.5	U	0.5	U
MW-25(dg)	Diff	848	7/31/2012	2.0		0.5	U	0.5	U	0.5	U	0.5	U
MW-25(dg)	Diff	848	2/13/2013	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
MW-26(dg)	Diff		2/7/2008	15		0.5	U	0.91		0.5	U	0.5	U
MW-26(dg) Dup	Diff		2/7/2008	16		0.5	U	0.91		0.5	U	0.5	U
MW-26(dg)	Diff		5/7/2008	15		0.5	U	0.96		0.5	U	0.5	U
MW-26(dg) Dup	Diff		5/7/2008	15		0.5	U	1.0		0.5	U	0.5	U
MW-26(dg)	Diff		8/11/2008	7.1		0.5	U	0.60		0.5	U	0.5	U
MW-26(dg) Dup	Diff		8/11/2008	7.3		0.5	U	0.62		0.5	U	0.5	U
MW-26(dg)	Diff		11/11/2008	5.9		0.5	U	0.56		0.5	U	0.5	U
MW-26(dg) Dup	Diff		11/11/2008	5.9		0.5	U	0.54		0.5	U	0.5	U
MW-26(dg)	Diff		12/3/2008	5.9		0.5	U	0.5	U	0.5	U	0.5	U
MW-26(dg)	Diff		1/5/2009	4.8		0.5	U	0.5	U	0.5	U	0.5	U
MW-26(dg)	Diff		2/9/2009	5.4		0.5	U	0.5	U	0.5	U	0.5	U
MW-26(dg) Dup	Diff		2/9/2009	5.3		0.5	U	0.5	U	0.5	U	0.5	U
MW-26(dg)	Diff		5/13/2009	13		0.5	U	0.80		0.5	U	0.5	U
MW-26(dg) Dup	Diff		5/13/2009	12		0.5	U	0.79		0.5	U	0.5	U
MW-26(dg)	Diff		8/17/2009	7.9		0.5	U	0.63		0.5	U	0.5	U
MW-26(dg) Dup	Diff		8/17/2009	9.7		0.5	U	0.73		0.5	U	0.5	U
MW-26(dg)	Diff		11/11/2009	5.4		0.5	U	0.5	U	0.5	U	0.5	U
MW-26(dg) Dup	Diff		11/11/2009	5.3		0.5	U	0.53		0.5	U	0.5	U
MW-26(dg)	Diff		2/9/2010	6.0		0.5	U	0.5	U	0.5	U	0.5	U
MW-26(dg) Dup	Diff		2/9/2010	6.0		0.5	U	0.5	U	0.5	U	0.5	U
MW-26(dg)	Diff		5/5/2010	10		0.5	U	0.5	U	0.5	U	0.5	U
MW-26(dg) Dup	Diff		5/5/2010	9.9		0.5	U	0.5	U	0.5	U	0.5	U
MW-26(dg)	Purge		8/5/2010	7.0		0.5	U	0.5	U	0.5	U	0.5	U
MW-26(dg)	Diff @ 165.9		8/5/2010	7.5		0.5	U	0.52		0.5	U	0.5	U
MW-26(dg)	Diff @ 167.6		8/5/2010	6.9		0.5	U	0.5	U	0.5	U	0.5	U
MW-26(dg)	Diff @ 169.3		8/5/2010	6.7		0.5	U	0.5	U	0.5	U	0.5	U
MW-26(dg)	Diff @ 171.0		8/5/2010	7.0		0.5	U	0.5	U	0.5	U	0.5	U

APPENDIX D
Volatile Organic Compound COPCs — TSA Wells
Cascade Corporation

Well Name	Sample Method	PMX No.	Sample Date	Trichloroethene (TCE)		cis -1,2-Dichloroethene		Tetrachloroethene (PCE)		1,1-Dichloroethene		Vinyl Chloride	
				(µg/L)		(µg/L)		(µg/L)		(µg/L)		(µg/L)	
MW-26(dg)	Diff @ 172.7		8/5/2010	6.9		0.5	U	0.5	U	0.5	U	0.5	U
MW-26(dg)	Diff @ 174.7		8/5/2010	6.8		0.5	U	0.5	U	0.5	U	0.5	U
MW-26(dg)	Diff		11/3/2010	5.5		0.5	U	0.5	U	0.5	U	0.5	U
MW-26(dg) Dup	Diff		11/3/2010	5.4		0.5	U	0.5	U	0.5	U	0.5	U
MW-26(dg)	Diff		2/8/2011	7.0		0.5	U	0.51		0.5	U	0.5	U
MW-26(dg) Dup	Diff		2/8/2011	7.1		0.5	U	0.51		0.5	U	0.5	U
MW-26(dg)	Diff		5/9/2011	9.5		0.5	U	0.56		0.5	U	0.5	U
MW-26(dg) Dup	Diff		5/9/2011	9.6		0.5	U	0.54		0.5	U	0.5	U
MW-26(dg)	Diff		8/9/2011	6.8		0.5	U	0.5	U	0.5	U	0.5	U
MW-26(dg) Dup	Diff		8/9/2011	6.7		0.5	U	0.5	U	0.5	U	0.5	U
MW-26(dg)	Diff		11/9/2011	5.4		0.5	U	0.5	U	0.5	U	0.5	U
MW-26(dg) Dup	Diff		11/9/2011	5.5		0.5	U	0.5	U	0.5	U	0.5	U
MW-26(dg)	Diff		2/22/2012	5.3		0.5	U	0.5	U	0.5	U	0.5	U
MW-26(dg) Dup	Diff		2/22/2012	5.2		0.5	U	0.5	U	0.5	U	0.5	U
MW-26(dg)	Diff		5/2/2012	8.1		0.5	U	0.51		0.5	U	0.5	U
MW-26(dg) Dup	Diff		5/2/2012	8.1		0.5	U	0.52		0.5	U	0.5	U
MW-26(dg)	Diff		7/31/2012	8.2		0.5	U	0.5	U	0.5	U	0.5	U
MW-26(dg)	Diff		11/7/2012	6.6		0.5	U	0.51		0.5	U	0.5	U
MW-26(dg) Dup	Diff		11/7/2012	6.3		0.5	U	0.5	U	0.5	U	0.5	U
MW-26(dg)	Diff		2/13/2013	7.5		0.5	U	0.5	U	0.5	U	0.5	U
MW-26(dg) Dup	Diff		2/13/2013	7.6		0.5	U	0.5	U	0.5	U	0.5	U
MW-36(dg)	Diff		8/7/2008	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
MW-36(dg)	Diff		8/17/2009	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
MW-36(dg)	Diff		8/9/2011	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
Andrews		196	8/12/2008	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
Andrews		196	8/12/2009	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
Andrews		196	8/9/2011	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
Udd		198	8/12/2008	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
Udd		198	8/12/2009	0.69		0.5	U	0.5	U	0.5	U	0.5	U
Udd		198	8/9/2010	0.86		0.5	U	0.5	U	0.5	U	0.5	U
Udd		198	8/9/2011	0.83		0.5	U	0.5	U	0.5	U	0.5	U
Udd		198	7/31/2012	1.6		0.5	U	0.5	U	0.5	U	0.5	U
PWB-1(lts)	Diff	392	8/11/2008	0.89		0.5	U	0.5	U	0.5	U	0.5	U
PWB-1(lts)	Diff	392	8/17/2009	0.92		0.5	U	0.5	U	0.5	U	0.5	U
PWB-1(lts)	Purge	392	8/11/2010	1.0		0.5	U	0.5	U	0.5	U	0.5	U
PWB-1(lts)	Purge	392	8/11/2011	1.2		0.5	U	0.5	U	0.5	U	0.5	U
PWB-1(lts) Dup	Purge	392	8/11/2011	1.4		0.5	U	0.5	U	0.5	U	0.5	U
PWB-1(lts)	Purge	392	7/31/2012	1.7		0.5	U	0.5	U	0.5	U	0.5	U
PWB-1(lts) Dup	Purge	392	7/31/2012	1.6		0.5	U	0.5	U	0.5	U	0.5	U
PWB-1(uts)	Diff	391	8/11/2008	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
PWB-1(uts)	Diff	391	8/13/2009	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
PWB-1(uts)	Diff	391	8/10/2010	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
PWB-1(uts)	Diff	391	8/10/2011	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
Wells No Longer Monitored													
BOP-43(ds)	Diff	547	2/7/2008	0.93		0.5	U	0.5	U	0.5	U	0.5	U
BOP-43(ds)	Diff	547	8/11/2008	1.2		0.5	U	0.5	U	0.5	U	0.5	U
BOP-43(ds) Dup	Diff	547	8/11/2008	1.2		0.5	U	0.5	U	0.5	U	0.5	U
BOP-43(ds)	Diff	547	8/13/2009	0.87		0.5	U	0.5	U	0.5	U	0.5	U
BOP-43(ds) Dup	Diff	547	8/13/2009	0.87		0.5	U	0.5	U	0.5	U	0.5	U
BOP-43(ds)	Diff	547	8/10/2010	0.67		0.5	U	0.5	U	0.5	U	0.5	U
BOP-43(ds) Dup	Diff	547	8/10/2010	0.64		0.5	U	0.5	U	0.5	U	0.5	U

APPENDIX D
Volatile Organic Compound COPCs — TSA Wells
Cascade Corporation

Well Name	Sample Method	PMX No.	Sample Date	Trichloroethene (TCE)		<i>cis</i> -1,2-Dichloroethene		Tetrachloroethene (PCE)		1,1-Dichloroethene		Vinyl Chloride	
				(µg/L)		(µg/L)		(µg/L)		(µg/L)		(µg/L)	
BOP-43(ds)	Diff	547	8/8/2011	0.72		0.5	U	0.5	U	0.5	U	0.5	U
BOP-43(ds) Dup	Diff	547	8/8/2011	0.74		0.5	U	0.5	U	0.5	U	0.5	U
BOP-43(ds)	Diff	547	7/30/2012	0.57		0.5	U	0.5	U	0.5	U	0.5	U
BOP-43(ds) Dup	Diff	547	7/30/2012	0.62		0.5	U	0.5	U	0.5	U	0.5	U
Decommissioned September 5, 2012													
BOP-43(dg)	Diff	546	8/11/2008	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
BOP-43(dg)	Diff	546	8/13/2009	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
BOP-43(dg)	Diff	546	8/8/2011	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
Decommissioned September 6, 2012													
D-15(ds)	Upper Diff	589	11/23/2009	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
D-15(ds)	Lower Diff	589	11/23/2009	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
Decommissioned March 1, 2010													
D-15(dg)	Upper Diff	590	11/23/2009	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
D-15(dg)	Lower Diff	590	11/23/2009	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
Decommissioned March 1, 2010													
D-18(dg)	Upper Diff		1/6/2010	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
D-18(dg)	Lower Diff		1/6/2010	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
Decommissioned March 2, 2010													
EMC-2(ds)	Diff	913	11/23/2009	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
Decommissioned March 2, 2010													
EW-7	Purge		2/7/2008	0.77		0.5	U	0.5	U	0.5	U	0.5	U
EW-7	Purge		5/7/2008	1.5		0.5	U	0.5	U	0.5	U	0.5	U
Well Decommissioned October 2008													
EW-9	Upper Diff		2/6/2008	3.2		0.5	U	0.5	U	0.5	U	0.5	U
EW-9	Lower Diff		2/6/2008	2.3		0.5	U	0.5	U	0.5	U	0.5	U
EW-9	Upper Diff		5/7/2008	2.9		0.5	U	0.5	U	0.5	U	0.5	U
EW-9	Lower Diff		5/7/2008	2.4		0.5	U	0.5	U	0.5	U	0.5	U
Well Decommissioned October 2008													
EW-19	Purge		2/7/2008	1.9		0.5	U	0.5	U	0.5	U	0.5	U
EW-19	Purge		5/7/2008	2.8		0.5	U	0.5	U	0.5	U	0.5	U
Well Decommissioned October 2008													
MW-14R(dg)	Diff		8/12/2008	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
MW-14R(dg)	Purge		8/18/2009	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
Decommissioned March 1, 2010													
MW-16(dg)	Upper Diff	831	11/23/2009	3.6		0.5	U	0.5	U	0.5	U	0.5	U
MW-16(dg)	Lower Diff	831	11/23/2009	3.5		0.5	U	0.5	U	0.5	U	0.5	U
MW-20(dg)	Diff	851	11/23/2009	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
MW-20(dg) Dup	Diff	851	11/23/2009	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
Decommissioned March 2, 2010													
MW-22(ds)	Diff	854	11/23/2009	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
Decommissioned March 1, 2010													
MW-29(ds)	Diff	865	11/23/2009	2.4		0.5	U	0.5	U	0.5	U	0.5	U
MW-29(ds)	Diff	865	1/6/2010	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U

APPENDIX D
Volatile Organic Compound COPCs — TSA Wells
Cascade Corporation

Well Name	Sample Method	PMX No.	Sample Date	Trichloroethene (TCE)		<i>cis</i> -1,2-Dichloroethene		Tetrachloroethene (PCE)		1,1-Dichloroethene		Vinyl Chloride	
				(µg/L)		(µg/L)		(µg/L)		(µg/L)		(µg/L)	
MW-29(ds) Dup	Diff	865	1/6/2010	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
Decommissioned March 1, 2010													
MW-41(ds)	Diff		11/23/2009	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
MW-41(ds) Dup	Diff		11/23/2009	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
Decommissioned March 2, 2010													
RPW-1(dg) Upper	Upper Diff	859	11/23/2009	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
RPW-1(dg) Lower	Lower Diff	859	11/23/2009	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
RPW-2	Purge	860	8/16/2007	1.6		0.5	U	0.5	U	0.5	U	0.5	U
Well Decommissioned October 2008													

**APPENDIX D
HISTORICAL WATER LEVEL MEASUREMENTS
TSA/SGA MONITORING WELLS JANUARY 2008 THROUGH PRESENT**

Well ID	Measuring Point Elevation (ft, MSL)	Date	Time	Depth to Water (ft,MPE)	Groundwater Elevation (ft, MSL)	Change in Water Level (ft)
TSA EXTRACTION WELLS						
EW-1	124.04	1/3/08	12:36	160.49	-36.45	5.04
EW-1	124.04	2/1/08	9:40	163.67	-39.63	-3.18
EW-1	124.04	3/7/08	14:52	164.76	-40.72	-1.09
EW-1	124.04	4/4/08	11:18	164.84	-40.80	-0.08
EW-1	124.04	5/1/08	11:39	164.60	-40.56	0.24
EW-1	124.04	6/6/08	11:51	165.04	-41.00	-0.44
EW-1	124.04	7/2/08	9:35	165.10	-41.06	-0.06
EW-1	124.04	8/8/08	10:00	165.06	-41.02	0.04
EW-1	124.04	9/5/08	10:01	164.99	-40.95	0.07
EW-1	124.04	10/2/08	11:07	164.97	-40.93	0.02
EW-1	124.04	11/5/08	9:30	165.06	-41.02	-0.09
EW-1	124.04	12/3/08	9:12	165.04	-41.00	0.02
EW-1	124.04	1/7/09	10:04	165.11	-41.07	-0.07
EW-1	124.04	2/4/09	10:00	165.14	-41.10	-0.03
BEGAN PULSE PUMP OPERATION MARCH 3, 2009						
EW-1	124.04	3/6/09	11:18	122.12	1.92	43.02
EW-1	124.04	4/3/09	9:24	164.11	-40.07	-41.99
EW-1	124.04	5/6/09	12:08	119.94	4.10	44.17
EW-1	124.04	7/2/09	12:10	164.21	-40.17	-44.27
EW-1	124.04	8/7/09	13:54	164.11	-40.07	0.10
RESUMED CONTINUOUS OPERATION NOVEMBER 2, 2009						
EW-1	124.04	11/6/09	11:25	159.49	-35.45	4.62
EW-1	124.04	12/3/09	16:19	161.68	-37.64	-2.19
EW-1	124.04	1/8/10	10:30	164.47	-40.43	-4.98
EW-1	124.04	2/4/10	11:04	164.51	-40.47	-0.04
EW-1	124.04	3/5/10	9:57	163.66	-39.62	0.85
EW-1	124.04	4/2/10	13:05	163.04	-39.00	0.62
EW-1	124.04	5/4/10	11:05	164.80	-40.76	-1.76
EW-1	124.04	6/4/10	9:50	162.99	-38.95	1.81
EW-1	124.04	7/2/10	8:35	163.48	-39.44	-0.49
EW-1	124.04	8/4/10	8:34	163.75	-39.71	-0.27
EW-1	124.04	9/3/10	14:35	163.38	-39.34	0.37
EW-1	124.04	10/1/10	8:34	162.81	-38.77	0.57
EW-1	124.04	11/5/10	12:51	163.75	-39.71	-0.94
EW-1	124.04	12/3/10	10:16	164.07	-40.03	-0.32
EW-1	124.04	1/5/11	15:58	162.86	-38.82	1.21
EW-1	124.04	2/3/11	9:00	162.99	-38.95	-0.13
EW-1	124.04	3/2/11	9:34	145.39	-21.35	17.60
EW-1	124.04	4/1/11	9:32	152.51	-28.47	-7.12
EW-1	124.04	4/14/11	9:51	155.37	-31.33	-2.86
EW-1	124.04	5/4/11	9:05	158.63	-34.59	-3.26
EW-1	124.04	6/1/11	13:20	159.73	-35.69	-1.10
EW-1	124.04	7/1/11	8:42	162.54	-38.50	-2.81
EW-1	124.04	8/4/11	8:45	156.47	-32.43	6.07
EW-1	124.04	9/2/11	9:52	163.13	-39.09	-6.66
EW-1	124.04	10/5/11	8:04	162.09	-38.05	1.04
EW-1	124.04	11/2/11	11:49	160.93	-36.89	1.16
EW-1	124.04	12/2/11	9:45	162.80	-38.76	-1.87
EW-1	124.04	1/4/12	8:23	162.21	-38.17	0.59
EW-1	124.04	2/1/12	9:48	162.88	-38.84	-0.67
EW-1	124.04	3/7/12	11:09	162.31	-38.27	0.57
EW-1	124.04	4/4/12	7:29	161.32	-37.28	0.99
EW-1	124.04	5/2/12	8:45	161.87	-37.83	-0.55
EW-1	124.04	6/6/12	8:34	163.23	-39.19	-1.36
EW-1	124.04	7/5/12	10:28	164.11	-40.07	-0.88
EW-1	124.04	8/2/12	13:06	139.99	-15.95	24.12
EW-1	124.04	9/6/12	10:19	143.38	-19.34	-3.39
EW-1	124.04	10/4/12	13:54	146.81	-22.77	-3.43

**APPENDIX D
HISTORICAL WATER LEVEL MEASUREMENTS
TSA/SGA MONITORING WELLS JANUARY 2008 THROUGH PRESENT**

Well ID	Measuring Point Elevation (ft, MSL)	Date	Time	Depth to Water (ft,MPE)	Groundwater Elevation (ft, MSL)	Change in Water Level (ft)
EW-1	124.04	11/1/12	9:50	150.27	-26.23	-3.46
EW-1	124.04	12/6/12	13:41	151.58	-27.54	-1.31
EW-1	124.04	1/3/13	14:58	150.79	-26.75	0.79
EW-1	124.04	2/7/13	9:31	152.11	-28.07	-1.32
EW-1	124.04	3/7/13	14:33	153.73	-29.69	-1.62
EW-1	124.04	4/4/13	12:04	156.33	-32.29	-2.60
EW-1	124.04	5/2/13	12:50	160.29	-36.25	-3.96
EW-2	126.01	1/3/08	12:42	142.14	-16.13	8.69
EW-2	126.01	2/1/08	10:58	147.75	-21.74	-5.61
EW-2	126.01	3/7/08	14:33	150.15	-24.14	-2.40
EW-2	126.01	4/4/08	11:08	147.00	-20.99	3.15
EW-2	126.01	5/1/08	11:20	147.32	-21.31	-0.32
EW-2	126.01	6/6/08	11:58	147.14	-21.13	0.18
EW-2	126.01	7/2/08	9:20	146.70	-20.69	0.44
EW-2	126.01	8/8/08	9:30	147.00	-20.99	-0.30
EW-2	126.01	9/5/08	10:50	145.98	-19.97	1.02
EW-2	126.01	10/2/08	11:12	146.90	-20.89	-0.92
EW-2	126.01	11/5/08	9:12	146.86	-20.85	0.04
EW-2	126.01	12/3/08	9:00	146.94	-20.93	-0.08
EW-2	126.01	1/7/09	9:49	146.92	-20.91	0.02
EW-2	126.01	2/4/09	9:50	146.86	-20.85	0.06
EW-2	126.01	3/6/09	11:04	145.96	-19.95	0.90
EW-2	126.01	4/3/09	9:02	146.12	-20.11	-0.16
EW-2	126.01	5/6/09	12:16	146.20	-20.19	-0.08
EW-2	126.01	6/5/09	9:53	145.81	-19.80	0.39
EW-2	126.01	7/2/09	11:40	145.71	-19.70	0.10
EW-2	126.01	8/7/09	13:32	145.81	-19.80	-0.10
EW-2	126.01	9/4/09	13:57	145.01	-19.00	0.80
EW-2	126.01	10/2/09	9:38	145.02	-19.01	-0.01
EW-2	126.01	11/6/09	11:04	146.29	-20.28	-1.27
EW-2	126.01	12/3/09	10:50	145.81	-19.80	0.48
EW-2	126.01	1/8/10	10:20	144.78	-18.77	1.03
EW-2	126.01	2/4/10	10:42	144.38	-18.37	0.40
EW-2	126.01	3/5/10	9:41	144.75	-18.74	-0.37
EW-2	126.01	4/2/10	12:54	144.40	-18.39	0.35
EW-2	126.01	5/4/10	10:58	144.73	-18.72	-0.33
EW-2	126.01	6/4/10	9:25	143.90	-17.89	0.83
EW-2	126.01	7/2/10	8:26	144.85	-18.84	-0.95
EW-2	126.01	8/4/10	9:20	145.44	-19.43	-0.59
EW-2	126.01	9/3/10	14:22	145.71	-19.70	-0.27
EW-2	126.01	10/1/10	8:16	156.90	-30.89	-11.19
EW-2	126.01	11/5/10	12:45	156.91	-30.90	-0.01
EW-2	126.01	12/3/10	9:50	156.61	-30.60	0.30
EW-2	126.01	1/5/11	15:28	154.86	-28.85	1.75
EW-2	126.01	2/3/11	8:46	156.58	-30.57	-1.72
EW-2	126.01	3/2/11	9:22	157.70	-31.69	-1.12
EW-2	126.01	4/1/11	9:22	157.70	-31.69	0.00
EW-2	126.01	4/14/11	10:05	157.33	-31.32	0.37
EW-2	126.01	5/4/11	9:13	157.55	-31.54	-0.22
EW-2	126.01	6/1/11	12:38	156.99	-30.98	0.56
EW-2	126.01	7/1/11	8:34	156.13	-30.12	0.86
EW-2	126.01	8/4/11	8:38	153.49	-27.48	2.64
EW-2	126.01	9/2/11	10:03	157.44	-31.43	-3.95
EW-2	126.01	10/5/11	8:16	156.93	-30.92	0.51
EW-2	126.01	11/2/11	11:46	157.47	-31.46	-0.54
EW-2	126.01	12/2/11	9:54	157.21	-31.20	0.26
EW-2	126.01	1/4/12	8:15	157.64	-31.63	-0.43
EW-2	126.01	2/1/12	9:38	156.96	-30.95	0.68

**APPENDIX D
HISTORICAL WATER LEVEL MEASUREMENTS
TSA/SGA MONITORING WELLS JANUARY 2008 THROUGH PRESENT**

Well ID	Measuring Point Elevation (ft, MSL)	Date	Time	Depth to Water (ft,MPE)	Groundwater Elevation (ft, MSL)	Change in Water Level (ft)
EW-2	126.01	3/7/12	10:55	157.42	-31.41	-0.46
EW-2	126.01	4/4/12	7:39	156.41	-30.40	1.01
EW-2	126.01	5/2/12	8:58	157.21	-31.20	-0.80
EW-2	126.01	6/6/12	8:44	137.64	-11.63	19.57
EW-2	126.01	7/5/12	10:19	138.88	-12.87	-1.24
EW-2	126.01	8/2/12	12:55	141.44	-15.43	-2.56
EW-2	126.01	9/6/12	10:07	145.88	-19.87	-4.44
EW-2	126.01	10/4/12	13:48	149.22	-23.21	-3.34
EW-2	126.01	11/1/12	10:03	152.81	-26.80	-3.59
EW-2	126.01	12/6/12	13:34	155.82	-29.81	-3.01
EW-2	126.01	1/3/13	14:52	156.45	-30.44	-0.63
EW-2	126.01	2/7/13	9:46	157.33	-31.32	-0.88
EW-2	126.01	3/7/13	14:08	157.74	-31.73	-0.41
EW-2	126.01	4/4/13	11:56	157.53	-31.52	0.21
EW-2	126.01	5/2/13	12:46	157.49	-31.48	0.04
EW-3	94.26	1/15/08	10:15	114.30	-20.04	0.10
EW-3	94.26	2/22/08	12:15	114.91	-20.65	-0.61
EW-3	94.26	3/6/08	10:35	115.55	-21.29	-0.64
EW-3	94.26	4/14/08	10:15	115.56	-21.30	-0.01
EW-3	94.26	5/2/08	9:55	117.85	-23.59	-2.29
EW-3	94.26	6/10/08	11:07	119.77	-25.51	-1.92
EW-3	94.26	7/7/08	9:50	119.24	-24.98	0.53
EW-3	94.26	8/6/08	13:50	121.40	-27.14	-2.16
EW-3	94.26	9/9/08	10:44	123.74	-29.48	-2.34
EW-3	94.26	10/1/08	10:22	124.35	-30.09	-0.61
EW-3	94.26	11/17/08	13:43	91.74	2.52	32.61
EW-3	94.26	12/15/08	11:35	93.42	0.84	-1.68
EW-3	94.26	1/14/09	10:05	119.25	-24.99	-25.83
EW-3	94.26	2/18/09	10:20	117.52	-23.26	1.73
EW-3	94.26	3/10/09	10:00	117.30	-23.04	0.22
EW-3	94.26	4/8/09	9:34	117.30	-23.04	0.00
EW-3	94.26	5/4/09	11:55	117.48	-23.22	-0.18
EW-3	94.26	6/2/09	9:15	118.60	-24.34	-1.12
EW-3	94.26	7/13/09	11:05	121.72	-27.46	-3.12
EW-3	94.26	8/3/09	10:50	123.96	-29.70	-2.24
EW-3	94.26	9/1/09	11:55	124.11	-29.85	-0.15
EW-3	94.26	10/6/09	12:05	124.26	-30.00	-0.15
EW-3	94.26	11/2/09	9:35	127.53	-33.27	-3.27
EW-3	94.26	12/9/09	11:10	126.24	-31.98	1.29
PILOT SHUTDOWN DECEMBER 12, 2009						
EW-3	94.26	1/5/10	12:20	88.47	5.79	37.77
EW-3	94.26	2/2/10	13:10	86.57	7.69	1.90
EW-3	94.26	3/3/10	9:55	86.21	8.05	0.36
EW-3	94.26	8/2/10	12:30	85.05	9.21	1.16
EW-3	94.26	2/4/11	11:52	90.83	3.43	-5.78
EW-3	94.26	4/18/11	9:04	84.13	10.13	6.70
EW-3	94.26	8/1/11	11:10	84.00	10.26	0.13
EW-3	94.26	2/22/12	12:20	86.40	7.86	-2.40
EW-3	94.26	8/1/12	11:46	82.91	11.35	3.49
PROPOSED FOR MONITOR WELL Status IN TSA FALL SA RPT 11-23-12						
EW-3	94.26					0.00
SEE MONITORING WELL TABLE FOR MW-16(dg)/EW-4 DATA						
SEE MONITORING WELL TABLE FOR MW-24(dg)/EW-5 DATA						
EW-7	70.92	2/1/08	15:00	66.44	4.48	3.60
WELL DECOMMISSIONED OCTOBER 2008						

**APPENDIX D
HISTORICAL WATER LEVEL MEASUREMENTS
TSA/SGA MONITORING WELLS JANUARY 2008 THROUGH PRESENT**

Well ID	Measuring Point Elevation (ft, MSL)	Date	Time	Depth to Water (ft,MPE)	Groundwater Elevation (ft, MSL)	Change in Water Level (ft)
SEE MONITORING WELL TABLE FOR EW-8 DATA						
EW-9	44.99	2/1/08	15:20	42.77	2.22	4.42
WELL DECOMMISSIONED OCTOBER 2008						
SEE MONITORING WELL TABLE FOR PMX-189/EW-10 DATA						
SEE MONITORING WELL TABLE FOR EW-11 DATA						
SEE MONITORING WELL TABLE FOR EW-12 DATA						
SEE MONITORING WELL TABLE FOR EW-13 DATA						
EW-14	127.63	1/3/08	12:28	142.12	-14.49	2.24
EW-14	127.63	2/1/08	10:00	154.04	-26.41	-11.92
EW-14	127.63	3/7/08	14:46	156.17	-28.54	-2.13
EW-14	127.63	4/4/08	11:13	149.63	-22.00	6.54
EW-14	127.63	5/1/08	11:26	147.83	-20.20	1.80
EW-14	127.63	6/6/08	11:45	156.49	-28.86	-8.66
EW-14	127.63	7/2/08	9:26	156.63	-29.00	-0.14
EW-14	127.63	8/8/08	9:53	156.63	-29.00	0.00
EW-14	127.63	9/5/08	10:33	158.36	-30.73	-1.73
EW-14	127.63	10/2/08	11:00	158.96	-31.33	-0.60
EW-14	127.63	11/5/08	9:45	156.59	-28.96	2.37
EW-14	127.63	12/3/08	9:06	158.64	-31.01	-2.05
EW-14	127.63	1/7/09	9:54	158.12	-30.49	0.52
EW-14	127.63	2/4/09	9:54	158.19	-30.56	-0.07
EW-14	127.63	3/6/09	11:10	153.41	-25.78	4.78
EW-14	127.63	4/3/09	9:18	157.56	-29.93	-4.15
EW-14	127.63	5/6/09	12:12	156.65	-29.02	0.91
EW-14	127.63	6/5/09	9:58	155.10	-27.47	1.55
EW-14	127.63	7/2/09	12:43	157.24	-29.61	-2.14
EW-14	127.63	8/7/09	13:47	157.28	-29.65	-0.04
EW-14	127.63	9/4/09	13:47	156.21	-28.58	1.07
EW-14	127.63	10/2/09	9:53	154.66	-27.03	1.55
EW-14	127.63	11/6/09	11:34	158.52	-30.89	-3.86
EW-14	127.63	12/3/09	10:35	155.03	-27.40	3.49
EW-14	127.63	1/8/10	10:37	141.75	-14.12	13.28
EW-14	127.63	2/4/10	11:00	139.21	-11.58	2.54
EW-14	127.63	3/5/10	10:06	138.49	-10.86	0.72
EW-14	127.63	4/2/10	12:58	137.04	-9.41	1.45
EW-14	127.63	5/4/10	11:10	146.58	-18.95	-9.54
EW-14	127.63	6/4/10	9:41	148.40	-20.77	-1.82
EW-14	127.63	7/2/10	8:42	149.12	-21.49	-0.72
EW-14	127.63	8/4/10	8:44	149.38	-21.75	-0.26
EW-14	127.63	9/3/10	14:28	150.11	-22.48	-0.73
EW-14	127.63	10/1/10	8:24	165.48	-37.85	-15.37
EW-14	127.63	11/5/10	13:00	163.04	-35.41	2.44
EW-14	127.63	12/3/10	10:08	164.01	-36.38	-0.97
EW-14	127.63	1/5/11	15:50	166.01	-38.38	-2.00
EW-14	127.63	2/3/11	9:07	163.83	-36.20	2.18
EW-14	127.63	3/2/11	9:39	163.90	-36.27	-0.07
EW-14	127.63	4/1/11	13:35	162.83	-35.20	1.07
EW-14	127.63	4/14/11	9:57	164.38	-36.75	-1.55
EW-14	127.63	5/4/11	10:39	164.22	-36.59	0.16
EW-14	127.63	6/1/11	14:31	164.18	-36.55	0.04
EW-14	127.63	7/1/11	8:46	163.61	-35.98	0.57
EW-14	127.63	8/4/11	8:54	153.14	-25.51	10.47

**APPENDIX D
HISTORICAL WATER LEVEL MEASUREMENTS
TSA/SGA MONITORING WELLS JANUARY 2008 THROUGH PRESENT**

Well ID	Measuring Point Elevation (ft, MSL)	Date	Time	Depth to Water (ft,MPE)	Groundwater Elevation (ft, MSL)	Change in Water Level (ft)
EW-14	127.63	9/2/11	9:57	164.59	-36.96	-11.45
EW-14	127.63	10/5/11	8:09	163.72	-36.09	0.87
EW-14	127.63	11/2/11	11:57	164.19	-36.56	-0.47
EW-14	127.63	12/2/11	9:51	163.91	-36.28	0.28
EW-14	127.63	1/4/12	8:28	163.46	-35.83	0.45
EW-14	127.63	2/1/12	9:53	163.64	-36.01	-0.18
EW-14	127.63	3/7/12	11:14	163.85	-36.22	-0.21
EW-14	127.63	4/4/12	7:34	164.13	-36.50	-0.28
EW-14	127.63	5/2/12	8:52	165.11	-37.48	-0.98
EW-14	127.63	6/6/12	8:39	165.28	-37.65	-0.17
EW-14	127.63	7/5/12	10:38	164.81	-37.18	0.47
EW-14	127.63	8/2/12	13:10	163.51	-35.88	1.30
EW-14	127.63	9/6/12	11:14	165.04	-37.41	-1.53
EW-14	127.63	10/4/12	13:58	164.04	-36.41	1.00
EW-14	127.63	11/1/12	9:56	163.11	-35.48	0.93
EW-14	127.63	12/6/12	13:46	163.27	-35.64	-0.16
EW-14	127.63	1/3/13	15:04	163.10	-35.47	0.17
EW-14	127.63	2/7/13	9:37	161.75	-34.12	1.35
EW-14	127.63	3/7/13	14:39	163.01	-35.38	-1.26
EW-14	127.63	4/4/13	13:21	169.06	-41.43	-6.05
EW-14	127.63	5/2/13	13:50	164.30	-36.67	4.76
SEE MONITORING WELL TABLE FOR EW-15 DATA						
EW-16	83.71	1/3/08	NM	NM	NM	NM
EW-16	83.71	2/1/08	9:38	153.25	-69.54	-33.13
EW-16	83.71	3/7/08	13:20	120.18	-36.47	33.07
EW-16	83.71	4/4/08	10:10	124.31	-40.60	-4.13
EW-16	83.71	5/1/08	12:30	110.27	-26.56	14.04
EW-16	83.71	6/6/08	12:09	124.21	-40.50	-13.94
EW-16	83.71	7/2/08	9:55	123.86	-40.15	0.35
EW-16	83.71	8/8/08	9:10	124.68	-40.97	-0.82
EW-16	83.71	9/5/08	9:20	121.31	-37.60	3.37
EW-16	83.71	10/2/08	8:45	118.64	-34.93	2.67
EW-16	83.71	11/5/08	9:00	130.35	-46.64	-11.71
EW-16	83.71	12/3/08	8:40	124.25	-40.54	6.10
EW-16	83.71	1/7/09	10:15	112.31	-28.60	11.94
EW-16	83.71	2/4/09	10:44	122.95	-39.24	-10.64
EW-16	83.71	3/6/09	10:58	127.01	-43.30	-4.06
EW-16	83.71	4/3/09	9:11	124.81	-41.10	2.20
EW-16	83.71	5/6/09	12:30	127.08	-43.37	-2.27
EW-16	83.71	6/5/09	9:40	69.74	13.97	57.34
EW-16	83.71	7/2/09	12:55	124.01	-40.30	-54.27
EW-16	83.71	8/7/09	13:41	123.86	-40.15	0.15
EW-16	83.71	9/4/09	11:23	121.44	-37.73	2.42
EW-16	83.71	10/2/09	9:18	119.67	-35.96	1.77
EW-16	83.71	11/6/09	10:45	124.63	-40.92	-4.96
EW-16	83.71	12/3/09	11:00	121.46	-37.75	3.17
EW-16	83.71	1/8/10	10:07	119.64	-35.93	1.82
EW-16	83.71	2/4/10	10:01	119.69	-35.98	-0.05
EW-16	83.71	3/5/10	9:24	122.33	-38.62	-2.64
EW-16	83.71	4/2/10	12:26	123.01	-39.30	-0.68
PILOT SHUTDOWN APRIL 12, 2010						
EW-16	83.71	8/4/10	10:52	66.27	17.44	56.74
EW-16	83.71	2/3/11	11:30	65.61	18.10	0.66
EW-16	83.71	4/14/11	11:45	63.97	19.74	1.64
EW-16	83.71	8/4/11	10:24	63.79	19.92	0.18
EW-16	83.71	2/20/12	10:28	65.44	18.27	-1.65
EW-16	83.71	8/1/12	12:46	64.33	19.38	1.11

**APPENDIX D
HISTORICAL WATER LEVEL MEASUREMENTS
TSA/SGA MONITORING WELLS JANUARY 2008 THROUGH PRESENT**

Well ID	Measuring Point Elevation (ft, MSL)	Date	Time	Depth to Water (ft,MPE)	Groundwater Elevation (ft, MSL)	Change in Water Level (ft)
RESUMED PUMPING AUGUST 22, 2012						
EW-16	83.71	9/6/12	10:00	96.48	-12.77	-32.15
EW-16	83.71	10/4/12	13:40	94.67	-10.96	1.81
EW-16	83.71	11/1/12	10:09	95.37	-11.66	-0.70
EW-16	83.71	12/6/12	13:28	96.48	-12.77	-1.11
EW-16	83.71	1/3/13	14:33	102.78	-19.07	-6.30
EW-16	83.71	2/7/13	9:53	106.78	-23.07	-4.00
EW-16	83.71	3/7/13	14:00	98.58	-14.87	8.20
EW-16	83.71	4/4/13	11:35	95.44	-11.73	3.14
EW-16	83.71	5/2/13	12:39	96.77	-13.06	-1.33
EW-17	19.30	5/2/07	11:55	11.61	7.69	2.23
WELL DECOMMISSIONED OCTOBER 2008						
EW-18	104.50	1/3/08	10:57	127.18	-22.68	1.03
BEGAN PULSE PUMP OPERATION JANUARY 3, 2008						
EW-18	104.50	3/7/08	15:15	120.74	-16.24	6.44
EW-18	104.50	4/4/08	11:03	122.12	-17.62	-1.38
EW-18	104.50	5/1/08	9:20	107.20	-2.70	14.92
EW-18	104.50	7/2/08	9:43	125.17	-20.67	-17.97
EW-18	104.50	8/8/08	9:25	120.41	-15.91	4.76
EW-18	104.50	9/5/08	9:40	100.61	3.89	19.80
EW-18	104.50	11/5/08	9:20	112.61	-8.11	-12.00
EW-18	104.50	12/3/08	8:50	114.50	-10.00	-1.89
EW-18	104.50	1/7/09	10:30	108.30	-3.80	6.20
EW-18	104.50	3/23/09	9:45	109.10	-4.60	-0.80
EW-18	104.50	4/3/09	9:30	124.96	-20.46	-15.86
EW-18	104.50	7/2/09	11:58	124.91	-20.41	0.05
EW-18	104.50	8/7/09	13:27	119.81	-15.31	5.10
PILOT SHUTDOWN NOVEMBER 3, 2009						
EW-18	104.50	2/9/10	15:00	94.68	9.82	25.13
EW-18	104.50	8/4/10	9:12	91.88	12.62	2.80
EW-18	104.50	2/3/11	9:12	92.65	11.85	-0.77
EW-18	104.50	4/14/11	9:17	91.51	12.99	1.14
EW-18	104.50	8/4/11	12:48	89.66	14.84	1.85
EW-18	104.50	2/20/12	12:59	91.61	12.89	-1.95
EW-18	104.50	8/1/12	11:07	91.92	12.58	-0.31
EW-18	104.50	2/7/13	9:53	106.78	-2.28	-14.86
EW-19	47.50	2/1/08	15:10	40.79	6.71	5.24
WELL DECOMMISSIONED OCTOBER 2008						
EW-23	83.93	1/3/08	12:04	98.15	-14.22	4.76
EW-23	83.93	2/1/08	15:18	92.67	-8.74	5.48
EW-23	83.93	3/7/08	15:40	97.14	-13.21	-4.47
EW-23	83.93	4/4/08	10:53	97.01	-13.08	0.13
EW-23	83.93	5/1/08	9:00	97.99	-14.06	-0.98
EW-23	83.93	6/6/08	12:27	97.17	-13.24	0.82
EW-23	83.93	7/2/08	10:20	97.91	-13.98	-0.74
EW-23	83.93	8/8/08	10:25	98.89	-14.96	-0.98
EW-23	83.93	9/5/08	13:10	99.46	-15.53	-0.57
EW-23	83.93	10/2/08	12:33	100.71	-16.78	-1.25
EW-23	83.93	11/5/08	10:15	99.63	-15.70	1.08
EW-23	83.93	12/3/08	11:22	99.03	-15.10	0.60
EW-23	83.93	1/7/09	10:40	94.94	-11.01	4.09
EW-23	83.93	2/4/09	12:46	91.49	-7.56	3.45
EW-23	83.93	3/6/09	11:40	91.97	-8.04	-0.48
EW-23	83.93	4/3/09	8:50	91.45	-7.52	0.52
EW-23	83.93	5/6/09	12:43	89.80	-5.87	1.65

**APPENDIX D
HISTORICAL WATER LEVEL MEASUREMENTS
TSA/SGA MONITORING WELLS JANUARY 2008 THROUGH PRESENT**

Well ID	Measuring Point Elevation (ft, MSL)	Date	Time	Depth to Water (ft,MPE)	Groundwater Elevation (ft, MSL)	Change in Water Level (ft)
EW-23	83.93	6/5/09	9:33	88.18	-4.25	1.62
EW-23	83.93	7/2/09	10:45	87.21	-3.28	0.97
EW-23	83.93	8/7/09	13:21	87.71	-3.78	-0.50
EW-23	83.93	9/4/09	14:16	94.64	-10.71	-6.93
EW-23	83.93	10/2/09	9:07	96.26	-12.33	-1.62
EW-23	83.93	11/6/09	10:38	99.08	-15.15	-2.82
EW-23	83.93	12/3/09	11:14	97.80	-13.87	1.28
EW-23	83.93	1/8/10	9:53	92.25	-8.32	5.55
EW-23	83.93	2/4/10	8:19	90.64	-6.71	1.61
EW-23	83.93	3/5/10	9:10	91.08	-7.15	-0.44
EW-23	83.93	4/2/10	12:44	90.41	-6.48	0.67
EW-23	83.93	5/4/10	10:48	91.02	-7.09	-0.61
EW-23	83.93	6/4/10	9:20	90.72	-6.79	0.30
EW-23	83.93	7/2/10	8:02	89.75	-5.82	0.97
EW-23	83.93	8/4/10	9:10	91.28	-7.35	-1.53
EW-23	83.93	9/3/10	14:05	92.74	-8.81	-1.46
EW-23	83.93	10/1/10	7:56	93.38	-9.45	-0.64
EW-23	83.93	11/5/10	13:40	92.84	-8.91	0.54
EW-23	83.93	12/3/10	10:24	92.53	-8.60	0.31
EW-23	83.93	1/5/11	15:15	88.64	-4.71	3.89
EW-23	83.93	2/3/11	10:31	94.24	-10.31	-5.60
EW-23	83.93	3/2/11	9:15	96.61	-12.68	-2.37
EW-23	83.93	4/1/11	9:10	94.01	-10.08	2.60
EW-23	83.93	4/14/11	10:17	91.52	-7.59	2.49
EW-23	83.93	5/4/11	8:46	91.53	-7.60	-0.01
EW-23	83.93	6/1/11	12:15	93.35	-9.42	-1.82
EW-23	83.93	7/1/11	8:25	92.61	-8.68	0.74
EW-23	83.93	8/4/11	13:50	93.58	-9.65	-0.97
EW-23	83.93	9/2/11	10:13	81.46	2.47	12.12
EW-23	83.93	10/5/11	7:41	82.32	1.61	-0.86
EW-23	83.93	11/2/11	11:26	82.57	1.36	-0.25
EW-23	83.93	12/2/11	8:41	82.00	1.93	0.57
EW-23	83.93	1/4/12	8:05	81.41	2.52	0.59
EW-23	83.93	2/1/12	9:28	83.65	0.28	-2.24
EW-23	83.93	3/7/12	10:43	83.09	0.84	0.56
EW-23	83.93	4/4/12	7:52	80.67	3.26	2.42
EW-23	83.93	5/2/12	9:03	80.11	3.82	0.56
EW-23	83.93	6/6/12	14:00	79.73	4.20	0.38
EW-23	83.93	7/5/12	13:25	79.39	4.54	0.34
EW-23	83.93	8/2/12	13:19	80.24	3.69	-0.85
EW-23	83.93	9/6/12	11:40	81.70	2.23	-1.46
EW-23	83.93	10/4/12	13:31	82.05	1.88	-0.35
EW-23	83.93	11/1/12	10:27	82.54	1.39	-0.49
EW-23	83.93	12/6/12	13:18	81.58	2.35	0.96
EW-23	83.93	1/3/13	14:42	80.68	3.25	0.90
EW-23	83.93	2/7/13	10:02	81.33	2.60	-0.65
EW-23	83.93	3/7/13	13:46	81.14	2.79	0.19
EW-23	83.93	4/4/13	11:46	81.37	2.56	-0.23
EW-23	83.93	5/2/13	12:30	81.23	2.70	0.14
SEE MONITORING WELL TABLE FOR RPW-2 DATA						
TSA MONITORING WELLS						
BOP-13(ds)	128.94	2/22/08	10:25	>130.24	<-1.30	—
BOP-13(ds)	128.94	5/1/08	12:10	>130.24	<-1.30	—
BOP-13(ds)	128.94	8/6/08	10:46	>130.24	<-1.30	—
BOP-13(ds)	128.94	11/24/08	13:36	>130.24	<-1.30	—
BOP-13(ds)	128.94	2/2/09	10:50	>130.24	<-1.30	—
BOP-13(ds)	128.94	5/6/09	9:46	124.84	4.10	—

**APPENDIX D
HISTORICAL WATER LEVEL MEASUREMENTS
TSA/SGA MONITORING WELLS JANUARY 2008 THROUGH PRESENT**

Well ID	Measuring Point Elevation (ft, MSL)	Date	Time	Depth to Water (ft,MPE)	Groundwater Elevation (ft, MSL)	Change in Water Level (ft)
BOP-13(ds)	128.94	8/5/09	8:30	124.70	4.24	0.14
BOP-13(ds)	128.94	11/12/09	9:20	125.19	3.75	-0.49
BOP-13(ds)	128.94	2/2/10	8:25	123.88	5.06	1.31
BOP-13(ds)	128.94	5/5/10	9:35	121.33	7.61	2.55
BOP-13(ds)	128.94	8/5/10	12:40	119.62	9.32	1.71
BOP-13(ds)	128.94	11/11/10	9:18	120.98	7.96	-1.36
BOP-13(ds)	128.94	2/4/11	9:25	119.52	9.42	1.46
BOP-13(ds)	128.94	4/14/11	12:14	125.74	3.20	-6.22
BOP-13(ds)	128.94	5/2/11	14:55	124.00	4.94	1.74
BOP-13(ds)	128.94	8/1/11	14:35	122.11	6.83	1.89
BOP-13(ds)	128.94	11/3/11	14:00	122.20	6.74	-0.09
BOP-13(ds)	128.94	2/22/12	7:30	120.38	8.56	1.82
BOP-13(ds)	128.94	5/2/12	11:31	120.23	8.71	0.15
BOP-13(ds)	128.94	8/1/12	9:08	120.08	8.86	0.15
BOP-13(ds)	128.94	11/7/13	10:08	123.35	5.59	-3.27
BOP-13(ds)	128.94	2/1/13	9:13	122.09	6.85	1.26
BOP-13(dg)	128.71	2/22/08	10:20	134.21	-5.50	2.50
BOP-13(dg)	128.71	5/1/08	12:14	135.30	-6.59	-1.09
BOP-13(dg)	128.71	8/6/08	10:43	131.25	-2.54	4.05
BOP-13(dg)	128.71	11/24/08	13:53	130.54	-1.83	0.71
BOP-13(dg)	128.71	2/2/09	10:52	129.35	-0.64	1.19
BOP-13(dg)	128.71	8/5/09	8:34	125.01	3.70	4.34
BOP-13(dg)	128.71	2/2/10	8:30	123.97	4.74	1.04
BOP-13(dg)	128.71	8/5/10	12:45	119.79	8.92	4.18
BOP-13(dg)	128.71	2/4/11	9:26	119.70	9.01	0.09
BOP-13(dg)	128.71	4/14/11	12:17	125.16	3.55	-5.46
BOP-13(dg)	128.71	8/1/11	14:40	122.66	6.05	2.50
BOP-13(dg)	128.71	2/22/12	7:35	120.54	8.17	2.12
BOP-13(dg)	128.71	8/1/12	11:01	120.80	7.91	-0.26
BOP-13(dg)	128.71	2/1/13	9:11	122.71	6.00	-1.91
BOP-20(ds)	77.45	2/22/08	13:25	78.35	-0.90	8.73
BOP-20(ds)	77.45	5/1/08	11:02	78.88	-1.43	-0.53
BOP-20(ds)	77.45	8/6/08	15:50	87.23	-9.78	-8.35
BOP-20(ds)	77.45	11/24/08	12:21	74.82	2.63	12.41
BOP-20(ds)	77.45	2/2/09	11:34	72.18	5.27	2.64
BOP-20(ds)	77.45	8/5/09	14:20	71.24	6.21	0.94
BOP-20(ds)	77.45	2/2/10	9:45	67.63	9.82	3.61
BOP-20(ds)	77.45	8/5/10	13:55	66.19	11.26	1.44
BOP-20(ds)	77.45	2/4/11	8:21	70.92	6.53	-4.73
BOP-20(ds)	77.45	4/14/11	13:24	65.40	12.05	5.52
BOP-20(ds)	77.45	8/1/11	13:50	65.40	12.05	0.00
BOP-20(ds)	77.45	2/22/12	8:12	67.12	10.33	-1.72
BOP-20(ds)	77.45	8/1/12	10:12	64.19	13.26	2.93
BOP-20(ds)	77.45	2/1/13	9:30	64.21	13.24	-0.02
BOP-20(dg)	77.32	2/22/08	13:30	78.10	-0.78	9.00
BOP-20(dg)	77.32	5/1/08	10:57	78.63	-1.31	-0.53
BOP-20(dg)	77.32	8/6/08	15:54	87.55	-10.23	-8.92
BOP-20(dg)	77.32	11/24/08	12:27	74.55	2.77	13.00
BOP-20(dg)	77.32	2/2/09	11:36	72.02	5.30	2.53
BOP-20(dg)	77.32	8/5/09	14:15	71.12	6.20	0.90
BOP-20(dg)	77.32	2/2/10	9:42	67.74	9.58	3.38
BOP-20(dg)	77.32	8/5/10	14:00	66.11	11.21	1.63
BOP-20(dg)	77.32	2/4/11	8:20	70.83	6.49	-4.72
BOP-20(dg)	77.32	4/14/11	13:22	65.27	12.05	5.56
BOP-20(dg)	77.32	8/1/11	13:47	65.29	12.03	-0.02
BOP-20(dg)	77.32	2/22/12	8:09	67.12	10.20	-1.83

**APPENDIX D
HISTORICAL WATER LEVEL MEASUREMENTS
TSA/SGA MONITORING WELLS JANUARY 2008 THROUGH PRESENT**

Well ID	Measuring Point Elevation (ft, MSL)	Date	Time	Depth to Water (ft,MPE)	Groundwater Elevation (ft, MSL)	Change in Water Level (ft)
BOP-20(dg)	77.32	8/1/12	10:15	64.05	13.27	3.07
BOP-20(dg)	77.32	2/1/13	9:34	64.08	13.24	-0.03
BOP-21(ds)	78.02	2/22/08	NM	NM	NM	NM
BOP-21(ds)	78.02	8/6/08	13:02	81.60	-3.58	—
BOP-21(ds)	78.02	2/2/09	11:43	72.81	5.21	8.79
BOP-21(ds)	78.02	8/5/09	9:08	72.24	5.78	0.57
BOP-21(ds)	78.02	2/2/10	9:00	67.87	10.15	4.37
BOP-21(ds)	78.02	8/5/10	14:10	66.59	11.43	1.28
BOP-21(ds)	78.02	2/4/11	11:00	71.58	6.44	-4.99
BOP-21(ds)	78.02	4/14/11	10:50	66.74	11.28	4.84
BOP-21(ds)	78.02	8/1/11	8:14	65.81	12.21	0.93
BOP-21(ds)	78.02	2/22/12	8:19	67.73	10.29	-1.92
BOP-21(ds)	78.02	8/1/12	10:27	64.34	13.68	3.39
BOP-21(ds)	78.02	2/1/13	8:45	64.53	13.49	-0.19
BOP-22(ds)	81.93	2/22/08	15:40	84.43	-2.50	9.38
BOP-22(ds)	81.93	5/1/08	11:21	84.76	-2.83	-0.33
BOP-22(ds)	81.93	8/6/08	11:12	85.10	-3.17	-0.34
BOP-22(ds)	81.93	11/24/08	12:45	78.12	3.81	6.98
WELL DECOMMISSIONED JANUARY 2009						
BOP-22R(ds)	82.91	2/2/09	15:53	77.48	5.43	NA
BOP-22R(ds)	82.91	5/4/09	13:45	74.74	8.17	2.74
BOP-22R(ds)	82.91	8/5/09	13:30	77.20	5.71	-2.46
BOP-22R(ds)	82.91	11/2/09	14:30	81.70	1.21	-4.50
BOP-22R(ds)	82.91	2/2/10	10:05	72.52	10.39	9.18
BOP-22R(ds)	82.91	8/5/10	6:50	71.40	11.51	1.12
BOP-22R(ds)	82.91	11/10/10	12:12	71.79	11.12	-0.39
BOP-22R(ds)	82.91	2/4/11	8:39	78.76	4.15	-6.97
BOP-22R(ds)	82.91	4/14/11	13:34	70.21	12.70	8.55
BOP-22R(ds)	82.91	5/2/11	15:10	70.10	12.81	0.11
BOP-22R(ds)	82.91	8/1/11	10:20	70.31	12.60	-0.21
BOP-22R(ds)	82.91	2/22/12	8:34	72.51	10.40	-2.20
BOP-22R(ds)	82.91	5/2/12	9:03	68.66	14.25	3.85
BOP-22R(ds)	82.91	8/1/12	8:09	68.81	14.10	-0.15
BOP-22R(ds)	82.91	2/1/13	8:22	69.16	13.75	-0.35
BOP-22(dg)	81.05	2/22/08	15:45	76.10	4.95	13.25
BOP-22(dg)	81.05	5/1/08	11:27	76.35	4.71	-0.25
BOP-22(dg)	81.05	8/6/08	11:08	77.78	3.27	-1.43
BOP-22(dg)	81.05	11/24/08	12:50	75.78	5.27	2.00
BOP-22(dg)	81.05	2/2/09	15:50	72.70	8.35	3.08
BOP-22(dg)	81.05	8/5/09	13:17	74.74	6.31	-2.04
BOP-22(dg)	81.05	2/2/10	9:57	69.00	12.05	5.74
BOP-22(dg)	81.05	8/5/10	6:40	68.85	12.20	0.15
BOP-22(dg)	81.05	2/4/11	8:42	81.47	-0.42	-12.62
BOP-22(dg)	81.05	4/14/11	13:35	66.47	14.58	15.00
BOP-22(dg)	81.05	8/1/11	10:27	67.04	14.01	-0.57
BOP-22(dg)	81.05	2/22/12	8:27	70.49	10.56	-3.45
BOP-22(dg)	81.05	8/1/12	8:14	65.08	15.97	5.41
BOP-22(dg)	81.05	2/1/13	8:28	66.17	14.88	-1.09
BOP-23(ds)	76.97	2/22/08	13:15	70.62	6.35	—
BOP-23(ds)	76.97	5/1/08	10:46	71.61	5.36	0.99
BOP-23(ds)	76.97	8/6/08	15:58	73.40	3.57	1.79
BOP-23(ds)	76.97	11/24/09	10:28	72.62	4.35	-0.78
BOP-23(ds)	76.97	2/2/09	11:25	70.29	6.68	-2.33
BOP-23(ds)	76.97	8/5/09	13:50	68.66	8.31	1.63

**APPENDIX D
HISTORICAL WATER LEVEL MEASUREMENTS
TSA/SGA MONITORING WELLS JANUARY 2008 THROUGH PRESENT**

Well ID	Measuring Point Elevation (ft, MSL)	Date	Time	Depth to Water (ft,MPE)	Groundwater Elevation (ft, MSL)	Change in Water Level (ft)
BOP-23(ds)	76.97	2/2/10	9:20	66.67	10.30	1.99
WELL DECOMMISSIONED MARCH 10, 2010						
BOP-23(dg)	76.96	2/22/08	13:20	70.80	6.16	9.75
BOP-23(dg)	76.96	5/1/08	10:51	71.57	5.39	-0.77
BOP-23(dg)	76.96	8/6/08	16:00	80.20	-3.24	-8.63
BOP-23(dg)	76.96	11/24/08	10:36	73.22	3.74	6.98
BOP-23(dg)	76.96	2/2/09	11:27	70.40	6.56	2.82
BOP-23(dg)	76.96	8/5/09	13:55	68.73	8.23	1.67
BOP-23(dg)	76.96	2/2/10	9:23	66.69	10.27	2.04
BOP-23(dg)	76.96	8/5/10	13:45	65.34	11.62	1.35
BOP-23(dg)	76.96	2/4/11	13:25	65.73	11.23	-0.39
BOP-23(dg)	76.96	4/14/11	11:49	64.09	12.87	1.64
BOP-23(dg)	76.96	8/1/11	13:42	64.86	12.10	-0.77
BOP-23(dg)	76.96	2/22/12	7:53	66.11	10.85	-1.25
BOP-23(dg)	76.96	8/1/12	10:10	63.68	13.28	2.43
BOP-23(dg)	76.96	2/1/13	9:27	63.27	13.69	0.41
BOP-31(ds)	99.04	2/22/08	13:05	>91.94	<7.10	—
BOP-31(ds)	99.04	5/1/08	12:32	>91.94	<7.10	—
BOP-31(ds)	99.04	8/6/08	16:20	>91.94	<7.10	—
BOP-31(ds)	99.04	11/24/08	10:12	>91.94	<7.10	—
BOP-31(ds)	99.04	2/2/09	11:51	>91.94	<7.10	—
BOP-31(ds)	99.04	5/6/09	10:45	90.92	8.12	—
BOP-31(ds)	99.04	8/5/09	8:17	>91.94	<7.10	—
BOP-31(ds)	99.04	11/12/09	10:48	>91.94	<7.10	—
BOP-31(ds)	99.04	2/2/10	8:50	90.28	8.76	—
BOP-31(ds)	99.04	5/5/10	10:30	88.16	10.88	2.12
BOP-31(ds)	99.04	8/5/10	13:35	87.20	11.84	0.96
BOP-31(ds)	99.04	11/11/10	10:03	88.55	10.49	-1.35
BOP-31(ds)	99.04	2/4/11	9:34	87.33	11.71	1.22
BOP-31(ds)	99.04	4/14/11	11:55	87.65	11.39	-0.32
BOP-31(ds)	99.04	5/9/11	9:50	87.13	11.91	0.52
BOP-31(ds)	99.04	8/1/11	13:37	87.22	11.82	-0.09
BOP-31(ds)	99.04	11/3/11	14:20	88.81	10.23	-1.59
BOP-31(ds)	99.04	2/22/12	7:41	88.22	10.82	0.59
BOP-31(ds)	99.04	5/2/12	11:40	85.54	13.50	2.68
BOP-31(ds)	99.04	8/1/12	9:30	85.66	13.38	-0.12
BOP-31(ds)	99.04	11/1/12	10:28	88.38	10.66	-2.72
BOP-31(ds)	99.04	2/1/13	9:20	86.28	12.76	2.10
BOP-31(dg)	98.51	2/22/08	13:10	95.31	3.20	5.26
BOP-31(dg)	98.51	5/1/08	12:30	95.89	2.62	-0.58
BOP-31(dg)	98.51	8/6/08	16:23	103.21	-4.70	-7.32
BOP-31(dg)	98.51	11/24/08	10:17	95.96	2.55	7.25
BOP-31(dg)	98.51	2/2/09	11:55	93.67	4.84	2.29
BOP-31(dg)	98.51	8/5/09	8:15	90.67	7.84	3.00
BOP-31(dg)	98.51	2/2/10	8:55	89.54	8.97	1.13
BOP-31(dg)	98.51	8/5/10	13:37	86.72	11.79	2.82
BOP-31(dg)	98.51	2/4/11	9:38	87.19	11.32	-0.47
BOP-31(dg)	98.51	4/14/11	11:54	87.09	11.42	0.10
BOP-31(dg)	98.51	8/1/11	13:35	86.71	11.80	0.38
BOP-31(dg)	98.51	2/22/12	7:45	87.71	10.80	-1.00
BOP-31(dg)	98.51	8/1/12	9:57	85.22	13.29	2.49
BOP-31(dg)	98.51	2/1/13	9:18	85.67	12.84	-0.45
BOP-41(ds)	136.74	2/1/08	16:50	138.80	-2.06	3.21
BOP-41(ds)	136.74	8/6/08	17:05	137.91	-1.17	0.89
BOP-41(ds)	136.74	2/4/09	12:43	137.43	-0.69	0.48

**APPENDIX D
HISTORICAL WATER LEVEL MEASUREMENTS
TSA/SGA MONITORING WELLS JANUARY 2008 THROUGH PRESENT**

Well ID	Measuring Point Elevation (ft, MSL)	Date	Time	Depth to Water (ft,MPE)	Groundwater Elevation (ft, MSL)	Change in Water Level (ft)
BOP-41(ds)	136.74	8/5/09	14:10	131.28	5.46	6.15
BOP-41(ds)	136.74	2/4/10	8:48	127.53	9.21	3.75
BOP-41(ds)	136.74	8/4/10	10:15	125.48	11.26	2.05
BOP-41(ds)	136.74	2/3/11	10:59	132.53	4.21	-7.05
BOP-41(ds)	136.74	4/14/11	9:48	124.70	12.04	7.83
BOP-41(ds)	136.74	8/4/11	11:26	123.95	12.79	0.75
BOP-41(ds)	136.74	2/20/12	11:36	125.94	10.80	-1.99
BOP-41(ds)	136.74	8/1/12	12:38	122.41	14.33	3.53
BOP-41(ds)	136.74	2/13/13	12:10	121.78	14.96	0.63
BOP-41(dg)	136.45	2/1/08	16:56	137.39	-0.94	#REF!
BOP-41(dg)	136.45	8/6/08	17:08	137.73	-1.28	-0.34
BOP-41(dg)	136.45	2/4/09	12:39	137.21	-0.76	0.52
BOP-41(dg)	136.45	8/5/09	14:15	131.21	5.24	6.00
BOP-41(dg)	136.45	2/4/10	8:45	125.79	10.66	5.42
BOP-41(dg)	136.45	8/4/10	10:18	124.66	11.79	1.13
BOP-41(dg)	136.45	2/3/11	10:54	135.21	1.24	-10.55
BOP-41(dg)	136.45	4/14/11	9:53	123.49	12.96	11.72
BOP-41(dg)	136.45	8/4/11	11:18	123.81	12.64	-0.32
BOP-41(dg)	136.45	2/20/12	11:40	126.12	10.33	-2.31
BOP-41(dg)	136.45	8/1/12	12:30	121.81	14.64	4.31
BOP-41(dg)	136.45	2/13/13	12:00	122.15	14.30	-0.34
BOP-42(ds)	130.74	2/22/08	10:30	131.22	-0.48	2.58
BOP-42(ds)	130.74	5/1/08	12:54	132.32	-1.58	-1.10
BOP-42(ds)	130.74	8/6/08	10:35	134.40	-3.66	-2.08
BOP-42(ds)	130.74	11/24/08	13:03	129.86	0.88	4.54
BOP-42(ds)	130.74	2/2/09	11:05	126.60	4.14	3.26
BOP-42(ds)	130.74	8/5/09	8:45	123.67	7.07	2.93
BOP-42(ds)	130.74	2/2/10	8:35	121.82	8.92	1.85
BOP-42(ds)	130.74	8/5/10	12:35	118.84	11.90	2.98
BOP-42(ds)	130.74	2/4/11	9:19	121.51	9.23	-2.67
BOP-42(ds)	130.74	4/14/11	12:09	119.08	11.66	2.43
BOP-42(ds)	130.74	8/1/11	14:45	117.88	12.86	1.20
BOP-42(ds)	130.74	2/22/12	7:13	119.61	11.13	-1.73
BOP-42(ds)	130.74	8/1/12	10:56	116.51	14.23	3.10
BOP-42(ds)	130.74	2/1/13	9:07	117.22	13.52	-0.71
BOP-42(dg)	130.71	2/22/08	10:35	131.19	-0.48	3.67
BOP-42(dg)	130.71	5/1/08	12:58	132.43	-1.72	-1.24
BOP-42(dg)	130.71	8/6/08	10:33	130.50	0.21	1.93
BOP-42(dg)	130.71	11/24/08	13:18	130.55	0.16	-0.05
BOP-42(dg)	130.71	2/2/09	11:10	126.58	4.13	3.97
BOP-42(dg)	130.71	8/5/09	8:48	124.24	6.47	2.34
BOP-42(dg)	130.71	2/2/10	8:40	121.73	8.98	2.51
BOP-42(dg)	130.71	8/5/10	12:30	119.21	11.50	2.52
BOP-42(dg)	130.71	2/4/11	9:20	122.46	8.25	-3.25
BOP-42(dg)	130.71	4/14/11	12:08	119.20	11.51	3.26
BOP-42(dg)	130.71	8/1/11	14:48	118.39	12.32	0.81
BOP-42(dg)	130.71	2/22/12	7:11	120.01	10.70	-1.62
BOP-42(dg)	130.71	8/1/12	10:53	116.87	13.84	3.14
BOP-42(dg)	130.71	2/1/13	9:05	117.51	13.20	-0.64
BOP-43(ds)	76.98	2/1/08	16:30	78.31	-1.33	8.33
BOP-43(ds)	76.98	8/6/08	17:15	78.78	-1.80	-0.47
BOP-43(ds)	76.98	2/4/09	12:56	71.60	5.38	7.18
BOP-43(ds)	76.98	8/5/09	13:40	70.95	6.03	0.65
BOP-43(ds)	76.98	2/4/10	12:54	67.80	9.18	3.15
BOP-43(ds)	76.98	8/4/10	9:36	65.92	11.06	1.88

**APPENDIX D
HISTORICAL WATER LEVEL MEASUREMENTS
TSA/SGA MONITORING WELLS JANUARY 2008 THROUGH PRESENT**

Well ID	Measuring Point Elevation (ft, MSL)	Date	Time	Depth to Water (ft,MPE)	Groundwater Elevation (ft, MSL)	Change in Water Level (ft)
BOP-43(ds)	76.98	2/3/11	10:25	70.87	6.11	-4.95
BOP-43(ds)	76.98	4/14/11	9:35	65.04	11.94	5.83
BOP-43(ds)	76.98	8/4/11	11:00	65.15	11.83	-0.11
BOP-43(ds)	76.98	2/20/12	10:50	66.95	10.03	-1.80
BOP-43(ds)	76.98	8/1/12	12:00	63.82	13.16	3.13
WELL DECOMMISSIONED SEPTEMBER 5, 2012						
BOP-43(dg)	76.42	2/1/08	16:35	74.89	1.53	5.97
BOP-43(dg)	76.42	8/6/08	17:16	75.94	0.48	-1.05
BOP-43(dg)	76.42	2/4/09	12:58	69.75	6.67	6.19
BOP-43(dg)	76.42	8/5/09	13:45	70.38	6.04	-0.63
BOP-43(dg)	76.42	2/4/10	12:58	65.68	10.74	4.70
BOP-43(dg)	76.42	8/4/10	9:45	65.30	11.12	0.38
BOP-43(dg)	76.42	2/3/11	10:28	74.11	2.31	-8.81
BOP-43(dg)	76.42	4/14/11	9:30	63.66	12.76	10.45
BOP-43(dg)	76.42	8/4/11	11:05	65.39	11.03	-1.73
BOP-43(dg)	76.42	2/20/12	10:53	66.42	10.00	-1.03
BOP-43(dg)	76.42	8/1/12	12:06	62.59	13.83	3.83
WELL DECOMMISSIONED SEPTEMBER 6, 2012						
BOP-44(ds)	35.24	2/1/08	15:36	30.73	4.51	0.32
BOP-44(ds)	35.24	8/6/08	17:32	32.32	2.92	-1.59
BOP-44(ds)	35.24	2/4/09	13:32	27.08	8.16	5.24
BOP-44(ds)	35.24	8/5/09	13:23	26.83	8.41	0.25
BOP-44(ds)	35.24	2/4/10	12:12	24.46	10.78	2.37
BOP-44(ds)	35.24	8/4/10	8:40	24.15	11.09	0.31
BOP-44(ds)	35.24	2/3/11	10:10	26.15	9.09	-2.00
BOP-44(ds)	35.24	4/14/11	9:13	23.24	12.00	2.91
BOP-44(ds)	35.24	8/4/11	10:49	23.51	11.73	-0.27
BOP-44(ds)	35.24	2/20/12	10:21	24.37	10.87	-0.86
BOP-44(ds)	35.24	8/1/12	11:25	23.05	12.19	1.32
BOP-44(ds)	35.24	2/13/13	10:08	22.98	12.26	0.07
BOP-44(dg)	35.15	2/1/08	15:37	28.95	6.20	0.33
BOP-44(dg)	35.15	8/6/08	17:33	30.73	4.42	-1.78
BOP-44(dg)	35.15	2/4/09	13:38	26.91	8.24	3.82
BOP-44(dg)	35.15	8/5/09	13:21	26.58	8.57	0.33
BOP-44(dg)	35.15	2/4/10	12:16	24.54	10.61	2.04
BOP-44(dg)	35.15	8/4/10	8:46	24.34	10.81	0.20
BOP-44(dg)	35.15	2/3/11	10:13	26.08	9.07	-1.74
BOP-44(dg)	35.15	4/14/11	9:10	23.31	11.84	2.77
BOP-44(dg)	35.15	8/4/11	10:52	23.72	11.43	-0.41
BOP-44(dg)	35.15	2/20/12	10:23	24.72	10.43	-1.00
BOP-44(dg)	35.15	8/1/12	11:20	23.31	11.84	1.41
BOP-44(dg)	35.15	2/13/13	10:05	23.27	11.88	0.04
BOP-60(ds)	92.75	2/22/08	11:50	96.92	-4.17	9.07
BOP-60(ds)	92.75	5/1/08	11:10	97.11	-4.36	-0.19
BOP-60(ds)	92.75	8/6/08	16:26	107.20	-14.45	-10.09
BOP-60(ds)	92.75	11/24/08	10:47	90.10	2.65	17.10
BOP-60(ds)	92.75	2/2/09	12:35	90.03	2.72	0.07
BOP-60(ds)	92.75	8/5/09	11:52	89.14	3.61	0.89
BOP-60(ds)	92.75	2/2/10	11:06	82.66	10.09	6.48
WELL DECOMMISSIONED MARCH 30, 2010						
BOP-60R(ds)	82.80	3/3/10	14:00	72.20	10.60	NA
BOP-60R(ds)	82.80	8/5/10	15:00	71.31	11.49	0.89
BOP-60R(ds)	82.80	11/10/10	9:42	72.05	10.75	-0.74
BOP-60R(ds)	82.80	2/4/11	12:00	77.13	5.67	-5.08

**APPENDIX D
HISTORICAL WATER LEVEL MEASUREMENTS
TSA/SGA MONITORING WELLS JANUARY 2008 THROUGH PRESENT**

Well ID	Measuring Point Elevation (ft, MSL)	Date	Time	Depth to Water (ft,MPE)	Groundwater Elevation (ft, MSL)	Change in Water Level (ft)
BOP-60R(ds)	82.80	4/14/11	12:38	70.53	12.27	6.60
BOP-60R(ds)	82.80	5/2/11	15:05	70.31	12.49	0.22
BOP-60R(ds)	82.80	8/1/11	10:50	70.49	12.31	-0.18
BOP-60R(ds)	82.80	2/22/12	9:40	72.62	10.18	-2.13
BOP-60R(ds)	82.80	8/1/12	11:25	68.42	14.38	4.20
BOP-60R(ds)	82.80	2/1/13	10:07	69.37	13.42	-0.96
BOP-60(dg)	93.59	2/22/08	11:45	95.88	-2.29	5.52
BOP-60(dg)	93.59	5/1/08	11:12	96.32	-2.73	-0.44
BOP-60(dg)	93.59	8/6/08	16:30	106.90	-13.31	-10.58
BOP-60(dg)	93.59	11/24/08	10:59	90.61	2.98	16.29
BOP-60(dg)	93.59	2/2/09	12:38	89.30	4.29	1.31
BOP-60(dg)	93.59	8/5/09	11:55	88.65	4.94	0.65
BOP-60(dg)	93.59	2/2/10	11:10	83.87	9.72	4.78
BOP-60(dg)	93.59	8/5/10	14:20	82.27	11.32	1.60
BOP-60(dg)	93.59	2/4/11	12:05	87.63	5.96	-5.36
BOP-60(dg)	93.59	4/14/11	12:31	81.41	12.18	6.22
BOP-60(dg)	93.59	8/1/11	10:55	81.36	12.23	0.05
BOP-60(dg)	93.59	2/22/12	9:44	83.40	10.19	-2.04
BOP-60(dg)	93.59	8/1/12	11:30	79.61	13.98	3.79
BOP-60(dg)	93.59	2/1/13	10:13	80.17	11.17	-2.81
BOP-61(ds)	94.64	2/22/08	12:30	>98.34	<-3.70	—
BOP-61(ds)	94.64	5/1/08	10:35	>98.34	<-3.70	—
BOP-61(ds)	94.64	8/6/08	13:20	97.45	-2.81	—
BOP-61(ds)	94.64	11/24/08	14:21	96.44	-1.80	1.01
BOP-61(ds)	94.64	2/2/09	12:02	92.83	1.81	3.61
BOP-61(ds)	94.64	8/5/09	12:22	90.12	4.52	2.71
BOP-61(ds)	94.64	2/2/10	9:07	88.05	6.59	2.07
BOP-61(ds)	94.64	8/5/10	7:25	85.53	9.11	2.52
BOP-61(ds)	94.64	2/4/11	12:15	88.07	6.57	-2.54
BOP-61(ds)	94.64	4/14/11	13:05	85.29	9.35	2.78
BOP-61(ds)	94.64	8/1/11	15:23	84.69	9.95	0.60
BOP-61(ds)	94.64	2/22/12	11:06	86.65	7.99	-1.96
BOP-61(ds)	94.64	8/1/12	12:01	82.88	11.76	3.77
BOP-61(ds)	94.64	2/1/13	10:44	83.47	11.17	-0.59
BOP-61(dg)	94.43	2/22/08	12:35	97.25	-2.82	4.47
BOP-61(dg)	94.43	5/1/08	9:24	95.00	-0.57	2.25
BOP-61(dg)	94.43	8/6/08	13:21	96.55	-2.12	-1.55
BOP-61(dg)	94.43	11/24/08	11:20	92.85	1.58	3.70
BOP-61(dg)	94.43	2/2/09	12:00	92.59	1.84	0.26
BOP-61(dg)	94.43	8/5/09	12:15	90.15	4.28	2.44
BOP-61(dg)	94.43	2/2/10	9:05	87.83	6.60	2.32
BOP-61(dg)	94.43	8/5/10	7:20	85.58	8.85	2.25
BOP-61(dg)	94.43	2/4/11	12:14	88.40	6.03	-2.82
BOP-61(dg)	94.43	4/14/11	13:06	85.20	9.23	3.20
BOP-61(dg)	94.43	8/1/11	15:19	84.71	9.72	0.49
BOP-61(dg)	94.43	2/22/12	11:08	86.47	7.96	-1.76
BOP-61(dg)	94.43	8/1/12	11:58	82.84	11.59	3.63
BOP-61(dg)	94.43	2/1/13	10:41	83.31	11.12	-0.47
BOP-62(ds)	114.32	2/22/08	15:10	116.85	-2.53	4.95
BOP-62(ds)	114.32	5/1/08	13:09	117.10	-2.78	-0.25
BOP-62(ds)	114.32	8/6/08	13:25	126.76	-12.44	-9.66
BOP-62(ds)	114.32	11/24/08	11:41	114.12	0.20	12.64
BOP-62(ds)	114.32	2/2/09	12:30	110.41	3.91	3.71
BOP-62(ds)	114.32	8/5/09	9:00	109.42	4.90	0.99
BOP-62(ds)	114.32	2/2/10	9:12	104.70	9.62	4.72

**APPENDIX D
HISTORICAL WATER LEVEL MEASUREMENTS
TSA/SGA MONITORING WELLS JANUARY 2008 THROUGH PRESENT**

Well ID	Measuring Point Elevation (ft, MSL)	Date	Time	Depth to Water (ft,MPE)	Groundwater Elevation (ft, MSL)	Change in Water Level (ft)
BOP-62(ds)	114.32	8/5/10	13:10	102.98	11.34	1.72
BOP-62(ds)	114.32	2/4/11	10:54	107.63	6.69	-4.65
BOP-62(ds)	114.32	4/14/11	12:25	102.31	12.01	5.32
BOP-62(ds)	112.29	8/1/11	7:45	100.20	12.09	0.08
BOP-62(ds)	112.29	2/22/12	9:54	102.15	10.14	-1.95
BOP-62(ds)	112.29	8/1/12	13:10	98.67	13.62	3.48
BOP-62(ds)	112.29	2/1/13	11:27	99.01	13.28	-0.34
BOP-65(ds)	104.22	2/22/08	15:05	106.06	-1.84	4.75
BOP-65(ds)	104.22	5/1/08	13:24	107.50	-3.28	-1.44
BOP-65(ds)	104.22	8/6/08	13:45	>112.22	<-8.00	—
BOP-65(ds)	104.22	11/24/08	11:49	102.16	2.06	—
BOP-65(ds)	104.22	2/9/09	12:00	100.10	4.12	2.06
BOP-65(ds)	104.22	8/5/09	9:15	98.64	5.58	1.46
BOP-65(ds)	104.22	2/2/10	9:27	94.67	9.55	3.97
BOP-65(ds)	104.22	8/5/10	7:15	92.93	11.29	1.74
BOP-65(ds)	104.22	2/4/11	10:19	97.75	6.47	-4.82
BOP-65(ds)	104.22	4/14/11	12:53	92.23	11.99	5.52
BOP-65(ds)	104.22	8/1/11	8:02	92.11	12.11	0.12
BOP-65(ds)	104.22	2/22/12	11:25	94.08	10.14	-1.97
BOP-65(ds)	104.22	8/1/12	13:22	90.52	13.70	3.56
BOP-65(ds)	104.22	2/1/13	11:18	90.90	13.32	-0.38
BOP-66(ds)	102.97	2/22/08	12:55	>100.17	<2.80	—
BOP-66(ds)	102.97	5/1/08	13:46	>100.17	<2.80	—
BOP-66(ds)	102.97	8/6/08	13:40	>100.17	<2.80	—
BOP-66(ds)	102.97	11/24/08	11:58	>100.17	<2.80	—
BOP-66(ds)	102.97	2/2/09	12:12	99.55	3.42	—
BOP-66(ds)	102.97	8/5/09	9:22	96.71	6.26	2.84
BOP-66(ds)	102.97	2/2/10	9:33	94.74	8.23	1.97
BOP-66(ds)	102.97	8/5/10	7:55	92.11	10.86	2.63
BOP-66(ds)	102.97	2/4/11	10:25	94.35	8.62	-2.24
BOP-66(ds)	102.97	4/14/11	13:10	91.99	10.98	2.36
BOP-66(ds)	102.97	8/1/11	15:30	91.28	11.69	0.71
BOP-66(ds)	102.97	2/22/12	11:15	93.16	9.81	-1.88
BOP-66(ds)	102.97	8/1/12	12:22	89.49	13.48	3.67
BOP-66(ds)	102.97	2/1/13	11:00	90.11	12.86	-0.62
BOP-70(ds-215)	65.15	2/1/08	12:47	65.37	-0.22	5.16
BOP-70(ds-215)	65.15	8/6/08	16:58	65.72	-0.57	-0.35
BOP-70(ds-215)	65.15	2/4/09	12:25	58.52	6.63	7.20
BOP-70(ds-215)	65.15	8/5/09	14:45	58.68	6.47	-0.16
BOP-70(ds-215)	65.15	2/4/10	8:54	54.21	10.94	4.47
BOP-70(ds-215)	65.15	8/4/10	10:30	53.51	11.64	0.70
BOP-70(ds-215)	65.15	2/3/11	11:18	63.26	1.89	-9.75
BOP-70(ds-215)	65.15	4/14/11	10:45	52.06	13.09	11.20
BOP-70(ds-215)	65.15	8/4/11	11:34	52.45	12.70	-0.39
BOP-70(ds-215)	65.15	2/20/12	11:51	54.79	10.36	-2.34
BOP-70(ds-215)	65.15	8/1/12	13:01	51.02	14.13	3.77
BOP-70(ds-215)	65.15	2/13/13	11:10	51.43	13.72	-0.41
BOP-71(ds)	87.88	2/1/08	13:10	87.00	0.88	5.98
BOP-71(ds)	87.88	8/6/08	16:14	87.48	0.40	-0.48
BOP-71(ds)	87.88	2/4/09	12:29	80.89	6.99	6.59
BOP-71(ds)	87.88	8/5/09	14:49	81.66	6.22	-0.77
BOP-71(ds)	87.88	2/4/10	13:15	76.24	11.64	5.42
BOP-71(ds)	87.88	8/4/10	10:05	75.67	12.21	0.57
BOP-71(ds)	87.88	2/3/11	11:10	87.95	-0.07	-12.28
BOP-71(ds)	87.88	4/14/11	10:25	74.06	13.82	13.89

**APPENDIX D
HISTORICAL WATER LEVEL MEASUREMENTS
TSA/SGA MONITORING WELLS JANUARY 2008 THROUGH PRESENT**

Well ID	Measuring Point Elevation (ft, MSL)	Date	Time	Depth to Water (ft,MPE)	Groundwater Elevation (ft, MSL)	Change in Water Level (ft)
BOP-71(ds)	87.88	8/4/11	13:49	74.44	13.44	-0.38
BOP-71(ds)	87.88	2/20/12	11:45	77.32	10.56	-2.88
BOP-71(ds)	87.88	8/1/12	12:51	72.61	15.27	4.71
BOP-71(ds)	87.88	2/13/13	11:32	73.15	14.73	-0.54
D-16(ds)	16.91	2/1/08	11:45	11.91	5.00	0.35
D-16(ds)	16.91	8/6/08	16:38	13.38	3.53	-1.47
D-16(ds)	16.91	2/4/09	12:09	9.01	7.90	4.37
D-16(ds)	16.91	8/5/09	11:23	8.91	8.00	0.10
D-16(ds)	16.91	2/4/10	9:29	6.09	10.82	2.82
D-16(ds)	16.91	8/4/10	11:20	6.39	10.52	-0.30
D-16(ds)	16.91	2/3/11	12:43	8.83	8.08	-2.44
D-16(ds)	16.91	4/14/11	12:01	5.34	11.57	3.49
D-16(ds)	16.91	8/4/11	11:51	5.57	11.34	-0.23
D-16(ds)	16.91	2/20/12	12:30	6.84	10.07	-1.27
D-16(ds)	16.91	8/1/12	13:33	5.07	11.84	1.77
D-16(ds)	16.91	2/13/13	13:20	5.18	11.73	-0.11
D-17(ds)	123.28	2/1/08	9:30	>121.40	<1.88	—
D-17(ds)	123.28	8/6/08	8:15	>121.40	<1.88	—
D-17(ds)	123.28	2/4/09	10:19	>121.40	<1.88	—
D-17(ds)	123.28	5/6/09	12:05	>121.40	<1.88	—
D-17(ds)	123.28	8/5/09	10:25	>121.40	<1.88	—
D-17(ds)	123.28	11/12/09	10:30	118.36	4.92	—
D-17(ds)	123.28	2/4/10	10:02	117.85	5.43	0.51
D-17(ds)	123.28	3/10/10	14:10	116.70	6.58	1.15
D-17(ds)	123.28	4/7/10	11:48	115.88	7.40	0.82
D-17(ds)	123.28	5/5/10	11:55	115.53	7.75	0.35
D-17(ds)	123.28	6/3/10	8:50	115.00	8.28	0.53
D-17(ds)	123.28	7/7/10	9:55	114.17	9.11	0.83
D-17(ds)	123.28	8/4/10	9:01	113.98	9.30	0.19
D-17(ds)	123.28	9/1/10	10:04	114.07	9.21	-0.09
D-17(ds)	123.28	10/5/10	9:25	114.84	8.44	-0.77
D-17(ds)	123.28	11/3/10	12:05	114.98	8.30	-0.14
D-17(ds)	123.28	12/6/10	13:30	114.98	8.30	0.00
D-17(ds)	123.28	1/12/11	10:55	113.91	9.37	1.07
D-17(ds)	123.28	2/3/11	9:46	113.78	9.50	0.13
D-17(ds)	123.28	3/2/11	10:21	114.93	8.35	-1.15
D-17(ds)	123.28	4/6/11	11:05	116.00	7.28	-1.07
D-17(ds)	123.28	4/14/11	8:40	116.15	7.13	-0.15
D-17(ds)	123.28	5/9/11	11:53	115.88	7.40	0.27
D-17(ds)	123.28	6/9/11	10:05	115.36	7.92	0.52
D-17(ds)	123.28	7/13/11	10:10	115.15	8.13	0.21
D-17(ds)	123.28	8/4/11	8:41	114.81	8.47	0.34
D-17(ds)	123.28	9/7/11	10:56	114.81	8.47	0.00
D-17(ds)	123.28	10/12/2011	11:34	114.56	8.72	0.25
D-17(ds)	123.28	11/9/2011	9:34	115.13	8.15	-0.57
D-17(ds)	123.28	12/19/2011	12:04	115.21	8.07	-0.08
D-17(ds)	123.28	1/11/12	11:10	114.59	8.69	0.62
D-17(ds)	123.28	2/20/12	12:24	113.97	9.31	0.62
D-17(ds)	123.28	3/28/12	11:15	113.51	9.77	0.46
D-17(ds)	123.28	4/18/12	9:54	112.82	10.46	0.69
D-17(ds)	123.28	5/2/12	9:45	112.34	10.94	0.48
D-17(ds)	123.28	6/6/12	14:08	112.10	11.18	0.24
D-17(ds)	123.28	7/11/12	10:35	112.38	10.90	-0.28
D-17(ds)	123.28	8/1/12	10:35	112.64	10.64	-0.26
D-17(ds)	123.28	9/4/12	12:40	114.04	9.24	-1.40
D-17(ds)	123.28	10/8/12	10:25	114.89	8.39	-0.85
D-17(ds)	123.28	11/7/12	11:32	115.46	7.82	-0.57

**APPENDIX D
HISTORICAL WATER LEVEL MEASUREMENTS
TSA/SGA MONITORING WELLS JANUARY 2008 THROUGH PRESENT**

Well ID	Measuring Point Elevation (ft, MSL)	Date	Time	Depth to Water (ft,MPE)	Groundwater Elevation (ft, MSL)	Change in Water Level (ft)
PROPOSED FOR DECREASE TO QTRLY SMPLG IN TSA FALL SA RPT 11-23-11						
D-17(ds)	123.28	12/5/12	11:35	115.10	8.18	0.36
D-17(ds)	123.28	1/10/13	12:47	115.22	8.06	-0.12
D-17(ds)	123.28	2/13/13	9:06	114.71	8.57	0.51
D-17(ds)	123.28	3/13/13	11:40	114.89	8.39	-0.18
D-17(ds)	123.28	5/8/13	9:57	114.58	8.70	0.31
D-17(dg)	124.61	2/1/08	9:25	127.46	-2.85	2.16
D-17(dg)	124.61	8/6/08	8:17	125.42	-0.81	2.04
D-17(dg)	124.61	2/4/09	10:15	123.39	1.22	2.03
D-17(dg)	124.61	8/5/09	10:28	119.80	4.81	3.59
D-17(dg)	124.61	2/4/10	11:36	118.14	6.47	1.66
D-17(dg)	124.61	8/4/10	8:56	114.93	9.68	3.21
D-17(dg)	124.61	2/3/11	9:42	114.90	9.71	0.03
D-17(dg)	124.61	4/14/11	8:44	117.42	7.19	-2.52
D-17(dg)	124.61	8/4/11	8:43	116.18	8.43	1.24
D-17(dg)	124.61	2/20/12	12:28	115.28	9.33	0.90
D-17(dg)	124.61	8/1/12	10:40	114.79	9.82	0.49
D-17(dg)	124.61	2/13/13	8:59	116.06	8.55	-1.27
D-18(ds)	18.01	2/1/08	12:28	13.55	4.46	5.32
D-18(ds)	18.01	8/6/08	16:53	14.72	3.29	-1.17
D-18(ds)	18.01	2/4/09	12:19	9.54	8.47	5.18
D-18(ds)	18.01	8/5/09	11:30	10.88	7.13	-1.34
D-18(ds)	18.01	2/4/10	8:58	6.52	11.49	4.36
D-18(ds)	18.01	8/4/10	10:50	6.72	11.29	-0.20
D-18(ds)	18.01	2/3/11	11:27	16.68	1.33	-9.96
D-18(ds)	18.01	4/14/11	11:00	4.49	13.52	12.19
D-18(ds)	18.01	8/4/11	11:39	5.42	12.59	-0.93
D-18(ds)	18.01	2/20/12	11:56	7.49	10.52	-2.07
D-18(ds)	18.01	8/1/12	13:11	4.27	13.74	3.22
D-18(ds)	18.01	2/13/13	13:06	4.77	13.24	-0.50
DEQ-1(dg)	150.58	2/1/08	14:31	142.31	8.27	3.01
DEQ-1(dg)	150.58	8/6/08	17:45	141.82	8.76	0.49
DEQ-1(dg)	150.58	2/4/09	13:30	139.71	10.87	2.11
DEQ-1(dg)	150.58	8/5/09	13:00	141.11	9.47	-1.40
DEQ-1(dg)	150.58	2/4/10	11:48	138.03	12.55	3.08
DEQ-1(dg)	150.58	8/4/10	12:13	138.00	12.58	0.03
DEQ-1(dg)	150.58	2/3/11	12:05	137.58	13.00	0.42
DEQ-1(dg)	150.58	4/14/11	12:32	134.05	16.53	3.53
DEQ-1(dg)	150.58	8/4/11	14:44	135.16	15.42	-1.11
DEQ-1(dg)	150.58	2/20/12	11:32	135.08	15.50	0.08
DEQ-1(dg)	150.58	8/1/12	11:54	133.15	17.43	1.93
DEQ-1(dg)	150.58	2/13/13	9:33	132.81	17.77	0.34
DEQ-5(ds)	155.68	2/1/08	13:43	>155.90	<0.00	—
DEQ-5(ds)	155.68	8/6/08	13:38	>155.90	<0.00	—
DEQ-5(ds)	155.68	2/4/09	12:08	>155.90	<0.00	—
DEQ-5(ds)	155.68	8/5/09	12:45	147.05	8.63	—
DEQ-5(ds)	155.68	2/4/10	11:35	146.31	9.37	0.74
DEQ-5(ds)	155.68	8/4/10	11:54	143.40	12.28	2.91
DEQ-5(ds)	155.68	2/3/11	12:18	144.39	11.29	-0.99
DEQ-5(ds)	155.68	4/14/11	12:58	143.83	11.85	0.56
DEQ-5(ds)	155.68	8/4/11	15:50	142.22	13.46	1.61
DEQ-5(ds)	155.68	2/20/12	10:59	143.34	12.34	-1.12
DEQ-5(ds)	155.68	8/1/12	12:08	140.90	14.78	2.44
DEQ-5(ds)	155.68	2/13/13	9:42	141.84	13.84	-0.94

**APPENDIX D
HISTORICAL WATER LEVEL MEASUREMENTS
TSA/SGA MONITORING WELLS JANUARY 2008 THROUGH PRESENT**

Well ID	Measuring Point Elevation (ft, MSL)	Date	Time	Depth to Water (ft,MPE)	Groundwater Elevation (ft, MSL)	Change in Water Level (ft)
DEQ-5(dg)	155.95	2/1/08	13:46	154.75	1.20	-5.37
DEQ-5(dg)	155.95	8/6/08	13:32	152.61	3.34	2.14
DEQ-5(dg)	155.95	2/4/09	12:12	150.98	4.97	1.63
DEQ-5(dg)	155.95	8/5/09	12:40	147.49	8.46	3.49
DEQ-5(dg)	155.95	2/4/10	11:45	146.75	9.20	0.74
DEQ-5(dg)	155.95	8/4/10	12:01	143.59	12.36	3.16
DEQ-5(dg)	155.95	2/3/11	12:23	144.46	11.49	-0.87
DEQ-5(dg)	155.95	4/14/11	12:06	144.35	11.60	0.11
DEQ-5(dg)	155.95	8/4/11	15:46	142.81	13.14	1.54
DEQ-5(dg)	155.95	2/20/12	11:04	143.82	12.13	-1.01
DEQ-5(dg)	155.95	8/1/12	12:12	141.19	14.76	2.63
DEQ-5(dg)	155.95	2/13/13	9:46	142.33	13.62	-1.14
MW-3	147.69	2/1/08	13:30	140.39	7.30	-0.35
MW-3	147.69	8/6/08	10:40	138.43	9.26	1.96
MW-3	147.69	2/4/09	12:31	137.92	9.77	0.51
MW-3	147.69	8/5/09	12:12	135.88	11.81	2.04
MW-3	147.69	2/4/10	12:25	135.18	12.51	0.70
MW-3	147.69	8/4/10	11:23	133.21	14.48	1.97
MW-3	147.69	2/3/11	12:48	132.33	15.36	0.88
MW-3	147.69	4/14/11	13:18	131.91	15.78	0.42
MW-3	147.69	8/4/11	14:53	130.41	17.28	1.50
MW-3	147.69	2/20/12	11:12	130.98	16.71	-0.57
MW-3	147.69	8/1/12	12:24	129.73	17.96	1.25
MW-3	147.69	2/13/13	10:11	130.17	17.52	-0.44
EW-5 (MW-24dg)	77.74	2/1/08	10:15	67.65	10.09	4.33
EW-5 (MW-24dg)	77.74	8/6/08	13:56	71.26	6.48	-3.61
CONVERTED TO MONITORING WELL OCTOBER 28, 2008						
EW-8	77.16	2/1/08	15:27	72.37	4.79	11.06
EW-8	77.16	8/6/08	16:02	73.67	3.49	-1.30
EW-8	77.16	2/4/09	12:49	71.02	6.14	2.65
CONVERTED TO MONITORING WELL JUNE 17, 2009						
EW-8	77.16	8/5/09	14:40	68.45	8.71	2.57
EW-8	77.16	2/4/10	12:41	66.78	10.38	1.67
EW-8	77.16	8/4/10	9:20	64.54	12.62	2.24
EW-8	77.16	2/3/11	10:43	64.05	13.11	0.49
EW-8	77.16	4/14/11	10:38	64.11	13.05	-0.06
EW-8	77.16	8/4/11	13:38	64.40	12.76	-0.29
EW-8	77.16	2/20/12	9:40	65.64	11.52	-1.24
EW-8	77.16	8/1/12	13:48	62.98	14.18	2.66
EW-8	77.16	2/13/13	10:36	63.21	13.95	-0.23
MW-8(dg)	136.21	2/1/08	12:05	141.70	-5.49	1.51
MW-8(dg)	136.21	8/6/08	13:06	138.98	-2.77	2.72
MW-8(dg)	136.21	2/4/09	12:55	137.94	-1.73	1.04
MW-8(dg)	136.21	8/5/09	14:35	133.31	2.90	4.63
MW-8(dg)	136.21	2/4/10	13:28	130.95	5.26	2.36
MW-8(dg)	136.21	8/4/10	12:48	128.29	7.92	2.66
MW-8(dg)	136.21	2/3/11	13:18	129.06	7.15	-0.77
MW-8(dg)	136.21	4/14/11	13:38	131.42	4.79	-2.36
MW-8(dg)	136.21	8/4/11	15:15	129.65	6.56	1.77
MW-8(dg)	136.21	2/20/12	11:45	128.20	8.01	1.45
MW-8(dg)	136.21	8/1/12	14:31	128.78	7.43	-0.58
MW-8(dg)	136.21	2/13/13	10:56	129.83	6.38	-1.05
MW-10(ds)	134.54	2/1/08	12:25	>128.30	<6.24	—
MW-10(ds)	134.54	8/6/08	12:35	>128.30	<6.24	—

**APPENDIX D
HISTORICAL WATER LEVEL MEASUREMENTS
TSA/SGA MONITORING WELLS JANUARY 2008 THROUGH PRESENT**

Well ID	Measuring Point Elevation (ft, MSL)	Date	Time	Depth to Water (ft,MPE)	Groundwater Elevation (ft, MSL)	Change in Water Level (ft)
MW-10(ds)	134.54	2/4/09	13:05	>128.30	<6.24	—
MW-10(ds)	134.54	8/5/09	14:15	>128.30	<6.24	—
MW-10(ds)	134.54	2/4/10	13:46	125.45	9.09	—
MW-10(ds)	134.54	3/10/10	14:50	125.44	9.10	0.01
MW-10(ds)	134.54	4/7/10	12:35	125.37	9.17	0.07
MW-10(ds)	134.54	5/5/10	14:12	>128.30	<6.24	—
MW-10(ds)	134.54	6/3/10	13:46	125.45	9.09	—
MW-10(ds)	134.54	7/7/10	10:35	123.61	10.93	1.84
MW-10(ds)	134.54	8/4/10	13:10	123.52	11.02	0.09
MW-10(ds)	134.54	9/1/10	11:22	123.40	11.14	0.12
MW-10(ds)	134.54	10/5/10	11:50	124.11	10.43	-0.71
MW-10(ds)	134.54	11/3/10	13:55	122.98	11.56	1.13
MW-10(ds)	134.54	12/6/10	14:15	122.98	11.56	0.00
MW-10(ds)	134.54	1/12/11	12:20	122.52	12.02	0.46
MW-10(ds)	134.54	2/3/11	13:28	122.72	11.82	-0.20
MW-10(ds)	134.54	3/2/11	10:52	122.31	12.23	0.41
MW-10(ds)	134.54	4/6/11	12:00	122.15	12.39	0.16
MW-10(ds)	134.54	4/14/11	13:48	122.46	12.08	-0.31
MW-10(ds)	134.54	5/9/11	12:58	122.21	12.33	0.25
MW-10(ds)	134.54	6/9/11	11:00	121.98	12.56	0.23
MW-10(ds)	134.54	7/13/11	11:58	121.23	13.31	0.75
MW-10(ds)	134.54	8/4/11	15:24	120.93	13.61	0.30
MW-10(ds)	134.54	9/7/11	12:15	120.93	13.61	0.00
MW-10(ds)	134.54	10/12/11	12:30	120.69	13.85	0.24
MW-10(ds)	134.54	11/9/11	12:50	121.13	13.41	-0.44
MW-10(ds)	134.54	12/19/11	13:06	121.60	12.94	-0.47
MW-10(ds)	134.54	1/11/12	12:41	122.10	12.44	-0.50
MW-10(ds)	134.54	2/20/12	11:58	121.19	13.35	0.91
MW-10(ds)	134.54	3/28/12	12:55	121.33	13.21	-0.14
MW-10(ds)	134.54	4/18/12	11:55	121.37	13.17	-0.04
MW-10(ds)	134.54	5/2/12	10:40	121.08	13.46	0.29
MW-10(ds)	134.54	6/6/12	15:30	121.12	13.42	-0.04
MW-10(ds)	134.54	7/11/12	12:25	121.94	12.60	-0.82
MW-10(ds)	134.54	8/1/12	14:45	120.59	13.95	1.35
MW-10(ds)	134.54	9/4/12	13:54	120.61	13.93	-0.02
MW-10(ds)	134.54	10/8/12	14:30	121.14	13.40	-0.53
MW-10(ds)	134.54	11/7/12	12:55	120.96	13.58	0.18
PROPOSED FOR DECREASE TO QTRLY SMPLG IN TSA FALL SA RPT 11-23-12						
MW-10(ds)	134.54	12/5/12	12:25	120.14	14.40	0.82
MW-10(ds)	134.54	1/10/13	13:42	120.98	13.56	-0.84
MW-10(ds)	134.54	2/13/13	10:38	120.91	13.63	0.07
MW-10(ds)	134.54	3/13/13	13:00	121.08	13.46	-0.17
MW-10(ds)	134.54	5/8/13	13:43	120.53	14.01	0.55
MW-10(dg)	135.05	2/1/08	12:21	135.51	-0.46	0.56
MW-10(dg)	135.05	8/6/08	12:40	134.27	0.78	1.24
MW-10(dg)	135.05	2/4/09	13:11	132.66	2.39	1.61
MW-10(dg)	135.05	8/5/09	14:20	130.45	4.60	2.21
MW-10(dg)	135.05	2/4/10	13:41	128.18	6.87	2.27
MW-10(dg)	135.05	8/4/10	13:05	126.31	8.74	1.87
MW-10(dg)	135.05	2/3/11	13:35	127.31	7.74	-1.00
MW-10(dg)	135.05	4/14/11	13:54	126.50	8.55	0.81
MW-10(dg)	135.05	8/4/11	15:20	125.43	9.62	1.07
MW-10(dg)	135.05	2/20/12	11:52	124.92	10.13	0.51
MW-10(dg)	135.05	8/1/12	14:55	125.30	9.75	-0.38
MW-10(dg)	135.05	2/13/13	10:44	125.60	9.45	-0.30
EW-11	114.73	2/1/08	9:44	108.03	6.70	37.21
EW-11	114.73	8/6/08	14:02	106.18	8.55	1.85

**APPENDIX D
HISTORICAL WATER LEVEL MEASUREMENTS
TSA/SGA MONITORING WELLS JANUARY 2008 THROUGH PRESENT**

Well ID	Measuring Point Elevation (ft, MSL)	Date	Time	Depth to Water (ft,MPE)	Groundwater Elevation (ft, MSL)	Change in Water Level (ft)
EW-11	114.73	2/4/09	10:46	104.98	9.75	1.20
EW-11	114.73	8/5/09	10:18	103.62	11.11	1.36
CONVERTED TO MONITORING WELL NOVEMBER 3, 2009						
EW-11	114.73	2/4/10	10:04	102.79	11.94	0.83
EW-11	114.73	8/4/10	11:07	99.81	14.92	2.98
EW-11	114.73	2/3/11	11:50	98.65	16.08	1.16
EW-11	114.73	4/14/11	11:25	97.44	17.29	1.21
EW-11	114.73	8/4/11	10:15	94.85	19.88	2.59
EW-11	114.73	2/20/12	10:12	98.58	16.15	-3.73
EW-11	114.73	8/1/12	12:54	97.77	16.96	0.81
EW-11	114.73	2/14/13	14:52	96.54	18.19	1.23
EW-12	94.14	2/1/08	9:45	93.13	1.01	16.08
EW-12	94.14	8/6/08	14:28	92.72	1.42	0.41
EW-12	94.14	2/4/09	10:06	90.05	4.09	2.67
CONVERTED TO MONITORING WELL MARCH 11, 2009						
EW-12	94.14	8/5/09	10:39	86.72	7.42	3.33
EW-12	94.14	2/4/10	11:08	85.89	8.25	0.83
EW-12	94.14	8/4/10	8:26	82.44	11.70	3.45
EW-12	94.14	2/3/11	9:30	81.85	12.29	0.59
EW-12	94.14	4/14/11	9:00	84.05	10.09	-2.20
EW-12	94.14	8/4/11	8:49	83.44	10.70	0.61
EW-12	94.14	2/20/12	12:12	83.54	10.60	-0.10
EW-12	94.14	8/1/12	10:52	81.55	12.59	1.99
EW-12	94.14	2/13/13	9:18	82.54	11.60	-0.99
EW-13	103.59	1/15/08	8:00	146.10	-42.51	6.50
EW-13	103.59	2/22/08	13:00	114.55	-10.96	31.55
EW-13	103.59	3/6/08	11:15	133.70	-30.11	-19.15
EW-13	103.59	4/14/08	10:50	114.95	-11.36	18.75
EW-13	103.59	5/2/08	10:07	122.40	-18.81	-7.45
EW-13	103.59	6/10/08	7:55	122.70	-19.11	-0.30
EW-13	103.59	7/7/08	12:15	148.65	-45.06	-25.95
EW-13	103.59	8/6/08	14:35	143.80	-40.21	4.85
EW-13	103.59	9/9/08	11:47	146.32	-42.73	-2.52
EW-13	103.59	10/1/08	9:13	148.71	-45.12	-2.39
EW-13	103.59	11/17/08	15:48	143.44	-39.85	5.27
EW-13	103.59	12/15/08	11:59	144.34	-40.75	-0.90
EW-13	103.59	1/14/09	10:20	132.76	-29.17	11.58
EW-13	103.59	2/18/09	10:40	130.50	-26.91	2.26
EW-13	103.59	3/10/09	10:25	130.88	-27.29	-0.38
EW-13	103.59	4/8/09	10:05	132.98	-29.39	-2.10
EW-13	103.59	5/4/09	12:10	132.74	-29.15	0.24
EW-13	103.59	6/2/09	10:00	132.56	-28.97	0.18
EW-13	103.59	7/13/09	11:33	133.59	-30.00	-1.03
EW-13	103.59	8/3/09	11:30	134.68	-31.09	-1.09
EW-13	103.59	9/1/09	10:45	135.05	-31.46	-0.37
EW-13	103.59	10/6/09	11:30	135.41	-31.82	-0.36
EW-13	103.59	11/2/09	10:10	147.60	-44.01	-12.19
PILOT SHUTDOWN NOVEMBER 25, 2009						
EW-13	103.59	12/9/09	11:45	100.36	3.23	47.24
EW-13	103.59	1/5/10	12:55	96.62	6.97	3.74
EW-13	103.59	2/2/10	13:45	94.65	8.94	1.97
EW-13	103.59	3/3/10	10:40	93.81	9.78	0.84
EW-13	103.59	8/2/10	12:45	92.41	11.18	1.40
EW-13	103.59	2/4/11	12:26	96.10	7.49	-3.69
EW-13	103.59	4/14/11	12:58	92.01	11.58	4.09
EW-13	103.59	8/1/11	11:28	91.61	11.98	0.40
EW-13	103.59	2/22/12	12:34	93.60	9.99	-1.99

**APPENDIX D
HISTORICAL WATER LEVEL MEASUREMENTS
TSA/SGA MONITORING WELLS JANUARY 2008 THROUGH PRESENT**

Well ID	Measuring Point Elevation (ft, MSL)	Date	Time	Depth to Water (ft,MPE)	Groundwater Elevation (ft, MSL)	Change in Water Level (ft)
CONVERTED TO MONITORING WELL AUGUST 1, 2012						
EW-13	103.59	8/1/12	12:30	90.02	13.57	3.58
EW-13	103.59	2/1/13	11:08	90.49	13.10	-0.47
MW-14R(ds)	83.48	3/3/08	10:20	65.84	17.64	2.35
MW-14R(ds)	83.48	5/1/08	10:15	65.81	17.67	0.03
MW-14R(ds)	83.48	7/1/08	8:45	65.17	18.31	0.64
MW-14R(ds)	83.48	9/2/08	NM	NM	NM	NM
MW-14R(ds)	83.48	11/3/08	11:45	67.15	16.33	-1.98
MW-14R(ds)	83.48	1/5/09	10:30	66.94	16.54	0.21
MW-14R(ds)	83.48	3/23/09	9:40	66.65	16.83	0.29
MW-14R(ds)	83.48	5/6/09	12:40	65.58	17.90	1.07
MW-14R(ds)	83.48	7/2/09	11:35	64.11	19.37	1.47
MW-14R(ds)	83.48	2/4/10	10:31	64.39	19.09	-0.28
MW-14R(ds)	83.48	8/4/10	9:34	61.47	22.01	2.92
MW-14R(ds)	83.48	2/3/11	10:10	61.20	22.28	0.27
MW-14R(ds)	83.48	4/14/11	12:01	59.52	23.96	1.68
MW-14R(ds)	83.48	8/4/11	9:10	58.88	24.60	0.64
MW-14R(ds)	83.48	2/20/12	9:22	61.32	22.16	-2.44
MW-14R(ds)	83.48	8/1/12	11:23	59.49	23.99	1.83
MW-14R(ds)	83.48	2/13/13	12:25	60.14	23.34	-0.65
MW-14R(dg)	82.88	2/1/08	14:05	67.15	15.73	9.76
MW-14R(dg)	82.88	8/6/08	14:40	75.29	7.59	-8.14
MW-14R(dg)	82.88	2/4/09	11:16	72.75	10.13	2.54
MW-14R(dg)	82.88	8/5/09	9:54	71.98	10.90	0.77
WELL DECOMMISSIONED MARCH 1, 2010						
EW-15	116.21	1/3/08	12:15	145.46	-29.25	3.82
EW-15	116.21	2/1/08	9:53	156.84	-40.63	-11.38
EW-15	116.21	3/7/08	13:28	148.21	-32.00	8.63
EW-15	116.21	4/4/08	10:25	146.21	-30.00	2.00
EW-15	116.21	5/1/08	12:20	149.84	-33.63	-3.63
EW-15	116.21	6/6/08	12:17	153.86	-37.65	-4.02
EW-15	116.21	7/2/08	10:00	152.46	-36.25	1.40
EW-15	116.21	8/8/08	9:15	152.14	-35.93	0.32
EW-15	116.21	9/5/08	10:41	153.76	-37.55	-1.62
EW-15	116.21	10/2/08	8:51	152.96	-36.75	0.80
EW-15	116.21	11/5/08	9:06	151.68	-35.47	1.28
EW-15	116.21	12/3/08	8:44	151.71	-35.50	-0.03
EW-15	116.21	1/7/09	10:21	151.74	-35.53	-0.03
EW-15	116.21	2/4/09	10:50	147.48	-31.27	4.26
EW-15	116.21	3/6/09	10:50	146.71	-30.50	0.77
EW-15	116.21	4/3/09	10:17	151.81	-35.60	-5.10
EW-15	116.21	5/6/09	12:23	151.11	-34.90	0.70
EW-15	116.21	6/5/09	9:45	78.80	37.41	72.31
EW-15	116.21	7/2/09	11:20	152.68	-36.47	-73.88
EW-15	116.21	8/7/09	13:38	152.45	-36.24	0.23
EW-15	116.21	9/4/09	11:28	90.11	26.10	62.34
EW-15	116.21	10/2/09	9:26	143.11	-26.90	-53.00
EW-15	116.21	11/6/09	10:52	143.81	-27.60	-0.70
EW-15	116.21	12/3/09	11:06	141.85	-25.64	1.96
EW-15	116.21	1/8/10	10:15	141.29	-25.08	0.56
EW-15	116.21	2/4/10	10:07	142.63	-26.42	-1.34
EW-15	116.21	4/2/10	12:37	139.80	-23.59	1.06
PILOT SHUTDOWN APRIL 12, 2010						
EW-15	116.21	8/4/10	10:59	68.98	47.23	70.82
EW-15	116.21	2/3/11	11:41	65.92	50.29	3.06
EW-15	116.21	4/14/11	11:34	65.16	51.05	0.76
EW-15	116.21	8/4/11	9:51	67.89	48.32	-2.73

**APPENDIX D
HISTORICAL WATER LEVEL MEASUREMENTS
TSA/SGA MONITORING WELLS JANUARY 2008 THROUGH PRESENT**

Well ID	Measuring Point Elevation (ft, MSL)	Date	Time	Depth to Water (ft,MPE)	Groundwater Elevation (ft, MSL)	Change in Water Level (ft)
EW-15	116.21	2/20/12	10:19	67.51	48.70	0.38
CONVERTED TO MONITORING WELL AUGUST 1, 2012						
EW-15	116.21	8/1/12	13:08	66.28	49.93	1.23
EW-15	116.21	2/13/13	11:16	65.41	50.80	0.87
MW-17(ds)	121.89	2/1/08	14:35	>108.40	<13.49	—
MW-17(ds)	121.89	8/6/08	8:10	>108.40	<13.49	—
MW-17(ds)	121.89	2/4/09	9:50	>108.40	<13.49	—
MW-17(ds)	121.89	8/5/09	9:30	>108.40	<13.49	—
MW-17(ds)	121.89	2/4/10	11:26	107.08	14.81	—
MW-17(ds)	121.89	3/10/10	13:45	107.77	14.12	-0.69
MW-17(ds)	121.89	4/7/10	11:00	107.50	14.39	0.27
MW-17(ds)	121.89	5/5/10	13:37	106.82	15.07	0.68
MW-17(ds)	121.89	6/3/10	8:50	105.41	16.48	1.41
MW-17(ds)	121.89	7/7/10	9:15	105.03	16.86	0.38
MW-17(ds)	121.89	8/4/10	8:15	104.91	16.98	0.12
MW-17(ds)	121.89	9/1/10	9:30	104.51	17.38	0.40
MW-17(ds)	121.89	10/5/10	8:15	104.83	17.06	-0.32
MW-17(ds)	121.89	11/3/10	11:10	104.51	17.38	0.32
MW-17(ds)	121.89	12/6/10	12:35	104.58	17.31	-0.07
MW-17(ds)	121.89	1/12/11	10:12	104.94	16.95	-0.36
MW-17(ds)	121.89	2/3/11	9:20	104.37	17.52	0.57
MW-17(ds)	121.89	3/2/11	9:51	103.72	18.17	0.65
MW-17(ds)	121.89	4/6/11	10:28	103.49	18.40	0.23
MW-17(ds)	121.89	4/14/11	8:28	103.74	18.15	-0.25
MW-17(ds)	121.89	5/9/11	11:13	103.36	18.53	0.38
MW-17(ds)	121.89	6/9/11	9:15	103.04	18.85	0.32
MW-17(ds)	121.89	7/13/11	9:25	102.50	19.39	0.54
MW-17(ds)	121.89	8/4/11	12:35	102.31	19.58	0.19
MW-17(ds)	121.89	9/7/11	10:15	102.78	19.11	-0.47
MW-17(ds)	121.89	10/12/2011	10:50	102.69	19.20	0.09
MW-17(ds)	121.89	11/9/2011	9:20	102.58	19.31	0.11
MW-17(ds)	121.89	12/19/2011	11:35	102.84	19.05	-0.26
MW-17(ds)	121.89	1/11/12	10:38	102.98	18.91	-0.14
MW-17(ds)	121.89	2/20/12	12:36	102.60	19.29	0.38
MW-17(ds)	121.89	3/28/12	10:25	102.53	19.36	0.07
MW-17(ds)	121.89	4/18/12	9:23	102.39	19.50	0.14
MW-17(ds)	121.89	5/2/12	9:15	102.26	19.63	0.13
MW-17(ds)	121.89	6/6/12	13:40	102.11	19.78	0.15
MW-17(ds)	121.89	7/11/12	9:43	102.40	19.49	-0.29
MW-17(ds)	121.89	8/1/12	10:28	102.32	19.57	0.08
MW-17(ds)	121.89	9/4/12	11:20	102.02	19.87	0.30
MW-17(ds)	121.89	10/8/12	9:30	102.41	19.48	-0.39
MW-17(ds)	121.89	11/7/12	10:55	102.48	19.41	-0.07
PROPOSED FOR DECREASE TO QTRLY SPLG IN TSA FALL SA RPT 11-23-12						
MW-17(ds)	121.89	12/5/12	10:36	102.36	19.53	0.12
MW-17(ds)	121.89	1/10/13	10:45	102.72	19.17	-0.36
MW-17(ds)	121.89	2/13/13	8:50	102.68	19.21	0.04
MW-17(ds)	121.89	3/13/13	10:30	102.76	19.13	-0.08
MW-17(ds)	121.89	5/8/13	9:05	102.20	19.69	0.56
MW-18(ds)	117.66	2/1/08	11:10	>111.50	<6.16	—
MW-18(ds)	117.66	8/6/08	10:23	>111.50	<6.16	—
MW-18(ds)	117.66	2/4/09	11:05	>111.50	<6.16	—
MW-18(ds)	117.66	8/5/09	11:55	>111.50	<6.16	—
MW-18(ds)	117.66	2/4/10	10:37	107.55	10.11	—
MW-18(ds)	117.66	8/4/10	13:35	104.23	13.43	3.32
MW-18(ds)	117.66	2/3/11	9:58	104.06	13.60	0.17
MW-18(ds)	117.66	4/14/11	12:19	103.40	14.26	0.66

**APPENDIX D
HISTORICAL WATER LEVEL MEASUREMENTS
TSA/SGA MONITORING WELLS JANUARY 2008 THROUGH PRESENT**

Well ID	Measuring Point Elevation (ft, MSL)	Date	Time	Depth to Water (ft,MPE)	Groundwater Elevation (ft, MSL)	Change in Water Level (ft)
MW-18(ds)	117.66	8/4/11	14:31	101.85	15.81	1.55
MW-18(ds)	117.66	11/9/11	11:50	102.12	15.54	-0.27
MW-18(ds)	117.66	12/19/11	12:26	102.45	15.21	-0.33
MW-18(ds)	117.66	2/20/12	12:46	102.85	14.81	-0.40
MW-18(ds)	117.66	3/28/12	12:15	102.14	15.52	0.71
MW-18(ds)	117.66	4/18/12	11:25	101.98	15.68	0.16
MW-18(ds)	117.66	5/2/12	12:40	101.36	16.30	0.62
MW-18(ds)	117.66	6/6/12	15:00	101.30	16.36	0.06
MW-18(ds)	117.66	7/11/12	11:40	101.91	15.75	-0.61
MW-18(ds)	117.66	8/1/12	11:14	101.67	15.99	0.24
MW-18(ds)	117.66	9/4/12	13:45	101.81	15.85	-0.14
MW-18(ds)	117.66	10/8/12	12:15	102.11	15.55	-0.30
MW-18(ds)	117.66	11/7/12	13:00	102.27	15.39	-0.16
PROPOSED FOR DECREASE TO QTRLY SMLPG IN TSA FALL SA RPT 11-23-12						
MW-18(ds)	117.66	12/5/12	10:30	102.92	14.74	-0.65
MW-18(ds)	117.66	1/10/13	13:35	102.40	15.26	0.52
MW-18(ds)	117.66	2/13/13	12:41	102.31	15.35	0.09
MW-18(ds)	117.66	3/13/13	12:40	102.40	15.26	-0.09
MW-18(ds)	117.66	5/8/13	11:50	101.84	15.82	0.56
MW-19(ds)	144.08	2/1/08	13:15	139.80	4.28	-1.35
MW-19(ds)	144.08	8/6/08	10:55	136.85	7.23	2.95
MW-19(ds)	144.08	2/4/09	12:41	136.25	7.83	0.60
MW-19(ds)	144.08	8/5/09	13:10	134.42	9.66	1.83
MW-19(ds)	144.08	2/4/10	12:14	133.65	10.43	0.77
MW-19(ds)	144.08	3/10/10	15:40	133.80	10.28	-0.15
MW-19(ds)	144.08	4/7/10	13:00	133.45	10.63	0.35
MW-19(ds)	144.08	5/5/10	11:50	132.69	11.39	0.76
MW-19(ds)	144.08	6/3/10	11:00	132.81	11.27	-0.12
MW-19(ds)	144.08	7/7/10	11:20	130.97	13.11	1.84
MW-19(ds)	144.08	8/4/10	11:31	131.15	12.93	-0.18
MW-19(ds)	144.08	9/1/10	10:40	131.18	12.90	-0.03
MW-19(ds)	144.08	10/5/10	10:50	131.69	12.39	-0.51
MW-19(ds)	144.08	11/3/10	15:10	130.81	13.27	0.88
MW-19(ds)	144.08	12/6/10	15:10	130.48	13.60	0.33
MW-19(ds)	144.08	1/12/11	12:15	130.13	13.95	0.35
MW-19(ds)	144.08	2/3/11	13:02	130.25	13.83	-0.12
MW-19(ds)	144.08	3/2/11	11:35	130.47	13.61	-0.22
MW-19(ds)	144.08	4/6/11	13:00	130.41	13.67	0.06
MW-19(ds)	144.08	4/14/11	13:20	130.20	13.88	0.21
MW-19(ds)	144.08	5/9/11	13:36	130.34	13.74	-0.14
MW-19(ds)	144.08	6/9/11	12:10	129.96	14.12	0.38
MW-19(ds)	144.08	7/13/11	11:30	129.38	14.70	0.58
MW-19(ds)	144.08	8/4/11	15:02	129.37	14.71	0.01
MW-19(ds)	144.08	9/7/11	12:10	129.37	14.71	0.00
MW-19(ds)	144.08	10/12/2011	12:20	129.29	14.79	0.08
MW-19(ds)	144.08	11/9/2011	12:30	129.54	14.54	-0.25
MW-19(ds)	144.08	12/19/2011	13:00	129.78	14.30	-0.24
MW-19(ds)	144.08	1/11/12	12:35	130.11	13.97	-0.33
MW-19(ds)	144.08	2/20/12	11:21	129.78	14.30	0.33
MW-19(ds)	144.08	3/28/12	12:45	129.61	14.47	0.17
MW-19(ds)	144.08	4/18/12	11:45	129.42	14.66	0.19
MW-19(ds)	144.08	5/2/12	11:50	129.25	14.83	0.17
MW-19(ds)	144.08	6/6/12	15:25	128.98	15.10	0.27
MW-19(ds)	144.08	7/11/12	12:10	130.03	14.05	-1.05
MW-19(ds)	144.08	8/1/12	12:32	128.31	15.77	1.72
MW-19(ds)	144.08	11/7/12	12:50	128.30	15.78	0.01
MW-19(ds)	144.08	2/13/13	10:22	128.29	15.79	0.01
MW-19(ds)	144.08	5/8/13	13:30	127.91	16.17	0.38

**APPENDIX D
HISTORICAL WATER LEVEL MEASUREMENTS
TSA/SGA MONITORING WELLS JANUARY 2008 THROUGH PRESENT**

Well ID	Measuring Point Elevation (ft, MSL)	Date	Time	Depth to Water (ft,MPE)	Groundwater Elevation (ft, MSL)	Change in Water Level (ft)
MW-20(ds)	152.72	2/1/08	13:53	152.38	0.34	-0.50
MW-20(ds)	152.72	8/6/08	13:21	149.49	3.23	2.89
MW-20(ds)	152.72	2/4/09	12:20	148.42	4.30	1.07
MW-20(ds)	152.72	8/5/09	12:54	156.10	-3.38	-7.68
MW-20(ds)	152.72	2/4/10	11:58	144.06	8.66	12.04
MW-20(ds)	152.72	8/4/10	11:43	141.55	11.17	2.51
MW-20(ds)	152.72	2/3/11	12:35	140.63	12.09	0.92
MW-20(ds)	152.72	4/14/11	12:47	141.24	11.48	-0.61
MW-20(ds)	152.72	8/4/11	15:36	139.66	13.06	1.58
MW-20(ds)	152.72	2/20/12	10:51	139.37	13.35	0.29
MW-20(ds)	152.72	8/1/12	12:23	138.06	14.66	1.31
MW-20(ds)	152.72	2/13/13	9:59	139.00	13.72	-0.94
MW-20(dg)	152.86	5/2/07	13:39	158.98	-6.12	0.96
WELL DECOMMISSIONED MARCH 2, 2010						
EW-22	81.45	1/15/08	13:30	116.25	-34.80	-31.65
EW-22	81.45	2/22/08	13:45	116.40	-34.95	-0.15
EW-22	81.45	3/6/08	11:45	117.90	-36.45	-1.50
EW-22	81.45	4/14/08	10:35	115.98	-34.53	1.92
EW-22	81.45	5/2/08	10:05	129.80	-48.35	-13.82
EW-22	81.45	6/10/08	11:45	128.68	-47.23	1.12
EW-22	81.45	7/7/08	12:25	132.20	-50.75	-3.52
EW-22	81.45	8/6/08	13:13	135.00	-53.55	-2.80
EW-22	81.45	9/9/08	11:00	145.21	-63.76	-10.21
EW-22	81.45	10/1/08	11:23	150.62	-69.17	-5.41
EXTRACTION PERMANENTLY CEASED ON OCTOBER 29, 2008						
EW-22	81.45	11/17/08	12:37	76.13	5.32	74.49
EW-22	81.45	12/15/08	13:19	77.66	3.79	-1.53
EW-22	81.45	1/14/09	9:25	76.12	5.33	1.54
EW-22	81.45	2/18/09	11:25	74.03	7.42	2.09
EW-22	81.45	3/10/09	9:06	73.74	7.71	0.29
EW-22	81.45	4/8/09	9:00	73.17	8.28	0.57
EW-22	81.45	5/4/09	11:00	71.70	9.75	1.47
CONVERTED TO MONITORING WELL MAY 4, 2009						
EW-22	81.45	6/2/09	8:25	71.11	10.34	0.59
EW-22	81.45	7/13/09	10:20	71.92	9.53	-0.81
EW-22	81.45	8/3/09	9:55	73.48	7.97	-1.56
EW-22	81.45	9/1/09	10:05	72.84	8.61	0.64
EW-22	81.45	11/2/09	8:42	78.22	3.23	-5.38
EW-22	81.45	2/2/10	12:10	69.30	12.15	8.92
WELL DECOMMISSIONED MARCH 26, 2010						
MW-22(dg)	81.65	2/1/08	9:23	70.78	10.87	-0.23
MW-22(dg)	81.65	8/6/08	15:18	72.61	9.04	-1.83
MW-22(dg)	81.65	2/4/09	11:28	70.68	10.97	1.93
MW-22(dg)	81.65	8/5/09	9:59	68.92	12.73	1.76
MW-22(dg)	81.65	2/4/10	10:26	66.94	14.71	1.98
MW-22(dg)	81.65	8/4/10	9:50	62.95	18.70	3.99
MW-22(dg)	81.65	2/3/11	9:20	62.45	19.20	0.50
MW-22(dg)	81.65	4/14/11	8:35	51.26	30.39	11.19
MW-22(dg)	81.65	8/4/11	9:16	62.28	19.37	-11.02
MW-22(dg)	81.65	2/20/12	9:28	63.32	18.33	-1.04
MW-22(dg)	81.65	8/1/12	11:38	56.05	25.60	7.27
MW-22(dg)	81.65	2/13/13	9:56	61.98	19.67	-5.93
MW-24(dg) (EW-5)	77.74	2/4/09	11:40	69.44	8.30	1.82
MW-24(dg) (EW-5)	77.74	8/5/09	9:40	65.78	11.96	3.66

**APPENDIX D
HISTORICAL WATER LEVEL MEASUREMENTS
TSA/SGA MONITORING WELLS JANUARY 2008 THROUGH PRESENT**

Well ID	Measuring Point Elevation (ft, MSL)	Date	Time	Depth to Water (ft,MPE)	Groundwater Elevation (ft, MSL)	Change in Water Level (ft)
MW-24(dg) (EW-5)	77.74	2/4/10	11:43	63.44	14.30	2.34
MW-24(dg) (EW-5)	77.74	8/4/10	10:25	60.64	17.10	2.80
MW-24(dg) (EW-5)	77.74	2/3/11	11:18	59.77	17.97	0.87
MW-24(dg) (EW-5)	77.74	4/14/11	9:38	61.18	16.56	-1.41
MW-24(dg) (EW-5)	77.74	8/4/11	14:21	62.08	15.66	-0.90
MW-24(dg) (EW-5)	77.74	2/20/12	10:38	65.29	12.45	-3.21
MW-24(dg) (EW-5)	77.74	8/1/12	14:13	61.38	16.36	3.91
MW-24(dg) (EW-5)	77.74	2/13/13	12:06	61.95	15.79	-0.57
MW-25(dg)	75.28	2/1/08	14:17	70.11	5.17	5.26
MW-25(dg)	75.28	8/6/08	13:48	70.90	4.38	-0.79
MW-25(dg)	75.28	2/4/09	11:52	68.44	6.84	2.46
MW-25(dg)	75.28	8/5/09	13:11	65.97	9.31	2.47
MW-25(dg)	75.28	2/4/10	11:53	64.91	10.37	1.06
MW-25(dg)	75.28	8/4/10	10:11	62.97	12.31	1.94
MW-25(dg)	75.28	2/3/11	10:58	61.10	14.18	1.87
MW-25(dg)	75.28	4/14/11	10:53	61.70	13.58	-0.60
MW-25(dg)	75.28	8/4/11	14:05	62.00	13.28	-0.30
MW-25(dg)	75.28	2/20/12	10:40	62.91	12.37	-0.91
MW-25(dg)	75.28	8/1/12	13:57	60.69	14.59	2.22
MW-25(dg)	75.28	2/13/13	11:43	61.05	14.23	-0.36
MW-26(dg)	108.98	2/1/08	10:10	100.21	8.77	1.62
MW-26(dg)	108.98	8/6/08	15:34	100.05	8.93	0.16
MW-26(dg)	108.98	2/4/09	11:14	98.81	10.17	1.24
MW-26(dg)	108.98	8/5/09	10:27	98.18	10.80	0.63
MW-26(dg)	108.98	2/4/10	9:58	96.72	12.26	1.46
MW-26(dg)	108.98	8/4/10	12:33	95.34	13.64	1.38
MW-26(dg)	108.98	2/3/11	9:47	94.04	14.94	1.30
MW-26(dg)	108.98	4/14/11	9:00	92.76	16.22	1.28
MW-26(dg)	108.98	8/4/11	10:37	93.24	15.74	-0.48
MW-26(dg)	108.98	2/20/12	9:53	93.67	15.31	-0.43
MW-26(dg)	108.98	8/1/12	13:29	92.52	16.46	1.15
MW-26(dg)	108.98	2/13/13	9:20	92.49	16.49	0.03
MW-36(dg)	78.84	2/1/08	9:34	64.95	13.89	5.80
MW-36(dg)	78.84	8/6/08	14:20	68.61	10.23	-3.66
MW-36(dg)	78.84	2/4/09	10:40	66.45	12.39	2.16
MW-36(dg)	78.84	8/5/09	10:08	66.44	12.40	0.01
MW-36(dg)	78.84	2/4/10	10:18	63.68	15.16	2.76
MW-36(dg)	78.84	8/4/10	8:30	62.36	16.48	1.32
MW-36(dg)	78.84	2/3/11	9:24	60.97	17.87	1.39
MW-36(dg)	78.84	4/14/11	8:43	58.00	20.84	2.97
MW-36(dg)	78.84	8/4/11	10:29	61.49	17.35	-3.49
MW-36(dg)	78.84	2/20/12	13:15	62.64	16.20	-1.15
MW-36(dg)	78.84	8/1/12	10:56	60.78	18.06	1.86
MW-36(dg)	78.84	2/13/13	9:03	59.29	19.55	1.49
Interlachen W (PMX-167)	44.84	2/1/08	10:56	30.34	14.50	5.13
Interlachen W (PMX-167)	44.84	8/6/08	16:46	34.56	10.28	-4.22
Interlachen W (PMX-167)	44.84	2/4/09	13:33	34.40	10.44	0.16
Interlachen W (PMX-167)	44.84	8/5/09	10:52	33.45	11.39	0.95
Interlachen W (PMX-167)	44.84	2/4/10	9:40	27.37	17.47	6.08
Interlachen W (PMX-167)	44.84	8/4/10	12:37	32.58	12.26	-5.21
Interlachen W (PMX-167)	44.84	2/3/11	12:55	32.58	12.26	0.00
Interlachen W (PMX-167)	44.84	4/14/11	12:20	9.46	35.38	23.12
Interlachen W (PMX-167)	44.84	8/4/11	12:27	32.34	12.50	-22.88
Interlachen W (PMX-167)	44.84	2/20/12	12:45	36.21	8.63	-3.87
Interlachen W (PMX-167)	44.84	8/1/12	14:38	32.28	12.56	3.93

**APPENDIX D
HISTORICAL WATER LEVEL MEASUREMENTS
TSA/SGA MONITORING WELLS JANUARY 2008 THROUGH PRESENT**

Well ID	Measuring Point Elevation (ft, MSL)	Date	Time	Depth to Water (ft,MPE)	Groundwater Elevation (ft, MSL)	Change in Water Level (ft)
Interlachen W (PMX-167)	44.84	2/13/13	13:51	32.81	12.03	-0.53
Andrews (PMX-196)	89.27	2/1/08	10:05	79.11	10.16	2.40
Andrews (PMX-196)	89.27	8/6/08	15:42	79.49	9.78	-0.38
Andrews (PMX-196)	89.27	2/4/09	11:08	77.56	11.71	1.93
Andrews (PMX-196)	89.27	8/5/09	13:05	77.21	12.06	0.35
Andrews (PMX-196)	89.27	2/4/10	9:50	75.81	13.46	1.40
Andrews (PMX-196)	89.27	8/4/10	13:15	73.98	15.29	1.83
Andrews (PMX-196)	89.27	2/3/11	9:40	72.08	17.19	1.90
Andrews (PMX-196)	89.27	4/14/11	8:20	70.15	19.12	1.93
Andrews (PMX-196)	89.27	8/4/11	10:41	71.98	17.29	-1.83
Andrews (PMX-196)	89.27	2/20/12	13:32	72.64	16.63	-0.66
Andrews (PMX-196)	89.27	8/1/12	11:08	71.57	17.70	1.07
Andrews (PMX-196)	89.27	2/13/13	9:12	71.19	18.08	0.38
Udd (PMX-198)	117.54	2/1/08	9:57	110.99	6.55	3.38
Udd (PMX-198)	117.54	8/6/08	14:12	109.25	8.29	1.74
Udd (PMX-198)	117.54	2/4/09	10:56	107.85	9.69	1.40
Udd (PMX-198)	117.54	8/5/09	10:11	104.11	13.43	3.74
Udd (PMX-198)	117.54	2/4/10	10:12	104.98	12.56	-0.87
Udd (PMX-198)	117.54	8/4/10	13:00	102.70	14.84	2.28
Udd (PMX-198)	117.54	2/3/11	9:33	100.81	16.73	1.89
Udd (PMX-198)	117.54	4/14/11	11:15	100.36	17.18	0.45
Udd (PMX-198)	117.54	8/4/11	9:45	4.51	113.03	95.85
Udd (PMX-198)	117.54	2/20/12	13:26	24.11	93.43	-19.60
Udd (PMX-198)	117.54	8/1/12	13:16	4.92	112.62	19.19
Udd (PMX-198)	117.54	2/13/13	11:31	3.22	114.32	1.70
Sandy Mobile (208dg)	81.14	2/1/08	9:28	64.02	17.12	6.43
Sandy Mobile (208dg)	81.14	8/6/08	15:58	68.65	12.49	-4.63
Sandy Mobile (208dg)	81.14	2/4/09	10:36	65.19	15.95	3.46
Sandy Mobile (208dg)	81.14	8/5/09	10:04	65.78	15.36	-0.59
Sandy Mobile (208dg)	81.14	2/4/10	10:23	62.71	18.43	3.07
Sandy Mobile (208dg)	81.14	8/4/10	8:21	60.19	20.95	2.52
Sandy Mobile (208dg)	81.14	2/3/11	9:27	56.66	24.48	3.53
Sandy Mobile (208dg)	81.14	4/14/11	8:39	55.46	25.68	1.20
Sandy Mobile (208dg)	81.14	8/4/11	9:21	59.11	22.03	-3.65
Sandy Mobile (208dg)	81.14	2/20/12	9:34	59.60	21.54	-0.49
Sandy Mobile (208dg)	81.14	8/1/12	10:50	58.45	22.69	1.15
Sandy Mobile (208dg)	81.14	2/13/13	9:51	56.95	24.19	1.50
PWB-1(uts)	15.98	2/1/08	11:21	7.65	8.33	3.67
PWB-1(uts)	15.98	8/6/08	16:34	9.59	6.39	-1.94
PWB-1(uts)	15.98	2/4/09	11:48	7.34	8.64	2.25
PWB-1(uts)	15.98	8/5/09	11:11	6.61	9.37	0.73
PWB-1(uts)	15.98	2/4/10	9:10	5.38	10.60	1.23
PWB-1(uts)	15.98	8/4/10	11:59	5.08	10.90	0.30
PWB-1(uts)	15.98	2/3/11	12:06	5.63	10.35	-0.55
PWB-1(uts)	15.98	4/14/11	11:30	4.43	11.55	1.20
PWB-1(uts)	15.98	8/4/11	12:06	4.61	11.37	-0.18
PWB-1(uts)	15.98	2/20/12	12:16	5.66	10.32	-1.05
PWB-1(uts)	15.98	8/1/12	14:18	4.55	11.43	1.11
PWB-1(uts)	15.98	2/13/13	13:38	4.61	11.37	-0.06
PWB-1(lts)	16.48	2/1/08	11:25	8.27	8.21	6.22
PWB-1(lts)	16.48	8/6/08	16:30	10.25	6.23	4.24
PWB-1(lts)	16.48	2/4/09	11:50	7.86	8.62	0.41
PWB-1(lts)	16.48	8/5/09	11:08	7.26	9.22	0.60
PWB-1(lts)	16.48	2/4/10	9:08	5.85	10.63	1.41

**APPENDIX D
HISTORICAL WATER LEVEL MEASUREMENTS
TSA/SGA MONITORING WELLS JANUARY 2008 THROUGH PRESENT**

Well ID	Measuring Point Elevation (ft, MSL)	Date	Time	Depth to Water (ft,MPE)	Groundwater Elevation (ft, MSL)	Change in Water Level (ft)
PWB-1(lts)	16.48	8/4/10	11:50	5.65	10.83	0.20
PWB-1(lts)	16.48	2/3/11	12:10	5.04	11.44	0.61
PWB-1(lts)	16.48	4/14/11	11:37	4.87	11.61	0.17
PWB-1(lts)	16.48	8/4/11	12:03	4.78	11.70	0.09
PWB-1(lts)	16.48	2/20/12	12:12	6.03	10.45	-1.25
PWB-1(lts)	16.48	8/1/12	14:00	4.69	11.79	1.34
PWB-1(lts)	16.48	2/13/13	13:34	4.75	11.73	-0.06
PWB-2(lts)	44.32	2/1/08	11:01	31.06	13.26	3.96
PWB-2(lts)	44.32	8/6/08	16:47	33.66	10.66	-2.60
PWB-2(lts)	44.32	2/4/09	11:37	33.60	10.72	0.06
PWB-2(lts)	44.32	8/5/09	10:54	32.78	11.54	0.82
PWB-2(lts)	44.32	2/4/10	9:41	32.48	11.84	0.30
PWB-2(lts)	44.32	8/4/10	12:30	48.15	-3.83	-15.67
PWB-2(lts)	44.32	2/3/11	13:00	34.88	9.44	13.27
PWB-2(lts)	44.32	4/14/11	12:25	30.96	13.36	3.92
PWB-2(lts)	44.32	8/4/11	12:34	29.96	14.36	1.00
PWB-2(lts)	44.32	2/20/12	12:41	33.03	11.29	-3.07
PWB-2(lts)	44.32	8/1/12	14:44	31.76	12.56	1.27
PWB-2(lts)	44.32	2/13/13	13:47	32.78	11.54	-1.02
RPW-1(ds)	9.73	2/1/08	11:43	1.98	7.75	3.00
RPW-1(ds)	9.73	8/6/08	16:25	3.35	6.38	-1.37
RPW-1(ds)	9.73	2/4/09	11:41	2.98	6.75	0.37
RPW-1(ds)	9.73	8/5/09	11:00	0.06	9.67	2.92
RPW-1(ds)	9.73	2/4/10	9:02	0.04	9.69	0.02
RPW-1(ds)	9.73	8/4/10	12:12	0.19	9.54	-0.15
RPW-1(ds)	15.90	2/3/11	11:50	3.94	11.96	2.42
RPW-1(ds)	15.90	4/14/11	11:41	2.91	12.99	1.03
RPW-1(ds)	15.90	8/4/11	11:58	2.96	12.94	-0.05
RPW-1(ds)	15.90	2/20/12	12:05	3.92	11.98	-0.96
RPW-1(ds)	15.90	8/1/12	13:55	2.96	12.94	0.96
RPW-1(ds)	15.90	2/13/13	13:29	3.14	12.76	-0.18
RPW-2	51.10	02/01/08	14:10	44.71	6.39	3.93
WELL DECOMMISSIONED OCTOBER 2008						
CU2 Equivalent Well (a)						
BOP-69(usg)	77.73	2/1/08	16:09	74.46	3.27	5.78
BOP-69(usg)	77.73	8/6/08	17:25	76.49	1.24	-2.03
BOP-69(usg)	77.73	2/4/09	13:23	71.65	6.08	4.84
WELL DECOMMISSIONED MAY 24, 2012						
SGA Monitoring Wells						
BOP-44(usg)	34.25	2/1/08	15:38	29.42	4.83	1.21
BOP-44(usg)	34.25	8/6/08	17:34	43.68	-9.43	-14.26
BOP-44(usg)	34.25	2/4/09	13:42	35.50	-1.25	8.18
BOP-44(usg)	34.25	8/5/09	13:19	46.64	-12.39	-11.14
BOP-44(usg)	34.25	2/4/10	12:19	29.09	5.16	17.55
BOP-44(usg)	34.25	8/4/10	8:53	39.54	-5.29	-10.45
BOP-44(usg)	34.25	2/3/11	10:05	66.14	-31.89	-26.60
BOP-44(usg)	34.25	4/14/11	9:20	26.22	8.03	39.92
BOP-44(usg)	34.25	8/4/11	10:47	34.26	-0.01	-8.04
BOP-44(usg)	34.25	2/20/12	10:26	33.68	0.57	0.58
BOP-44(usg)	34.25	8/1/12	11:28	28.21	6.04	5.47
BOP-44(usg)	34.25	2/13/13	10:12	24.48	9.77	3.73
BOP-68(usg)	76.18	2/1/08	16:38	70.93	5.25	28.19
BOP-68(usg)	76.18	8/6/08	17:17	84.60	-8.42	-13.67

**APPENDIX D
HISTORICAL WATER LEVEL MEASUREMENTS
TSA/SGA MONITORING WELLS JANUARY 2008 THROUGH PRESENT**

Well ID	Measuring Point Elevation (ft, MSL)	Date	Time	Depth to Water (ft,MPE)	Groundwater Elevation (ft, MSL)	Change in Water Level (ft)
BOP-68(usg)	76.18	2/4/09	13:01	74.37	1.81	10.23
BOP-68(usg)	76.18	8/5/09	13:43	87.71	-11.53	-13.34
BOP-68(usg)	76.18	2/4/10	13:03	70.29	5.89	17.42
BOP-68(usg)	76.18	8/4/10	9:50	80.15	-3.97	-9.86
BOP-68(usg)	76.18	2/3/11	10:21	112.62	-36.44	-32.47
BOP-68(usg)	76.18	4/14/11	9:27	67.75	8.43	44.87
BOP-68(usg)	76.18	8/4/11	11:03	75.35	0.83	-7.60
BOP-68(usg)	76.18	2/20/12	10:56	75.59	0.59	-0.24
BOP-68(usg)	76.18	8/1/12	12:11	69.08	7.10	6.51
WELL DECOMMISSIONED SEPTEMBER 5, 2012						
EMC-2(usg)	47.15	2/1/08	10:29	40.69	6.46	18.90
EMC-2(usg)	47.15	8/6/08	14:55	48.87	-1.72	-8.18
EMC-2(usg)	47.15	2/4/09	11:26	43.02	4.13	5.85
EMC-2(usg)	47.15	8/5/09	10:45	52.09	-4.94	-9.07
EMC-2(usg)	47.15	2/4/10	9:44	39.66	7.49	12.43
EMC-2(usg)	47.15	8/4/10	12:50	47.25	-0.10	-7.59
EMC-2(usg)	47.15	2/3/11	13:11	59.43	-12.28	-12.18
EMC-2(usg)	47.15	4/14/11	12:40	36.61	10.54	22.82
EMC-2(usg)	47.15	8/4/11	12:24	42.75	4.40	-6.14
EMC-2(usg)	47.15	2/20/12	12:53	42.35	4.80	0.40
EMC-2(usg)	47.15	8/1/12	14:30	39.40	7.75	2.95
EMC-2(usg)	47.15	2/13/13	14:01	36.41	10.74	2.99
PWB-1(usg)	16.59	2/1/08	11:31	10.92	5.67	24.21
PWB-1(usg)	16.59	8/6/08	16:32	22.95	-6.36	-12.03
PWB-1(usg)	16.59	2/4/09	11:51	14.84	1.75	8.11
PWB-1(usg)	16.59	8/5/09	11:06	25.61	-9.02	-10.77
PWB-1(usg)	16.59	2/4/10	9:06	10.37	6.22	15.24
PWB-1(usg)	16.59	8/4/10	11:54	19.32	-2.73	-8.95
PWB-1(usg)	16.59	2/3/11	12:01	46.17	-29.58	-26.85
PWB-1(usg)	16.59	4/14/11	11:34	7.35	9.24	38.82
PWB-1(usg)	16.59	8/4/11	12:04	14.32	2.27	-6.97
PWB-1(usg)	16.59	2/20/12	12:14	14.33	2.26	-0.01
PWB-1(usg)	16.59	8/1/12	14:05	9.58	7.01	4.75
PWB-1(usg)	16.59	2/13/13	13:36	6.54	10.05	3.04
SGA EXTRACTION WELL						
(a) Positive value indicates increase in water level.						
NOTES:						
ft,MSL = feet with respect to mean sea level; ft,MPE = feet below measuring point elevation.						
NM = not measured; NR = not recorded; NA = not accessible.						
TSA MONITORING WELLS						
(a) BOP-69 (usg) is screened within a lithologic facies of Confining Unit 2 and has been reclassified from its former SGA designation.						
NOTES:						
ft,MSL = feet with respect to mean sea level; ft,MPE = feet below measuring point elevation.						
NM = not measured; NR = not recorded; NA = not accessible.						

TECHNICAL MEMORANDUM

TO: Chris Kimmel, Project Manager

FROM: Terry McGourty and Anne Halvorsen

DATE: March 5, 2013

**RE: BOEING PORTLAND (TSA)
FOURTH QUARTER 2012 GROUNDWATER QUALITY SAMPLING
LABORATORY DATA QUALITY EVALUATION**

This technical memorandum provides the results of a focused data validation associated with 3 groundwater samples collected during the fourth quarter 2012 TSA water quality sampling event at Boeing Portland. Samples were analyzed by Eurofins Lancaster Laboratories (LLI), located in Lancaster, Pennsylvania. This data quality evaluation covers LLI data package 1347684. Samples submitted to LLI were analyzed for volatile organic compounds [(VOCs) U.S. Environmental Protection Agency (EPA) Method SW8260C]. Sample data were evaluated in accordance with the *Boeing Portland Quality Assurance Project Plan* (QAPP) (EMCON and Landau Associates 1997) and applicable portions of the *National Functional Guidelines for Organic Data Review* (EPA 1999). The following parameters were evaluated:

- Chain-of-custody records
- Holding times
- Blank results (laboratory method and field trip)
- Surrogate recoveries
- Matrix spike/matrix spike duplicate (MS/MSD) and laboratory replicate results
- Laboratory control sample (LCS) and laboratory control sample duplicate (LCSD) results
- Blind field duplicate results
- Quantitation limits
- Audit/corrective action records
- Completeness and overall data quality.

Data validation qualifiers are added to samples based on the evaluation of data quality. The absence of a data qualifier indicates that the reported result is acceptable without qualification. The data quality evaluation is summarized below.

CHAIN-OF-CUSTODY RECORDS

A signed chain-of-custody (COC) record was attached to each data package. The laboratory received all samples in good condition. All analyses were performed as requested. No special cleanups or handling methods were requested. No qualification of the data is necessary.

Upon receipt by LLI, the sample container information was compared to the associated chain-of-custodies and the cooler temperatures were recorded. One cooler was received with temperatures slightly below the EPA-recommended limit of $4^{\circ}\text{C}\pm 2^{\circ}\text{C}$. Data were not qualified based upon the cooler temperatures.

HOLDING TIMES

For all analyses and all samples, the time between sample collection, extraction (if applicable), and analysis was determined to be within EPA- and project-specified holding times. No qualification of the data is necessary.

BLANK RESULTS

Laboratory Method Blanks

At least one method blank was analyzed with this batch of samples for VOCs analysis. No contamination was detected in the method blanks. No qualification of the data is necessary.

Field Trip Blanks and Field Equipment Blanks

No trip blanks or field equipment blanks were submitted for analysis with this batch of samples.

SURROGATE RECOVERIES

Appropriate compounds were used as surrogate spikes for the VOCs analysis. Recovery values for the surrogate spikes were within the current laboratory-specified control limits. No qualification of the data is necessary.

MATRIX SPIKE/MATRIX SPIKE DUPLICATE (MS/MSD) AND LABORATORY REPLICATE RESULTS

No matrix spike or laboratory duplicate samples were analyzed with this data package.

LABORATORY CONTROL SAMPLE AND LABORATORY CONTROL SAMPLE DUPLICATE (LCS/LCSD) RESULTS

A laboratory control sample (LCS) was analyzed with this batch of samples for VOCs analysis. Recovery was within the current laboratory-specified control limits. No qualification of the data is necessary.

BLIND FIELD DUPLICATE RESULTS

No blind field duplicates were submitted for analysis with this batch of samples.

QUANTITATION LIMITS

Project-specified quantitation limits were met for all samples except for instances where high concentrations required dilution of the sample extracts.

AUDIT/CORRECTIVE ACTION RECORDS

No audits were performed or required. No corrective action records were generated for these sample batches.

COMPLETENESS AND OVERALL DATA QUALITY

The completeness for this data set is 100 percent, which meets the project-specified goal of 90 percent minimum.

Data accuracy was evaluated through laboratory control samples and surrogate spikes. No data were rejected.

REFERENCES

EMCON and Landau Associates. 1997. *Appendix D, Quality Assurance Project Plan, Troutdale Sandstone Aquifer Remedy, Remedial Design and Remedial Action Work Plan, Troutdale Sandstone Aquifer, East Multnomah County, Oregon*. Prepared for Cascade Corporation and The Boeing Company. June 19.

EPA. 1999. *Contract Laboratory Program National Functional Guidelines for Organic Data Review*. U.S. Environmental Protection Agency. October.

TECHNICAL MEMORANDUM

TO: Chris Kimmel, Project Manager

FROM: Terry McGourty and Anne Halvorsen

DATE: March 25, 2013

**RE: BOEING PORTLAND (TSA)
FIRST QUARTER 2013 GROUNDWATER QUALITY SAMPLING
LABORATORY DATA QUALITY EVALUATION**

This technical memorandum provides the results of a focused data validation associated with 12 groundwater samples and 1 trip blank collected during the first quarter 2013 TSA water quality sampling event at Boeing Portland. Samples were analyzed by Eurofins Lancaster Laboratories (LLI), located in Lancaster, Pennsylvania. This data quality evaluation covers LLI data package 1367684. Samples submitted to LLI were analyzed for volatile organic compounds [(VOCs) U.S. Environmental Protection Agency (EPA) Method SW8260C]. Sample data were evaluated in accordance with the *Boeing Portland Quality Assurance Project Plan (QAPP)* (EMCON and Landau Associates 1997) and applicable portions of the *National Functional Guidelines for Organic Data Review* (EPA 1999). The following parameters were evaluated:

- Chain-of-custody records
- Holding times
- Blank results (laboratory method and field trip)
- Surrogate recoveries
- Matrix spike/matrix spike duplicate (MS/MSD) and laboratory replicate results
- Laboratory control sample (LCS) and laboratory control sample duplicate (LCSD) results
- Blind field duplicate results
- Quantitation limits
- Audit/corrective action records
- Completeness and overall data quality.

Data validation qualifiers are added to samples based on the evaluation of data quality. The absence of a data qualifier indicates that the reported result is acceptable without qualification. The data quality evaluation is summarized below. Data qualifiers are summarized in Table 1.

CHAIN-OF-CUSTODY RECORDS

A signed chain-of-custody (COC) record was attached to this data package. The laboratory received all samples in good condition. All analyses were performed as requested. No special cleanups or handling methods were requested. No qualification of the data is necessary.

Upon receipt by LLI, the sample container information was compared to the associated chain-of-custodies and the cooler temperatures were recorded. The cooler was received with temperatures within the EPA-recommended limit of $4^{\circ}\text{C}\pm 2^{\circ}\text{C}$. Data were not qualified based upon the cooler temperatures.

HOLDING TIMES

For all analyses and all samples, the time between sample collection, extraction (if applicable), and analysis was determined to be within EPA- and project-specified holding times. No qualification of the data is necessary.

BLANK RESULTS

Laboratory Method Blanks

At least one method blank was analyzed with this batch of samples for VOCs analysis. No contamination was detected in the method blanks. No qualification of the data is necessary.

Field Trip Blanks and Field Equipment Blanks

One trip blank was analyzed with this batch of samples for VOCs analysis. No contamination was detected in the trip blank. No qualification of the data is necessary.

No field equipment blanks were submitted for analysis with this batch of samples.

SURROGATE RECOVERIES

Appropriate compounds were used as surrogate spikes for the VOCs analysis. Recovery values for the surrogate spikes were within the current laboratory-specified control limits. No qualification of the data is necessary.

MATRIX SPIKE/MATRIX SPIKE DUPLICATE (MS/MSD) AND LABORATORY REPLICATE RESULTS

No matrix spike or laboratory duplicate samples were analyzed with this data package.

LABORATORY CONTROL SAMPLE AND LABORATORY CONTROL SAMPLE DUPLICATE (LCS/LCSD) RESULTS

At least one laboratory control sample and/or laboratory control sample duplicate (LCS/LCSD) was analyzed with this batch of samples for VOC analysis. Recoveries and relative percent differences (RPDs) for the laboratory control samples and associated duplicates were within the current laboratory-specified control limits with the following exceptions:

- The percent recovery values for the LCS and/or LCSD associated with two samples in the VOC analyses for 1,1-dichloroethene in this data package were slightly above the laboratory-specified control limits. Since the associated samples are not detected, no qualification of the data is necessary.

BLIND FIELD DUPLICATE RESULTS

As specified in the QAPP, blind field duplicate samples were collected at a rate of one blind field duplicate sample per 20 samples, but not less than one blind field duplicate per sampling round. One pair of blind field duplicate water samples (BOP-Z-0213/BOP-13ds-0213) was submitted for analysis with data package 1367684.

A project-specified control limit of 20 percent was used to evaluate the RPDs between the duplicate samples except when the sample results were within five times the reporting limit. In these cases, a project-specified control limit of plus or minus the reporting limit was used. RPDs for the duplicate sample pairs submitted for analysis were within the project-specified control limits. No qualification of the data is necessary.

QUANTITATION LIMITS

Project-specified quantitation limits were met for all samples except for instances where high concentrations required dilution of the sample extracts.

AUDIT/CORRECTIVE ACTION RECORDS

No audits were performed or required. No corrective action records were generated for these sample batches.

CCV recovery results are provided associated with this data package. All CCV recovery results were acceptable with the following exceptions:

- CCV results were out of limits high for several compounds associated with samples BOP-65ds-0213 and EW-3-0213. Associated samples were not detected for these compounds. No qualification of the data is necessary.
- CCV results were out of limits low for 4-methyl-2-pentanone and 2-hexanone associated with several samples in this data package. Corresponding samples are flagged as estimated (UJ) as shown in Table 1.

COMPLETENESS AND OVERALL DATA QUALITY

The completeness for this data set is 100 percent, which meets the project-specified goal of 90 percent minimum.

Data precision was evaluated through laboratory control sample duplicates. Data accuracy was evaluated through laboratory control samples and surrogate spikes. No data were rejected.

REFERENCES

EMCON and Landau Associates. 1997. *Appendix D, Quality Assurance Project Plan, Troutdale Sandstone Aquifer Remedy, Remedial Design and Remedial Action Work Plan, Troutdale Sandstone Aquifer, East Multnomah County, Oregon*. Prepared for Cascade Corporation and The Boeing Company. June 19.

EPA. 1999. *Contract Laboratory Program National Functional Guidelines for Organic Data Review*. U.S. Environmental Protection Agency. October.

**TABLE 1
SUMMARY OF DATA QUALIFIERS**

Data Package	Analyte	Result	Qualifier	Sample Number	Reason
1367684	4-Methyl-2-Pentanone	5.0 U	UJ	EW-13-0213	Low continuing calibration recovery
1367684	4-Methyl-2-Pentanone	5.0 U	UJ	BOP-13ds-0213	Low continuing calibration recovery
1367684	4-Methyl-2-Pentanone	5.0 U	UJ	BOP-22R(ds)-0213	Low continuing calibration recovery
1367684	4-Methyl-2-Pentanone	5.0 U	UJ	BOP-31ds-0213	Low continuing calibration recovery
1367684	4-Methyl-2-Pentanone	5.0 U	UJ	BOP-31dg-0213	Low continuing calibration recovery
1367684	4-Methyl-2-Pentanone	5.0 U	UJ	BOP-60R(ds)-0213	Low continuing calibration recovery
1367684	4-Methyl-2-Pentanone	5.0 U	UJ	BOP-61ds-0213	Low continuing calibration recovery
1367684	4-Methyl-2-Pentanone	5.0 U	UJ	BOP-61dg-0213	Low continuing calibration recovery
1367684	4-Methyl-2-Pentanone	5.0 U	UJ	BOP-66ds-0213	Low continuing calibration recovery
1367684	4-Methyl-2-Pentanone	5.0 U	UJ	BOP-Z-0213	Low continuing calibration recovery
1367684	2-Pentanone	5.0 U	UJ	EW-13-0213	Low continuing calibration recovery
1367684	2-Pentanone	5.0 U	UJ	BOP-13ds-0213	Low continuing calibration recovery
1367684	2-Pentanone	5.0 U	UJ	BOP-22R(ds)-0213	Low continuing calibration recovery
1367684	2-Pentanone	5.0 U	UJ	BOP-31ds-0213	Low continuing calibration recovery
1367684	2-Pentanone	5.0 U	UJ	BOP-31dg-0213	Low continuing calibration recovery
1367684	2-Pentanone	5.0 U	UJ	BOP-60R(ds)-0213	Low continuing calibration recovery
1367684	2-Pentanone	5.0 U	UJ	BOP-61ds-0213	Low continuing calibration recovery
1367684	2-Pentanone	5.0 U	UJ	BOP-61dg-0213	Low continuing calibration recovery
1367684	2-Pentanone	5.0 U	UJ	BOP-66ds-0213	Low continuing calibration recovery
1367684	2-Pentanone	5.0 U	UJ	BOP-Z-0213	Low continuing calibration recovery

UJ = The analyte was not detected in the sample; the reported sample reporting limit is an estimate.
 U = Indicates the compound was undetected at the reported concentration.

Memorandum

Date: 16 July 2013
To: Cindy Bartlett, RG, LG, Geosyntec Consultants, Portland, Oregon
From: Geosyntec Quality Assurance Group, Knoxville, Tennessee
Subject: **Stage 2A Data Validation - Level II Data Deliverables –
ALS Environmental Work Orders:
K1301170, K1301347, K1301349, and K1301400**

SITE: Cascade Corp, TSA Remedy; Job No: PNG0564S-2

INTRODUCTION

This report summarizes the findings of the Stage 2A data validation of thirty-nine (39) water samples, including five field duplicate samples and four trip blanks were collected in February and March 2013, as part of the site investigation activities for the Cascade Corporation TSA Remedy project in Portland, Oregon. ALS (formerly Columbia Analytical Services, CAS), Kelso, Washington, analyzed the samples. The samples were analyzed for the following test:

- EPA Methods 5030B/8260C - Volatile Organic Compounds (VOCs)

EXECUTIVE SUMMARY

The samples were handled, prepared, and measured in the same manner under similar prescribed conditions.

Overall, based on this Stage 2A data validation covering the quality control (QC) parameters listed below, the data as qualified are usable for meeting project objectives.

The organic data were reviewed based on USEPA Contract Laboratory Program National Functional Guidelines for Superfund Organic Methods Data Review, June 2008 (USEPA-540-R-08-01), as well as by the pertinent methods referenced by the data package and professional judgment.

The sample results were reported in four ALS reports. The samples reported in each ALS report are listed in the table below.

ESC Report No.	Date of Report	Samples	Equip. Blank	Trip Blank
K1301170	02/19/2013	BOP13DS-020713, BOP31DS-020713, TRIP BLANK 1	No	Yes
K1301347	02/25/2013	MW26DG-021313, MW26DG-021313-D, EW8-021313-U, EW8-021313-L, BOP70DS215-021313, BOP71DS-021313, MW25DG-021313, MW24DG-021313-U, MW24DG-021313-L, MW14RDS-021313, TRIP BLANK 4	No	Yes
K1301349	02/25/2013	CS-EFF-021313, CS-EFF-021313-D, CS-INF-021313, TRIP BLANK 2	No	Yes
K1301400	02/28/2013	EW12-021413-U, EW12-021413-L, EW15-021413-U, EW15-021413-L, EW1-021413, EW2-021413, EW14-021413, EW14-021413-D, EW16-021413, EW23-021413, MW10DS-021413, MW18DS-021413, MW19DS-021413, D17DG-021413, EW18-021413-U, EW18-021413-L, MW17DS-021413, MW17DS-021413-D, D17DS-021413, EW11-021413U, EW11-021413-L, TRIP BLANK 1	No	Yes

The samples were received at the laboratory within the criteria $<6^{\circ}\text{C}$, but not frozen. The cooler temperatures were documented at 1.7°C , 1.9°C , 1.1°C , and -0.2°C ; the temperature blank temperatures were documented at 3.3°C , 5.6°C , 2.2°C , and 2.7°C . No sample preservation issues were noted by the laboratory.

ALS laboratory reports K1301347, K1301349, and K1301400 were revised on July 5, 2013 to correct case narratives.

1.0 VOCS

Thirty-nine (39) water samples, five field duplicate samples, and four trip blanks were analyzed for VOCs per EPA Method 5030B/8260C.

The areas of data review are listed below. A leading check mark (✓) indicates an area of review in which the data were acceptable. A preceding crossed circle (⊗) signifies areas where issues

were raised during the course of the validation review and should be considered to determine any impact on data quality and usability.

- ⊗ Overall Assessment
- ✓ Holding Time
- ✓ Method Blank
- ✓ Matrix Spike/Matrix Spike Duplicate
- ✓ Laboratory Control Sample
- ✓ Surrogates
- ✓ Field Duplicate
- ✓ Trip Blank
- ✓ Sensitivity
- ✓ Electronic Data Deliverables Review

1.1 Overall Assessment

The VOC data reported in this package are considered to be usable for meeting project objectives. The results are considered valid; analytical completeness, defined as the ratio of the number of valid analytical results (valid analytical results include values qualified as estimated) to the total number of analytical results requested on samples submitted for analysis, for the project is 100%.

The report narratives indicated that the following compounds in the continuing calibration verification (CCV) standards did not meet the laboratory specified acceptance criteria. The raw data was provided by the laboratory for review of the percent difference (%D) results for each compound:

- Work order K1301170: Dichlorodifluoromethane (-35.5%D), chloromethane (24.1%D).
- Work orders K1301347 and K1301349: Bromomethane (-29.4%D).
- Work order K1301400: Tetrachloroethene (-20.1 %D).

Since the %Ds for dichlorodifluoromethane and chloromethane were $\leq 40\%D$ (the acceptance criteria from the USEPA National Functional Guidelines for VOCs exhibiting poor response), no qualifications were applied to the dichlorodifluoromethane and chloromethane results in the associated samples.

Since the %D for tetrachloroethene was $\leq 25\%D$ (the acceptance criteria from the USEPA National Functional Guidelines), no qualifications were applied to the associated samples.

However, the undetected values of bromomethane in the associated samples in work orders K1301347 and K1301349 were UJ qualified as estimated less than the RLs due to the CCV results with low biases greater than 25%D.

Client Sample ID	Compound	Laboratory Result (µg/L)	Laboratory Flag	Validation Result (µg/L)	Validation Qualifier*	Reason Code**
MW24DG-021313-U	Bromomethane	0.50	U	0.50	UJ	9
MW24DG-021313-L	Bromomethane	0.50	U	0.50	UJ	9
MW14RDS-021313	Bromomethane	0.50	U	0.50	UJ	9
TRIP BLANK 4	Bromomethane	0.50	U	0.50	UJ	9
CS-EFF-021313	Bromomethane	0.50	U	0.50	UJ	9
CS-EFF-021313-D	Bromomethane	0.50	U	0.50	UJ	9
CS-INF-021313	Bromomethane	0.50	U	0.50	UJ	9
TRIP BLANK 2	Bromomethane	0.50	U	0.50	UJ	9

* Validation qualifiers are defined in Attachment 1 at the end of this report

**Reason codes are defined in Attachment 2 at the end of this report

U-not detected at or above the RL

1.2 Holding Time

The holding time for the VOC analysis of a preserved water sample is 14 days from collection to analysis. The holding times were met for the sample analyses.

1.3 Method Blank

Method blanks were analyzed at the proper frequency for the number and types of samples analyzed (one per batch of 20 samples). Eleven method blanks were reported with the data sets. VOCs were not detected in the method blanks above the method reporting limits (MRL).

1.4 Matrix Spike/Matrix Spike Duplicate (MS/MSD)

Four sample set specific MS/MSD pairs were reported, using samples EW15-021413-L in batch KWG1301511 in report K1301400, sample EW14-021413-D in batch KWG1301641 in report K1301400, and sample MW10DS-021413 in batch KWG1301716 in report K1301400. The results for the sample set specific MS/MSD pairs met the laboratory specified acceptance criteria for recovery and relative percent difference (RPD).

MS/MSD pairs were not reported for batch KWG1301661 in report K130400. Based on professional judgment and because laboratory control samples (LCSs) were reported for each batch, no qualifications were applied to the data.

It was noted that the recoveries and RPDs for only 9 of the 30 reported compounds were included in the analytical reports for the MS/MSD pairs. Based on professional judgment and because all 30 compounds were reported in the LCSs, no qualifications were applied to the data.

1.5 Laboratory Control Sample

LCSs were analyzed at the proper frequency for the number and types of samples analyzed (one per batch of 20 samples). Five LCSs and one LCS/LCS duplicate (LCSD) pair were reported with the data sets. The results for the LCSs and LCS/LCSD pair were within the laboratory specified acceptance criteria for recovery and RPD, with the following exceptions.

The recovery of chloromethane was high and outside the laboratory specified acceptance criteria in the LCS in batch KWG1301270 in laboratory report K1301170. Since chloromethane was not detected in the associated samples, no qualifications were applied to the data.

1.6 Surrogates

Acceptable surrogate recoveries were reported for the sample analyses.

1.7 Field Duplicate

Five field duplicate samples, MW26DG-021313-D, CS-EFF-021313-D, EW14-021413-D, MW17DS-021413-D, D17DS-031313-D, were analyzed with the data sets. Acceptable precision (RPD \leq 30%) was demonstrated between the field duplicates and the original samples, MW26DG-021313, CS-EFF-021313, EW14-021413, MW17DS-021413, and D17DS-031313, respectively.

Sample ID	Compound	Laboratory Concentration ($\mu\text{g/L}$)	RPD (%)
MW26DG-021313	Trichloroethene	7.5	1
MW26DG-021313-D		7.6	
MW26DG-021313	The other VOCs	ND	0
MW26DG-021313-D		ND	
CS-EFF-021313	The VOCs	ND	0
CS-EFF-021313-D		ND	
EW14-021413	cis-1,2-Dichloroethene	1.8	15
EW14-021413-D		2.1	
EW14-021413	Trichloroethene	15	7

Sample ID	Compound	Laboratory Concentration (µg/L)	RPD (%)
EW14-021413-D		14	
EW14-021413	Tetrachloroethene	0.84	12
EW14-021413-D		0.95	
EW14-021413	The other VOCs	ND	0
EW14-021413-D		ND	
MW17DS-021413	cis-1,2-Dichloroethene	9.7	3
MW17DS-021413-D		9.4	
MW17DS-021413	Chloroform	0.72	7
MW17DS-021413-D		0.77	
MW17DS-021413	Trichloroethene	72	1
MW17DS-021413-D		71	
MW17DS-021413	Tetrachloroethene	3.2	3
MW17DS-021413-D		3.1	
MW17DS-021413	The other VOCs	ND	0
MW17DS-021413-D		ND	
D17DS-031313	cis-1,2-Dichloroethene	18	6
D17DS-031313-D		17	
D17DS-031313	Trichloroethene	72	6
D17DS-031313-D		68	
D17DS-031313	Tetrachloroethene	1.7	6
D17DS-031313-D		1.6	
D17DS-031313	The other VOCs	ND	0
D17DS-031313-D		ND	

µg/L-microgram per liter
 ND-not detected at the MRL

1.8 Trip Blank

Four trip blanks accompanied the sample shipments. VOCs were not detected in the trip blanks above MRLs.

1.9 Sensitivity

The sample results were reported to the MRLs. No elevated non-detect values were reported with the data sets.

1.10 Electronic Data Deliverables (EDD) Review

Results and sample IDs in the EDDs were reviewed against the information provided by the associated level II reports at a minimum of 20% as part of the data validation process. No discrepancies were identified between the level II reports and the EDDs.

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ATTACHMENT 1
DATA VALIDATION QUALIFIER DEFINITIONS
AND INTERPRETATION KEY
Assigned by Geosyntec's Data Validation Team

DATA QUALIFIER DEFINITIONS

- U The analyte was analyzed for, but was not detected above the reported sample quantitation limit.
- J The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample.
- J+ The analyte was positively identified; however, the associated numerical value is likely to be higher than the concentration of the analyte in the sample due to positive bias of associated QC or calibration data or attributable to matrix interference.
- J- The analyte was positively identified; however, the associated numerical value is likely to be lower than the concentration of the analyte in the sample due to negative bias of associated QC or calibration data or attributable to matrix interference.
- UJ The analyte was not detected above the reported sample quantitation limit. However, the reported quantitation limit is approximate and may or may not represent the actual limit of quantitation necessary to accurately and precisely measure the analyte in the sample.
- R The sample results are rejected due to serious deficiencies in the ability to analyze the sample and meet quality control criteria. The presence or absence of the analyte cannot be verified.

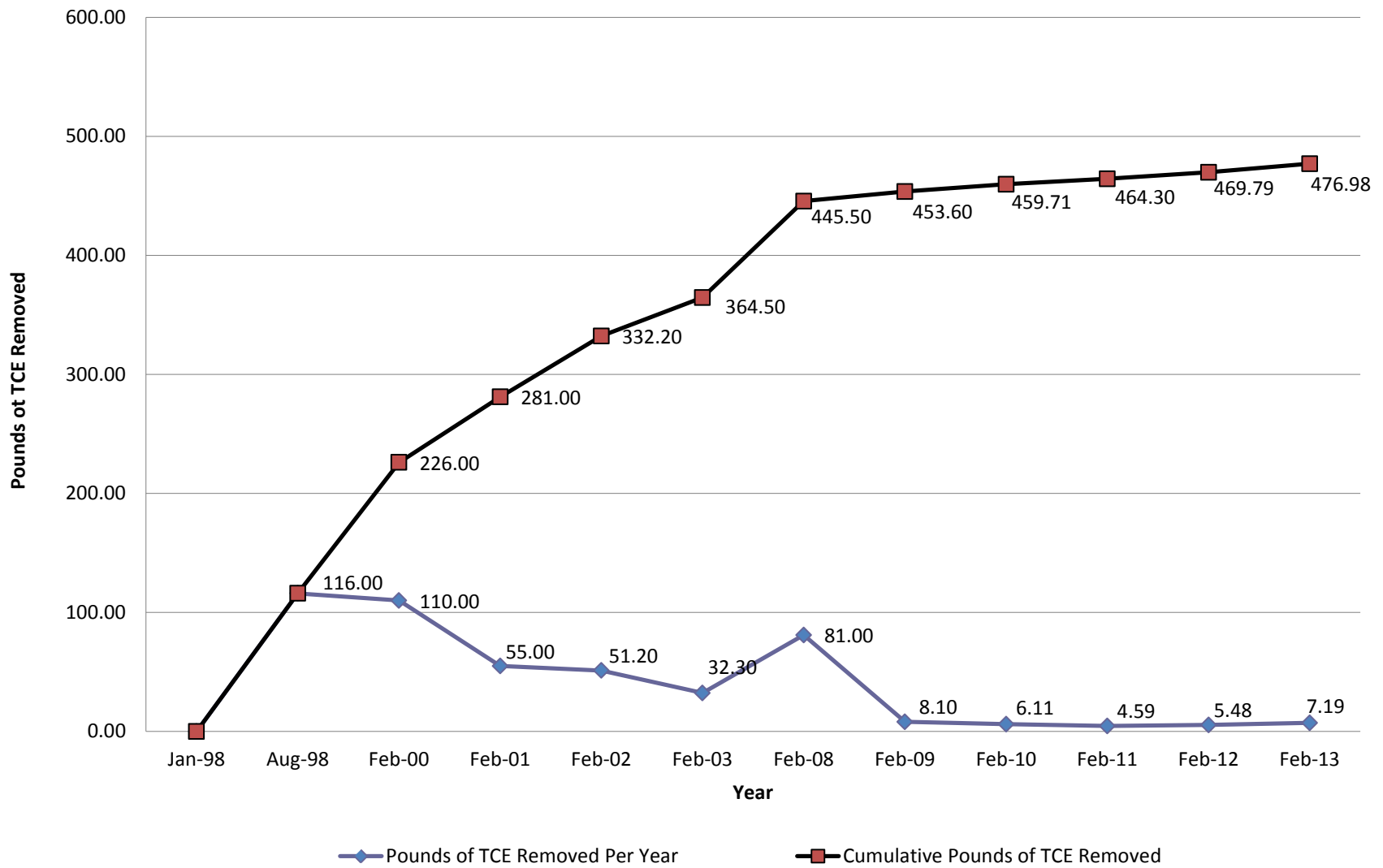
DATA VALIDATION REASON CODES
Assigned by Geosyntec's Data Validation Team

Valid Value	Description
1	Preservation requirement not met
2	Analysis holding time exceeded
3	Blank contamination (i.e., method, trip, equipment, etc.)
4	Matrix spike/matrix spike duplicate recovery or RPD outside limits
5	LCS recovery outside limits and RPD outside limits (LCS/LCSD)
6	Surrogate recovery outside limits
7	Field Duplicate RPD exceeded
8	Serial dilution percent difference exceeded
9	Calibration criteria not met
10	Linear range exceeded
11	Internal standard criteria not met
12	Lab duplicates RPD exceeded
13	Other

RPD-relative percent difference

APPENDIX E

TCE Removal Estimates



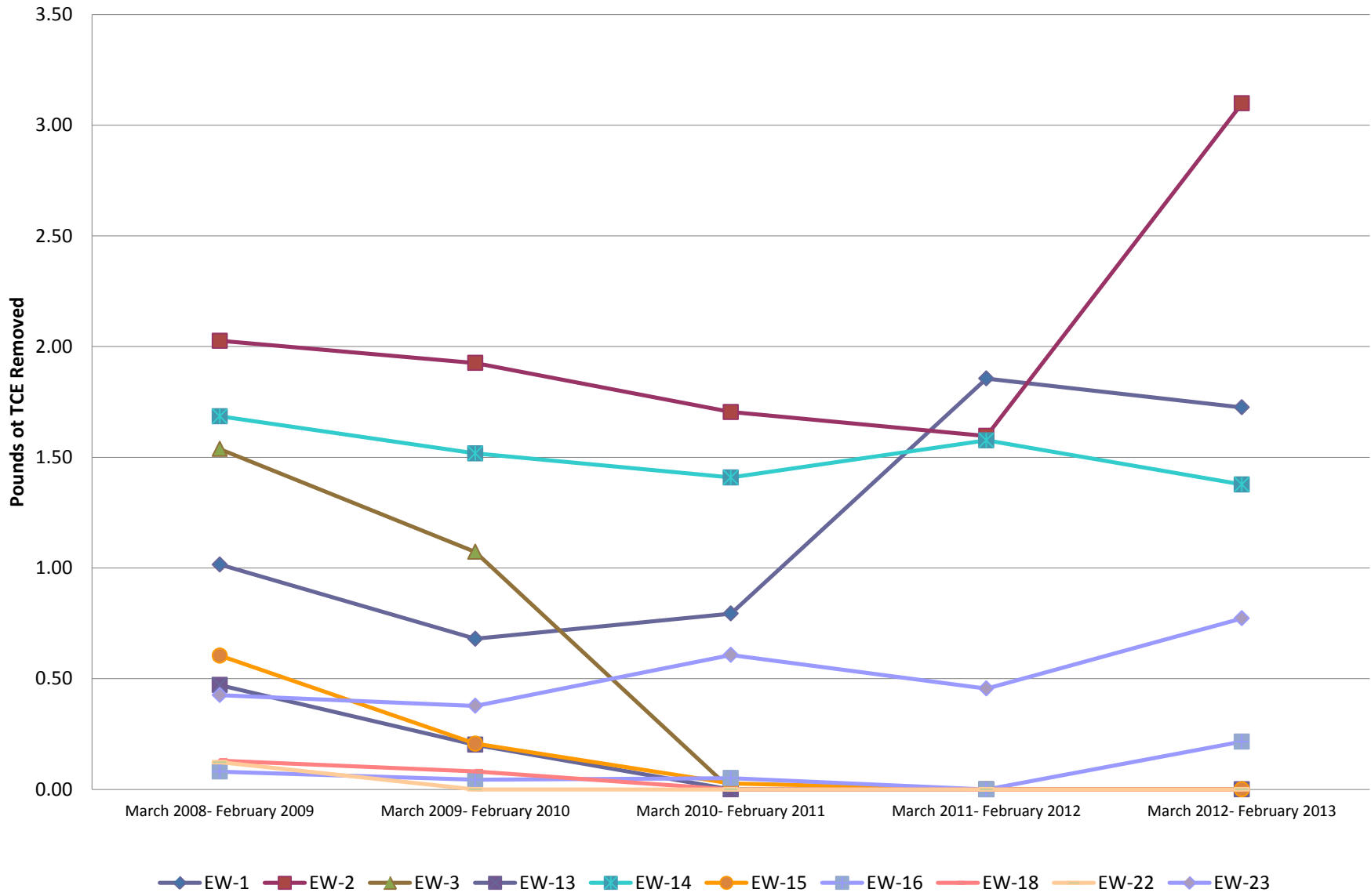


Table E-1
TCE Removal - January 1998 through February 2013
TSA Remedy - East Multnomah County

Date	Pounds of TCE Removed Per Year	Cumulative Pounds of TCE Removed
Jan-98	0.00	0.00
Aug-98	116.00	116.00
Feb-00	110.00	226.00
Feb-01	55.00	281.00
Feb-02	51.20	332.20
Feb-03	32.30	364.50
Feb-08	81.00	445.50
Feb-09	8.10	453.60
Feb-10	6.11	459.71
Feb-11	4.59	464.30
Feb-12	5.48	469.79
Feb-13	7.19	476.98

Table E-2
TCE Removal Per Extraction Well
TSA Remedy - East Multnomah County

Date	Pounds of TCE Removed Per Well									
	EW-1	EW-2	EW-3	EW-13	EW-14	EW-15	EW-16	EW-18	EW-22	EW-23
March 2008- February 2009	1.02	2.03	1.54	0.47	1.69	0.60	0.08	0.13	0.12	0.43
March 2009- February 2010	0.68	1.93	1.07	0.20	1.52	0.21	0.04	0.08	0.00	0.38
March 2010- February 2011	0.79	1.70	0.00	0.00	1.41	0.03	0.05	0.00	0.00	0.61
March 2011- February 2012	1.86	1.60	0.00	0.00	1.58	0.00	0.00	0.00	0.00	0.46
March 2012- February 2013	1.73	3.10	0.00	0.00	1.38	0.00	0.22	0.00	0.00	0.77

Notes

The amount of TCE removed by the extraction wells in the remedial systems was calculated by multiplying average monthly flow rates at each extraction well by estimated TCE concentration at the extraction wells at the mid-point of each month. The mid-monthly TCE concentrations were calculated by linear interpolation from the two near sampling dates.