Remedial Action Contract 2
For Remedial Response, Enforcement Oversight, and Non-Time-Critical Removal Activities at Sites of Release or Threatened Release of Hazardous Substances in EPA Region VIII

U.S. EPA Contract No. EP-W-05-049

Field Oversight Report
For Segment 2 Capture Zone Field Test

Work Assignment No.:	**336-VOEE-10EW**
	GASCO/Siltronics
EPA RPM:	**Sean Sheldrake**
CDM Project Manager:	**Lance Peterson**

August 22, 2011

Prepared for:
U.S. Environmental Protection Agency
Region 10
1200 Sixth Avenue Suite 900
Seattle, Washington 98101

Prepared by:
CDM Federal Programs Corporation
555 17th Street, Suite 1100
Denver, Colorado 80202

Contents

Section 1 Introduction

1.1 Project Background 1-1
1.2 Piezometer/Well Installation Summary 1-2
1.3 Pumping Test Summary 1-3

Section 2 Objectives and Scope of Field Oversight

2.1 Governing Documents 2-1
2.2 Objectives of Field Oversight 2-1
2.3 Field Investigation Schedule 2-1
2.4 Oversight Personnel 2-2
2.5 Field Documentation 2-2
2.6 Photographic Documentation 2-3

Section 3 Observations

3.1 Summary of Work Performed 3-1
3.1.1 Offshore Piezometer Installations 3-1
3.1.2 Upland Well Installations 3-6
3.1.3 Monitoring Instrumentation and Pump System Installation 3-24
3.1.4 Pumping Tests and Variable Frequency Drive Testing 3-26
3.2 Health and Safety Program 3-32
3.2.1 Health and Safety Meetings 3-32
3.2.2 Use of Personal Protective Equipment 3-33
3.2.3 Slip, Trip, and Fall Hazards 3-35
3.2.4 Weather Hazards 3-36

Section 4 Deviations

4.1 Summary of Field Change Requests 4-1
4.2 Deviations in Well Completion Depth and Materials 4-2

Section 5 References 5-1

Tables

1 Well and Piezometer Construction Details – Modified from Capture Zone Test Plan
2 Summary of Contamination in Sediment Cores for Offshore Piezometers & Upland Wells as Documented by CDM
3 Summary of Pumping Test Data
4 Deviations in Piezometer and Well Completion Depths

Appendices

Appendix A Field Notes
Appendix B Field Oversight Photographs
Appendix C Health and Safety Inspection Reports
Appendix D Field Change Requests

Acronyms and Abbreviations

AED	automated external defibrillator
bgs	below ground surface
bml	below mudline
CDM	CDM Federal Programs Corporation
DEQ	Oregon Department of Environmental Quality
DTW	depth to water
EPA	U.S. Environmental Protection Agency
gpm	gallons per minute
HASP	health and safety plan
HCN	hydrogen cyanide
IDW	investigation-derived waste
NAPL	nonaqueous phase liquid
PID	photoionization detector
PPE	personal protective equipment
ppm	parts per million
PVC	polyvinyl chloride
RPM	EPA Remedial Project Manager
Site	Gasco/Siltronic site
VFD	variable frequency drive
VOC	volatile organic compound

Section 1
Introduction

Under Work Assignment 336-VOEE-10EW from U.S. Environmental Protection Agency (EPA), under EPA Region 8, Response Action Contract No. EP-W-05-049, CDM Federal Programs Corporation (CDM) was assigned to conduct oversight of field investigation activities at the Gasco/Siltronic site (Site) in Portland, Oregon.

CDM provided technical field oversight of field activities described in the *Capture Zone Field Test Plan* (Anchor QEA 2009a). The field activities were undertaken by Anchor QEA on behalf of NW Natural and included the following:

- Offshore piezometer installation
- Upland monitoring well installation
- Upland extraction and observation well installation
- Pumping tests and general testing of extraction wells

Offshore piezometer and upland monitoring wells were installed from November 17, 2009, through February 5, 2010. Extraction and observation wells were installed from February 8 through March 18, 2010. Additional extraction wells were installed from July 1 through August 19, 2010. The pumping test and general testing phase of the program occurred from March 18 through May 7, 2010, September 2 through 9, 2010 and March 29 through April 12, 2011.

During implementation of the *Capture Zone Field Test Plan*, CDM conducted oversight to monitor health and safety compliance and provide an independent verification of piezometer and well installation and extraction well testing performed by Anchor QEA.

This report summarizes the field oversight activities, photo documentation and a discussion of deviations from the *Capture Zone Field Test Plan* and supplemental addenda submitted to EPA by NW Natural.

1.1 Project Background

The Site is on the southwest bank of the lower Willamette River generally between river miles 6 and 7, immediately downstream of the Burlington Northern Santa Fe railroad bridge. The Site is within Portland Harbor, which was designated a federal Superfund site by EPA in 2000 based on sediment contamination.

The statement of work for the Site is contained in Appendix A to the September 9, 2009 administrative settlement agreement and order on consent (AOC) (Docket No. CERCLA 10-2009-0255) for the Site. The statement of work identifies chemicals of concern at the Site, which include:

- Benzene, toluene, ethylbenzene, xylenes
- Polynuclear aromatic hydrocarbons, extended to include 2-methylnaphthalene, dibenzofuran, and carbazole
- Cyanide (including total cyanide in sediment and total, available, and free forms in water samples)
- Zinc
- Trichloroethene
- Cis-1,2-dichloroethylene
- Trans-1,2-dichloroethylene
- 1,1-dichloroethylene
- Vinyl chloride
- Polychlorinated biphenyls
- Dichlorodiphenyltrichloroethanes
- Dichlorodiphenyldichloroethanes
- Dichlorodiphenyldichloroethylenes
- Diesel range hydrocarbons
- Residual range hydrocarbons
- Benzene hexachlorides
- Endrin ketone

1.2 Piezometer/Well Installation Summary

The primary objective of the offshore and upland well installation was to install 20 new piezometers/wells to collect supplemental data during the capture zone pilot testing. Results from the testing will be used by NW Natural to evaluate the extent of seepage control from pumping shoreline wells as well as verify and refine (if necessary) model-predicted pumping rates to achieve groundwater capture at the adjacent shoreline. In addition to the 22 planned piezometer/well locations, an additional shallow pumping well (designated PW-8-39) was installed, abandoned (because of improper completion), and re-installed throughout the months of July and August 2010, after initial pumping test data showed insufficient capture in the fill and shallow alluvium. Also, on August 13, 2010, an additional observation well (OW-8-28) was installed to accommodate a request by Oregon Department of Environmental Quality (DEQ) to provide useful lithology and water level data in the vicinity of PW-8-39.

CDM personnel were present during a majority of the piezometer and well installation on behalf of EPA to provide oversight of health and safety and the technical aspects of the piezometer/well installation, including drilling, completion and development activities.

The 24 piezometer/wells were drilled using sonic drilling techniques. The number, type, and purpose of wells installed are summarized below.

- Piezometers[1] (PZ): ten piezometers were installed to monitor hydraulic control of offshore seepage.
- Monitoring wells[2] (MW): six monitoring wells were installed to collect water quality samples and monitor hydraulic response to upland pumping wells.
- Observation wells (OW): four observation wells were installed to monitor hydraulic response in the shallow fill where nonaqueous phase liquid (NAPL) is present.
- Pumping wells (PW): four pumping wells were installed to extract groundwater and maintain hydraulic control of groundwater discharge/seepage to the river.

The piezometers and monitoring wells were installed in clusters with individual wells within the cluster screened in different stratigraphic horizons. The boring for the deepest piezometer and monitoring well installed in the cluster and all observation wells/pumping wells were sampled and the lithology was logged continuously. Intermediate depth and shallow piezometers and monitoring wells in each cluster were sampled at 5- to 10-foot core intervals, unless there was poor recovery in the deeper piezometer/monitoring well in the cluster.

Table 1, modified from the *Capture Zone Field Test Plan*, is included in this document. The table is modified to show as-built completion depths and well identifications (IDs) for the wells installed to implement the *Capture Zone Field Test Plan* to account for any deviation to the planned completion depths of the wells.

1.3 Pumping Test Summary

After the upland well installation, NW Natural instrumented the piezometers, monitoring wells, and piezometers with dataloggers/transducers, and installed pumps/control systems in the extraction wells. The extraction wells were then linked by pipeline to the existing granular activated carbon treatment system, which ultimately discharges to the City of Portland municipal treatment system.

By March 30, 2010, the pump system installation was complete and initial pumping tests were conducted throughout April and early May 2010. In June 2010, after review of the initial pumping test data, NW Natural proposed the installation of an additional shallow extraction well near PW-8, which became PW-8-39. After completion of PW-8-39 throughout the month of July and early August, the final well was instrumented and a pump/controller was installed and connected to treatment at the end of August 2010. In September and November 2010 additional tests were conducted with this shallow extraction well.

[1] One piezometer (PZ3-10) was not installed.
[2] One shallow monitoring well was added to characterize hydraulic response in the shallow fill between PW8 and PW9.

The interface between a programmable logic control and pump variable frequency drives (VFDs) was field tested in late March/early April 2011. The ability of the programmable logic control /transducer system to respond to groundwater elevation changes and the consequent response of the well pumps was tested.

Section 2
Objectives and Scope of Field Oversight

2.1 Governing Documents

Activities at the Site were conducted by the potentially responsible party in accordance with the following documents prepared and submitted by Anchor QEA for NW Natural:

- *Capture Zone Field Test Plan, Gasco, Portland, Oregon,* September 2009
- *Health and Safety Plan, NW Natural "Gasco" Site, Field Activities for Capture Zone Field Test Plan*, November 2009
- Responses to EPA/DEQ comments on the offshore piezometer installation portion of the Capture Zone Field Test Plan, November 3, 2009
- Responses to EPA/DEQ comments on upland well installation portion of the Capture Zone Field Test Plan, January 20, 2010
- *Capture Zone Field Test Plan Addendum 2* in response to EPA/DEQ comments provided on July 21 and 24, 2010, regarding plans to abandon PW-8-39 and install pilot extraction well PW-8-39b, August 3, 2010
- *Capture Zone Field Test Plan Addendum 3* in response to EPA/DEQ comments on Capture Zone Field Test Plan Addendum 2, August 6, 2010
- *Gasco Field Test of Variable Frequency Drive Well Pumps*, January 24, 2011

2.2 Objectives of Field Oversight

The primary objective of the field oversight was to observe field activities for compliance with the governing documents listed in Section 2.1. Through daily reporting of field observations made by CDM, the EPA Remedial Project Manager (RPM) was informed of the detailed status of the data gaps investigation work. Furthermore, oversight personnel provided the RPM with timely notification of issues that developed during the course of the investigation work, including possible deviations from the governing documents. The information was important because it assisted the RPM in making decisions regarding necessary changes in the data collection effort.

2.3 Field Investigation Schedule

The well installation portion of the capture zone field test plan conducted by Anchor QEA commenced on November 17, 2009, with a site safety meeting. Offshore piezometer drilling/installation began the same day and continued through December 4, 2009. The upland well installations were also conducted by Anchor QEA from January 25, 2010, to March 8, 2010.

Monitoring instrumentation, pump/control installation and connection to treatment of the wells occurred from March 9 through 30, 2010. Monitoring instrumentation was performed by the Anchor QEA team, while pump installation and connection to the treatment system were performed by Advanced Remediation Technologies, Inc (subcontractor to Anchor QEA). Electrical work for the pump controls was performed by Stoner Electrical (subcontractor to Anchor QEA).

Pumping tests, conducted by Anchor QEA, commenced on April 19 and continued with additional testing through April and early May 2010. After review of the initial pumping test data in May and June 2010, a shallow extraction well (PW-8-39) and shallow observation well (OW-8-28) were added during the months of July and early August 2010. After instrumentation and pump/control installation for these wells, additional pumping tests resumed in September and a final 72-hour pumping test with all four extraction wells was conducted November 8 through 11, 2010.

Short-term logic control testing of the VFD system for extraction wells based on the pumping response from four upland monitoring wells was performed on March 28, 2011. Long-term logic control testing of the VFD system for extraction wells based on the pumping response from three upland monitoring wells was performed on April 6 through 12, 2011.

2.4 Oversight Personnel

Oversight was conducted by the following CDM personnel:

- Lance Peterson, project manager/field team support
- Scott Coffey, field team lead – offshore piezometer installation
- Damon Repine, health and safety lead – offshore piezometer installations
- Jennifer Jones, field team lead – upland well installation, monitoring and pumping system installation, pumping tests
- Barry Sarin, field team support – upland well installation
- Matthew Hewitt, field team support –upland well installation
- Paul Opem, health and safety lead –upland well installations

2.5 Field Documentation

Information and notations were recorded as required in a field logbook in accordance with CDM Standard Operating Procedure 4-1; revision 6 Field Logbook Content and Control. Field documentation consisted of an accounting of activities at the Site, noting problems or deviations from governing documents described in Section 2.1.

The field team leads maintained the field logbooks and submitted copies of the logbook on a regular basis to the CDM project manager for review, use in preparing field reports, and filing in the project files. Field notes are provided in **Appendix A**.

2.6 Photographic Documentation

Photographs were taken during field oversight in accordance with CDM Standard Operating Procedure 4-2; revision 7 Photographic Documentation of Field Activities. Photo-documentation by the CDM field oversight team included taking photos of boring locations, selected core samples (especially where visual contamination was noted), field quality assurance/quality control procedures, health and safety compliance procedures, and any other instance determined necessary. Photographs taken during field oversight are provided in **Appendix B**.

Section 3
Observations

3.1 Summary of Work Performed

On November 16, 2009, January 22, 2010, and August 11, 2010, before the mobilization for field drilling activities, a field planning meeting was conducted by the CDM project manager and attended by the CDM field staff and a member of the CDM quality assurance staff. During the meeting, CDM field staff were provided information about the site, health and safety issues, the objectives and scope of field activities, governing documents for the field work and required quality control measures, the roles and responsibilities of staff involved, equipment and training needs, communication requirements, and schedule. CDM field staff obtained the required field supplies, including personal protective equipment (PPE), and reviewed the project health and safety plan (HASP) to determine health and safety protocols for performing site work. The daily descriptions provided below present a general overview of activities performed during the piezometer/well installation fieldwork and pumping tests with a focus on health and safety compliance, locations where field evidence of contamination (sheen, odors, elevated photoionization detector [PID] readings) were noted, and compliance with well completion protocols. **Table 2** summarizes sample core descriptions and photo IDs of depth intervals in the offshore piezometers where substantial product was noted. Substantial product is defined in Section 3.6.2.1 of the statement of work. **Table 3** summarizes pumping test durations, flow rates, and hydraulic data obtained from testing during CDM site visits. **Table 4**, located in Section 4.2, summarizes deviations in piezometer and well completion depths.

3.1.1 Offshore Piezometer Installations

The following field teams were on site during the reported periods in 2009– November 17-20, November 23-25, November 30, and December 1-4.

Anchor QEA – NW Natural consultant
CDM – field oversight
Cascade Drilling, Inc. – driller
Diversified Marine – barge operator

November 17, 2009

The piezometer installation program was initiated on November 17. After the health and safety kick off meeting at the Anchor QEA job trailer all personnel proceeded down to the Willamette River shoreline to drill the PZ5 piezometer cluster. After the driller (Cascade Drilling) completed loading the barge (beached in the upstream area of the site) the barge operator (Diversified Marine) moved the barge to the shoreline near the PZ5 area. PZ5 was drilled above the level of the Willamette River on the Gasco beach. After rig and work zones were set up drilling at PZ5 started at 12:37 p.m. The boring for PZ5 was drilled to 15 feet below ground surface (bgs) on November 17 (85-foot planned depth). The sediment consisted primarily of silty sand.

A minor sheen was noted at 5 feet bgs, no odor and 0.6 parts per million (ppm) PID headspace. All other portions of the 0-to-15-foot bgs core showed no evidence of contamination.

November 18, 2009

After the health and safety tailgate meeting at Anchor QEA's job trailer all personnel proceeded down to the Willamette River shoreline to the PZ5 piezometer cluster location. Drilling commenced at PZ5-85 from 15 feet bgs at 7:55 a.m. after the driller had repositioned the sonic rig on the borehole (the rig was left on the barge overnight). The plan for November 18 was to complete drilling for the deep PZ5-85 piezometer (85-foot target depth) and install the deep piezometer.

The boring for PZ5-85 was drilled to the target depth (85.5 feet). The sediment from 15 to 50 feet bgs was fine-grained sandy silt and silty sand with silty sand being predominant. A transition from silty sand to sand was noted in the 45-to-50-foot core. Below 50 feet medium-grained sand was present to the total depth of 85.5 feet bgs. The only field evidence of contamination in the 15 to 85 foot interval was an odor noted in the 70-to-80-foot core interval where Anchor QEA logged a "dirty sock" odor. John Renda from Anchor QEA stated that the odor had been noted in sediment borings upstream of PZ5 and samples had been analyzed for a suite of analytes with no detections noted. The source of the odor remains unknown. All PID headspace readings were less than 0.6 ppm. No sheen was noted in the cores collected on November 18.

November 19, 2009

After the health and safety tailgate meeting at Anchor QEA's job trailer all personnel proceeded down to the Willamette River shoreline to the PZ5 piezometer cluster location. Installation of the 85-foot piezometer resumed at 8:20 a.m. after the driller repositioned the rig on the drill site and staged installation supplies. PZ5-85 was installed as planned. Grout was brought to the surface and was to be allowed to settle and the reminder of the seal was to be completed with bentonite chips.

The 50-foot piezometer at the PZ-5 cluster location was drilled and installation was initiated, which included 2-inch polyvinyl chloride (PVC) and filter pack placement. PZ5-50 is approximately 3 feet from PZ5-85. Soils were logged at PZ5-50 only where Anchor QEA felt there was a data gap (in this case the upper 20 feet). The bottom 10 feet of the boring were also logged (40 to 50 feet bgs) to confirm the target zone for the 50-foot piezometer (medium-grained sand). A subtle sheen noted at about 5 feet bgs in the 85-foot boring was evident at about 7 feet bgs in the 50-foot boring. The only PID headspace noted in the zones logged was 0.6 ppm at 17.5 to 20 feet bgs. No odors were noted.

Anchor QEA also measured hydrogen cyanide (HCN) in bagged sediment. Readings were low (0 to a few ppm). One location at PZ5-85 at 62.5 to 65 feet bgs produced 16 ppm. John Renda from Anchor QEA also checked all bagged core intervals (roughly

every 2.5 feet) from PZ5-85 with a florescent lamp and reported there was no indication of hydrocarbons.

November 20, 2009

After the health and safety tailgate meeting at Anchor QEA's job trailer all personnel proceeded down to the Willamette River shoreline to the PZ5 piezometer cluster location. Installation of the 55-foot piezometer resumed at 7:45 a.m. after the driller repositioned the rig on the drill site. The installation of PZ5-55 was completed with bentonite grout being pumped to the surface. Bentonite chips were to be placed near the surface after the bentonite grout settled.

PZ5-20 was drilled and installed (approximately 3 feet from PZ5-50). Soils were logged at PZ5-20 to confirm conditions seen at PZ5-50. The same sheen noted at about 5 feet bgs in the 50-foot boring (3 feet away) was evident at about 6 feet in the 20-foot boring. PZ5-20 was screened from 15 to 20 feet bgs in a mixture of silty sand and sandy silt.

PZ5-5 was drilled and installed (approximately 3 feet from PZ5-20). No soil logging occurred because of the consistency in the upper 5 feet in the three previous borings (mixture of silty sand and sand). PZ5-5 was screened from 3.8 to 4.8 feet bgs.

November 21-22, 2009

Weekend; no work activity.

November 23, 2009

After the health and safety tailgate meeting, the drill rig was moved into position at the PZ1 cluster location. PZ1-50 was drilled and installed from 9:57 a.m. to 4:30 p.m. Soils were logged at PZ1-50, because the other piezometers in the cluster (PZ1-5 and PZ1-20) were manually driven without the ability to log the subsurface soils. No sheen was seen in any of the core samples, and there were complete cores for each 5-foot advance. PID readings were obtained in the breathing zone at frequent intervals and in headspace samples of the soil samples at approximate 2.5–foot intervals. The highest reading in core samples was 0.7 ppm in the 50-foot bgs sample. Fluorescent lamp testing revealed a very small percentage of hydrocarbons in the 5-to-10-foot bgs samples. PZ1-50 was screened from 45 to 50 feet bgs in a mixture of dark gray medium to fine sand that contains some small (0.1 to 0.5 feet thick) silt lenses.

Other activities on the site included the purging and development of the PZ5 cluster piezometers installed during the previous week.

November 24, 2009

After the health and safety tailgate meeting at Anchor QEA's job trailer the barge with the drill rig was moved to the PZ4 cluster location.

Soils were logged at PZ4-41, because it was anticipated to be the deepest of the two piezometers in the PZ4 cluster. A small amount of sheen was seen in the 0-to-5 foot

and 5-to-10-foot core samples. An 8-inch diameter conductor casing was advanced to 15 feet below mudline (bml) to ensure a seal 5 feet below the identified sheen. Complete cores were recovered for each 5-foot advance. PID readings were obtained in the breathing zone at frequent intervals and in headspace of core samples collected at approximate 2.5-foot intervals. The highest reading in headspace core samples was 1.3 ppm in the 5-foot sample.

Extra spill containment measures were taken while work was conducted on the barge. Other activities near the site included finishing the purging and development of the PZ5 cluster piezometers installed the previous week. PZ5-5 and PZ5-20 were completely developed by the end of the day.

November 25, 2009

After the health and safety tailgate meeting at Anchor QEA's job trailer the barge with the drill rig was moved into position of the PZ3 cluster.

Soils were logged at PZ3-33, because it was anticipated to be the deeper of the two piezometers in the PZ3 cluster. Substantial product (NAPL and sheen) was noted in the 0-to-3-foot and 3-to-8-foot core samples. An 8-inch diameter conductor casing was advanced to 18 feet bml to ensure a seal through and below the substantial product zone. There were complete cores recovered for each 5-foot advance. PID readings were obtained in the breathing zone at frequent intervals and in headspace of core samples collected at approximate 2.5-foot intervals. The highest reading in headspace core samples was 7.7 ppm in the 0-to-3-foot bml sample. This zone and the next sample interval down to 9 feet bml was a black to dark gray silt with significant product-saturated layers greater than 2 inches thick. Between 3 and 8 feet bml the contaminated sediment had a significant percentage of organics comprised of tan wood fibers that looked to be from matting material. From 8 to 9 feet bml the sediment was dark gray silt with fine sand and small milky white blebs of product and sheen. Below 9 feet bml sediments consisted of dark gray medium coarse sand with no indication of product/sheen.

The well was packed with the proper filter sand pack at the specified intervals and the grout seal installed. All sand pack and grout volumes introduced matched theoretical calculations to within 90 percent. Other activities near the site included purging and development of the PZ1-50 cluster piezometer installed on Monday, November 23.

November 26-29, 2009

Thanksgiving Holiday and weekend; no site activity.

November 30, 2009

The plan for November 30t was to move the barge into position under the north catwalk/pier and set up on the PZ2 cluster location to begin drilling PZ2-77. The barge approached the drill site location, but could not advance the last 10 feet into position because of a low river level as a result of an outgoing tide. At 2 p.m. Anchor QEA's site supervisor sent everyone home except the Diversified Marine tug operator

who would wait for high tide (about 5:30 p.m.) and make an attempt to push the remaining 10 feet forward to position the barge's moon pool over the desired location at the PZ2 cluster.

December 1, 2009

After the health and safety tailgate meeting at Anchor QEA's job trailer, drilling and sampling proceeded at PZ2-77.

Soils were logged at PZ2-77, because it is anticipated to be the deeper of the two piezometers in the PZ2 cluster. Substantial product (NAPL and sheen) was noted in the 0-to-5-foot, 5-to-10-foot, and the upper 2 feet of the 10-to-15-foot bml core samples. An 8-inch diameter conductor casing was advanced to 20 feet bml to ensure a seal through and below the substantial product zone. There were complete cores recovered for each 5-foot advance. PID readings were obtained in the breathing zone at frequent intervals and in the headspace of core samples collected at approximate 2.5-foot intervals. The highest reading in headspace core samples was 16.5 ppm in the 5-to-7.5-foot bml sample. This zone and the next sample interval down to 12 feet bml was a black to dark brown silt with significant product saturation and a significant percentage of organics comprised of wood fibers and fragments, similar to those found in PZ3-33. It is suspected the source of the wood comes from a former dock and support pilings. Below 12 feet bml, sediments consisted of dark gray clayey silt with no indication of product/sheen; the sediment changed to fine- to medium-coarse sand at 14.5 feet bml.

December 2, 2009

After the health and safety tailgate meeting at Anchor QEA's job trailer the drilling crew proceeded to complete PZ2-77 with a 5-foot PVC screen, steel riser, and properly backfilled material.

Sand pack and seal materials met theoretical volumes, proper weight specifications and the upper 20 feet of 8-inch diameter surface seal was sealed with a 90 percent bentonite/10 percent organoclay mix because of the presence of substantial product. The deep piezometer screens an interval between 72 and 77 feet bml in a dark gray medium sand unit. Noted from December 1 analysis of soil cuttings, although organic vapor meter readings were low in the deeper sand unit, the HCN levels increased in the deeper sand unit and remained 5 to 7 ppm compared to the upper sand unit which measured 0 to 1 ppm. The drill rig was repositioned on the deck of the barge and drilling of PZ2-43. Drilling advanced casing to 30 feet bml before stopping for the day and winterizing fluids on the drill rig and decontamination equipment. The soil cuttings were not logged from 0 to 30 feet bml; however, a review of the cuttings placed in the 55-gallon waste drum revealed similar sediments as those encountered at PZ2-77.

CDM noted concern over grinding stainless steel centralizers, creating small sparks and possibly violating hot work permit requirements. It was decided after

consultation with Anchor QEA that no further grinding would occur on the site, including work on the barge and, if necessary, grinding would occur off site.

December 3, 2009

After the health and safety tailgate meeting at Anchor QEA's job trailer the drilling crew resumed drilling of PZ2-43 and reached total depth of 43 feet at 9:18 a.m. Core samples were collected from 30 to 44 feet bml and were similar in lithology to those encountered at PZ2-78. Completion of PZ2-43 ended at 12:04 p.m. Sand pack and seal materials met theoretical volumes, proper seal weight specifications (10.4 pounds per gallon) and the upper 20 feet of 8-inch diameter surface seal were sealed with a 90 percent bentonite/10 percent organoclay mix because of the presence of substantial product. PZ2-43 (the medium depth piezometer) screens an interval between 38 and 43 feet bml in a dark gray medium sand unit.

From 12:04 p.m. to 3:00 p.m. the drilling crew cleaned up and reorganized the work site while waiting for the tide to rise and lift the barge off the river bottom so that it could be moved. However, because of barge traffic, moving on to the next location (PZ4-12) would have to wait until Friday morning, December 4. At 3 p.m. the barge was moved back to expose the tops of PZ2-77 and PZ2-43 and an additional 25 feet of steel riser were added to bring the top of the piezometers to the catwalk/pier.

December 4, 2009

After the health and safety tailgate meeting at Anchor QEA's job trailer, drilling on PZ4-12 started at 9:20 a.m. and reached a total depth of 16 feet at 10:40 a.m. Core samples were collected from 0 to 12 feet bml and were similar in lithology to those encountered at PZ4-33. Completion of PZ4-12 ended at 12:25 p.m. PZ4-12 screens an interval between 7 and 12 feet bml in a dark gray fine sand and silt with several layers of petroleum staining and blebs. Drilling began with 6-inch diameter casing instead of the 8-inch conductor casing, because of the shallow completion of this piezometer and the fact that piezometer completion would not be located below the contaminated sediment encountered between 0 and 12 feet bml.

At 12:25 p.m. the barge was moved back to expose the tops of PZ4-33 and PZ4-12 and additional 25 feet of steel riser were added to bring the top of the piezometers to the catwalk/pier. From 1:00 p.m. to 3:30 p.m. the barge was moved back to the PZ3 location to replace the riser pipe with a yellow painted pipe and reflective tape for visibility.

3.1.2 Upland Well Installations

Upland well installation work took 6 weeks and 1 day in 2010 to complete. The following field teams were on site during the reported periods – January 25-29, February 1-5, 8-12, 15-19, and 22-26, March 1-5 and 8, July 1-2 and July 16, August 12/13 and August 19.

Anchor QEA – NW Natural consultant
CDM – field oversight
Cascade Drilling, Inc. – driller

CDM health and safety lead, field team lead, and field team support visited the site to conduct drilling oversight on all the above days except the following: February 16, 18, 19, 23, 25, 26, and March 3 and 5.

January 25, 2010

CDM field team leader and CDM health and safety team leader were present for health and safety oversight. The health and safety kick off meeting began at 12:40 p.m. at the Anchor QEA job trailer. Tim Stone and John Renda (both with Anchor QEA) led the meeting. Tim Stone discussed initial tasks (to begin on Tuesday) to primarily consist of drilling and development of monitoring wells, starting with MW-22. Hazards identified at the site included active NW Natural operations and fuel storage. Most fuel was ship fuel and not highly volatile; however, there was some traffic around the site to be aware of. Chemicals of concern during drilling/sampling were presented (included NAPL, petroleum hydrocarbons, semivolatile organic compounds, polynuclear aromatic hydrocarbons, volatile organic compounds (VOCs), including benzene, and cyanide). HCN had not been detected but this was to be monitored along with VOCs in the drillers' and samplers' breathing zones. An automated external defibrillator (AED) was housed inside the job trailer at all times. There was a first aid kit at the drill rig. PPE required: Level D, hard hat, safety glass, orange vest, and safety boots. Daily hours were health and safety briefing at 7:00 a.m.; work ended by 5:00 p.m. (last sample collected no later than 4:00 p.m.). John Renda discussed well installation procedures briefly. There would be continuous coring and monitoring of soil cores using PID (sample inside resealable plastic bags) and checking for hydrocarbons using a fluorescent lamp (back at the job trailer).

Cascade representatives left the site to get their drill rig, which was off property. At 3:20 p.m. the drillers returned and set the rig up at the MW-22 location. CDM observed them lay down plastic sheeting, position rig and support vehicle, and set up the drill rig. The exclusion zone was then established.

January 26, 2010

CDM was on site for health and safety oversight and for technical oversight. As of Tuesday afternoon the drilling crew was working at MW22-80, but had not progressed very far because of two hydraulic fluid leaks earlier in the day. They involved a hydraulic hose getting pinched, which caused the leaks. The hose sprayed hydraulic fluid, but all fluid was contained on the plastic sheeting containment and cleaned up immediately using absorbent pads. The leaks resulted in nearly 4 hours of down time, so by 2:00 p.m. the driller had advanced only to 20 feet bgs. The hose configuration was modified to eliminate the pinching risk.

The upper 23 feet at MW22-80 was filled with a composition consistent with the site cross section for the area (gravel, sand, silt mixture). Matt Wilson, Anchor QEA

geologist, stated he observed "lampblack" (sooty material) in the fill material. According to the Gasco RI, lampblack is a byproduct of the "Pacific Coast Oil Gas Process" the Gasco facility used to thermally crack oil. At 23 feet bgs, native soil was encountered (upper alluvium fine sand/silty sand). No elevated PID or HCN levels were recorded in the breathing zone. PID readings up to 1.2 ppm were observed in the bagged soil from the sample cores. The driller attempted 10 sonic core runs with poor success, because the bit lacked a flapper (soil kept falling out of the core sampler). The drillers eventually stopped work and obtained a flapper bit to improve sample recovery.

January 27, 2010

CDM was on site for health and safety oversight and for technical oversight. At 10:25 a.m. the drillers were drilling and collecting continuous core samples at MW22-80; the next sample to be collected was from 75 to 80 feet bgs. According to Matt Wilson, Anchor QEA geologist, the lower alluvium (medium-grained sand) was encountered at 69 feet bgs. Anchor QEA's plan was to confirm they were into that layer a minimum 10 feet, so they drilled to a total depth of 80 feet bgs.

At 1:00 p.m., the drillers began MW22-80 well construction. First the 1-foot sump was attached to the bottom of the 10-foot slotted 2-inch diameter PVC screen and placed into the casing. A "centralizer" was installed at the top of the screen to ensure the screen was in the center of the hole so that when the sand was poured in, it would fill around all sides of the screen. As the well was constructed, two additional centralizers were installed about every 25 feet along the 2-inch diameter PVC casing. Once the screen was in place, 10-20 filter pack sand was poured into the casing to pack around the screen. The larger diameter outer steel casing was pulled up in stages as the sand filter pack was poured in. Once the sand filter pack was in place, the drillers began surging the well (for 5 minutes) to settle the sand pack. Following surging, the driller measured the depth to the top of the sand pack to ensure it was present at the desired depth.

January 28, 2010

The driller had just completed grouting MW22-74 upon CDM's arrival at 1:50 p.m.

At 2:00 p.m., the drilling crew began setting up the rig at the location of MW24-130. At 3:25 p.m., Matt Wilson, Anchor QEA geologist, informed CDM that the drillers were having trouble with their crane, which was needed to move the drill rods and casing to the decontamination trailer. A mechanic was called to the site and the crane was operable by 4:00 p.m. At 4:30 p.m., the drilling crew moved all equipment from the MW22-80 location to the decontamination area. They used the crane to offload investigation-derived waste (IDW) drums to the storage pad. Then they decontaminated the drilling equipment.

January 29, 2010

Drilling was in progress at MW24-130 upon CDM's arrival at 1:15 p.m. NAPL was reportedly observed in the boring from approximately 18.2 feet bgs to approximately

30 feet bgs. According to Matt Wilson, Anchor QEA geologist, they had progressed past the NAPL zone and the drillers were preparing to decontaminate the sampling tools that encountered the NAPL before progressing deeper. The following information was obtained from the MW24-130 boring log prepared by Matt Wilson:

0-6 feet:	dark brown wet silty gravel (fill)
6-14.1 feet:	dark brown moist silty gravel (fill)
14.1-25 feet:	mixed dark gray and black dry silty sandy gravel (fill)
25-25.8 feet:	sandy silt, spotty sheen with hydrocarbon odor (begin native material)
29.4 feet:	sand layer, heavy sheen, trace oil
30-40 feet:	no recovery
40 feet:	dark brown, loose, wet poorly graded fine sand, trace gravel, no sheen, slight hydrocarbon odor
40-45 feet:	no recovery
45-46 feet:	dark brownish gray loose wet sand with silt, no sheen, slight hydrocarbon odor

PID readings of the samples ranged from 1.1 to 29.6 ppm, with the highest reading recorded in the interval 25 to 28 feet bgs. All samples shallower than 15 feet bgs had PID readings less than 1.0 ppm and no PID readings were possible from 30 to 40 feet bgs because of a lack of sample recovery.

January 30-31, 2010

Weekend; no work activity.

February 1, 2010

Drilling had reached the 130-foot bgs target depth at MW24-130 upon CDM's arrival at 1:00 p.m. The 10-foot slotted PVC screen, with 1-foot bottom sump, had been installed, and the drillers had added the filter pack. The drillers were in the process of repairing the drill rig at 1:00 p.m. A small amount of hydraulic fluid had leaked out of a hydraulic piston on the drill rig, but was contained on the plastic sheeting under the drill rig. The leaked fluid was addressed using absorbent pads.

On Friday, January 29 drilling had stopped at 80 feet bgs. PID readings of soil sample intervals from 49 through 130 feet bgs ranged from less than 1.0 ppm to a maximum of 13.1 ppm, which was recorded in the 100-to-103-foot bgs interval. HCN detections less than or equal to 1.0 ppm were between 0 to 110 feet bgs, 5 to 8 ppm from 110 to 117 feet bgs and 1 to 2 ppm from 117 to 130 feet bgs.

At 1:41 p.m. the drillers surged MW24-130 well for 5 minutes to settle the sand pack.

The plan for the remainder of Monday was to grout up MW24-130, decontaminate drilling equipment and clean up the drill site. The driller was also set up at the MW24-70 location.

February 2, 2010

The drilling crew was completing decontamination of equipment used at MW24-130 and prepared to begin drilling MW24-70 upon CDM's arrival at 10:10 a.m.

Matt Wilson, Anchor QEA geologist, stated that the target depth of the shallow well was revised based on the lithology observed when drilling MW24-130. The screen was to be placed in fine-medium sand, which is present from 60 to 70 feet bgs in the 130 foot boring, whereas the target 70-to-80-foot interval has more silt. Because of the known presence of NAPL at this location, the drillers advanced 8-inch casing to 30 feet, sealed it with bentonite chips, then used 6-inch casing for deeper drilling. This isolated the NAPL zone thereby reducing the potential for NAPL to be transported below 30 feet bgs. A sample core was planned from 30 to 40 feet bgs where there was no recovery during drilling of the 130-foot boring for MW24-130. NAPL was evident during installation of the 8-inch casing to 30 feet for the shallow monitoring well (MW24-70). The Sonic cores from this interval were black and covered in tar.

CDM observed drillers complete installation of 8-inch casing to 30 feet for MW24-70. They then added a bag of bentonite chips to seal the hole and allowed the bentonite to hydrate. The plan for the remainder of the day was to complete drilling of the borehole for MW24-70 well and complete as much installation as possible.

February 3, 2010

The drillers had completed grouting MW24-70, decontaminated the equipment, and de-mobilized from the MW-24 cluster location upon CDM's arrival at 2:30 p.m. Anchor QEA informed CDM on February 2 that they planned to start drilling at PW-7; however, Matt Wilson (Anchor QEA geologist) stated the drillers had left the site to re-tool the Sonic drill rig to use the 12-inch casing needed for the pumping well installation.

Cascade Drilling arrived in the afternoon with the limited access drill rig needed to access the tight space for drilling at the MW-23 cluster. A health and safety meeting was held. Because of their late arrival, Cascade spent the day setting up the rig, plastic sheeting containment, and exclusion zone to begin drilling February 4.

February 4, 2010

Drilling was in progress for the 130-foot monitoring well at the MW-23 cluster using the limited access Sonic drill rig upon CDM's arrival at 8:30 a.m. CDM noted the following from the Anchor QEA boring log for MW23-123:

0-3 feet:	silt with cobble
2.2- 7 feet:	gravelly silt, concrete pieces from 3.8 to 4 feet, low recovery from 7 to 9 feet as drillers hit a large rock.
9-14 feet:	silty gravel with cobble at 10 feet: wet, black, sticky silt with concrete and lampblack, described as fine-grained soot-like material
14-21 feet:	gravelly silt, strong naphthalene odor, PID reading above sample (in breathing zone) = 0.1 ppm

21-25 feet:	sandy silt with fine gravel
22.5-24 feet:	gravelly silt
24-24.5 feet:	sand
24.5-25 feet:	sandy silt
25-26 feet:	sand
26-27.5 feet:	silty sand, mottled
27.5-32 feet:	silty sand unit with sand lenses
31-31.5 feet:	fine sand
32-36 feet:	fine sand, trace organics (root hairs, decomposed leaves)

February 5, 2010

The drillers had reached the target depth (131.5 feet bgs) for the deep monitoring well at MW-23 upon CDM's arrival at 12:43 p.m. The soil type in the target screen interval (120-130 feet bgs) was silt so Matt Wilson (Anchor QEA geologist) decided to place the screen from 113 to 123 feet, which was logged as a medium-grained sand. Coated bentonite chips were used ("Enviroplug tablets 3/8 inch") to backfill the borehole from 131.5 feet to 123 feet.

CDM obtained the following information from Matt Wilson's boring log (information for shallower depths was in the Thursday, February 4 report):

32-59 feet:	sand, fine sand with silt lenses
59-91 feet:	sand, medium-grained
91-96 feet:	silty sand, fine to medium sand
96-97 feet:	no recovery, driller overdrilled casing
97-123 feet:	medium-grained sand
123 feet:	grain size change to fine-grained sand
123.5-129 feet:	fine-grained sand with silt layers
129.3 feet:	color change, medium-grained sand
128.1-128.5 feet:	silt layer
130.7-131.5:	sandy silt layer

The PID readings (total VOCs) at MW23-123 ranged from 0 to 25.9 ppm with the highest recorded in the interval between 16 and 18 feet bgs. HCN readings greater than 1.0 ppm at MW23-123 ranged from 2 to 12 ppm with the highest recorded in the interval between 93 and 96 feet bgs.

February 6-7, 2010

Weekend; no work activity.

February 8, 2010

Cascade Drilling had demobilized the limited access Sonic rig from the site (was working on the MW-23 well cluster) and mobilized a full-size Sonic rig for drilling PW-8 upon CDM's arrival at 1 p.m. The 70-foot target depth had been reached at PW-8. Drilling was conducted using a 6-inch diameter casing; however, the pumping well borings need to be 12-inch diameter (2 inches on either side of 8-inch well casing). The

drillers felt the Sonic rig did not have enough power to drill to 70 feet with 12-inch casing so after 6-inch casing installation, they overdrilled the 6-inch casing to increase the borehole to 12 inches using a bit with welded teeth that were attached to 8-inch casing thus creating a 12-inch diameter borehole. CDM obtained the following information from Anchor QEA's PW-8 boring log:

0-2.5 feet:	moist gravel with silt (fill)
2.5-7 feet:	gravel with silt, dry (fill)
7-10.5 feet:	mottled sticky moist well-graded gravel with silt (fill)
10.5-12 feet:	moist to wet silty sand, fine to medium sand, trace brick pieces (fill)
12-13 feet:	wet firm sandy silt with fine sand
13-14 feet:	very loose, wet sand with silt, medium-grained
14-20 feet:	very loose, wet sand, fine- to medium-grained, slight hydrocarbon odor
15.8-16.3 feet:	silt layer
26-27.5 feet:	increasing sand content with depth
27.5-30 feet:	loose wet fine- to medium-grained sand with silt, no sheen
30-46 feet:	very loose very wet fine to medium-grained poorly graded sand, no sheen
35.1-35.6 feet:	sheen, moderate hydrocarbon odor, silt layers to 39 feet
40-46 feet:	moderate hydrocarbon odor, no sheen, sand as above
46-46.9 feet:	silt with organic debris
46.9-55 feet:	very loose wet medium-grained sand with silt layers to 60 feet
60-70 feet:	medium-grained sand, as above

Matt Wilson (Anchor QEA geologist) stated native soil was encountered around 12 feet bgs. Groundwater was encountered within the fill unit in the vicinity of 10.5 to 12 feet bgs. PID readings greater than 1.0 ppm at PW-8 were found between 13 and 20 feet bgs and ranged from 2.0 to 5.9 ppm. All PID readings in breathing zones were 0 ppm. HCN readings greater than 1.0 ppm at PW-8 were found between 60 and 65 feet bgs and ranged from 2 to 3 ppm.

February 9, 2010

Upon CDM's arrival at 2:20 p.m. the drillers were installing 12-inch casing in the PW-8 borehole. The casing installation was very slow and loud as the Sonic rig was having difficulty pushing casing to 70 feet.

At 4:20 p.m. the shaker arrived. Cascade Drilling mobilized the shaker, a large piece of equipment on its own trailer, from California. It has several sieves that filter out the soil material from the recirculation water during well casing cleanout. Cascade began assembling the shaker to prepare for use on February 10.

The process to install PW-8 is summarized as follows:

Step 1 - Drill a 6-inch borehole to the total depth.

Step 2 - Overdrill the 6-inch casing to ream the hole with a 12-inch bit attached to 8-inch casing.
Step 3 - Remove the 6-inch and 8-inch casings while flooding the hole with potable water to minimize collapse of the boring before installation of the 12-inch casing.
Step 4 - Install 12-inch casing into borehole to the total completion depth.
Step 5 - Install and complete 8-inch stainless steel screen assembly with 8-inch riser.

February 10, 2010

Drillers were assembling the shaker unit at the PW-8 drill site upon CDM's arrival at 8 a.m. The shaker has several sieves through which soil material, even fines, are filtered out and then allowed to drop into IDW drums. The water was then recycled to the 12-inch casing. The progress to clean out the 12-inch casing continued slowly and upon CDM's departure at 11:00 a.m. only a small amount (less than one tenth) of a 55-gallon drum of solids had been removed from the casing. The driller periodically used a weighted measuring tape to determine how much material was still inside the casing, and then started up the recirculating water again.

The plan for the remainder of February 10 was to continue cleaning out the 12-inch casing and then begin well construction.

February 11, 2010

The drilling crew had just begun removing the 12-inch steel casing at PW-8 upon CDM's arrival at 8:45 a.m. An 8-inch diameter by 20 feet long stainless steel well screen and steel casing had been installed to 70 feet bgs on February 10. The drillers were pulling the 12-inch casing up in 3-foot increments, adding sand filter pack as they went, ensuring that that sand was packing around the screen as the casing was removed.

Matt Wilson, Anchor QEA geologist, stated that the drillers added a polymer "EZ-MUD" to the borehole on February 10 to facilitate removal of solids from the 12-inch casing to the total depth of 70 feet. The driller was unsuccessful cleaning out the casing using potable water alone. After the solids were removed the driller flushed the casing with 1,000 gallons of potable water to remove the polymer. The first 55 gallons of water containing most of the polymer were put into a drum and kept separate from the rest of the water.

The drillers surged the PW-8 well screen for 20 minutes, adding sand as necessary after surging to ensure sand pack was above the screen, then added 3 more bags (about 2 feet) of sand on top of filter pack.

After CDM's departure at 11:20 a.m. the plan for the afternoon was to grout PW-8 and then potentially move to the observation well about 5 feet away (OW-8). The target depth of OW-8 has been changed to 15.5 feet to ensure the well screen was in the fill unit and not the upper alluvium.

February 12, 2010

The sonic drill rig was set up at the observation well OW-8 location and the drillers were preparing to drill upon CDM's arrival at 8:22 a.m. The target depth of OW-8 was 15.5 feet and was to be screened in the saturated portion of the fill zone. The screen was to be 5-foot slotted PVC.

Matt Wilson, Anchor QEA geologist, visually observed the soil collected from 0 to the total depth of 15.5 feet and compared the lithology to his log for PW-8. Anchor QEA felt confident that the 10.5-to-15.5-foot screen interval is in the saturated zone of the fill, not native material. Matt Wilson stated the water table was encountered at around 12.5 feet bgs. The plan for the remainder of February 12 was to complete construction of OW-8, decontaminate all equipment and demobilize from the OW-8 location.

February 13-14, 2010

Weekend; no work activity.

February 15, 2010

The limited access Sonic drill rig was set up at the MW-23 well cluster location upon CDM's arrival at 12:48 p.m. The target depth for the intermediate well at the MW-23 cluster was 74 feet bgs. The deep well at the location was completed to 123.5 feet bgs on February 5, 2010.

At 1:30 p.m., Matt Wilson, Anchor QEA geologist, took PID readings of three soil samples collected from the intermediate boring in the morning of February 15 at depth intervals where PID readings were elevated in MW24-130. The following results were obtained. Note: PID readings from the same depth in MW24-130 are shown in parentheses:

21-23 feet: VOCs = 3.5 ppm (5.4 ppm); HCN = 13 ppm (0 ppm)
23-26 feet: VOCs = 3.3 ppm (4.7 ppm); HCN = 36 ppm (0 ppm)
27-30 feet: VOCs = 152 ppm (3.9 ppm); HCN = 84 ppm (2 ppm)

Matt Wilson stated there were chunks of wood observed in the 27.5-foot bgs soil sample and the wood may have been coated with creosote or other chemical. The log for the MW24-130 well indicated a naphthalene odor at 21-22.5 feet bgs. Matt Wilson noted the odor in the 21-30 foot bgs interval in the MW-23 boring also.

February 16, 2010

No CDM personnel were on site for Tuesday, February 16. The following information was obtained from a phone conversation with Matt Wilson, Anchor QEA geologist.

The intermediate and shallow monitoring wells were installed at the MW-23 cluster on February 16. The intermediate well was identified as MW23-75 and the shallow well was identified as MW23-27. Both 2-inch diameter wells had 10-foot screen sections. The geologic log for the deep well (MW23-123) completed on February 5,

2010, was used as a guide for the stratigraphy. The only sampling that occurred on February 16 was from the proposed screen intervals to confirm lithology. The 75-foot well (MW23-75) was confirmed to be screened in a medium sand. The shallow well (MW23-27) was confirmed to be screened in fill (sand, silty sand, sandy silt mixture); the fill/native interface was identified at approximately 27.5 feet bgs.

February 17, 2010

The drilling crew was drilling the PW-7 borehole with the full size Sonic rig upon CDM's arrival at 8:20 a.m. The process to install PW-7 was about the same as was done for PW-8. The only substantive change at PW-7 was that the "12-inch bit" was re-fabricated so the 12-inch casing could over-drill the 8-inch casing eliminating the open hole/potable water flooding as the 8-inch casing would now remain in the borehole while the 12- inch casing was installed. The target depth for PW-7 was 90 feet bgs, which is approximately 20 feet into the lower alluvium unit where permeable sand was expected. The initial plan for PW-7 (as shown on Figure 2a in the September 2009 Capture Zone document) was to install the screen in the upper alluvium (predominantly fine sand and silt). CDM obtained the following information from Anchor QEA's PW-7 boring log:

0-17.5 feet:	fill unit (groundwater at 11 feet bgs); sheen was noted in the 10-to-15-foot interval
17.5-23 feet:	silt
23-44 feet:	fine sand with silt layers ("hydrocarbon like odors" noted at 23-foot and 33.2-to-33.3-foot bgs silt layers)
44-47 feet:	silt
47-55.5 feet:	fine sand with silt layers
55.5-59 feet:	silt
59-65 feet:	fine sand with silt layers
65-69 feet:	silt
69-72.5 feet:	fine sand with silt layers
72.5-95 feet:	coarse grained sand (lower alluvium)

The sheen noted in the 10-to-15-foot bgs interval did not appear to be from a volatile substance as the PID headspace was near 0 ppm.

February 18, 2010

No CDM personnel were on site for Thursday, February 18. The following information was obtained from Matt Wilson, Anchor QEA geologist.

The drillers continued to over-drill the 8-inch casing with the 12-inch casing at PW-7. They were able to advance the 12-inch casing to 85 feet bgs by the end of the day. The soil accumulation between the 12- and 8-inch casing caused the casing to lock up throughout the day. The driller added potable water to the 8-inch casing when the 12-inch casing was at 53 and 80 feet bgs to flush out the annular space between the

two casings. Drilling on Thursday was stopped after the driller ran out of potable water (an estimated 3,800 gallons were used in the flushing operation on February 18).

All PID headspace readings in soil from the PW-7 boring were near 0 ppm; the highest reading was 1.9 ppm at 85 feet bgs.

February 19, 2010

No CDM personnel were on site for Friday, February 19 because of minimal site activities. The following information was obtained from Matt Wilson, Anchor QEA geologist.

The drillers were able to advance the 12-inch casing at PW-7 to the target depth of 95 feet bgs on Friday. They continued to experience problems with "sand lock" while attempting to clean out the annular space between the 8- and 12-inch casings by flushing potable water down the 8-inch casing. By the end of the day the decision was made to remove the 8-inch casing.

February 20-21, 2010

Weekend, no work activity.

February 22, 2010

The drillers had completed cleaning out the 12-inch casing at PW-7 to the total depth of 95 feet bgs upon CDM's arrival at 9:02 a.m. Removal of solids from the casing was accomplished using only potable water with no drilling mud utilized. The drillers began constructing the well around 9:30 a.m. starting with two 10-foot lengths of stainless steel casing (8-inch diameter) followed by 10-foot steel riser pipe sections. Progress was slow, as each 10-foot section was screwed on by hand. At 11:20 a.m., the drillers had completed installation of the screen and casing and began adding the sand filter pack. A follow-up call to Matt Wilson at 4 p.m. confirmed the filter pack had been installed.

February 23, 2010

No CDM personnel were on site for Tuesday, February 23. The following information was obtained from Matt Wilson, Anchor QEA geologist.

Grouting of PW-7 was completed in the morning. Drilling and installation of OW-7 (adjacent to PW-7) was completed by noon. The total depth for OW-7 was 17.5 feet bgs. The OW-7 boring was not logged. The geologic log for PW-7 was used to guide the installation of OW-7. The PW-7 log showed the fill unit/upper alluvium interface is at 17.5 feet bgs; therefore, the 5-foot screen for OW-7 was placed just above the contact with the upper alluvium. Groundwater was encountered at 11 feet bgs. Granular bentonite was used as the seal at OW-7.After decontamination and demobilization from OW-7 the drillers set up at PW-9 where access was very limited.

February 24, 2010

Drilling was in progress at PW-9 and Matt Wilson, Anchor QEA geologist, was logging the 20-to-25-foot core sample upon CDM's arrival at 8:29 a.m. Matt stated drilling at PW-9 was initiated the afternoon of February 23 and they had reached 15 feet bgs by the end of the day. CDM obtained the following information from Anchor QEA's PW-7 boring log:

0-2 feet:	Wet, silty gravel.
2-15.8 feet:	Moist sticky gravelly silt, hydrocarbon-like odor, fine to cobble-sized gravel.
15.8-20 feet:	Moist gravelly sand with silt abundant, soot (lampblack present), no sheen, hydrocarbon-like odor. Poor recovery in this sample interval made determination of saturated conditions not possible, but Matt Wilson believed groundwater was encountered within the 15-to-20-foot depth interval.
20-21.4 feet:	Brownish-red wet loose fine-medium sand.
21.4-26.3 feet:	Dark gray wet, loose fine to medium sand. Matt Wilson stated he believes this was the first native (upper alluvium) material encountered.
22.2-22.3 feet	Silt layer.
26.3-27.6 feet:	Dark olive gray wet fine sand with intermittent silt layers.
27.6-29.1 feet:	Dark olive gray soft wet silt, trace fine sand with trace organic debris.
28.7-29.1	Sand layer.
29.1-37.7 feet:	Dark olive gray soft wet silty sand interbedded with fine sand and silt layers.
37.7-40 feet:	Dark olive gray very wet silty fine sand.
40-46.3 feet:	Dark grayish-brown very soft very wet silt with fine sand.
46.3-50	Dark grayish-brown dense wet silty sand.

Headspaces on soil samples 0 to 60 feet bgs showed the highest VOC detection was 1.3 ppm; highest HCN detection was 5 ppm.

February 25-26, 2010

No CDM personnel were on site for Thursday or Friday, February 25 and 26. The following information was obtained from Matt Wilson, Anchor QEA geologist.

On Thursday February 25 the 8-inch casing (connected to 10-inch bit) was advanced to the total PW-9 boring depth of 95 feet bgs. The 8-inch casing was over-drilled with the 12-inch casing to 76 feet bgs where the driller decided to pull the 8-inch casing because of sand lock between the two casings. The driller then continued with the 12-inch alone.

The 12-inch casing was driven to the total PW-9 depth of 95 feet bgs on Friday, February 26 by about 10:30 a.m. There were 20 feet of solids accumulated inside the 12-inch casing. The drilling crew spent the rest of February 26 installing well monuments and bollards at previous well installation locations.

The medium sand comprising the lower alluvium was encountered in the PW-9 boring at 70 feet bgs. The sequence of sand from 70 feet to the total boring depth of 95 feet was uniform with the exception of a 6-inch layer of dense silty sand at 89.5 feet bgs. This silty sand layer has been evident in other borings but typically thicker (around 3 feet thick). Matt Wilson, Anchor QEA geologist, noted the following HCN headspace readings in the vicinity of the 6-inch silty sand layer.

87-90 feet: 42 ppm (silty sand present from 89.5to 90 feet)
90-92.5 feet: 13 ppm
92.5-95 feet: 5 ppm

There was no HCN present in the breathing zone during health and safety monitoring.

February 27-28, 2010

Weekend. no work activity.

March 1, 2010

Drillers were cleaning out the 20 feet of solids inside the 12-inch casing at PW-9 using potable water upon CDM's arrival at 9:30 a.m. This process was completed at about 10:00 a.m. and the driller then removed the tricone bit used to suspend the material inside the casing. The total depth of 95 feet was confirmed at 10:15 a.m. and the drillers began preparing for the 8-inch diameter pumping well installation. PW-9 installation began at 11:40 a.m. Two 10-foot screen sections were screwed together (19.3 feet of continuously wire wrapped, 0.035-inch slot) with a 2.2-foot sump at the bottom. Cascade Drilling did not have sufficient carbon steel riser to complete the well so stainless steel schedule 40 riser was used as a substitute; therefore, the completed riser was a combination of 8-inch diameter stainless and carbon steel. The filter pack at PW-9 was surged for 10 minutes with no loss of sand measured; the filter pack was surged an additional 5 minutes again with the depth to sand remaining constant.

At about 10:30 a.m. a second Cascade Drilling crewmember began setting up to develop PW-8. A follow-up call to Matt Wilson at Anchor QEA revealed the following for the PW-8 development process:

Calculated well volume: 137.5 gallons
Total water volume removed: 1,500 gallons
Air lift water removal rate: 35-40 gallons per minute (gpm)
Drawdown: 4-4.5 feet.
Estimated specific yield: 7-10 gpm/foot.
(There was no flow meter in use during the development process so the above numbers are estimated)

March 2, 2010

The Cascade Drilling crew had just initiated development at PW-7 upon CDM's arrival at 9:30 a.m. The development process consisted of lifting the "surge block" up and down throughout the screened portion of the well while injecting air. During the PW-7 development process the average flow was estimated by measuring the volume of water in the polyethylene holding tank over time; the average flow was estimated at 30 gpm. This process was scheduled to continue until 10 times the well volume (calculated PW-7 well volume was 210.1 gallons) had been collected. At the time CDM departed the site at 12:00 p.m. approximately 700 gallons had been removed.

Matt Wilson, Anchor QEA geologist, stated that the drilling of PW-9 was completed on Monday, March 1 and the grouting was completed Tuesday morning, March 2. The well development crew continued to remove water from PW-7 and PW-8 on Wednesday, March 3.

A follow-up call with Tim Stone of Anchor QEA on Wednesday morning, March 3 indicated water being removed from PW-7 and PW-8 was running clean. PW-7 yielded 50 gpm during development. Orange sediment was present in a jar sample from PW-7 that was clear the night before suggesting iron precipitate according to Tim Stone. Anchor QEA planned to begin installation of pumping well PW-7, PW-8, and PW-9 plumbing, pumps, carbon dioxide treatment system, pump controls, etc. during the week of March 8, 2011, pursuant the design envisioned in the October 2009 Interim Design Report. The three pumping wells were to have aboveground completions.

March 3, 2010

No CDM personnel were on site for Wednesday, March 3. Information for Wednesday was obtained from Doug Laffoon, Anchor QEA. An estimated 1,400 gallons of water were removed from PW-9 on Wednesday, March 3 using the air lift/surging technique. Water at end of Wednesday was running "almost clear." The air lift water removal rate was 8.7-11.4 gpm, and total drawdown was 27.38 feet. Using an average removal rate of 10 gpm, the estimated specific yield of PW-9 from Wednesday was 10 gpm/27.38 feet of drawdown = 0.37 gpm/foot which was lower than Anchor QEA expected. Doug stated that they would likely use the March 4 results (using a down hole pump) to get a better estimate of the specific yield of this well.

March 4, 2010

Doug Laffoon, Anchor QEA, was on site at PW-9 upon CDM's arrival at 9:00 a.m. A Grundfos pump had just been installed in the well to a depth of 84 feet, which was approximately in the mid-point of the 20-foot long screen section. At 9:20 a.m. Tim Stone of Anchor QEA arrived at PW-9 and discussed the pumping procedure with CDM. He stated that the large amount of drawdown seen in PW-9 on March 3 was unusual, and that PW-7 and PW-8 were much more efficient than PW-9. Tim Stone stated that they did not want the water level to go below the screen (located at

approximately 74 feet bgs) and expose the screen to dry conditions. Once drawdown in the well equilibrated at 50 gpm they planned to increase the pumping to full throttle (60 gpm) to observe and record drawdown followed by recovery measurements. CDM recorded the following observations:

After 8 minutes of pumping (9:27 a.m.) water was very light tan, cloudy; after 19 minutes of pumping (9:38 a.m.) water was almost clear; and after 26 minutes (9:45 a.m.) the water was clear. At 46 minutes (10:05 a.m.) drawdown started to equilibrate. At the beginning of pumping, the draw down rate was approximately 1.5 feet every 6 minutes. After 46 minutes of pumping at 50 gpm, drawdown decreased to 0.09 feet in 6 minutes. Pumping at 50 gpm continued to a total of 110 minutes (11:15 a.m.) until drawdown reduced to equilibrium conditions less than 0.1 feet every (6 minutes). At 11:15 a.m. with the pumping level (depth to water [DTW]) now at 66.08 feet, with a total of 7,100 gallons of water removed Anchor QEA decided to open the pump up to full power which produced about 60 gpm. At 11:24 a.m., after 119 minutes of total pumping and 9 minutes of pumping at 60 gpm, the pumping DTW level dropped to 74 feet and the pump was shut off to not expose the screen. Recovery was then observed. Recovery occurred quickly, with DTW at 27.82 feet (1.57 feet within pre-pumping static) after 9 minutes of recovery. At that point, Anchor QEA decided to restart the pump at a flow rate of 30 gpm reportedly to reach equilibrium again. At 12:10 p.m. Anchor QEA determined that the well had equilibrated and little drawdown was occurring with 30 gpm. The pumping DTW was 35.34 feet and total water removed from the well was 8,310 gallons.

March 5, 2010

No CDM personnel were on site for Friday, March 5. Activity that occurred on Friday included the driller demobilizing the full size Sonic rig and Anchor QEA developing OW-7.

March 6-7, 2010

Weekend, no work activity.

March 8, 2010

Drilling had commenced at 8:40 a.m. at OW-9, which is about 4 feet from PW-9, upon CDM's arrival at 9:05 a.m. The 15-to-21-foot core sample was being inspected upon CDM's arrival. Matt Wilson, Anchor QEA geologist, noted that the sample was fill, with large chunks of gravel and debris. The material was wet/saturated and had a strong naphthalene odor; however, the PID did not register above background (0 ppm) when held closely over the soil core. No noticeable sheen/staining was observed in the fill unit at OW-9.

OW-9 was constructed at a total depth of 25 feet bgs. A 2-inch end cap was placed on the bottom of the 5-foot long slotted PVC screen. A stainless steel centralizer was placed in the middle of the 2-inch blank PVC casing attached to the top of the screen. Surging was conducted manually, using small diameter PVC pipe with a rigid disc near the bottom. The surge disc has a diameter slightly less than 2 inches. The driller

pulled the surge disc up and down to move water through the screen and settle the sand filter pack. The well was surged for approximately 5 minutes with minimal settlement of the sand pack noted. Sand was added to the desired depth and then granular bentonite was used to fill to the surface and complete construction of OW-9.

July 1, 2010

CDM arrived at 7:00 a.m. on Thursday, July 1, 2010, to observe drilling and installation of an additional pumping well PW-8-37 (originally intended to be designated PW-8-52). The concept for PW-8-37 is described in an Anchor QEA memorandum to EPA dated June 24, 2010. The intent of the well was to better evaluate capture of groundwater in the upper alluvium and fill near PW-8-68. Since the estimated bottom depth of the new well screen was 52 feet, the proposed well was preliminarily designated PW-8-52. Installation of PW-8-52 was to be similar in design to the other pumping wells except it would be a 6-inch diameter well. PW-7, PW-8, and PW-9 are 8-inch wells; the 6-inch diameter for PW-8-37 was possible because the planned well discharge was less than 10 gpm, and a smaller diameter submersible pump could be used. After leading the health and safety meeting, Anchor QEA and the drilling crew proceeded with planned work activities. This included drilling a 45-to-55-foot pumping well near existing PW-8-68. Up to 40 feet of screen were to be installed. The goal was to drill to find the medium sand unit at depth and then backfill so that the well would be screened only in the upper alluvium layer above the medium sand. The screen was to be placed in locations without thick layers of silt. High-density polyethylene was used to wrap the screen and blind off any silty sections. The plan for sampling was to collect 5-foot cores in the first three runs in the fill unit where Anchor QEA anticipated low recovery based on previous drilling experience. Anchor QEA would then switch to 10-foot cores in the upper alluvium and then back to 5-foot cores when getting near the target depth (medium sand).

The following was observed from 9:00 a.m. to 2:20 p.m.: Drilling and sampling progressed at PW-8-37. At 3:10 p.m. Anchor QEA made the decision to screen the well from 7 to 37 feet and blind out from 16 to 20 feet using high-density polyethylene wrap. High-density polyethylene is woven plastic, 28 mil thick. At 3:30 p.m. the drillers added bentonite chips (½-inch coated Enviroplug Tablets) to backfill depth from 50 to 42 feet. At 4:40 p.m., the drillers began assembling the sump and well screen. The sump was 5 feet long, and was to be placed from 37 to 42 feet. Centralizers were to be installed at every threaded location, including the junction of the sump and the bottom of screen.

CDM obtained the following information from Anchor QEA's PW-8-37 boring log:

0-10 feet:	Dark reddish brown with black patches, dry, gravelly silt. Trace concrete pieces, fill.
5 feet:	Color change to black with patches of reddish brown, slightly moist.
10-14 feet:	Dark brownish red, wet, fine-medium sand.
14 feet:	Gray sand. Water table at 10 feet.

14.4-16.1 feet:	Sand, gray to brown, wet, loose, fine to medium. Sheen from 15.7 to 16.1 feet; slight hydrocarbon-like petroleum odor.
16.1 feet:	Silt, dark gray, moist, trace fine sand, trace spotty sheen from 16.1 to 17.5 feet; trace hydrocarbon-like odor. Trace rootlets and black organic material residue and small plant debris.
19.7 feet:	Increased sand content. Sandy silt.
19.7-31.4 feet:	Silty sand, dark gray, wet fine sand, moderately plastic silt, soft, trace hydrocarbon-like odor, trace gravel. Sand and silt are intermixed. Some layers can be discerned but there appears to be no stratification.
28.8-30 feet:	Silt layer.
31.4 -37.5 feet:	Silty sand, dark brownish gray, wet fine sand and high plasticity silt, abundant silt blebs.
37.5-42 feet:	Sand, dark gray, loose, wet, abundant silt blebs, fine to medium sand.
45 feet:	Sand dark gray, medium grained, wet.
48.6 feet:	Large silt bleb.
49-50 feet:	Sand with silt.

Highest PID readings of soil samples were recorded in the 16-to-17.5-foot interval (1.4 ppm for VOC and 2 ppm for HCN).

July 2, 2010

CDM arrived at 6:00 a.m. Planned activities for July 2 included installation of PW-8-37. At 6:20 a.m. Matt Wilson, Anchor QEA geologist, arrived as well as Cascade Drilling personnel. The daily health and safety meeting was conducted at the Anchor QEA job trailer by a representative from Cascade Drilling. By 8:39 a.m. the well was constructed and the drillers began to add sand for filter pack.

At 10:05 a.m. Matt Wilson received a call from John Edwards, Anchor QEA, instructing them to stop work. DEQ had informed Anchor QEA that there might need to be 18 feet of annular seal above all pumping well screens. Anchor QEA was not aware of the 18-foot annular seal requirement. At 12:30 p.m. Anchor QEA received word that they are to complete the well as planned; DEQ was allowing them to complete the well, pending the outcome of a discussion on the future of the well. At 2:10 p.m. well PW-8-37 was completed.

July 16, 2010

A three-person crew from Cascade Drilling was on site at the PW-8-37 well location and in the process of well development upon CDM's arrival at 9:45 a.m. Doug Laffoon, Matt Wilson, and Tim Stone from Anchor QEA were also present at PW-8-37. The plan for July 16 was to develop PW-8-37.

A total of 890 gallons of water were removed from PW-8-37 on July 16. The drillers also used a bailer on July 16 in an attempt to remove the sand from the well sump with no success. A vacuum truck was used on Monday morning, July 19 to remove

the sand. Additional pumping also occurred on July 19 in an attempt to decrease the well turbidity.

August 12, 2010

CDM arrived at 8:45 a.m. Planned activities for August 12 included abandonment of PW-8-37 and installation of PW-8-39 (note new name for well) in the same location as PW-8-37. Abandonment of PW-8-37 was directed by EPA and Oregon DEQ. Information concerning the abandonment of PW-8-37 and installation of PW-8-39 is provided in Anchor QEA memorandums dated August 3 and 6, 2010.

A health and safety meeting had been conducted before the CDM representative arrived and the drillers were proceeding to remove the bollards at PW-8-37. At 9:20 a.m. the drillers used an air knife to cut through the bentonite seal at the wellhead. A vacuum truck was used to remove the bentonite material as it was cut. At 11:45 a.m. the drillers began slowly pulling up the casing assembly from PW-8-37. This process was slow as each piece was dismantled by hand rather than using the rig jaws to unscrew the casing and screen lengths as they were pulled up from the well. During this process, Matt Wilson used a PID meter to measure for VOCs and HCN in the driller's breathing zone. No VOCs or HCN were detected above background.

A 2:53 p.m. the entire casing and screen assembly for PW-8-37 was removed. The drillers then began assembling hollow stem auger equipment flights to start over-drilling the PW-8-37 borehole. A follow-up call with Anchor QEA after CDM's departure showed that over-drilling and installation of the well sump, screen, and casing was completed on Thursday, August 12 and the addition of filter pack had begun.

August 13, 2010

CDM arrived at 7:00 a.m. on Friday, August 13, 2010, to observe installation activities for PW-8-39 in the over-drilled borehole that was the former location of PW-8-37.

After the health and safety meeting, CDM accompanied Matt Wilson, Anchor QEA, and the drillers to PW-8-39 and observed that over-drilling using the 12-inch (inside diameter) auger had been completed down to the well bottom at 42.1 feet bgs and the new well casing and screen had been installed. From 8:00 a.m.to 9:30 a.m. the filter pack was installed and surged for about 1 hour using a surge block. After surging, the depth of the filter pack was re-measured and 4 additional bags of sand were added to bring the sand level up to 23 feet bgs, comprising a total 19 feet of sand filter pack.

After installation of the annular seal at PW-8-39 the drill rig was moved 6 feet to the south to drill a shallow piezometer. A follow-up call was placed to Anchor QEA and CDM learned the drilling and installation of the shallow piezometer was completed on Friday afternoon, August 13. The piezometer (denoted OW-8-28) was screened from 23.1 to 28.1 feet bgs.

August 19, 2010

CDM arrived at 7:55 a.m. on Thursday, August 19, 2010. The planned activity for the day was the development of the new pumping well PW-8-39. A health and safety meeting was held, during which the lead driller discussed general emergency procedures, PPE, and the work scope planned for the day.

At 8:20 a.m. the CDM representative, Doug Laffoon, Anchor QEA, and the drillers left the job trailer for the PW-8-39 work area to collect measurements and set up the development equipment.

At 9:20 a.m. the drillers began using a steel bailer to remove material from the well. The bailer was inserted to the bottom of the well and then surged up and down to dislodge fines and suspend them in the water column. The bailer was then removed and water and fines poured into a bucket. As the drillers proceeded with bailing PW-8-39, Doug Laffoon periodically collected fines from the well into Imhoff cones, along with another sample in which he measured temperature, conductivity, and pH. The Imhoff cones were used to determine the amount of sand versus silt being removed from well. Cumulative volume (gallons) of material removed was also recorded.

At 9:30 a.m. 3 feet of sediment had been removed from the well using the bailing method (a total of 7.4 feet had been measured in the well before initiating bailing). At 10:08 a.m. the drillers lowered a pump into well to try pumping water and fines out. The pump was operated at 5 gpm and after about 10 minutes of running the pump, the well went dry and the pump was stopped. There was still too much sand in the well for the pump to function properly so it was decided to continue bailing out the fines. A total of 110 gallons were removed from the well (by both bailing and pumping) as of 10:18 a.m.

During a follow up call by CDM with Doug Laffoon at 4:00 p.m., Doug stated that they had pumped a total of 675 gallons using the pump at 3 gpm. The water being pumped from the well was almost clear at that point and there were no more fines in the well.

3.1.3 Monitoring Instrumentation and Pump System Installation

Oversight of the wells and pump system monitoring instrumentation installation took approximately 4 weeks. The following field teams were on site during the month of March and into early April 2010 to conduct the work.

Anchor QEA, NW Natural consultant
Advanced Remediation Technologies, Inc., pump installation and pipe conveyance to treatment system
CDM, field oversight
Stoner Electrical, pump controls

CDM's field team lead visited the site on March 18, 23, and 30 to conduct oversight on the monitoring system instrumentation and pump system installation.

March 18, 2010

CDM arrived for at 8:58 a.m. on Thursday, March 18. The only activity at the site on March 18 was fusion of plastic piping to be used to convey water from the pumping wells to a water holding pond for processing through the onsite carbon filter treatment system. John Renda, Anchor QEA, stated that the carbon filters for the treatment system are being changed Thursday or Friday (March 18 or 19). The pipe fusion was being conducted by Lance Downs of Advanced Remediation Technologies, Inc. Mr. Downs showed CDM the fusion tool, which was basically a hot plate that melts the two pipe ends and a vise that holds them together while they are fused.

A gravel berm had been installed at the location of PW-9 and OW-9, preventing stormwater from going over the bank to the Willamette River. All the drilling sites had been graded and new gravel had been brought in.

March 23, 2010

CDM arrived at 8:30 a.m. on Tuesday, March 23. CDM observed the assembly and installation of the 5-horsepower, 9-stage pump at PW-7. The total length of the pump including the motor is 53 inches, with the motor being 23 inches. The bottom of the pump assembly was set to a depth just above the top of the well screen. The pump inlet was just above the motor, so the inlet would be about 2 feet above the top of the screen. Total depth of PW-7 was 96.1 feet, so the top of screen was at 74.1 feet. The same pump setting was planned for PW-8 and PW-9. The assembly for the well included the following:

- Water pump attached to steel piping (3.875-inch diameter)
- Two-inch steel piping for carbon dioxide (CO_2) injector
- Two-inch PVC piping for transducer (piping is slotted at bottom, and holes were drilled throughout the length above that so that water can enter)

Transducer piping was installed such that the bottom of the pipe was at the top of the well screen. The CO2 injection system piping was installed such that the bottom of the piping was near the bottom of the screen. CO2 injection was to be used if the well screen became clogged. The CO2 system was designed to inject high pressure CO2 into the well at the bottom of the screen. The process resulted in a lowering of pH with the formation of carbonic acid and, in theory, resulted in a scouring action that would helps remove inorganic scale and biofouling in-situ. Accumulated debris would then be removed with normal pump operation. Doug Laffoon, Anchor QEA, measured the DTW in well PW-7 Tuesday morning, March 23 and reported the tape came up with reddish-brown iron oxide on it suggesting a potential issue with iron fouling.

March 30, 2010

CDM arrived for at 8:35 a.m. The CDM representative met with Tim Stone, John Renda, and Doug Laffoon (all with Anchor QEA) in the onsite job trailer as they were gearing up to begin to download transducer data from all 41 of the onsite wells and piezometers. Tim Stone provided a project status update: all plumbing and headworks to the three pumping wells had been installed; the control panel was installed only at PW-8 to date. One worker from Stoner Electric was onsite March 30 working on installation of the control panel at PW-7. Electrical work was to continue through the week of March 29 and likely into the week of April 5s, 2010. At 9:00 a.m. the CDM representative accompanied John Renda and Doug Laffoon to the Fuel and Marine Marketing (FAMM) dock to download transducer data and take manual water level readings at the piezometers. As these are located over-water and accessed via the catwalk, personal floatation devices were donned.

3.1.4 Pumping Tests and Variable Frequency Drive Testing

Pumping tests occurred from mid-April through early May 2010 and resumed with additional tests in September and November 2010 utilizing shallow pumping well (PW-8-39). Short-term logic control testing of the VFD system was performed in March and April 2011. The following field teams were on site to conduct this work.

Anchor QEA, NW Natural consultant
CDM, field oversight
R&W Engineering, programmable logic control programming

CDM's field team lead visited the site on April 19, 21, and 30, 2010, May 7, 2010, September 2 and 9, 2010, November 8 and 11, 2010, March 29, 2011, and April 6 and 12, 2011, to conduct oversight on the operation of the pumping tests and VFD testing.

April 19, 2010

CDM arrived at 8:25 a.m. on Monday, April 19, 2010. Tim Stone, John Renda, and Doug Laffoon (all with Anchor QEA) were present. The purpose of the visit was to observe the first short-term (2-hour) pumping test under the Phase 1 field test portion of the September 2009 Capture Zone Field Test Plan.

The first short-term test began at 8:46 a.m. with Tim Stone (positioned at PW-9) radioing to Matt Wilson and John Renda to start PW-7 and PW-8, respectively. All three pumping wells ramped up to approximately 15 gpm in about 5 minutes. There was some variability in the beginning: PW-7 went up to 16 gpm then down to 11 gpm, and then stabilized at 15 gpm.

The pumping test appeared to be a success; all three pumps were showing drawdown, though not a significant amount (up to approximately 3 feet maximum in the first half hour). There was also evidence of drawdown in nearby monitoring wells, but it was slight (less than 0.2 feet of drawdown). Water from the three wells was transferred directly to the onsite carbon treatment system, maintained by Hahn and Associates. Tim Stone stated that the pumping test data would be downloaded and

the modelers would evaluate the data to see if 15 gpm was appropriate for long-term (72 hour) testing.

April 21, 2010

CDM arrived at 10:20 a.m. on Wednesday, April 21, 2010. Tim Stone, John Renda, and Doug Laffoon (all with Anchor QEA) were present. The purpose of the visit was to observe the third (last) short-term (2-hour) pumping test under the Phase 1 field test portion of the September 2009 Capture Zone Field Test Plan. The pumping rate for the third test was planned for 35 gpm.

At 10:44 a.m., Tim Stone radioed to Matt Wilson and John Renda and all the pumping wells were started. The pumping test appeared to be a success; all three pumping wells appeared to be producing drawdown in nearby observation wells.

April 30, 2010

CDM arrived at 8:00 a.m. on Friday, April 30, 2010. The purpose of the visit was to observe the termination of the first long-term pumping test. The test was started on Monday, April 26 at approximately 5 p.m. The test was planned for 72 hours at 25 gpm. Based on a recommendation from Anchor QEA's modeling subcontractor (S.S. Papadopulos & Associates, Inc.), the test was extended beyond the planned 72 hours. Instead of shutting down on Thursday, April 29 at 5 p.m., the test was shut down on Friday morning April 30.

CDM recorded end of pumping test DTW at all three pumping wells along with totalizer readings from the electronic readouts. The test was terminated at 8:40 a.m. CDM then observed recovery at PW-9, recording real-time data on DTW at PW-9. Information on recovery from PW-7 and PW-8 was also obtained before the CDM representative left the site by looking at previous readings collected by the meters at those wells (i.e., Tim Stone scrolled through the data on the meters and CDM recorded the DTW readings for the first few minutes after stopping the test for PW-7 and PW-8, since CDM could not observe those in real time).

May 7, 2010

CDM arrived at 6:20 a.m. on Friday, May 7, 2010. The purpose of the visit was to observe the termination of the second long-term pumping test. The test was started on morning of Tuesday May 4. The test was planned to run to the end of day on Friday May 7 at a rate of 35 gpm.

The CDM representative met Matt Wilson, Anchor QEA, at the onsite trailer. Matt was the only Anchor QEA personnel present as the pumping well controls had been re-wired so that it required only one person to start and stop the pumping tests. CDM accompanied Matt Wilson to PW-7 to stop the 35 gpm test. CDM observed the pump rate at PW-7 was 35.05 gpm, and recorded the electronic DTW and totalizer readings. Matt Wilson stopped the test at 4:30 p.m. after which the CDM representative and Matt Wilson walked to PW-8 and PW-9 and confirmed those wells had also stopped. The CDM representative observed the recovery at PW-9 for a few minutes then

proceeded to record DTW data at PW-7 and PW-8. Data from all three pumping wells were obtained by looking at previous readings collected by the meters at those wells (i.e., Matt Wilson scrolled through the data on the meters and CDM recorded the DTW readings for the first few minutes after stopping the test). The 35 gpm pumping test was started on Tuesday, May 4, 2010, at 8:37 a.m. so the total test time was 80 hours (4,800 minutes).

September 2, 2010

CDM arrived at 9:55 a.m. on Thursday, September 2, 2010. The purpose of the visit was to observe the step testing of shallow extraction well PW-8-39, installed per an addendum to the September 2009 Capture Zone Field Test Plan.

The CDM representative met Doug Laffoon, Anchor QEA, at the security gate and was escorted to Anchor QEA's onsite job trailer where Tim Stone, Anchor QEA, was present. At 10:37 a.m. Doug Laffoon started the step pumping test at 1 gpm. He began recording data including totalizer readings, flow, and DTW, which was measured manually. At 11:47 a.m., after 1 hour and 10 minutes of pumping at 1 gpm, the water level in PW-8-39 had stabilized with at total of 5.8 feet of drawdown and OW-8-38 had drawn down about 0.5 feet. At 11:50 a.m. the pumping rate in PW-8-29 was increased to 2 gpm and Doug Laffoon continued to record data at regular intervals. Testing continued and at 1:15 p.m., after 1 hour and 25 minutes of pumping at 2 gpm, the drawdown in PW-8-39 was 13.53 feet and in OW-8-28 it was 0.56 feet. The drawdown had not yet stabilized in the pumping well at the 2 gpm rate. After CDM's departure Anchor QEA planned to continue pumping at 2 gpm until well PW-8-37 reached stabilization, then increase to 2.5 gpm. Tim Stone stated that they would determine the maximum pumping rate for the 72-hour test at PW-8-39.

September 9, 2010

CDM arrived at 8:48 a.m. on Thursday, September 9, 2010. The purpose of the visit was to observe the start of the 72-hour constant rate pumping test of shallow extraction well PW-8-39 (Segment 2 Test Plan work).

The CDM representative met Doug Laffoon, Anchor QEA, at the security gate and was escorted to Anchor QEA's onsite job trailer where John Renda, Anchor QEA, was present. At 9:25 a.m. the pumping test was started at 2 gallons gpm. This pumping rate was chosen based on Anchor QEA's evaluation of the step testing completed on September 2, 2010. Anchor QEA field staff collected and recorded manual DTW measurement in PW-8-39 and OW-8-28 as well as flow and totalizer readings periodically. At one point during the testing, John Renda used an in situ "Rugged Reader" to view real-time water level data from an electronic transducer. Water level drawdown in PW-8-39 was noted immediately at the start of the pumping test while drawdown in OW-8-28 was observed to be much slower. It was presumed that the outgoing tide was influencing drawdown in both wells.

From a follow-up call to Doug Laffoon at 4:15 p.m. on September 9th, the DTW in PW-8-39 was 36.05 feet at 4 p.m. (3 feet from the pump intake) and the well had not

yet fully stabilized, but drawdown had slowed significantly. This reduction in drawdown was likely due to tidal influence, as the tide had started to come back in around 5:30 p.m.

November 8, 2010

CDM arrived at 9:50 a.m. on Monday, November 8, 2010. The purpose of the visit was to observe the start of the 72-hour pumping test of extraction wells PW-7, PW-8, PW-9, and shallow extraction well PW-8-39.

The CDM representative met John Renda, Tim Stone, Matt Wilson, and Doug Laffoon, Anchor QEA, at the onsite trailer. Anchor QEA personnel were preparing to begin the test, and assembling equipment needed to collect groundwater samples. Tim Stone set each of the 3 deeper alluvium well pumps to run at 25 gpm. PW-8-39 was to be run at 2 gpm, which was determined from the September 2010 test to be the optimum yield of the well. Two flow meters with totalizers were installed in the discharge line at PW-8-39, for redundancy.

Groundwater samples were collected from each of the four pumping wells, and from the Willamette River. Field water quality parameters were also measured using a YSI meter and a flow-through cell during sampling at each well. Samples were collected at the start of the test (following purging three well volumes from each well), middle, and end of the 72-hour test. Groundwater samples were analyzed for total metals, dissolved metals, cations/anions (including potassium, nitrate, ammonium sulfate, sodium carbonate, and bicarbonate), cyanide, iron, and manganese. Everything except for total metals and cyanides was field-filtered before sample collection.

November 11, 2010

CDM arrived at 11:30 a.m. on Thursday, November 11, 2010. The purpose of the visit was to observe the end of the 72-hour pumping test of extraction wells PW-7, PW-8, PW-9, and shallow extraction well PW-8-39.

The CDM representative met Matt Wilson, Anchor QEA, at PW-7. Matt had just completed collecting water samples at PW-9. From Matt's notes, the DTW at PW-9 at the time of sampling was 40.90 feet and the totalizer read 107,167 gallons.

At 11:45 a.m., Matt Wilson began collecting water samples from the pumping wells. At 12:44 p.m. all sampling had been completed and the test was ended. Matt turned off the three pumping wells at the control panel at PW-7, and then manually shut off the Grundfos pump at PW-8-39.

At 12:56 p.m., the CDM representative returned to the onsite trailer with Matt Wilson to obtain results of YSI parameters collected mid-way through test. Matt then left the trailer to collect the end of test water sample from the Willamette River.

Matt Wilson stated everything had gone as planned during the 72-hour test. Sampling during the middle of the test was conducted in the early morning on

Wednesday, November 10, 2010, approximately 44 hours from the start of the test. DTW calibration checks were conducted on November 9 and 10, 2010, on 36 onsite wells and piezometers. All electronic transducers were within 0.10 feet of the manual readings for DTW, with the exception of MW-21-12, where there was a 0.15-foot difference between the electronic and manual readings. Matt stated that Anchor QEA would re-set that transducer following the pumping test.

March 28, 2011

CDM arrived at 9:55 a.m. on Monday, March 28, 2011. The purpose of the visit was to observe short-term logic control testing of the VFD system for extraction wells PW-7, PW-8, PW-9, based on the pumping response at four upland monitoring wells: MW-21-75, MW-22-80, MW-23-75, and MW-24-70. The work was done per the Anchor QEA January 24, 2011 memorandum titled "Gasco Field Test of Variable Frequency Drive Well Pumps." Additional monitoring wells, including the offshore piezometers, were anticipated to be added as more programming tests were conducted and the VFD well pump controls were refined.

The CDM representative met Tim Stone, Anchor QEA, at the onsite trailer. Also present was Craig Della Corte, R&W Engineering (main programmer for the Gasco system). Craig Della Corte was preparing to begin testing the system, which is done remotely at a computer in the trailer. He explained that the system was programmed such that the differential between the water elevation in the monitoring wells and the elevation of the river controlled the speed of the pumps in the extraction wells. The system was programmed as follows: MW-21-75 (located just south of PW-8) controlled both PW-7 and PW-8, and MW-23-75 (located between and roughly equidistant from PW-8 and PW-9) controlled PW-9. The other two monitoring wells MW-22-80 and MW-24-70 were monitored during the test but were not programmed to control any pumping rates.

Tim Stone stated that the goal of the test was to evaluate the ability to achieve and maintain a differential of -0.1 to -0.2 feet between the river stage elevation and the elevation of water in the monitoring wells, with the monitoring well water level elevation lower than the river stage elevation. This differential controlled the pump speed, which was established with a "user defined bias," that Craig Della Corte adjusted throughout the test to optimize the pump speed.

At 10:11 a.m., the test was started and throughout the test the pump speed was adjusted upward in order to achieve the desired differential of -0.1 to -0.2 ft.

At 10:36 a.m., a negative differential was reached at MW-21-75 (-0.08), indicating that the water elevation in MW-21-75 was 0.08 feet lower than the river elevation. At 10:40 a.m., a negative differential was reached at MW-23-75 (-0.06) and the differential at MW-21-75 was -0.23, indicating that the water elevation in the wells was 0.06 and 0.23 feet lower than the river stage, respectively.

Anchor QEA concluded that the test showed a negative differential was reached at the monitoring wells controlling the extraction pumps. The plan was to demonstrate a similar condition with another short-term test when the tide was going out since the tide was coming in during the March 28 test.

Tim Stone, Anchor QEA, stated that the transducers in the extraction and monitoring wells had been calibrated on Friday, March 25, 2011, with manual measurement of the water levels in the three extraction wells, four monitoring wells, and the river elevation stilling well only (the stilling well was located on the Gasco dock).

April 5, 2011

CDM arrived at 9:55 a.m. on Tuesday, April 5, 2011. The purpose of the visit was to observe the start of a long-term logic control test of the VFD system for extraction wells PW-7, PW-8, and PW-9, controlled at three upland monitoring wells: MW-21-75, MW-22-80, and MW-23-75. The CDM representative met Tim Stone, Anchor QEA, at the onsite trailer. Also present were Craig Della Corte, R&W Engineering, and Lance Downs, Advanced Remediation Technologies. Craig Della Corte was preparing to begin the test from a computer in the trailer. He had re-programmed a few elements of the system since the short-term test performed on March 28. Instead of having both PW-7 and PW-8 controlled by MW-21-75, now only PW-7 was controlled by MW-21-75, and PW-8 was controlled by MW-23-75. In addition, PW-9 was controlled by MW-22-80 (located northwest of PW-9) instead of MW-23-75.

A major change in the programming was that the auto shut-off was based on elevation of the water level in the monitoring wells, instead of flow rate (to avoid the low level trips that were happening during the March 28 testing even though the water levels in the PWs were not too low). The low level trip elevations were set to the following elevations: -43 feet in PW-7, -18 feet in PW-8, and -34 feet in PW-9. This was about 1 foot above where the transducers were set in the wells, which were about 1 foot above the pump intakes.

The desired differential for this test was set to 0.3 feet. The goal was to achieve and maintain a differential of 0.3 feet such that the water elevation in the monitoring wells is 0.3 feet lower than the river stage elevation. Tim Stone stated that all of the transducers were calibrated on Friday, April 1 and Saturday, April 2.

At 10:14 a.m. the test was started; at 10:15 a.m. it became apparent that there was a problem at MW-21-75, which controls PW-7. MW-21-75 was reading the same elevation as PW-7, and the readings jumped around continuously such that it was not possible to tell what the true elevations were. The differential was reading very high (up to 7 feet at times), so that the programming told PW-7 not to operate. At 10:21 a.m. a differential of 0.27 feet was reached in MW-23-75 and at 10:23 a.m. a differential of 0.3 feet was reached at MW-22-80. Over the course of the 10-minute test the total drawdown in PW-8 was 3.32 feet and the total drawdown in PW-9 was 30.43 feet.

Tim Stone, Anchor QEA, stated that the transducer in MW-21-75 would be changed out the afternoon of April 5 and the control box checked to make sure it was functioning properly. Once the problem was addressed, Anchor QEA planned to start the long-term test the same afternoon. The test was planned to run for 48 to 72 hours (likely 72 hours).

April 8, 2011

CDM arrived at 11:33 a.m. on Friday, April 8, 2011. The purpose of the visit was to observe the end of a long-term (72-hour) logic control test of the VFD system for extraction wells PW-7, PW-8, and PW-9, controlled at three upland monitoring wells: MW-21-75, MW-23-75, and MW-22-80. The CDM representative met Tim Stone, Anchor QEA, at the onsite trailer.

The CDM representative recorded water elevation levels in the three pumping wells, four monitoring wells, and river elevation for about one hour before the end of the test and about one half-hour following the end of the test to observe recovery.

Tim Stone, Anchor QEA, stated that no problems with transducers or other issues occurred during the test, and that an approximate 0.3-foot differential was maintained for the most part throughout the test in all three monitoring wells (i.e., the water level in the monitoring wells was about 0.3 feet lower than the river level).

3.2 Health and Safety Program

A CDM Certified Safety Professional carried out oversight of health and safety during implementation of field activities during the initial week of both the offshore piezometer installations and the upland well installations. Additional health and safety observations were made by CDM field staff conducting oversight throughout both phases of the field work. This section provides a summary of health and safety observations.

Based on CDM health and safety lead's comprehensive health and safety assessment conducted on November 17 and 18, 2009, the first two days of field operations during offshore piezometer installation were determined to be in compliance with the requirements as defined in the HASP (see **Appendix C**).

A subsequent health and safety assessment was performed by the CDM health and safety lead on January 25 and 26, 2010, the first two days of the upland well installation. Based on the assessment, the upland well installations had some deficiencies in the use of PPE and the AED storage location (described in Section 3.2.2) that were corrected. In general, the Anchor QEA team was determined to be in compliance with the requirements as defined in the HASP (see **Appendix C**).

3.2.1 Health and Safety Meetings

A health and safety meeting was held at the Site on November 17, 2009, before the start of the offshore piezometer installations. The Anchor QEA health and safety site

supervisor, Tim Stone, led the meeting attended by field staff from CDM, Cascade Drilling, and Diversified Marine. During the meeting, the policies and procedures set forth in the Anchor QEA HASP and Cascade Drilling HASP were reviewed.

In addition, Anchor QEA and Cascade Drilling led health and safety briefings each morning during the offshore piezometer installation to reiterate health and safety concerns and provide new information.

On January 25, 2010, before the start of the upland well installation, the Anchor QEA team lead, John Renda, led a health and safety meeting to review the health and safety procedures in the Anchor QEA HASP. At the meeting, Tim Stone (Anchor QEA) also discussed lessons learned during the offshore piezometer installation. The lead driller provided a brief safety discussion regarding the particular hazards of the drill rig, expected areas of operation, kill switches, fuel storage, and location of spill kits. Anchor QEA also noted the first aid kit and AED locations. CDM requested Anchor QEA bring the AED to each work site instead of leaving it in the job trailer, which was a several minute round trip run from the current sampling location. John Renda stated the AED did not operate correctly in the cold. A solution to work site storage of the AED was developed by storing the unit in Anchor QEA's field van. This was a suitable location where it was not affected by the cold (Anchor QEA's concern) and was located near work activities in case of an emergency.

Daily health and safety briefings were held each morning during the upland well installations.

On February 5, 2010, CDM discussed with Matt Wilson the observation that he was at times the only Anchor QEA representative at the drilling site. The typical arrangement was that Matt Wilson and Doug Laffoon would be the Anchor QEA staff present at each drill site; however, Doug Laffoon had been observed leaving the work area so that Matt Wilson was the only Anchor QEA personnel present. Matt Wilson agreed that often neither Tim Stone, the designated site safety and health officer, nor John Renda, the site supervisor, were present. Matt stated that during those times he was taking on the roles himself. CDM requested that that this be discussed during each morning's health and safety briefing so that all site staff would aware this was the case. CDM confirmed through a phone call with John Renda that Doug Laffoon was to be at each drilling site to assist Matt Wilson. Only rarely would he need to leave for a short time for other project commitments.

3.2.2 Use of Personal Protective Equipment

In accordance with the NW Natural HASP, proper PPE for both the offshore piezometer installations and upland well installations was modified Level D, requiring Tyvek (or rain gear made of heavy material with long sleeves and long pants), hardhat, safety glasses, nitrile gloves and heavy work gloves (when handling heavy drilling equipment), steel-toed boots, and hearing protection when needed. In addition, a personal floatation device was required to be worn at all times over water.

Used PPE was properly disposed of within the exclusion zone as IDW. Leather gloves used throughout the field work were also disposed of at the end of the investigation or earlier if excessively soiled.

Overall CDM saw no substantive deficiencies in PPE use; several minor items were pointed out during the work performance period as follows:

November 17, 2009

On a few occasions during the offshore piezometer installations, drillers were observed not wearing nitrile gloves, or proper PPE, when handling drill rig controls and contaminated drilling pipe, or making repairs to the rig. CDM instructed the Anchor QEA team lead, to reiterate to all personnel the need to wear proper PPE at all times.

November 20, 2009

Minor suggestions were made such as reminding driller to use face shield when decontaminating drill pipe with pressure washer.

December 2, 2009

Some brief reminders to the drilling crew about donning life jackets, which they briefly forgot to put on after removing a layer of clothing as it became warmer throughout the day.

January 26, 2010

After a one-and-a-half-month break from the offshore drilling, some reminders regarding proper use of PPE were required during the first day of drilling as follows:

Drillers were found not wearing Tyvek and throughout the day their clothing was getting dirty. Even though they were using mostly their hands (with gloves) to handle the drill casing, core samplers, and extruder bags, potentially contaminated soil was getting on their clothes. CDM requested to John Renda (Anchor QEA site supervisor) that the drillers don Tyvek or impermeable rain gear. The drillers did not have Tyvek available so Anchor QEA provided it to them.

CDM also expressed a concern that the drillers were only using one pair of gloves, the outer chemical-resistant pair, and not also the inner nitrile gloves as required by the HASP. This item was brought to Anchor QEA's attention and the drillers began wearing the inner gloves.

January 27, 2010

Drillers wore proper PPE on Wednesday, including Tyvek and both inner nitrile gloves and outer chemical resistant gloves.

January 29, 2010

During core sampling, water began spraying out the vent hole in the drill rod. The water landed on the drillers standing under it. Drillers were wearing PPE (hard hat,

Tyvek, gloves); however, the water was spraying down on them and the plastic sheeting, although they tried to capture most of it in buckets.

The water was discolored (muddy) but did not appear to have a noticable sheen. CDM impressed on Anchor QEA the need to convey to driller to take precautions to prevent a reoccurance.

February 11, 2010

CDM called Matt Wilson after leaving the site to discuss the potential for HCN gas to be formed if chlorine bleach was used to break down the EZ-MUD polymer from the formation. He was aware of the potential health and safety issue and stated that for that reason Anchor QEA had decided not to use bleach but to flush the borehole with 1,000 gallons of potable water to clean out the polymer.

CDM also spoke with Matt Wilson about the observation in a photo from Wednesday showing a member of the drilling crew in the exclusion zone with no gloves on. He agreed to be more diligent about observing the drillers' use of PPE and asking them to always wear Level D PPE, including nitrile gloves, in the exclusion zone regardless of the work activity being conducted.

March 23, 2010

An open-flame propane torch was used to heat-shrink the plastic on electric connections to the PW-7 pump to create a watertight seal. The pump installation crew was not wearing gloves when working with the propane torch. The workers were instructed to wear work gloves and they complied.

August 12, 2010

The CDM representative asked Matt Wilson about the location of the AED. Matt Wilson stated it was being kept in the onsite trailer. The CDM representative reiterated EPA's request that the AED be kept at the work site. Matt Wilson noted this but did not relocate the AED.

The CDM representative asked Matt Wilson about PPE for the drillers as they were wearing nitrile and work gloves but two of three of the drillers were wearing cotton pants (no Tyvek or rain gear). At the time of the CDM representative's departure from the site, the hollow stem auger drilling operation had just begun and no soil cuttings were present at the surface. Thus, the drillers had not come in contact with soil from inside the borehole. The CDM representative stated to Matt Wilson that if drilling was such that soil and other potentially contaminated media were getting on the drillers' clothing, they should wear Tyvek.

3.2.3 Slip, Trip, and Fall Hazards

During the first week of offshore piezometer installation, the CDM health and safety lead stated concerns about a striking hazard (propped up drill pipe) and the driller leaving sonic drill mechanism in full up position while rig was off and unattended. These items were rectified by laying the drill pipe horizontally and dropping the drill

mechanism and storing the drill rig offshore on the barge overnight. Also noted were hazards associated with accessing the beach from the steep riverbank containing rough terrain such as loose and slippery rocks and debris. This was a serious hazard, especially when field personnel were transporting well development materials and heavy equipment down the steep slope of the riverbank and along the sandy beach. A bobcat and front-end loader were utilized to transport some of the heavy equipment on the beach area and onto the barge.

For the offshore piezometer installation, a shallow area on the beach north of the Gasco site pier where the barge could be "beached" close to shore was used each day to eliminate the use of the skiff and enable personnel to carry heavy equipment onto the barge directly. Other specific hazards noted during the well installation were as follows:

December 4, 2009

CDM noted a lifting/fall hazard associated with raising the 20-foot sections of 2-inch diameter steel pipe to the catwalk/pier area for the riser installation at PZ2-77 and PZ2-43. The drilling crew altered the work activity to not lift the pipe over them, but to position themselves in a way to fulcrum the 20-foot section of pipe to the catwalk area. A spotter was also positioned on the catwalk/pier who helped raise the pipe into position with a rope.

February 24, 2010

Upland well drilling of PW-8 required the drill rig to be backed up against the riverbank slope resulting in a tight workspace for the drillers. CDM asked Anchor QEA site personnel to remind drilling crew and field support staff to be watchful of rig stability and work next to the moderately steep slope.

3.2.4 Weather Hazards

During the final days of offshore piezometer installation (December 2 to 4, 2009), air temperature dropped to freezing at night (upper 20s). This created icy conditions in the morning on the barge, pier, and shoreline. All work personnel were reminded to pay close attention to footing and slip hazards. No significant slip incidences occurred.

No weather hazards were present during upland well installation, primarily because of an unseasonably warm and dry weather pattern for the month of February.

Section 4
Deviations

4.1 Summary of Field Change Requests

Significant field changes were required because of conditions encountered during field activities. The changes were documented in field change request forms. Issues that arose during the well installation fieldwork were discussed in the field/over the phone between Anchor QEA, CDM, EPA, and DEQ and the items that were deemed significant were documented in a field change request for EPA's review and approval. Specific EPA-approved field change requests are provided in **Appendix D**. The following briefly summarizes the field change requests issued and approved during the well installation and testing fieldwork.

December 3, 2009

Anchor QEA prepared a field change request on behalf of NW Natural requesting the shallow piezometer at the PZ3 cluster (PZ3-10) be deleted from the test plan program. Difficulties with installing PZ3-10 at the planned location necessitated the deletion. EPA approved the field change request on December 3, 2009.

There were no field change requests during the upland well installation. However, in response to DEQ's scope of work modification #1 in their comment letter dated January 11, 2010, a shallow monitoring well at the MW-23 cluster was added to assess water levels in the fill water-bearing zone between PW-8 and PW-9. MW23-27 was completed at a depth 27 feet bgs on February 16, 2010.

June 24, 2010

Anchor QEA prepared a memorandum on behalf of NW Natural requesting approval for a plan to install an upper alluvium test well (PW-8-52). The additional shallow well would be used to increase capture of groundwater within the fill and shallow alluvium.

July 15, 2010

Anchor QEA prepared a field change request on behalf of NW Natural requesting the approval to conduct additional pumping tests in Gasco Segment 2 and include pumping from PW-8-37 (formerly PW-8-52). EPA and DEQ did not approve the request because PW-8-37 was improperly completed. The improper completion of PW-8-37, which was the result of the screen being completed in the fill and upper alluvium, necessitated abandonment.

August 6, 2010

Anchor QEA prepared a field change request on behalf of NW Natural requesting EPA to approve the plan to abandon and replace PW-8-37 as described and commented on by EPA in three separate addendums. This field change request was in response to EPA's July 24, 2010 e-mail directing NW Natural to abandon well PW-

8-37 and construct and replace the shallow pumping well solely in the upper alluvium.

August 27, 2010

Anchor QEA prepared a field change request on behalf of NW Natural requesting EPA to approve the use of a temporary pump installation for the testing of PW-8-39.

The temporary pump was necessary because of the anticipated low yield of PW-8-39 and the need for further information on well performance before deciding on how to incorporate the well into the existing well control system.

4.2 Deviations in Well Completion Depths and Materials

This section describes deviations in well completion depths and materials used by the Anchor QEA team for the offshore piezometer and upland well installations.

The following wells had slight deviations in final completion depths as a result of the lithology encountered:

Table 4 - Deviations in Piezometer and Well Completion Depths

Original ID and proposed completion depth (feet bgs)	Revised ID and as-built completion depth (feet bgs)
PZ2-78 (73 to 78)	PZ2-77 (72 to 77)
PZ3-40 (35 to 40)	PZ3-33 (28 to 33)*
PZ4-10 (5 to 10)	PZ4-12 (7 to 12)
PZ4-40 (35 to 40)	PZ4-41 (36 to 41)
PZ5-50 (45 to 50)	PZ5-55 (50 to 55)
MW23-74 (64 to 74)	MW23-75 (65 to 75)
MW23-130 (120 to 130)	MW23-123 (113 to 123)
MW24-80 (70 to 80)	MW24-70 (60 to 70)
OW7 -20 (13 to 18)	OW7 (12 to 17)
OW8 -20 (13 to 18)	OW8 (10 to 15)
OW9 -27 (20 to 25)	OW9 (20 to 25)
PW-7 (48 to 68)	PW7 (73 to 93)
PW-9 (55 to 75)	PW-9 (72 to 92)

* PZ3-33 was struck by a boat and destroyed on January 10, 2010.

The deviations from proposed completion depth (screen) intervals in the Capture Zone Test Plan are updated to reflect actual completion depths in **Table 1**.

Deviations related to well completion materials are noted below:

On November 25, 2009, at the end of the 8-inch conductor casing removal PZ3-33 was properly grouted and a bag of bentonite chips was added to bring the seal to the mudline; however, it was discovered that the organoclay sealing material was not included in the sealing materials for the upper 10 feet of "substantial product" zone as

required by the agreed-to installation protocols. This was brought to the attention of the Anchor QEA geologist and it was agreed that this must be the sealing material used for future piezometer completions where substantial product/NAPL zones are found.

The following factors mitigated the lack of using the organoclay sealing material in the upper 10 feet of PZ3-33:

- The 8-inch conductor/surface seal casing was driven to 18 feet (9 feet below the substantial product NAPL zone) allowing for a thicker (larger diameter) and deeper surface seal.
- The grout mixed by the drilling contractor was a little thicker in viscosity than the normal mix weighing in at 10 pounds per gallon (minimum required is 9.5 pounds per gallon).

Also, for PZ5-5 the driller called in a variance to the State of Oregon because the bentonite seal was slightly less than the required 3 feet because of depth limits as a result of the shallow well completion.

Section 5
References

Anchor QEA. 2009s. Capture Zone Test Plan, Gasco, Portland, Oregon. Prepared for NWNatural. September, 2009.

_____. 2009b. Response to EPA and DEQ Comments – Capture Zone Field Test Plan; Gasco, Portland Oregon Administrative Settlement Agreement and Order on Consent for Removal Action USEPA Region 10, Docket No. CERCLA 10-2009-0255 Gasco Sediments Site within the Portland Harbor Superfund Site. November 3, 2009.

_____. 2009c. Response to EPA Review Comments – Capture Zone Test Field Plan, September 2009; Gasco Site, Portland, Oregon Administrative Settlement Agreement and Order on Consent for Removal Action EPA Region 10, Docket No. CERCLA 10-2009-0255 Gasco Sediments Site within the Portland Harbor Superfund Site. January 20, 2010.

_____. 2010a. Tech Memo: Capture Zone Field Test Status Report and Plan to Install Upper Alluvium Test Well. June 24, 2010.

_____. 2010b. Capture Zone Field Test Plan Addendum – revised plan to conduct additional pump tests in Gasco Segment 2 to included pumping from PW-8-37. July 15, 2010.

_____. 2010c. Capture Zone Field Test Plan Addendum 2 – plan to abandon PW-8-37 and install pilot extraction well PW-8-37b. August 3, 2010.

_____. 2010d. Capture Zone Field Test Plan Addendum 3, Response to EPA an DEQ Comments. August 6, 2010.

_____. 2010e. Gasco Field Test of Variable Frequency Drive Pumps. January 24, 2011.

CDM. 2007. Standard Operating Procedures 4-1, Revision 6 and 4-2, Revision 7 for Field Logbook Content and Control and Photo Documentation Prepared for EPA. March 2007.

Hanh and Associates, Inc. 2007. Remedial Investigation Report, NW Natural – Gasco Facility, 7900 NW St. Helens Road, Portland, Oregon. April 30, 2007.

Tables

Table 1
Segment 2 Capture Zone Field Test Plan Monitoring Well and Piezometer Construction Details

Well Number	Installed Transducer	Water-Bearing Zone	Date Installed	Date De-commissioned	Installation Method	Monument Type	Screen Type	Slot Size (inches)	Sand Pack (Colorado)	Well Diam. (inches)	Ground Surface (feet COP)	Top of Casing (feet COP)	Top of Casing (feet bgs)	Well Depth (feet bgs)	Well Depth (feet COP)	Top Screen (feet bgs)	Top Screen (feet COP)	Base Screen (feet bgs)	Base Screen (feet COP)
Monitoring Well																			
MW-1-22		Surficial Fill	24-Oct-95	-	Hollow-Stem Auger	Above-grade	Slotted PVC	0.020	10-20	2	32.00	34.75	(2.8)	22.0	10.0	11.0	21.0	21.0	11.0
MW-1-55		Alluvial	10-Jul-07	-	Sonic	Above-grade	Continuous wrap stainless steel	0.020	10-20	2	33.10	35.75	(2.7)	57.0	-23.9	45.0	-11.9	55.0	-21.9
MW-1-82		Alluvial	9-Jul-07	-	Sonic	Above-grade	Continuous wrap stainless steel	0.020	10-20	2	33.50	36.08	(2.6)	85.4	-51.9	72.0	-38.5	82.0	-48.5
MW-2-32	X	Surficial Fill	6-Nov-95	-	Hollow-Stem Auger	Flush	Slotted PVC	0.020	10-20	2	34.83	34.50	0.3	32.5	2.3	21.5	13.3	31.5	3.3
MW-2-61	X	Alluvial	8-Oct-98	-	Hollow-Stem Auger	Flush	Slotted PVC	0.020	10-20	2	34.61	34.42	0.2	61.5	-26.9	50.0	-15.4	60.0	-25.4
MW-2-104	X	Alluvial	25-Jun-07	-	Sonic	Flush	Continuous wrap stainless steel	0.020	10-20	2	34.86	34.88	(0.0)	116.5	-81.6	94.0	-59.1	104.0	-69.1
MW-3-26	X	Surficial Fill	1-Nov-95	-	Hollow-Stem Auger	Above-grade	Continuous wrap stainless steel	0.020	10-20	2	31.30	34.13	(2.8)	26.0	5.3	15.0	16.3	25.0	6.3
MW-3-56	X	Alluvial	1-Nov-95	-	Hollow-Stem Auger	Above-grade	Continuous wrap stainless steel	0.020	10-20	2	31.51	34.10	(2.6)	56.0	-24.5	45.0	-13.5	55.0	-23.5
MW-4-35		Surficial Fill	31-Oct-95	-	Hollow-Stem Auger	Above-grade	Continuous wrap stainless steel	0.020	10-20	2	31.70	34.54	(2.8)	35.0	-3.3	24.0	7.7	34.0	-2.3
MW-4-57		Alluvial	30-Oct-95	-	Hollow-Stem Auger	Above-grade	Continuous wrap stainless steel	0.020	10-20	2	31.70	34.53	(2.8)	57.0	-25.3	46.0	-14.3	56.0	-24.3
MW-4-101		Alluvial	16-Oct-98	-	Dual Wall Reverse Air	Above-grade	Slotted PVC (pre-pack)	0.010	20-40	2	31.80	34.36	(2.6)	120.0	-88.2	89.5	-57.7	99.5	-67.7
MW-5-32		Surficial Fill/Alluvial	27-Oct-95	-	Hollow-Stem Auger	Above-grade	Slotted PVC	0.020	10-20	2	25.10	27.83	(2.7)	32.0	-6.9	21.0	4.1	31.0	-5.9
MW-5-100		Alluvial	23-Oct-98	-	Dual Wall Reverse Air	Above-grade	Continuous wrap stainless steel	0.020	10-20	2	25.40	27.31	(1.9)	100.0	-74.6	88.0	-62.6	98.0	-72.6
MW-5-175		Alluvial	22-Oct-98	-	Dual Wall Reverse Air	Above-grade	Slotted PVC (pre-pack)	0.010	20-40	2	25.20	27.19	(2.0)	175.0	-149.8	163.0	-137.8	173.0	-147.8
MW-6-32		Surficial Fill	9-Nov-95	-	Hollow-Stem Auger	Flush	Continuous wrap stainless steel	0.020	10-20	2	35.80	35.51	0.3	32.0	3.8	21.0	14.8	31.0	4.8
MW-6-61		Alluvial	7-Nov-95	22-Dec-97	Hollow-Stem Auger	Flush	Continuous wrap stainless steel	0.020	10-20	2	35.80	34.50	1.3	61.0	-25.2	50.0	-14.2	60.0	-24.2
MW-7-61		Alluvial	20-Apr-10		Soinc	Flush	Continuous wrap stainless steel	0.010	10-20	2	36.22	35.77	0.4	65.0	-28.8	50.0	-13.8	60.0	-23.8
MW-8-29		Surficial Fill	26-Oct-95	-	Hollow-Stem Auger	Above-grade	Continuous wrap stainless steel	0.020	10-20	2	36.50	39.09	(2.6)	29.0	7.5	18.0	18.5	28.0	8.5
MW-8-56		Alluvial	25-Oct-95	-	Hollow-Stem Auger	Above-grade	Continuous wrap stainless steel	0.020	10-20	2	36.50	39.13	(2.6)	56.0	-19.5	45.0	-8.5	55.0	-18.5
MW-9-29		Surficial Fill/Alluvial	23-Oct-95	-	Hollow-Stem Auger	Flush	Slotted PVC	0.020	10-20	2	37.90	37.65	0.3	29.0	8.9	18.0	19.9	28.0	9.9
MW-10-25		Surficial Fill	9-Nov-95	-	Hollow-Stem Auger	Above-grade	Continuous wrap stainless steel	0.020	10-20	2	36.50	39.22	(2.7)	25.0	11.5	14.0	22.5	24.0	12.5
MW-10-61		Alluvial	8-Nov-95	-	Hollow-Stem Auger	Above-grade	Continuous wrap stainless steel	0.020	10-20	2	36.50	39.33	(2.8)	61.0	-24.5	50.0	-13.5	60.0	-23.5
MW-11-32		Surficial Fill	3-Nov-95	-	Hollow-Stem Auger	Above-grade	Continuous wrap stainless steel	0.020	10-20	2	35.40	38.39	(3.0)	32.0	3.4	21.0	14.4	31.0	4.4
MW-12-36		Surficial Fill/Alluvial	23-Oct-95	-	Hollow-Stem Auger	Above-grade	Slotted PVC	0.020	10-20	2	35.90	38.69	(2.8)	36.0	-0.1	25.0	10.9	35.0	0.9
MW-13-30		Surficial Fill	19-Dec-97	-	Hollow-Stem Auger	Flush	Continuous wrap stainless steel	0.020	10-20	2	35.23	34.86	0.4	30.0	5.2	19.0	16.2	29.0	6.2
MW-13-61		Alluvial	17-Dec-93	31-Aug-06	Hollow-Stem Auger	Flush	Continuous wrap stainless steel	0.020	10-20	2	35.23	34.78	0.4	61.0	-25.8	50.0	-14.8	60.0	-24.8
MW-13-61R		Alluvial	1-Jun-07	20-Apr-10	Sonic	Flush	Continuous wrap stainless steel	0.020	20-40	2	35.31	35.38	(0.1)	63.0	-27.7	51.0	-15.7	61.0	-25.7

Table 1
Segment 2 Capture Zone Field Test Plan Monitoring Well and Piezometer Construction Details

Well Number	Installed Transducer	Water-Bearing Zone	Date Installed	Date De-commissioned	Installation Method	Monument Type	Screen Type	Slot Size (inches)	Sand Pack (Colorado)	Well Diam. (inches)	Ground Surface (feet COP)	Top of Casing (feet COP)	Top of Casing (feet bgs)	Well Depth (feet bgs)	Well Depth (feet COP)	Top Screen (feet bgs)	Top Screen (feet COP)	Base Screen (feet bgs)	Base Screen (feet COP)
MW-14-110		Alluvial	19-Oct-98	-	Dual Wall Reverse Air	Above-grade	Slotted stainless steel (pre-pack)	0.010	20-40	2	35.30	37.41	(2.1)	110.0	-74.7	98.0	-62.7	108.0	-72.7
MW-15-50		Alluvial	1-Jul-99	-	Air Rotary	Flush	Slotted stainless steel (pre-pack)	0.010	10-20	2	36.27	35.97	0.3	50.0	-13.7	40.0	-3.7	50.0	-13.7
MW-15-66		Alluvial	30-Jun-99	-	Air Rotary	Flush	Slotted stainless steel	0.010	10-20	2	36.27	36.06	0.2	66.0	-29.7	60.5	-24.2	65.5	-29.2
MW-16-45		Alluvial	20-Jul-04	-	Sonic	Above-grade	Slotted stainless steel	0.010	10-20	2	30.81	33.12	(2.3)	49.0	-18.2	30.0	0.8	45.0	-14.2
MW-16-65	X	Alluvial	19-Jul-04	-	Sonic	Above-grade	Slotted stainless steel	0.010	10-20	2	30.75	33.21	(2.5)	68.0	-37.3	55.0	-24.3	65.0	-34.3
MW-16-125	X	Alluvial	15-Jul-04	26-Apr-10	Sonic	Above-grade	Slotted stainless steel	0.010	10-20	2	30.90	33.18	(2.3)	130.0	-99.1	115.0	-84.1	125.0	-94.1
MW-17-79		Alluvial	26-Jul-05	-	Sonic	Above-grade	Continuous wrap stainless steel	0.010	10-20	2	32.56	34.83	(2.3)	82.0	-49.4	38.5	-5.9	78.5	-45.9
MW-18-30		Surficial Fill	27-Feb-07	-	Sonic	Above-grade	Continuous wrap stainless steel	0.020	10-20	2	31.61	34.27	(2.7)	30.0	1.6	19.0	12.6	29.0	2.6
MW-18-125		Alluvial	22-Apr-10		Soinc	Above-grade	Continuous wrap stainless steel	0.010	10-20	2	31.93	34.65	(2.7)	126.0	-94.1	115.0	-83.1	125.0	-93.1
MW-18-180	X	Alluvial	26-Feb-07	-	Sonic	Above-grade	Continuous wrap stainless steel	0.020	10-20	2	31.70	33.90	(2.2)	230.0	-198.3	170.0	-138.3	180.0	-148.3
MW-19-22		Surficial Fill	6-Mar-07	-	Sonic	Above-grade	Continuous wrap stainless steel	0.020	10-20	2	27.40	29.82	(2.4)	23.0	4.4	12.0	15.4	22.0	5.4
MW-19-125		Alluvial	12-Mar-07	-	Sonic	Above-grade	Continuous wrap stainless steel	0.020	10-20	2	27.20	29.42	(2.2)	126.0	-98.8	115.0	-87.8	125.0	-97.8
MW-19-180		Alluvial	2-Mar-07	-	Sonic	Above-grade	Continuous wrap stainless steel	0.020	10-20	2	27.28	29.81	(2.5)	227.0	-199.7	170.0	-142.7	180.0	-152.7
MW-20-120		Alluvial	8-Mar-07	-	Sonic	Above-grade	Continuous wrap stainless steel	0.020	10-20	2	25.63	27.84	(2.2)	213.0	-187.4	110.0	-84.4	120.0	-94.4
MW-21-12	X	Surficial Fill	6-Jul-07	-	Sonic	Above-grade	Continuous wrap stainless steel	0.020	10-20	2	20.34	23.25	(2.9)	14.0	6.3	7.0	13.3	12.0	8.3
MW-21-75	X	Alluvial	5-Jul-07	-	Sonic	Above-grade	Continuous wrap stainless steel	0.020	10-20	2	20.22	23.11	(2.9)	77.0	-56.8	65.0	-44.8	75.0	-54.8
MW-21-115	X	Alluvial	2-Jul-07	-	Sonic	Above-grade	Continuous wrap stainless steel	0.020	10-20	2	20.32	23.43	(3.1)	118.0	-97.7	105.0	-84.7	115.0	-94.7
MW-21-166	X	Alluvial	28-Jun-07	-	Sonic	Above-grade	Continuous wrap stainless steel	0.020	10-20	2	20.35	23.15	(2.8)	193.0	-172.7	156.0	-135.7	166.0	-145.7
MW-22-80	X	Alluvial	28-Jan-10	-	Sonic	Above-grade	Slotted PVC	0.020	10-20	2	33.59	36.01	(2.5)	80.9	-47.3	69.9	-36.3	79.9	-46.3
MW-23-27	X	Surficial Fill	16-Feb-10	-	Sonic	Above-grade	Slotted PVC	0.020	10-20	2	32.77	34.72	(2.3)	28.0	4.8	17.7	15.1	27.7	5.1
MW-23-75	X	Alluvial	16-Feb-10	-	Sonic	Above-grade	Slotted PVC	0.020	10-20	2	32.91	34.87	(2.5)	75.7	-42.8	64.7	-31.8	74.7	-41.8
MW-23-123	X	Alluvial	5-Feb-10	-	Sonic	Above-grade	Slotted PVC	0.020	10-20	2	32.88	35.05	(2.5)	124.3	-91.4	113.3	-80.4	123.3	-90.4
MW-24-70	X	Alluvial	3-Feb-10	-	Sonic	Above-grade	Slotted PVC	0.020	10-20	2	31.42	33.83	(2.4)	71.1	-39.7	60.1	-28.7	70.1	-38.7
MW-24-130	X	Alluvial	2-Feb-10	-	Sonic	Above-grade	Slotted PVC	0.020	10-20	2	31.34	33.76	(2.5)	131.1	-99.8	120.1	-88.8	130.1	-98.8
PW-01-80		Alluvial	8-Aug-01	-	Sonic	Flush	Continuous wrap stainless steel	0.020	10-20	6	32.00	31.80	0.2	82.0	-50.0	39.5	-7.5	79.5	-47.5
Observation Well																			
OW-7-17	X	Surficial Fill	23-Feb-10	-	Sonic	Above-grade	Slotted PVC	0.020	10-20	2	24.20	26.51	(2.3)	17.7	6.5	12.5	11.7	17.5	6.7
OW-8-15	X	Surficial Fill	12-Feb-10	-	Sonic	Above-grade	Slotted PVC	0.020	10-20	2	24.56	26.42	(1.9)	15.3	9.3	10.1	14.5	15.1	9.5
OW-8-28	X	Upper Alluvial	13-Aug-10	-	Hollow-Stem Auger	Above-grade	Slotted PVC	0.020	10-20	2	23.79	26.38	(2.6)	28.7	-4.9	23.1	0.7	28.1	-4.3
OW-9-25	X	Surficial Fill	8-Mar-10	-	Sonic	Above-grade	Slotted PVC	0.020	10-20	2	33.11	35.38	(2.3)	25.3	7.8	20.0	13.1	25.0	8.1
Extraction Well																			
PW-7-93	X	Alluvial	22-Feb-10	-	Sonic	Above-grade	Continuous wrap stainless steel	0.035	10-20	8	24.19	26.74	(2.6)	95.5	-71.3	73.5	-49.3	93.5	-69.3
PW-8-39	X	Upper Alluvial	8-Aug-10	-	Sonic	Above-grade	Continuous wrap stainless steel	0.035	10-20	6	23.22	25.69	(2.5)	42.0	-18.8	24.2	-1.0	39.2	-16.0
PW-8-68	X	Alluvial	11-Feb-10	-	Sonic	Above-grade	Continuous wrap stainless steel	0.035	10-20	8	24.64	27.13	(2.5)	70.0	-45.4	48.0	-23.4	68.0	-43.4
PW-9-92	X	Alluvial	1-Mar-10	-	Sonic	Above-grade	Continuous wrap stainless steel	0.035	10-20	8	33.02	35.78	(2.8)	94.6	-61.6	72.6	-39.6	92.6	-59.6

Table 1
Segment 2 Capture Zone Field Test Plan Monitoring Well and Piezometer Construction Details

Well Number	Installed Transducer	Water-Bearing Zone	Date Installed	Date De-commissioned	Installation Method	Monument Type	Screen Type	Slot Size (inches)	Sand Pack (Colorado)	Well Diam. (inches)	Ground Surface (feet COP)	Top of Casing (feet COP)	Top of Casing (feet bgs)	Well Depth (feet bgs)	Well Depth (feet COP)	Top Screen (feet bgs)	Top Screen (feet COP)	Base Screen (feet bgs)	Base Screen (feet COP)
Piezometer																			
PZ1-5	X	Alluvial	17-Mar-05	-	Manual	Above-grade	Solinst push point		NA	1	9.96	36.07	(26.1)	5.6	4.3	4.5	5.5	5.4	4.6
PZ1-20	X	Alluvial	17-Mar-05	-	Manual	Above-grade	Solinst push point		NA	1	10.15	36.43	(26.3)	20.5	-10.3	19.3	-9.2	20.2	-10.1
PZ1-50	X	Alluvial	23-Nov-09	-	Sonic	Above-grade	Slotted PVC	0.020	10-20	2	10.17	37.67	(27.5)	50.4	-40.2	45.2	-35.0	50.2	-40.0
PZ2-5	X	Alluvial	18-Mar-05	-	Manual	Above-grade	Solinst push point		NA	1	2.89	37.90	(35.0)	6.7	-3.8	5.5	-2.6	6.4	-3.5
PZ2-20	X	Alluvial	17-Mar-05	-	Manual	Above-grade	Solinst push point		NA	1	3.38	37.89	(34.5)	21.7	-18.4	20.6	-17.2	21.5	-18.1
PZ2-43	X	Alluvial	3-Dec-09	-	Sonic	Above-grade	Slotted PVC	0.020	10-20	2	3.76	37.96	(34.2)	43.6	-39.8	38.4	-34.6	43.4	-39.6
PZ2-77	X	Alluvial	2-Dec-09	-	Sonic	Above-grade	Slotted PVC	0.020	10-20	2	3.05	38.65	(35.6)	77.2	-74.2	72.0	-69.0	77.0	-74.0
PZ4-12	X	Alluvial	4-Dec-09	-	Sonic	Above-grade	Slotted PVC	0.020	10-20	2	-8.63	34.67	(43.3)	12.0	-20.6	6.8	-15.4	11.8	-20.4
PZ4-41	X	Alluvial	24-Nov-09	-	Sonic	Above-grade	Slotted PVC	0.020	10-20	2	-8.33	33.07	(41.4)	41.4	-49.7	36.2	-44.5	41.2	-49.5
PZ5-5	X	Alluvial	20-Nov-09	-	Sonic	Above-grade	Slotted PVC	0.020	10-20	2	10.70	16.51	(5.5)	5.0	5.7	3.8	6.9	4.8	5.9
PZ5-20	X	Alluvial	20-Nov-09	-	Sonic	Above-grade	Slotted PVC	0.020	10-20	2	10.72	16.24	(5.5)	20.3	-9.6	15.1	-4.4	20.1	-9.4
PZ5-55	X	Alluvial	20-Nov-09	-	Sonic	Above-grade	Slotted PVC	0.020	10-20	2	10.79	16.31	(5.5)	55.3	-44.5	50.1	-39.3	55.1	-44.3
PZ5-85	X	Alluvial	19-Nov-09	-	Sonic	Above-grade	Slotted PVC	0.020	10-20	2	10.79	16.44	(5.4)	85.2	-74.4	80.0	-69.2	85.0	-74.2

Notes:
Highlighted cells = Previous survey value updated with 3/15/2009 survey results
bgs = below ground surface
btc = below top of casing
COP = City of Portland Datum
PVC = polyvinyl chloride

Table 2
Gasco Piezometer and Well Installation - Nov-Dec 2009 and Jan-Mar 2010
Summary of Contamination in Sample Cores as Documented by CDM

Location	Sampling Date	Observations	Meets Substantial Product Criteria (Y/N)	Photo ID
Offshore Piezometers				
PZ5-85'	11/17/2009	Minor sheen noted at approximately 5 feet bml (several inches thick)	N	November 17, 2009 photo #5
PZ5-50'	11/19/2009	Minor sheen noted at approximately 7 feet bml (several inches thick)	N	November 19, 2009 photos #6, 7
PZ5-20'	11/20/2009	Minor sheen noted at approximately 6 feet bml (several inches thick)	N	November 20, 2009 photo #3
PZ4-40'	11/24/2009	Sheen and product staining noted at approximately 4.5 feet bml (several inches thick)	Y	November 24, 2009 photo #5
PZ4-40'	11/24/2009	Sheen and product staining noted at approximately 7.5-9 feet bml (several inches thick)	N	N/A
PZ4-10'	12/3/2009	Several estimated one-inch thick layers of black petroleum stained sediment at 1.5 and 5 feet bml, milky white product blebs noted from 5-6 feet bml	Y	December 4, 2009 photos #1, 2
PZ3-40'	11/25/2009	Product present in 0 - 8 foot bml interval	Y	November 25, 2009 photos #8, 9
PZ3-40'	11/25/2009	Small milky white product blebs and sheen in 8 -9 feet bml interval	Y	November 25, 2009 photo #11
PZ2-78'	12/1/2009	Product present in 0 - 12 foot bml interval	Y	December 1, 2009 photos #3, 4, 5
PZ2-43'	12/2/2009	Product present in 0 - 12 foot bml interval	Y	N/A

Table 2
Gasco Piezometer and Well Installation - Nov-Dec 2009 and Jan-Mar 2010
Summary of Contamination in Sample Cores as Documented by CDM

Location	Sampling Date	Observations	Meets Substantial Product Criteria (Y/N)	Photo ID
Upland Wells*				
MW22-74	1/26/2010	Lamp Black present in the fill material from 0 -23 foot bgs interval; lamp black - gravel size, coal like and broke concoidally like glass, also sooty powder residue that stained the fill, slurry when wet.	N	N/A
MW24-130	1/29/2010	NAPL observed in boring from approximately 18.2 to 30 ft bgs	Y	N/A
MW24-70	2/2/2010	NAPL observed in boring from approximately 18.2 to 30 ft bgs	Y	N/A
MW23-123	2/4/2010	10 ft bgs: wet, black, sticky silt with concrete and lamp black material; 14-21 ft; gravelly silt, strong napthalene odor. PID reading above sample (in breathing zone) = 0.1 ppm	N	February 4, 2010 photos #5, 6, 7
PW-8-68	2/8/2010	15': moderate hydrocarbon odor, trace oil, sheen present, smells like oil; 35.1-35.6': sheen, moderate hydrocarbon odor, silt layers to 39'; 40-46': moderate hydrocarbon odor, no sheen, sand as above	N	N/A
PW-7	2/17/2010	Sheen noted in the 10 to 15 ft bgs interval; did not appear to be from a volatile substance as the PID headspace was near 0 ppm	N	February 17, 2010 photo #4
PW-9	2/24/2010	15.8-20 feet: moist gravelly sand with silt abundant. Soot (lampblack present), no sheen, hydrocarbon-like odor.	N	N/A
OW-9	3/8/2010	Strong Napthalene odor from 15 to 21 ft bgs; PID did not register above background (0 ppm) when held closely over the soil core	N	March 8, 2010 photos #4, 5
PW-8-39	7/1/2010	Sheen from 15.7-16.1 ft; slight hydrocarbon-like petroleum odor	N	July 1, 2010 photo #28

Notes:

* Documentation of upland well sample core observations are limited to periods when CDM was present during sampling, or Anchor QEA provided information. Therefore this table may not completely capture all upland contamination encountered during drilling.

bml - below mud level

N/A - photo not available

Table 3
Summary of Segment 2 Pumping Test Data

Well	April 19, 2010 (2hr Test)			April 20, 2010 (2hr Test)			April 21, 2010 (2hr Test)			April 26-30, 2010 (72hr test)		
	Total Drawdown	Ave. Pumping Rate (gpm)*	S.C. (gpm/ft-dd)	Total Drawdown (ft)	Ave. Pumping Rate (gpm)*	S.C. (gpm/ft-dd)	Total Drawdown (ft)	Ave. Pumping Rate (gpm)*	S.C. (gpm/ft-dd)	Total Drawdown (ft)	Ave. Pumping Rate (gpm)*	S.C. (gpm/ft-dd)
PW-7	3.46	15	4.3	5.52	25	4.5	8.14	35	4.3	Did not receive final test data		
PW-8-68	2.00	15	7.4	2.1	25	11.9	4.54	35	7.7			
PW-8-39	NA	NA	NA	NA	NA	NA	NA	NA	NA			
PW-9	7.46	15	2.0	13.05	25	1.9	19.44	35	1.8			

Well	May 4-7, 2010 (80hr Test)			September 2, 2010 (2hr Step Test)			September 9-12, 2010 (72hr Test)			November 8-11, 2010 (72hr Test)		
	Total Drawdown (ft)	Ave. Pumping Rate (gpm)*	S.C. (gpm/ft-dd)	Total Drawdown (ft)	Ave. Pumping Rate (gpm)*	S.C. (gpm/ft-dd)	Total Drawdown (ft)	Ave. Pumping Rate (gpm)*	S.C. (gpm/ft-dd)	Total Drawdown (ft)	Ave. Pumping Rate (gpm)*	S.C. (gpm/ft-dd)
PW-7	10.94	35	3.2	NA	NA	NA	NA	NA	NA	6.36	25	3.9
PW-8-68	5.93	35	5.9	NA	NA	NA	NA	NA	NA	3.35	25	7.5
PW-8-39	NA	NA	NA	13.53	2.5	0.19	18.2	1.95	0.11	16.21	1.94	0.12
PW-9	20.59	35	1.7	NA	NA	NA	NA	NA	NA	12.34	25	2.0

Notes:
*Average pumping rate = total gallons pumped / test period (minutes)
S.C. - Specific Capacity
NA - Well not tested, or available for monitoring

Field Water Quality Data Collected During 72 hr Test on November 8-11, 2010

Field Parameter	PW-7			PW-8-68			PW-8-39			PW-9		
	Start	Middle	End	Start	Middle	End	Start	Middle	End	Start	Middle	End
Temperature (degrees C)	16.29	15.92	15.94	17.22	16.12	17.19	17.04	17.06	17.24	15.87	15.6	15.78
Conductivity (uS/cm)	802	848	859	767	711	710	982	844	826	718	702	703
pH	7.15	7.09	7.36	7.06	7.05	7.33	7.26	7.15	7.33	7.06	7.13	7.16
Dissolved Oxygen (mg/L)	0.43	0.36	0.26	2.33	0.51	0.15	0.19	0.28	0.14	1.01	0.24	0.18
ORP	65.9	-8.4	35.2	57.8	2.6	30.6	34.2	10.4	42.8	74.6	9.1	92.4

Field Parameter	Willamette River		
	Start	Middle	End
Temperature (degrees C)	12.22	11.63	10.84
Conductivity (uS/cm)	78	80	78
pH	7.32	7.16	7.08
Dissolved Oxygen (mg/L)	9.98	11.62	12.33
ORP	130.8	132.6	198.3

Appendix A
Field Notes

CDM

"Rite in the Rain"®

ALL-WEATHER

ENVIRONMENTAL

No. 550F

GASCO

Portland Harbor

"Rite in the Rain"®
ALL-WEATHER WRITING PAPER

ALL-WEATHER
ENVIRONMENTAL FIELD BOOK

Name CDM

Address 11811 NE 1st St Suite 201 Bellevue WA 98005 | 1218 3rd Ave. Seattle, WA 98101

Phone (425) 453-8383 | (206) 336-4900

Project GASCO
Portland Harbor
Portland, OR

This book is printed on "Rite in the Rain" All-Weather Writing Paper - A unique paper created to shed water and enhance the written image. It is widely used throughout the world for recording critical field data in all kinds of weather. For best results, use a pencil or an all-weather pen.

Specifications for this book:

Page Pattern		Cover Options	
Left Page	Right Page	Polydura Cover	Fabrikoid Cover
Columnar	1/4" Grid	Item No. 550	Item No. 550F

© 1996 J. L. DARLING CORP.

CONTENTS

PAGE	REFERENCE	DATE
1-4	Table of Contents	—
5-10	11/17/09 Oversight Notes	11/17/09
11-17	11/18/09 Oversight Notes	11/18/09
18-26	11/19/09 Oversight Notes	11/19/09
27-31	11/20/09 oversight Notes	11/20/09
32-40	11/23/09 Oversight Notes	11/23/09
41-47	11/24/09 Oversight Notes	11/24/09
48-54	11/25/09 Oversight Notes	11/25/09
55-56	11/30/09 oversight Notes	11/30/09
57-64	12/1/09 Oversight Notes	12/1/09
65-69	12/2/09 oversight Notes	12/2/09
70-73	12/3/09 oversight Notes	12/3/09
74-76	12/4/09 oversight Notes	12/4/09

Reference Page Index

147 Error codes, Hazardous classifications, Container types
148 Sampling guidelines (Liquids)
149 Sampling guidelines (Solids)
150 Approximate Volume of Water in Casing or Hole, Ground Water Monitoring Well
151 PVC Pipe casing tables
152 Soil Classification
153 Soil Classification
154 Conversions (Length, Weight, Volume, Temp, etc...)
155 Conversions (Concentrations, Volume/Flow or Time, Velocity, Acceleration)
156 Maximum Concentration of Contaminants for the Toxicity Characteristic

Location _____ Date _____

Project / Client _____

Location Gasco - Portland Date 11/17/09

Project / Client Oversight of Piezometer Installation

0635 - Lance Peterson, Damon Repine on site, plan to attend project kick off meeting and initiate oversight of piezometer installation. Meet John Renda (Anchor) at guard shack - guard checks ID before can personnel allowed to enter site.

Weather: expect rain, high ~48°F

0645 - Assemble at Anchor job trailer for health & safety meeting

Attendees:

Wayne - Diversified Marine
Matt Wilson - Anchor
Tim Stone - Anchor
John Renda - Anchor
Rodney - Cascade
Steve - Cascade
Jeffery - Cascade
~~Taylor~~ - Cascade
Rolip
Lance Peterson

11/12/09

Location Gasco - Portland Date 11/17/09

Project / Client Oversight of piezometer Installation

Attendees (cont.):
Lance Peterson
Damin Repine
John Renla gives overview
HASP
Share w/ cascade goes over
Cascades H&S checklist
Items of note covered
- air monitoring
- containment
- PPE/PFDs use
- Tidal fluctuations expected
- emergency meeting locations
- sharp objects / pinch points
- winds expected
- work zones
- chemicals on barge:
  - gasoline 5 gal containers also on barge
  - diesel 5 gal containers also on barge
  - hyd fluid
- slips/trips/falls
- consider river water contaminated
- Discuss TWIC requirements

Lance Peterson 11/17/09

Location Gasco - Portland Date 11/17/09

Project / Client Oversight of piezometer Installation

0815 - Suit up into PPE/rain gear proceed to walk to beach/river edge, Cascade is loading barge with materials/supplies, barge is located in upstream area of Gasco site
Doug Laffoon (Anchor) on site - Doug will be responsible for securing piezos to dock & piezo development
0915 - Barge proceeds to PZ5 cluster location
0935 - Photo #1 - Barge approaching shore to offload drill rig at PZ5 cluster
Barge operator cannot beach at shore adjacent to dock at PZ5 cluster location
1020 - Barge able to beach after waiting for tide to fall

Lance Peterson 11/17/09

Location Gasco – Portland Date 11/17/09

Project / Client Oversight of Piezometer Installation

1028 – Take photo #2 – offloading drilling rig from barge

1150 – Off site for lunch

Driller getting rig set up at PZ5

1210 – Back on site – Drilling rig set up

1230 – John Renda (Anchor) provides explanation of PID use & shows location in orange box on barge

1237 – Start drilling PZ5-55

Photo #3 & #4: overview of exclusion zone and spill containment around & under drilling

1-800 Locate # 9215309

1300 – Anchor & Cascade discuss 0-10' core interval – ranges from silt to sandy silt

Photo #4: photo of 1-10' core interval

Lanie Peterson 11/17/09

Location Gasco – Portland Date 11/17/09

Project / Client Oversight of Piezometer Installation

1305 – Anchor reports breathing zone PID readings all 0 ppm

1325 – Anchor points out to driller that 8" casing not being used as planned – Cascade having 8" casing delivered tomorrow

– Some sheen at ~5', no odor

1405 – Hail storm for 15 minutes – Photo #5 taken

Headspace of soil is 0-15', interval all 0 ppm except 5'-6' which was 0-6 ppm

1500 – Photo #6 – overview of support zone & exclusion zone

1510 – Plan for remainder of 11/17/09 is to set 8" casing to 15', move drilling back on to barge due to rising tide

Lanie Peterson 11/17/09

Location Gasco – Portland Date 11/17/09

Project / Client Oversight of Piezometer Installation

1515 – Driller removing drill head due to crack – will be replaced with new drill head

1540 – Proceed back up to ~~[illegible]~~ Anchor job trailer and then be escorted off site (to guard shack)

1600 – Lance Peterson & Damian Repine off site for day. Plan to meet at guard shack at 0630 hrs on 11/18/09

Lance Peterson 11/17/09

Location Gasco – Portland Date 11/18/09

Project / Client Oversight of Piezometer Installation

0630 – Lance Peterson, Damian Repine (CDM) on site at guard shack – call John Renda who calls Matt Wilson to meet CDM crew at gate to escort into site

Weather: a.m. partly cloudy ~45°F expect rain in pm / high 40°F

0635 – Attend morning H&S meeting with Cascade and Anchor crew (Tim Stone & Matt Wilson)

0650 – Proceed to suit up with PPE and proceed to PZ-5 location to continue drilling for deep piezo at PZ-5. Drillers preparing to remediation sonicating on 8" casing (8" casing to 15 bgs)

Photo #1 – Work zone configuration for 11/18/09

Lance Peterson 11/18/09

Location Gasco-Portland Date 11/18/09

Project / Client Oversight of piezometer Installation

0755- Start drilling P25 at 15'bgs

0820- Hydraulic fitting comes loose on pipe clamp - ~1-2 ounces hydraulic fluid drips on plastic, Cascade immediately places absorbent pads under leak and tightens fitting. Discuss situation with Matt Wilson, will not consider a reportable release.

0830- 15'-20' ~~[illegible]~~ sample drive no recovery due to large gravel

Photo #2 & #3: cascade containing hydraulic leak

0835- Tim Stone & Doug Laffon (Anchor) on site

0840- Lance Peterson speaks with Tim Stone and Cascade (Rodney) supervisor concerning loose hydraulic fitting. Cascade will check fittings on rig daily

Lance Peterson 11/18/09

Location Gasco-Portland Date 11/18/09

Project / Client Oversight of Piezometer Installation

0845 - 20'-25' core retrieved

Photo #4: 22.5'-25' core section

Matt with Anchor reports small gravel mixed in fine grained sediment

Suggest sample contains some sloughed material

logged as sandy silt (ML), fine sand w/ trace lithics

0910 - 25-30' core interval has increased sand content (SM)

0920 - Lance Peterson call Sean Sheldrake (EPA) with update call and to notify of hydraulic spill, Sean agrees it no fluid left visqueen and all was soaked up it is not reportable

John Rende (Anchor) on site

0950 - 35-40' interlayered sand, sandy silt, silty sand, Photo #5

1010 - ~~35'-40'~~ 40-45': Silty sand (SM)

Quite a bit of sand per Anchor.

1035 - Photo #6: 45'-50' core

45'-48': sand, 48-50' sand/silt

OVM Headspace in soil bags 15'-50': 0-0.3 ppm

No odor, no sheen

Location Gasco – Portland Date 11/18/09

Project / Client Oversight of piezometer installation

1100 – 50'-55': sand
1125 – off site for lunch
1235 – on site at guard shack – call John Renda for escort into site
1252 – Arrive at PZ5 drill site
Currently pulling up
2nd ~~65'-70'~~ core sample
Photo #7: extruding portion of 60'-65' core into sample bag
50'-~~60'~~ 65' interval medium grained sand
Photo #8: 65'-70' core section
65'-70' core section also medium sand
1315: Matt with Anchor measures volume of 50 lb bags of filter pack sand at ~4 gallons
1328: 70-75' core sample
Photo #9: Anchor crew processing 70-75' core sample, core shows a "dirty gym sock odor" per
Zona Rebs 11/18/09

Location Gasco – Portland Date 11/18/09

Project / Client Oversight of piezometer installation

John Renda – similar odor noted in nearby deep borings at similar depth – no sheen,
Anchor has run cores from other borings for full analytical suite – has not exhibited chemical contamination
1335 – Driller adding potable water to control heave – water obtained from Cascade Shop in Milwaukie (city water from Portland?)
Anchor & driller discuss PZ5-85 installation plan – will place centralizers every 20'
1349 – Photo #10 – contaminant reduction zone / bioswitch station / coveralls washing station
1420 – 75'-80' core; medium sand
Matt w/ Anchor notes "dirty sock" odor
Photo #11: Installation materials staged for PZ-5-85 installation
Zona Rebs 11/18/09

Location Gasco – Portland Date 11/18/09

Project / Client Oversight of Piezometer Installation

1425 – John Edwards (Parker) on site
1450 – 80'-85' core, saturated loose sand, ~50% recovery
Photo 12: 80'-85' core interval
1500 – Bottom of PZ-5 boring at 85.5' bgs
Photo #13: Installation of 5' well screen (centralizer at bottom)
Photo #14: Driller placing centralizer #19 on upper portion of 5' screen)
1505 – Begin Piezometer 10 installation
Driller added ~3' sand to casing – pulled ~2' after placing 2" PVC
1545 – Sand pack almost installed, 2" PVC staying in place – Anchor inquires if hole can be loaded with bentonite to prevent bentonite slurry from hardening in mixing drum, Hana Peterson talks with Scott Cooley. TP grout is tremied then

Location Gasco – Portland Date 11/18/09

Project / Client Oversight of Piezometer Installation

that is OK. Driller to place 2' fine sand on top of filter pack per ~~[illegible]~~ OR well regulations
Summary of core observations: max OVA headspace 0.3 ppm, no odor other than "dirty gym socks" noted and no sheen
1600: driller surges well screen w/ 3/4" pvc to settle filter pack
1610: Driller plans to put temporary 6" steel casing strings on P35-85 and install grout seal armor 11/19
1625 – off site for day

James Peterson 11/18/09

Location Gasco - Portland Date 11/19/09

Project / Client Oversight of Piezometer Installation

0615 - Lance Peterson on site.
Check in at guard shack
Call John Rhode for escort
into site
0625 - Proceed to Anchor trailer
for daily H&S meeting
Matt Wilson performing
calibration check on
PID - uses 100 ppm
isobutylene and 10 ppm
hydrogen cyanide
Reads 99.9 ppm isobutylene
Reads 10 ppm hydrogen cyanide
Matt Wilson reports similar
calibration check results
for previous days
0635 - proceed with daily safety briefing
- Drillers will be using rain
gear to facilitate removal
of adhered soil in decon
station
~~will be~~ 33

Lance Peterson 11/19/09

Location Gasco - Portland Date 11/19/09

Project / Client Oversight of Piezometer Installation

- Followup to 11/18/09 hydraulic
oil fitting leak - ~~oil~~ driller will
be checking fittings and have
absorbent pads ready at rig
and have plastic bags ready
to place over drill casing
to minimize chance of leak
entering hole
- DPOW's deep piezometer
at PZ5 only showed field
evidence of contamination
in shallow (upper 15')
0855 - Proceed to suiting into
Level D PPE
0715 - Arrive at PZ15 drill site
Driller organizing supplies
Set up tents
Matt Wilson reports calculated
sandpack vol. at 2 1/4 bags
(50 lb) and driller has used
1 3/4 to top of screen (prior
to surging well), LEP confirms
actual calculation by Matt is
2.36 bags

Lance Peterson 11/19/09

Location Gasco / Portland Date 11/19/09

Project / Client Oversight of piezometer Installation

Sandpack vol. check:

0.17 ft³/ft x 7ft = 1.2 ft³ ÷ 0.5 ft³/bag

= 2.4 bags ✓

0820 – Driller completes getting setup on PZ5-E5 piezometer – preps to add remaining sand and mix grout

0846 – Mark Wilson reports 2.1 bags filter pack used – which 86% of calculated volume

Driller adding fine sand over filter pack – 2' minimum

Plan for 11/19/09 – complete install of PZ5-E5 and start drilling PZ5-S0

Photo #1 driller setting up rig over plastic sheeting containment

Photo #2 Fine sand used over filter pack to keep grout out ~~of~~ of filter pack – resembles fine beach sand

Lorna Reton 11/19/09

Location Gasco – Portland Date 11/19/09

Project / Client Oversight of piezometer installation

0900 – waiting for fine sand to settle to top of filter pack

Photo #3: filter pack (Colorado 10–20 sand)

0922 – Driller adding potable water to 6" casing to create a downward flow to help settle the fine sand

Weather: a.m. windy ~45°F expect high ~48°F & rain

0935 – Driller installing 1" pvc tremie pipe to convey grout to top of fine sand filter (2' of fine sand confirmed)

1005 – Grout weight measured at 9.8 lb/gal (9.5 lb/gal requirement)

Photo #4: mud balance measuring weight of grout

1007 – Begin pumping grout

Photo #5: Grouting operation

~~1010~~ – Batch 1 of grout completed

10:30 ~~#3~~ gals calculated

LO Lorna Reton 11/19/09

Location Gasco-Portland Date 11/19/09

Project / Client Oversight of Piezometer Installation

1110 — 2nd batch of bentonite grout weighs in at 9.6 lbs/gal

1210 — Break for Lunch —
Driller moving off of PZ5-85 to 50' PZ5 location, will finishing
Chasing after grout samples
Driller is decontaminating drill pipe on barge

1310 — Back at PZ5 site —
driller has set up on PZ5-50 boring location
PZ5-50 is ~3' from PZ-85
Driller places absorbent pads ~~and pla~~ around PZ5-85 and places sheeting over PZ5-85

1312 — Start drilling PZ5-50'
Note: prior to breaking for lunch Lance Peterson told John Renda that there is an expectation that the driller will use a splash shield when ~~the~~ using pressure washer — John will inform driller
Lance Peterson 11/19/09

Location Gasco-Portland Date 11/19/09

Project / Client Oversight of Piezometer Installation

1340 — Minor sheen noted at ~7' bgs in 5'-10' core section
Photo #~~8~~7: sheen in 5'-10' core (at ~7' bgs)
Photo #~~8~~7: 5'-10' core being processed by Anchor crew
Anchor is using core information from PZ5-50 to supplement PZ5-85 log

1355 — Drill advancing 6" casing from 20'-45', will then clean out interior of 6" casing with 4" core barrel — 20'-40' zone not relevant to planned piezometer screen zones but will still check 4" core material as it is removed
John Renda mentions that the PZ5-20 piezometer will go in as planned as sediment below 20' becomes more silty.

1430 — With 6" casing at 45' and 4" core casing clearing at 20-30' drill adds potable water to load 6" casing in preparation to break into sandy material at 45' — expect heave
Lance Peterson 11/19/09

Location Gasco / Portland Date 11/19/09

Project / Client Oversight of Piezometer Installation

Photo #8: work zones (exclusion zone) set up for PZ5-50

PZ5-50: 45'-50' core section all medium grained sand with exception for ~1" silty layer - 45'-50' core section in PZ5-85 had ~2 feet of silty sand/sandy silt (43'-45'), Anchor instructs driller to drill to 55'.

Anchor has been recording Hydrogen cyanide in addition to VOCs w/PID, one location PZ5-85 (62.5'-65.5') showed 16 ppm Hydrogen cyanide - all other readings (breathing zone and core baggies) were 0 ppm.

John Renda checked all core baggies from PZ5-85 for sheen using fluorescent lamp - no evidence of sheen noted.

Anchor has not been recording hydrogen cyanide in baggies consistently - may have been some around a few ppm per John

James Rietz 11/19/09

Location Gasco / Portland Date 11/19/09

Project / Client Oversight of Piezometer Installation

1320 - Driller begins installing PZ5-50 after loading hole with water and waiting for water pressure to equalize

Photo #9: PZ5-50 installation

Confirm with Matt Wilson that PZ5-50 is set at 50' bgs

Photo #10: Decontamination trailer in use on barge

1415 - Driller surging filter pack with 1" pvc connected to rubber "packer" at end to settle out filter pack

Photo #11 - rig refueling operation - 5 gallon cans with absorbent pads around fill spout

Sand is ~2' above top of screen prior to surging, sand is still up in casing also, driller reports sand is dropping

1850 - Driller completes adding one bag of fine sand above filter pack

James Rietz 11/19/09

Location Gasco/Portland Date 11/19/09

Project / Client Oversight of piezometer installation

Filter pack brought to 2' above screen, i.e. to 48' bgs
Matt Wilson reports headspace were recorded only where data gap existed, i.e. upper 20' — 17.5' location showed 0.6 ppm on OVM, all others were Ø ppm.
Health and Safety monitoring was all Ø ppm in breathing zones.
1700 — Proceed back to Arthur Jordan
1715 — off site for day

Lance Peterson
11/19/09

Location Gasco/Portland Date 11/20/09

Project / Client

0615 — Lance Peterson on site at Grand Shack
0630 — John Kenda escort into site
0635 — ~~Start~~ H&S Tailgate meeting — rig will be taken back to Cascade shop over weekend to change out drill head.
Plan for 11/20/09: Complete installation of PZS-50, drill and install PZS-20 and PZS-5.
Weather: a.m. rain ~45°F expect rain to taper off in p.m.
PID calibration check 100ppm isobutylene reads 100ppm, 10ppm Hydrogen cyanide reads 9 ppm
Mini Rae Plus is PID in use
0700 — Driving at PZS drill site
0715 — Driller set up on PZS and prepares for grouting

Lance Peterson 11/20/09

Location Gasco - Portland Date 11/20/09

Project / Client Oversight of piezometer installation

PZS-50 Screen ; 45.3 50.3
2.3' Filter pack above screen
2.8' fine sand over filter pack
Matt Wilson calculated filter pack is within 92.4% of calculated volume
Photo #1 : overview of PZS piezo cluster location
0814: First batch of grout weighs 9.5 lbs/gal & begins pumping grout seal
0820 - Driller to use only 1 batch grout and let settle - pulls 8" conductor casing after removing 6" casing
Driller proceeds to move to PZS-20 location (~3' from PZS-50)
0930 - Start drilling PZS-20
0-5 cuttings ; ~2.5' small gravel
brown ~2.5' grey sand
Photo #2 - exposing ~~[illegible]~~ 5'-7.5' core section
Jenna Rebo 11/20/09

Location Gasco - Portland Date 11/20/09

Project / Client Oversight of Piezometer Installation

Photo #3 - 5'-10' core section, subtle shear at ~6'
5'-7.5' : sand grey
7.5'-10' : silty sand with silt interbeds (thin interbeds)
1013 - 10'-15' core recovered, mostly sandy silt w/ sand interbeds
15-20' core recovered, mostly (10' run) sandy silt w/ silt interbeds
Photo #4 - 10'-15' core on right of photo
15'-20' core on left of photo
Anchor plans to have 15'-20' zone screened for most piezometer
1045 - Begin installation - plan to set screen at 15'-20'
Photo #5 : Surging PZS-20 to settle sand filter pack
Photo #6 : rubber surge block at end of surge pipe
1129: Begin adding bentonite chips for PZS-20 seal
2.3' filter pack above screen
no fine sand filter since chips are being used
Jenna Rebo 11/20/09

Location Gasco – Portland Date 11/20/09

Project / Client Oversight of piezometer Installation

11:48: brought chips to 3' bgs
breakfast lunch

12:45: Back at PZ5
drilling site, driller setting up at PZ5-5 location

12:57 Start drilling PZ5-5

Photo 7: 1' screen section intended for PZ5-5

Photo 8: 5' well for PZ5-5
(4' blank & 1' screen)
screen: 3.8'-4.8'
End cap at 5.0'
Native: 5.0'-5.4' (slough)
Top of sand: 2.8'
Will place bentonite chips to ground surface
Discussion is calling in a variance for PZ5-5 since surface seal will be <3'.

1300 – Complete PZ5-5 installation with exception of monument
Photo #9: PZ5-5 completion showing bentonite surface seal
James Peters 11/19/09

Location Gasco - Portland Date 11/20/09

Project / Client Oversight of Piezometer Installation

1415 – Driller decontaminating pipe and installing PZ5 monuments
Photo #10: monument installation PZ5-5 in photo
1450 – Off site for day after walking site with John Renda to inspect locations for proposed ~~exp~~ upland extraction and monitoring wells. Driller/Anchor planning to install PZ5 monuments & bollards and demob drill rig for remainder of 11/20/09

James Peters 11/20/09

Location GASCO - Portland OR Date 11-23-09

Project / Client EPA Oversight of offshore piezo installation

0605 Arrive & Guard Shack
check-in / wait for John Renda Anchor QEA

0615 meet John R.
who escorts me to Job Shed

0620-0630 Wayno, Torrestoia John Renda
Matt Wilson
Calibrating OVM - multi-RAE

0630 Cascade Drilling Crew
arrive Rodney
Caleb
Jeffery
Steve Zimmerman - Driller

0630-0650 Steve - Cascade Runs
through Cascade Health &
Safety plan

0650-0700 I question John R.
on Anchor Site safety plan Run Through
Supplement to Cascades
He performs this briefly * Could be expanded con. →

SEC 11-23-09

Location Gasco - Portland OR Date 11-23-09

Project / Client EPA oversight of offshore Piezo Installation

Provides overview of SSHO & SS
which is John Renda if
Tim Stone is not on site
if Tim Stone is on site:
Tim = SSHO
John = SS

0700-0720 Go with John to
take Wayno to Tug & Barge
using Anchor's Skiff

0720 Photo #1 - Sunrise Portland Harbor Diversified
John Renda motoring to Tug & Barge

0720-0800
- Return to dock w/ John R
walk down to PZ1-50 location
onshore under western pier
- Drillers loading Track Sonic Rig
Equip. onto Barge
- Discuss with John & Matt concern about grout
entering River when conductor casing
is removed. John not concerned
about this because Sonic keeps the
casing pretty clean when removing
& adding water to flush could

SEC - 11-23-09

Location GASCO Portland OR Date 11-23-09

Project / Client EPA oversight of offshore Piezo installations

thin the grout. He did say they would watch it

0830 Photo #2 - Pic of Barge approaching Shoreline for loading of Drilling equipment

0850 Barge moving into Position

Photos 3-7 SEC 11-23-09 wide angle shot stitched photos of Tug/Barge and Steve Jhn; Matt standing next to PZ1-50 location

Weather: Mid 40s, Partly Cloudy Sun breaks expected

0855 Tim Stone onsite - lowering dumbbell anchor from pier to locate PZ1-50 directly under west edge of Pier

0920 Doug Leffler (Anchor) comes onsite to develop PZ-5 cluster

- Drillers continue to set up

0930 - Take photo #8 SEC 11-23-09 Drill Rig Set up over PZ1-50

SEC 11-23-09

Location GASCO Portland OR Date 11-23-09

Project / Client EPA oversight of offshore Piezo Installations

0945 Plastic Sheeting set up under Rig w/ 4x4 raised ridges for spill containment

0957 Begin Drilling PZ1-50

0959 Collecting first 5' sample

take photo #8 SEC 11-23-09 full recovery

Matt w. logging hole - checking sample headspace w/ OVM

med-fine brown sand - slight moisture

OVM of Bagged Samples

1005 collect 10' Sample 2.5ft recovered

Resample material lost downhole

Recovered 7.5-10' Dark Brown Silty Sand (SP), wet, slight HC odor, OVM =

1025 Collecting 10-15 ft sample f

Matt logging hole / checking OVM reading in Breathing Zone = 0

full recovery

Photo #9 SEC 11-23-09 Rodney leaves site to get IO Tag stamp equip

1035 Doug L. Anchor setting up Waterra pump over PZ5-85 to Develop ~~well~~ Piezo ~13 gal / well volume

1040 Begin Development of ~~Well~~ Piezo

SEC 11-23-09

Location GASCO Portland, OR Date 11-23-09

Project / Client EPA oversight of offshore Piezo Installations

Watera pump works using an up-down arm secured to casing bottom of 3/4" tubing is a teflon check valve w/ ring that surges the screen interval while pumping the water.

1045 Collect 15-20' Sample / full recovery

1055 Collect 20-25' Sample
Dark Gray sandy silt, wet

1109 Witness driller helper Caleb washing off Boots in contamination reduction zone before getting equipment on barge

1111 Collect 25-30' Sample / similar to above, full recovery

1115 Doug L. continues purging P25-85
13 gals x 10 volumes
He will dump discharge water into Drilling Rig Decon Trailer

1120 Collect 30-35' Sample
Dark Gray silty Sand, wet / similar to above

SEC 11-23-09

Location GASCO Portland, OR Date 11-23-09

Project / Client EPA oversight of offshore

1145 Collect 35-40' Sample wet, slight HC odor
full recovery / Dark Gray Sandy Silt w/ some fine-med Sand lenses
checked / Breathing Zone w/ OVM
some water coming out onto containment pad / Driller laying down adsorbant pads to adsorb water

1150-1240 Drillers / Anchor Break for lunch
Doug Laffoine has purged ~20 gal from P25-85 ~ 80 gals left to purge - purge water cleaning up.

1255 Collect 40-45' Sample
Rodney (Cascade) on site
40-42' fine-med Dark Gray silty Sand SP-SM
42-44' med Dark Grey Sand SP
44-45 back to fine-med Dark Gray Sand w/ silt SP-SM

1310 Collect 45-50' Sample
Complete Recovery ~~[illegible]~~ AKC 11-23-09
45-50 med Dark Gray Sand, wet
OK'd by Anchor to begin completion

SEC 11-23-09

Location GASCO Portland, OR Date 11-23-09

Project / Client EPA oversight of offshore Piezo installation

~2' of hole lost

1315 Hole heaved - Drillers cleaning out hole
Driller Steve - checking hole Depth
- OVM range for headspace 0.4 → 0.7 KC 11-23-09 - highest @ 50' sample
- HC odor moderately strong from Gasco site Tanks onshore asked John about this; He indicates it's normal

1335 Pressurized hole w/ potable water to keep hole from heaving / Rechecked hole cleaned out to 50.5'
Ready to install well / Piezo

1341 Photo #10 - Pic of 5' screen assembly flush threaded to Sch 40 steel riser
weather: clouding up / cooling off, low 40s

1347 Installing centralizers ~1.5' length @ Top & Bottom sections of 5.5' Screen assembly

SEC — // — 11-23-09

Location Gasco Portland, OR Date 11-23-09

Project / Client EPA oversight of offshore Piezo installation

1355 Begin Installation
5.5' screen + 5' riser steel + 20' riser steel + 20' riser steel

KC 11-23-09

1400 ~~Casing~~ Well / Piezo assembly installed to 50.5' / adding 10-20 sand pack while holding steel riser w/ eyebolt / sandline
Volume Calc 2x6 annular space: 0.16 ft³/ft = 0.44
1 bag (50 lb) of 10-20 = 0.50 ft³
~7 ft of pack = 1.12 ft³ / 2.25 bags of sand

1500 Carefully pulling back casing while adding sand, measured sand to 44' ft

1510 Added 2.3 bags of sand to 43' ft total

1515 Adding 1 bag of fine sand 20-40
KC 11-23-09 ~~Brought~~ filled annular space 2.9 ft after settlement. Fine sand 43-40 ft

1530 Mixed Grout
weighed w/ Grout scale 9.5 lbs

1540 Adding Grout pulling 6-inch casing
~45 gallons

SEC — // — 11-23-09

Location Gasco, Portland OR Date 11-23-09

Project / Client EPA oversight of offshore Piezo installations

1600 - Drillers pull back 8 inch Conductor casing added ~10 gallons of grout to within 3ft GS

55 gal total - Doug Lafoonne still developing P2585 well cluster

Purged clear Parameters Stable
- PZ-5-85 Developed 97 gallons
- PZ5-35 Developed 55 gallons
- PZ5-20 Developed 6 gallons
- PZ5-5 Developed 3 gallons
- Piezo's not clear or stabilized purge water but are going dry; Doug will need to return tommorrow to finish purging PZ5-5 & PZ5-20

1620 Drillers Adding Bent chips 1.5 bags of Bentonite 3/8" to surface

1630 Went over annular vol calcs w/ Matt Wilson (Anchor Geologist) Volume added = Theoretical ~90% (11-23-09)

photo #1 - Piezo stickup to Pier catwalk - Steel Riser

1700 SEC Being Escorted off-site

SEC — " — 11-23-09

Location GASCO, Portland OR Date 11-24-09

Project / Client EPA oversight of offshore Piezo installations

0615 Arrive on Site / Check-in at job Shack

0630 - Drilling Crew / Anchor run through

0700 Health & Safety items / Anchor calibrates OVM

Special awareness noted for work today on the Barge - identified locations of Throw ring / life vests on at all times

- Anchor indicates we will be setting up to drill / install PZ4-40 instead of PZ2

0700 Convene H&S meeting

Drillers preparing Barge for Drilling operations - They will need to keep everything orderly on barge due to limited space.

Weather: Cloudy, low 40s

0700 - 0900 Set Barge / Drill rig over PZ4-40 position; move Oil curtain into position surrounding Tug & Barge. Photos #1 & 2

SEC — " — 11-24-09

Location GASCO Portland, OR Date 11-24-09

Project / Client EPA oversight of offshore Piezo installations

0910 [Photo #3] set up, front of Drill Rig over moon pool plumb bob lowered from catwalk above - off just slightly east but within acceptable location limits SEC 11-24-09

[Photo #4] Absorbant boom secured around front portion of barge where moon pool is located.

0940 Begin Drilling PZ4-40
Note: current River level -6.0 ft to mudline instead of -10ft
Drillers wrap absorbant pads around moon pool & 8-inch Casing stickup to absorb ~~water~~ oil generated from cutting ~~the casing~~ during drilling operation SEC 11-24-09 SEC 11-24-09
↳ Take [photo #5]

0955 Collect 0-5 ft sample; full recovery
~~0-5~~ Dark Gray Silt w/ Darker Oil-stained wet Sand/Silt lenses - slight sheen [photo #5] SEC 11-24-09

SEC — // — 11-24-09

Location: GASCO, Portland, OR Date 11-24-09

Project / Client EPA Oversight of offshore Piezo installations

1015 Collect 5-10 ft sample | full recovery
Dark Gray Silt w/ some fine sand, wet
Some faint sheen seen in the 7.5ft-9ft fine Sand layer ~~Silt~~ SEC 11-24-09
Drilling is going slow because Driller is taking caution not to disturb the contaminated River Anchor checking Breathing Zone OVM = 0.0 ppm

1048 Collect 10-15ft Sample; full recovery
Still using 8-inch Conductor Casing; switching to 6-inch now; Dark Gray Silt no sheen bottom of core 13-15ft
14ft change to fine-med Dark Gray Sand

1110 Collect 15-20 ft Sample; full recovery
6-inch Casing advance ~~Beg~~ SEC 11-24-09 Dark Gray Sand, fine-med to 17 ft / 17-20 Gray-brown Silt - Breathing Zone OVM = 0.0 ppm

1127 Collect 20-25 ft Sample; full recovery
Dark Gray med Sand 20-22.5 / 22.5-25 Dark Gray Silt w/ fine sand

1139 Collect 25-30 ft Sample; full recovery
Dark Gray med Sand 25-30ft

weather: Partly Sunny; mid 40s, light wind

SEC — // — 11-24-09

Location GASCO, Portland, OR Date 11-24-09

Project / Client EPA Oversight of offshore Piezo installation

1150 Doug Lafoone (Anchor) working on development of PZ5-20; PZ5-5

1158 Collect 30-35 ft sample; full Recovery
Dk Gray med Sand 30-34 ft
Gray-Brown fine Sand w/silt 34-35 ft (dec 11-24-09)

1205 Drillers Break for lunch - John R leaving site

1250 Lunch Break over; Resume Drilling

Workers present

On Barge
- Matt Wilson (Anchor) Geologist
- Scott Colley (OVM) EPA Oversight
- Steve Zimmerman (Cascade Driller)
- Kaleb (Cascade Helper)
- Jeffery (Cascade Helper)

Onshore [Developing PZ5 cluster] Doug Lafoone

Note: Tim Stone is supposed to relieve John R. but he has not shown up yet

1330 Collect 35-40 ft sample; full recovery
Dk Gray med Sand

1346 Drillers cleaning out hole for completion; Tim Stone arrives on site by boat

SEC 11-24-09

Location GASCO, Portland, OR Date 11-24-09

Project / Client EPA oversight of offshore Piezo Installation

1421 Hole cleaned out and measured 42 ft bgs (below mudline)
-50 ft elevation City of Portland Datum

OVM [Headspace OVM readings
Range from 0.3 to 1.3 ppm
1.3 ppm reading from the 0.5 ft sample

Theor Volume calc = 0.15 ft³/ft
1 x 50 lb bag of 10-20 sand = 0.50 ft³/bag
7 ft x 0.16 ft³/ft = 1.25 ft³
1.12 ft³ / .50 = 2.24 bags of sand
from TD 42 to 35.5 ft bgs
35 x 1.30 gal/ft 1.30 Vol of annular space in gallons/ft
= 45.5 gallons of Grout needed

Begin Installation 1st 11-24-09

1430 Install Screen assembly w/ 10 ft steel riser [photo #6]
5.5' + 10' + 20' + 20' + 2.5'
Screen, Steel Riser, Steel Riser, Steel Riser, Steel Riser
58' Total length - 12' w. Depth = 46'

1545 Sand Pack installed 1.1 bag of 10-20; Install tremie to surge & settle pack

SEC 11-24-09

Location GASCO, Portland OR Date 11-24-09

Project / Client EPA Oversight of offshore Piezo Installation

1605 Sand Pack Settled, adding 0.9 bag
Pull 6-inch / remeasure
1615 Add ~.25 (1/4 bag of 10-20)
1620 Finished Sand pack 2.25 bags total
Adding Fine Sand 20-40 for Grout
1642 Mixing Grout
1650 Anchor checking Grout mixture
- Doug Lafoone finished w/ Development of P25 well cluster
- Grout mix 9.7 lbs/gallon

1700 Adding Grout ~20 gallons
Pull 6-inch casing string
Adding more grout ~25 gallons to surface / 45 total
Remove remaining 6-inch & conductor casing
1730 Add 3 bags of chips to Bring Seal to mudline from 6ft below mudline
1738 Removed 8" conductor Casing

SEE 11 11-24-09

Location GASCO, Portland OR Date 11-24-09

Project / Client: EPA oversight of offshore Piezo Installation

1800 Backing off Piezo & Drillers picking up Drilling waste containment system / Booms

1830 Motor Back to shore unload & leave Site

11-24-09

Location GASCO Portland, OR Date 11-25-09

Project / Client EPA Oversight of offshore Piezo installation

0615 Arrive @ Site Guard Shack SEC

0620 Tim Stone arrives & escorts MR to job trailer

0630 Drillers arrive - Cascade & Anchor conduct Safety meeting. Run through plan for day

On site: Matt Wilson, Tim Stone, Doug Lafoone — Anchor

Matt Wilson (Anchor) Calibrates PID reads - 99.9 isobutylene, 10 ppm Hyd equivalent checks OK

Steve Zimmerman, Jeffrey, Kaleb — Cascade

Willie — Diversified Tug operator

Scott Coffey - CDM

0645 Load equipment onto barge. Prepare deck area for drilling

0800 Secure ~~Setup~~ large containment boom around Barge - photo 1-2 SEC 11-25-09

photos #3-7 looking North - St Johns Bridge appearing out of fog

Weather: morning fog, clearing to afternoon sun. morning Low 40s warming to mid 50s

SEC 11-25-09

Location GASCO, Portland OR Date 11-25-09

Project / Client EPA Oversight of offshore Piezo installation

0912 Barge/moon pool lined up over P23-40

Drillers lowering/securing second oil containment boom

0920 Realize drilling location may intercept an angled piling ~~coming~~ supporting the pier/catwalk structure SEC 11-25-09

Reposition the Barge/moon pool

0948 Willamette River elev 6.24 ft City of Portland datum

0950 Tim Stone (Anchor) leaving site relieved by John Renda (Anchor)

0955 Begin Drilling P23-40

1005 Installed 30 ft of 8-inch Conducter casing

1015 Collect Core sample 2/3 recovery

0-3 ft Dark Gray/black Silt w/ fine sand & product sheen; HC odor; John believes it is Naphthalene

headspace OVM 7.7 ppm

OVM = 0.0 in breathing space

Sheen present; small black magnet in sed sample - photo 8

1030 Collect Core Sample 3-8 ft; full recovery; similar to above except w/ more organics - fibers wood tin matting material - photo 9

OVM headspace 5.2 ppm

SEC 11-25-09

Location GASCO, Portland, OR Date 11-25-09

Project / Client EPA Oversight of offshore Piezo installations

1042 photo 10 of 8-inch conductor casing install w/ Absorbant mats and socks around moon pool to prevent leaks into river

1053 Collect 8-13 ft core sample; full recovery

OVM headspace 4.9

8-9 ft Drk Gray Silt w/ Sand - small globules of sheen/product photo 11

9-13 ft Drk Gray fine-med coarse Sand no indication of product/sheen

1100 photo 12 - photo of Doug Lafoone securing Caution Tape on railing of ramp overhead

1115 Collect 13-18 ft sample; full Recovery (-28.5 to -33.5)

Drk Gray fine grading to med sand Driller advance 8-inch conductor to 18 ft to get below product zone which ended ~9 ft

1150 Collect 18-23 ft sample; full Recovery

Drk Gray fine Sandy Silt (ML)

1210 Collect 23-28 ft sample; full Recovery

23-25.0 SAA

25-28 ft - Drk Gray med Sand w/ some silt (SP)

SEC 11-25-09

Location GASCO / Portland, OR Date 11-25-09

Project / Client EPA Oversight of offshore Piezo Installations

1225-1300 Break for Lunch

1330 Collect 28-36 ft Core

Pushed 3 ft further for an 8 ft core sample; complete recovery

28-30.5 Drk Gray med Sand (SP)

30.5-32 ft SAA

ACC 11-25-09 32.5-35 ft Gray Silt ML ~~w/ Sand layers etc.~~ SEC 11-25-09

33.5-36 Gray med Sand w/ layers of 0.5 ft Silt

1340 Discuss Piezo completion w/ Anchor will OK completion of 5 ft screen in bottom 1 ft of silt rather than grout up to 33 ft (~3 ft)

1343 Actually hearing Sands & slough filled hole to 28 ft bgs - Driller will clean out hole to 32 ft - No need to grout

1405 Begin Piezo installation

5.5' + 5' + 20' + 10' + 10' + 5' + 2.5

Screen PVC, riser steel, riser steel, riser, riser, riser

SEC 11-25-09

Location GASCO, Portland OR Date 11-25-09

Project / Client EPA Oversight of offshore Piezo Installation

1500 Tagged Bottom w/ well @ 32.5 ft bgs (below mud line) Screen set 27.5–32.5 ~~ft bgs~~

Added Sand Pack

Theoretical Sand Pack Volumes:

25.5 - 32.5 (7 ft) x 0.16 ft³/ft = 1.12 ft³ in 2x6 annular space

50lb Sand = 0.50 ft³ = 2.24 bags

Drillers have added 1 3/4 bags to 25 ft before surging

Theoretical Grout Volumes:

1.3 gallons/ft for 2x6

2.45 gallons/ft for 2x8

18 to 23 = 5 ft x 1.3 gallons = 6.5 gallons

0 to 18 = 18 ft x 2.45 gallons = 44.1 gallons

Total Grout needed = 50.6 gallons

1520 Surging settled pack ~2 ft adding more sand

2.5 bags Total slightly more than theoretical

1530 Adding fine sand 1 bag (~2.5 ft) to 23 ft ← Tagged

1540 Installing Grout seal w/ Tremie Grout 10 lbs/gallon

SEC 11-25-09

Location GASCO, Portland OR Date 11-25-09

Project / Client EPA Oversight of offshore Piezo Installation

1550 Doug Lafoque finished w/ Development of P21-50

John Renda Returns from Running Black light Fluoresence tests on soil cuttings from P24-40 & P23-40

P24-40		P23-40	
0-2.5 ft	~~Strong~~ Heavy fluoresence multi color Orange-Green & yellow	0-8 ft	~~Strong~~ Heavy multi-color fluoresence Orange-Green & yellow
2.5-5 ft	Heavy	8 ft	Trace
12.5		10.5	∅
12.5	Trace		
17.5	∅		

Drillers Continue

1612 Grouting & Removing 6-inch Casing Total Grout added 50 gallons

1630 Pulling 8-inch conductor & backfill ~~upper~~ 2 ft w/ Bent. chips to mudline

* Ask matt if Organo Clay was installed in the final 10 ft he said No *

SEC 11-25-09

Location GASCO, Portland, OR Date 11-25-09

Project / Client EPA Oversight of offshore Piezo Installation

1630-1700 add 20' stickup for visibility & security to ramp
move barge off P23-40

* Reminded Matt & John that organo-clay was specified to be used if NAPL was seen - John & Matt agree and they will make sure it is used at this location for the shallow piezo and future installs where significant contamination is seen.

Some mitigating factors to not using the organo-clay include:
- Grout mix had a higher viscosity (10 lbs/gallon)
- 8-inch conductor casing was driven to 18 ft (~9 ft below NAPL zone) allowing for a thicker ~~[illegible]~~ seal surface

1730 SEC being escorted offsite
work will resume Monday @ 1230 to check on second moon pool is geneed (off site).

ASC 11-25-09

SEC 11-25-09

Location GASCO Portland OR Date 11-30-09

Project / Client EPA Oversight of offshore Piezo Installation

1125 Arrive @ GASCO site (Guard shack)
find out from guard Tim Stone & Doug Lafoone (Anchor) onsite
Call Tim - find out he's out on the river just moving barge back from offsite work. Tim recommends I wait for Matt W. who should be arriving on site in next 15 min.

1131 Matt W. calls & confirms he will be at guard shack in 15-20 min.

1145 meet Matt who escorts me to ~~[illegible]~~ job trailer - suit up and take ~~boat~~ shuttle to Barge where drillers are already on board.

1210-1240 Hold Safety meeting
Steve Z runs through Cascade's safety checklist
Tim S. " " Anchor's safety checklist

Plan is to set up @ P22 cluster today; could be difficult access

SEC 11-30-09

Location GASCO, Portland, OR Date 11-30-09

Project / Client EPA Oversight of offshore Piezo Installations

1305 Pic 1 moving into position - exclusion zone delineated on Barge

1315 Pic 2 photo of PZ3-40 w/ red flagging around 2-inch steel riser to dock access ramp

Continue moving barge into position

1348 Pics 3 & 4 photos of Red Exclusion Zone & Yellow Decontamination corridor

Unable to move barge into position over PZ2 site due to low water levels - Barge hitting bottom or an old piling - Tide is rising

1400 Tim S. Decides to have everyone go home for the Day - Wayne (Diversified) will Stay on and move barge into position around high tide @ 5pm

1430 SEC being escorted by Tim S. offsite

SEC 11-30-09

Location GASCO, Portland, OR Date 12-1-09

Project / Client: EPA Oversight of offshore Piezo Installations

0600 SEC onsite - wait for Anchor to show up @ Guard Stations

0620 Anchor onsite escort to Job Trailer

0630 - 0700 Conduct H&S meeting with Drilling Crew / Calibrate PID

Run Through completion steps

* Importance of using Organo-Clay
* " of not becoming complacent
* FAM having issues w/ PZ3-40 location in the middle of access ramp & entry/exit of boat used for deploying oil curtain

PID calibrated: 100/100-Isobutyl / 9/10-HCN

0700-0730 walk down to barge (Barge under N. catwalk into PZ-2 cluster position) Take photo 1 & 2 of barge/Drill Rig below from catwalk/pier above. Drillers repositioning Rig over new (left side) moon pool

- Drillers setting down new plastic sheeting under Drill Rig

Weather: Cloudy, low 40s, light wind from North

SEC 12-1-09

Location GASCO ; Portland, OR Date 12-1-09

Project / Client EPA oversight of offshore Piezo Installation

0754 Begin Drilling PZ2-78
mudline @ +3 ft City of Portland Datum

0808 Matt Wilson - Geologist on barge
Doug Lafoone - Doctor support person on barge - checking Breathing Zone w/PID

0810 First Core Sample 0-2.5, full recovery ; Black - Dark Brown organic silt, petroleum saturated w/ fibrous woody organics
photo #3 bottom (2.5 ft) portion of core in shoe

0823 Second core sample (2.5-5 ft); full recovery
SAA - photo #4
L Same as above

0830 5-7.5 ft Core sample ; Half recovery ~1.25 ft
0.m 16.5 ppm SAA continues to be petroleum saturated
highest Significant wood fibers/organics ; old Dock is the likely source

0843 7.5-10 ft core sample ; full recovery
HC PID reading of open sample 0-1 ppm
SAA

0854 10-15 ft core samples ; full recovery
Lithology change @ 12 ft

SEC — 12-1-09

Location GASCO Portland, OR Date 12-1-09

Project / Client EPA Oversight of offshore Piezo Installation

10-12 ft SAA Photo #5
12-14.5 ft Dark Gray Silt (ML) Clayey no organics ; cleaner no detectable petroleum product Photo #6
14.5-15 lith change Dark Gray fine-med Sand w/silt (SP-SM) Photo #7

0910 Discuss with Matt that Driller will need to go down another 5 ft w/ 8-inch to get seal 5 ft below detected significant contamination

0912 Driller adding another 5 ft string of 8-inch

0918 collect 15-20 ft Core ; full recovery
Dark Gray fine-med Sand w/some silt (SP-SM), clean
Driller switching to 6-inch casing

0948 collect 20-25 ft core ; full recovery
20-22 - SAA
22-23.5 - Dark Gray-Brown Silt (ML)
23.5-25 - Dark Gray-Brown fine Sand (SP-SM) some med coarse grain sand and silt looks clean

Weather: Cleaning Partly Cloudy ; ~10 mph Breeze mid 40's, wind chill a factor (~30s)

SEC — 12-1-09

Location GASCO, Portland OR Date 12-1-09

Project / Client EPA oversight of offshore Piezo Installation

1007 25-30 ft core sample; full recovery
Dark Gray-brown med Sand w/ Some fine grain less silt than above (SP)

1031 30-35 ft core sample; full recovery
30-34 ft SAA - Same As Above
34-35 ft Dark Brown fine-med Sandy Silt (ML) JEC 12-1-09

1035 Drillers stop drilling to make adjustments to casing claws (they were slipping)

1057 Repairs made - Resume drilling

1109 35-40 ft core sample; full Recovery
Dark Gray-Brown fine-med Sand w/some silt (SP)

1126 40-45 ft core sample; full recovery
40-41 Dark Gray-brown Sandy Silt (ML)
41-44 Dark Gray-Brown fine Sand w/silt (SP-SM)
44-45 Dark Gray-brown Sandy Silt (ML) some white fragg shells? small - scattered

1148 45-50 ft core sample; full recovery
45-47 Dark Gray fine-med Sand (SP) some silt
47-47.5 " Increase Silt fine sand w/silt (SP-SM)
47.5-49 " Silt (ML)
49-50 " fine-med Sand w/some silt (SP)

1200-1235 Break for lunch

JEC — " — 12-1-09

Location GASCO, Portland, OR Date 12-1-09

Project / Client EPA Oversight of offshore piezo installation

1300 50-55 ft core sample; full recovery
SAA

1328 55-60 ft core sample; full recovery
Dark Gray-Brown, med Sand (SP) minor silt

* Reminded Driller (Steve) about life vest he took it off to remove a layer of clothing and forgot to put it back on.

1356 60-65 ft core sample; full recovery
SAA

1400 Doug Lafoore offsite to run fluorescence analysis on samples

1458 65-70 ft core sample; full Recovery
SAA

photo #7 photo of Olympic Tug & Barge Lucy Sandland in background / MW330 in fore ground

photo #8 photo of 65-67.5 core sample - Deeper med sand unit

1528 70-75 ft core sample; full recovery
SAA

1549 75-80 core sample; full recovery
SAA

JEC — " — 12-1-09

Location GASCO, Portland, OR Date 12-1-09

Project / Client EPA oversight of offshore piezo completions

1600 Driller will push casing down 4' ~~clean out hole and~~ prepare for piezo completion for tomorrow am will clean out the hole tomorrow

1630 SEC escorted offsite

SEC 12-1-09

SEC — " — 12-1-09

Location GASCO, Portland, OR Date 12-2-09

Project / Client EPA oversight of offshore piezo completions

0600 SEC onsite, wait for Anchor escort @ Guard shack

0615 Doug Lafosse onsite/escorts me to Job Trailer

0630-0700 Drillers, Matt W (Anchor) & Wayne onsite, Conduct H&S meeting

0700-0745 Prepare Drill Rig & site for piezo completion

SEC 12-2-09 Photo #1 - Moon setting behind St Johns Bridge

Note: Although OVM readings were low in the deeper sand unit the HCN level measured by the PID went up and remained 5 → 7 ppm compared to the upper sand which measured 0 → 1 ppm

Photo #2 #3 Sunrise over PZ2 location

0820 Tools removed/Driller measured hole

TD 70' 10" from Top of Casing

mudline 6' 1" from Top of 8"

" 5' 3" from Top of Deck

Driller needs to clean ~ 12.5 ft of sediment from hole before completion begins

SEC — " — 12-2-09

Location GASCO Portland, OR Date 12-2-09

Project / Client EPA Oversight of offshore Piezo Installation

Weather: Sunny; clear skies, Cold low 30s warming to upper 40s; Breezy

0857 Hole cleaned out to 77.5' below mudline
will set screen at this depth
photo #4 Installing centralizers on screen assembly

Piezo assembly
5.5' screen w tail pipe + 10' steel riser + 20' steel riser + 20' steel riser + 20' steel riser + 2.5' steel riser + 5' steel riser = 83'

0915 photos 5 & 6 of Barge & Operations from Catwalk above; photos show drillers lifting 20' riser pipe into position

83 ft of screen/Riser installed
77
6 ft stickup

Screen Setting @ -73.9 city datum / 77' below mudline
Adding Sand 10-20 CSS ½ 50# bag; pull casing

Theoretical Vol Calc
77 - 70 (SEC 12-2-09) (7 ft) x 0.16 ft = 1.12 ft³ in 2x6 annular space
1.2 / 0.50 ft³/bag = 2.4 bags of Sand

1045
Used = 1.9 bags = 85% of Theoretical Oil

SEC — 12-2-09

Location GASCO, Portland, OR Date 12-2-09

Project / Client EPA Oversight of offshore Piezo Installations

1050 Added 1 x 50# bag of fine Sand CSS 20-40 to 67 ft bgs
1105 Prepare to mix/add Grout

Theoretical Grout volumes
1.3 gallons/ft for 2x6
2.4 gallons/ft for 2x8

20' - 67' = 47 ft x 1.3 = 61.1 gallons (66)
0 - 20 = 20 ft x 2.4 = 48 gallons (38)
109 gallons total

Total Actual used = 120 gallons

- Grout Tally ~40 gallons Bentonite Grout 10.1 lbs/gallon
1130 pulled 30 ft of 6 inch

Second batch of Grout 90% Bent 10% organo Clay (volclay) 10 lbs/gallon
45 gallons → add
1155 continue pulling 6-inch casing

1230 6-inch casing pulled; Break for lunch
1255 Resume mixing Grout 90% Bent 10% organoclay for 8-inch casing pull
→ another 25 gallons
photo #7 of Bent/organo clay mixing in drum 10.4 lbs/gallon
1330 pulled 8-inch to mudline SEC 12-2-09
measured grout ~2 ft below mudline
Add another 10 gallon mix of Bent/organoclay mix

SEC — 12-2-09

Location GASCO, Portland OR Date 12-2-09

Project / Client EPA Oversight of offshore Piezo Installation

1337 PZ2-78 completed
Picking up equipment/Decon 12-2-09
Use plumb Bob to ~~get~~ SEC line up best location for PZ2-43

1340-1434 Move barge to line main post over PZ-43 location - closer to shore than PZ2-78
As spuds on barge were extracted/reset they stirred up the NAPL saturated sediments which created a sheen
all contained within oil curtains around barge. - Called Lance P to notify SEC 12-2-09
It was not drilling derived waste
left message Took photos #8 & 9
Doug L. Anchor mopping up residual w absorbent pads
1444 Begin Drilling PZ2-43 photos 10 & 11
Soil cuttings are not being logged but show similar characteristics to PZ2-78 upper 12 ft petroleum saturated silt w/ wood fragments
1530 Drilling @ 30 ft bgs (below mudline)
1557 Hole cleaned out to 30 ft bgs
Drillers stopping for night, winterize fluid reservoirs for cold weather
SEC 12-2-09

Location GASCO, Portland OR Date 12-2-09

Project / Client EPA Oversight of offshore Piezo Installation

1630 SEC escorted offsite by Anchor

SEC 12-2-09

Location GASCO Portland OR Date 12-3-09

Project / Client EPA oversight of offshore Piezo Installations

0600 SEC on site; wait for Anchor Escort @ Coast Guard Station

0615 SEC escorted by Anchor to Job Trailer

0630-0700 Hold H&S meeting with
Drillers: Steve, Jeffrey, Caleb
Anchor: Matt, Doug
Diversified Marine: Wayne
CDM: Scott Coffey

0700-0730 Drillers prepare Rig SEC 12-3-09 to resume drilling PZ2-43

$\boxed{\text{phase 1-2}}$ Sunrise over portland Harbor; Mt Hood in distance

0800 collect core sample 30-35 ft for verification; full recovery

30-33 Dark Gray Brown fine to med Sand (SP) some silt, no evidence of petroleum product

33-34 Gray Silt (ML)

34 SEC 12-3-09

34 → 35 Return to Dark Gray-Brown fine-med Sand (SP) some silt

* Similar to core interval sample @ PZ2-78 silt lense ~1 ft higher

0835 collect 35-40 core sample; full recovery

SEC — 12-3-09

Location GASCO; Portland OR Date 12-3-09

Project / Client EPA Oversight of offshore Piezo Installations

35-39 Dark Gray-Brown fine-sorted med Sand (SP)
39-40 " Silt w/ fine sand (ML)
Again similar to PZ2-78, but ~1 ft higher

0845 Collect 40-43.5 core sample; full recovery
40-41 Dark Gray fine-some med Sand (SP)
41-42 " fine sandy Silt lense (ML)
42-43 " fine-some med Sand (SP)
43-43.5 " fine sandy Silt lense (ML)

Drillers will take casing to 44' below mudline clean out hole and prepare for piezo install

0918 6" Hole cleaned out to 44 ft; Constructing Piezo PZ2-43

Screen Assembly

5.5' + 2.5' + 20' + 20

Sch 40 PVC Screen w/ tail, centralizer Bottom | Steel riser, centralizer Bottom | Steel Riser | Steel Riser, centralizer Bottom

0947 Lowered Screen assembly into position
Screen from 38 to 43 ft below mudline +0.5 ft Tail to 43.5 ft
Adding Sand 10-20 CSS to 36 ft
Should use ~2.25 bags used = 2 bags after Surging

SEC — 12-3-09

Location GASCO, Portland OR Date 12-3-09

Project / Client EPA Oversight of offshore piezo installation

1055 Find 2ft of Sand added from 34 to 36ft

Prepare to mix add Grout - Bent/Organoclay mix 90%/10%

Theoretical Grout Vol 1.3 gallons/ft 2.4 gallons/ft

0-18 (8 inch) 18 x 2.4 = 43 gallons

20-34 (6 inch) 14x1.3 = 18 gallons

Gallons used = Theoretical Gallons 61 gallons total

checking Mud Weight = 10.2 lbs/gallon

photos 3 & 4

SEC 12-3-09

mixed an added 48 gallons

pulling 6-inch casing

mixed another batch of Bent/Orgno Clay mix 90 / 10 %

↳ 20 gallons added

1148 pulling 8-inch casing

measure hole with final 8 inch casing at mudline ~2 ft of hole

SEC 12-3-09

used Bentonite chips (1 bag) to bring seal to mudline

1204 PZ2-43 completed

1210-1330 Break for lunch offsite, wait for tide to raise barge off bottom

1330 Return to job Trailer continue to wait for tide to lift barge off mud bottom

SEC — " — 12-3-09

Location GASCO, Portland OR Date 12-3-09

Project / Client EPA Oversight of offshore Piezo Installations

1330-1500 Walk down to barge - Drillers Cleaning up work area on barge Staging Drums/containers for removal, wait for barge to refloat

1500 move barge back contain oil residue stirred up from ~~bottom~~ spud removal from Sediments; Containment w/ absorbent pads

1520-1600 Add Steel riser to PZ2-77 & PZ2-43 to get ~~wells~~ to Catwalk/Pier access

EC 12-3-09

photo 5 & 6

1600-1640 Disembark from barge walk to Job Trailer, discuss scope for tomorrow - Drill/Complete PZ4-10 before barge arrives

Anchor has decided to scratch PZ3-10 due to obstruction issues.

Barge moving off PZ2 cluster location

Photos 7 & 8

1645 SEC escorted offsite

SEC — " — 12-3-09

Location GASCO, Portland OR Date 12-4-09

Project / Client EPA Oversight of offshore Piezo Installation

0600 Arrive on Site @ Guard Station

0615 Escorted by Anchor Tim S. to Job Trailer

0630 Drilling Crew on site / Anchor Geologist & support Matt W & Doug Laffoone

0630-0700 Conduct H&S Safety meeting

0700-0800 Olympic Tug & Barge moving barge off ~~the~~ the pier face SEC 12-3-09

So Drilling Barge can be moved into PZ4-10 position

0800-0900 move Drilling barge moor pool over PZ4-10 location

0900-0920 Set up Drill rig equipment

Calibrate PID — 100/100 Isobutyl

10/10 HCN

0920 Begin Drilling PZ4-10 w/ 6inch casing

0933 Too shallow for 3 inch Collect 0-5 core sample / full recovery

Drk Gray Green sandy Silt (ML)

w/ a couple 1-inch layers of Black petroleum stained intervals [photos 1 & 2]

one stained layer @ 1.5 ft 2.5-5 0-2.5

one " " @ 5 ft

0957 Collect 5-12 core sample / full recovery 3 core bags

5-7 SAA with milky globs of oily product from 5-6 ft ML

7-8 SAA fine sand increasing ML

~~8-9 Drk Gray-brown fine Sand w/silt SP-SM~~

SEC CDM

Location GASCO, Portland OR Date 12-4-09

Project / Client EPA Oversight of offshore Piezo Installation

9-12 Return to Drk Gray-brown fine sandy Silt (ML) no product evidence [photos 3 & 4]

lith looks similar to PZ4-40

Weather: Cloudy; Light Breeze, Cool low to mid 30s

1000 Drilling Complete; Clean out hole and prepare for piezo completion

1040 Hole was cleaned out to 16.5 ft due to base casing which sunk and during cleanout removed additional Sediment (vacuum created) when raising the drilling tools out

Driller will add 3/8" Bent Chips (1/2 bag) for Backfill to 16.5 → 13 ft below mudline; then ~~add~~ 1 ft of Sand (20-40 CSS) (1/4 bag) to 12 ft before / setting piezo SEC 12-4-09

1100 Construct Piezo SEC 12-4-09

Screen assembly Details

5.5 ft	+ 20 ft	+ 2.5 ft
Sch 40 PVC Screen & Tail centralizer on Bottom	Steel Riser centralizer on Bottom	Steel Riser

1112 Piezo landed @ 12 ft below mudline

Adding Filter pack CSS 10-20 Sand

SEC 12-4-09

Location GASCO, Portland, OR Date 12-4-09

Project / Client EPA Oversight of offshore Piezo Installation

1148 Filter Pack added to 5 ft bgs
Manually Surge Pack

1212 Pack Surged Total Sand added 2 bags to 3 ft below mudline
Add Bentonite Chips to mudline, 1 bag of 3/8" Holeplug chips
1220 Pull remaining 6" Casing
1225 PZ4-10 completed
Add 25 ft to Stickup & bring Risers for both PZ-4 piezos to catwalk
1300-1455 Move off PZ4 cluster move to PZ3 location, wait for printed pipe to arrive from Cascade's shop
1455-1530 Pipe arrives from cascade; ~~[illegible]~~ SEC 12-4-09
SEC 12-4-09 ~~[illegible]~~ Add reflective tape to riser/Stickup above water
1530-1830 mob Barge back to beach/ramp area & Demob equipment; Drillers will finish demob on Saturday

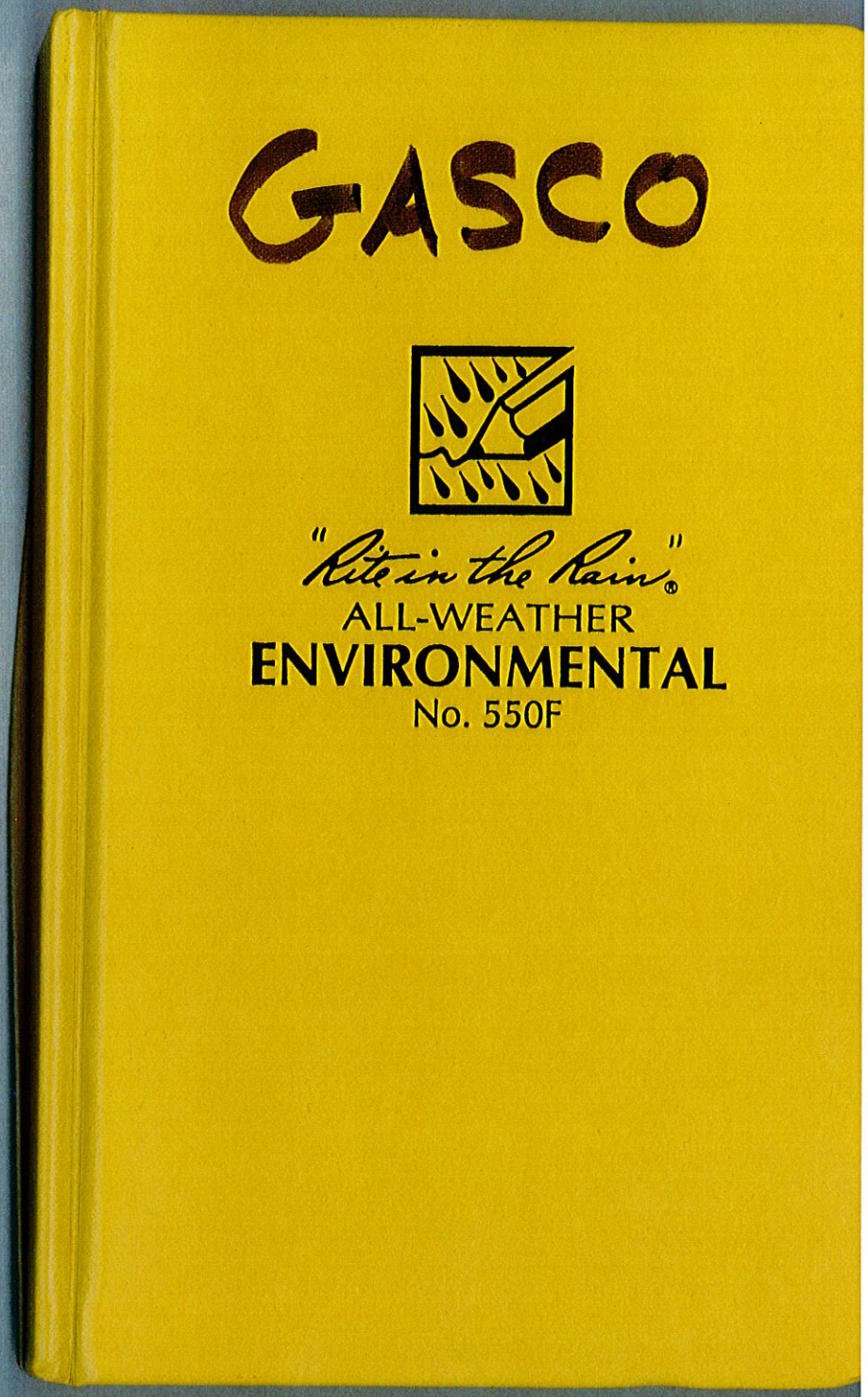
1630 SEC escorted offsite

SEC 12-4-09

Location Date

Project / Client

55021
1-932-19-50-0


GASCO
"Rite in the Rain"®
ALL-WEATHER
ENVIRONMENTAL
No. 550F

"Rite in the Rain"®
ALL-WEATHER WRITING PAPER

ALL-WEATHER
ENVIRONMENTAL FIELD BOOK

Name CDM

Address 319 SW Washington St #900

Phone (503) 205-7403 office
(323) 633-1920 Jennifer Jones cell

Project Gasco
Portland Harbor
Portland, OR

This book is printed on "Rite in the Rain" All-Weather Writing Paper - A unique paper created to shed water and enhance the written image. It is widely used throughout the world for recording critical field data in all kinds of weather. For best results, use a pencil or an all-weather pen.

Specifications for this book:

Page Pattern		Cover Options	
Left Page	Right Page	Polydura Cover	Fabrikoid Cover
Columnar	1/4" Grid	Item No. 550	Item No. 550F

© 1998 J. L. DARLING CORP.

CONTENTS

PAGE	REFERENCE	DATE
1-2	Table of Contents	—
3-7	Health & Safety Meet + Oversight	1/25/10
8-11	Oversight of MW-22 Installation	1/26/10
12-15	Oversight of MW-22 Installation	1/27/10
16-18	Oversight of MW-24 Installation	1/28/10
19-24	Oversight of MW-24 Installation	1/29/10
25-29	Oversight of MW-24 Installation	2/1/10
30-32	Oversight of MW-24 (Shallow) Installation	2/2/10
33-36	Oversight of MW-23 Installation	2/3/10
37-40	Oversight of MW-23 Installation	2/4/10
41-46	Oversight of MW-23 Installation	2/5/10
47-52	Oversight of PW-8 Installation	2/8/10
53-55	Oversight of PW-8 Installation	2/9/10
56-58	Oversight of PW-8 Installation	2/10/10
59-62	Oversight of PW-8 Installation	2/11/10
63-65	Oversight of OW-8 Installation	2/12/10
66-68	Oversight of MW-23 (74) Installation	2/15/10
69-71	Oversight of PW-7 Installation	2/17/10

Reference Page Index

147 Error codes, Hazardous classifications, Container types
148 Sampling guidelines (Liquids)
149 Sampling guidelines (Solids)
150 Approximate Volume of Water in Casing or Hole, Ground Water Monitoring Well
151 PVC Pipe casing tables
152 Soil Classification
153 Soil Classification
154 Conversions (Length, Weight, Volume, Temp, etc...)
155 Conversions (Concentrations, Volume/Flow or Time, Velocity, Acceleration)
156 Maximum Concentration of Contaminants for the Toxicity Characteristic

CONTENTS

PAGE	REFERENCE	DATE
72	Oversight of PW-7 Installation	2/19/10
73-76	Oversight of PW-7 Installation	2/22/10
77-80	Oversight of PW-9 Installation	2/24/10
81-83	Oversight of PW-9 Installation	3/1/10
84-87	Oversight of PW-7 Development	3/2/10
88-93	Oversight of PW-9 Development	3/4/10
94-97	Oversight of OW-9 Installation	3/8/10
98-100	Site Visit - Transducers	3/18/10
101-105	Oversight of PW-7 Pump Installation	3/23/10
106-108	Site Visit - Transducer data check	3/30/10
109-113	Oversight of 1st Short-Term Pump Test	4/19/10
114-116	Oversight of 3rd Short-term Pump Test	4/21/10
117-121	Oversight of End of 1st long-term Pump Test	4/30/10
122-125	Oversight of End of 2nd Long term Pump test	5/7/10
126-137	Oversight of PW-8-37 Pumping Well Installation	7/1/10
138-142	Oversight of PW-8-37 Pumping Well Installation	7/2/10

Location Gasco - Portland Date 1/25/10

Project / Client Oversight of Groundwater Well Installation

1225 Arrive at Gasco site. Guard at gate called John Renda who met us at gate to escort to trailer. At site trailer for Health + Safety meeting.
Weather ~48°F, partly cloudy.
Present at H&S meet:
Darrel Metzger - Cascade Drilling - Manager
Rick - Cascade Drilling - Helper
John Renda - Anchor - Site Sup
Matt Wilson - Anchor - geologist
Tim Stine - Anchor - Site H&S.
Mark - Cascade - escort + help
Jeff - Cascade helper
Doug Laffoon - Anchor, Geologist
Jason - Cascade - running rig
1240 Health + Safety Briefing.
TWIC escort duty - I will potentially need an escort even with TWIC card. Mark with Cascade will be escort.
Site has active NW Natural operations + fueling. Be careful + aware of heavy equipment.
[signature] 1/25/10

Location Gasco - Portland Date 1/25/10

Project / Client H & S Meeting and Oversight of Groundwater Well Installation

1240 H&S Meet, con't.
PPE required: Level D
Safety glasses, hard hat, orange vest.
Tasks to start - drilling monitoring wells. Development will go on as rig moves on to other drilling. For extraction wells, Cascade will use other rig to develop wells. This week - 3 MW and then go to PW-9. May be a shortage of materials but will progress as waiting for materials to arrive, if necessary.
H + S: Air monitoring will be conducted according to H&S Plan.
1245 Signed H&S Plan. Exclusion, CRZ + Support Zones will be established - may vary at boreholes according to space. Will use rigid barricades + red tape to establish Exclusion Zone. AED will be kept in trailer. Cold can affect operation. Trailer to near work area.

[illegible] 1/25/10

Location Gasco - Portland Date 1/25/10

Project / Client H&S Meeting and Oversight of Groundwater Well Installation

1250 John Renda explains typical drilling procedure: continuous coring. PID with bagging, black light. Logging to determine lithology. After filter pack, surging.
*Three foot minimal seal for OR (of bentonite seal chips); 2 feet of sand still.
Everyone has stop work authority, if any unsafe practices observed.
Chemicals of concern: NAPL, petroleum hydrocarbons, PAHs, SVOCs, benzene, cyanide (not measured as Hydrogen cyanide, which is the most dangerous). Will use meter to monitor for VOC + HCN. Action level is 4 ppm for HCN in breathing zone and > 40 VOCs in breathing zone = stop work. Fan can be used to ventilate breathing zone.
No site warning or emergency system known. Evacuation to guard gate if emergency occurs.
In case of spill - drill rig on visqueen.

[illegible] 1/25/10

Location Gasco-Portland Date 1/25/10

Project / Client H&S Meeting and Oversight of Groundwater Well Installation

1310 Cascade drill rig will be on visqueen and any spill would be cleaned up immediately. Spill kits would be used. If leak reaches water, would need to be reported. NRC is close by to respond with booms, etc. if necessary. IDW drums will be placed in containment area near trailer. IDW water will be drummed, but then treated on-site in pond.

1320 Jason - lead driller - with Cascade. Driller's checklist - safety first, no short cuts. Always do things the proper way. Temperatures not expected to be below freezing but dress appropriately with rain gear. Vehicle safety - use spotters to maneuver around. No smoking on site. Only with designated smoking areas. PPE for drillers - heavy protection required. Secondary containment under rig & spill kit has absorbent material. First Aid kit in ~~of near exclusion~~ support zone.

1/25/10

1/25/10

Location Gasco-Portland Date 1/25/10

Project / Client H&S Meet and Oversight of Groundwater Well Installation

1325 Hot Work permit needed for some activities that could create sparks - grinding, cutting, etc. None of these activities should be necessary. Cutting of final casing and welding of flange will be done off-site.

1328 End H&S Briefing.

1520 Drillers arrive with drill rig and begin to set up at location of MW-22. Drillers need space to position support truck next to drilling so they are discussing how to position the equipment to get at correct location on stable ground.

1525 Took photo #1 of MW-22 location.

1530 Took photo #2 showing drillers laying out visqueen plastic sheeting.

1545 Drillers established exclusion zone with red tape + rigid barricades.

1630 Left site for office. Drilling will begin at MW-22 tomorrow morning.

1/25/10

Location Gasco-Portland Date 1/26/10

Project / Client Oversight of Well Installation

1400 Arrived at Gasco site. Guard called for escort, Doug Laffoon, who escorted me to location of work, MW-22. Weather ~52°F, partly cloudy. Met John Renda, Anchor, who described problems encountered today. Hydraulic hose leaked twice, causing nearly 4 hour delay in work. At the time of my arrival, drillers were just at ~20 feet below ground surface at MW-22.

Paul Opem, CDM IH (Health & Safety) on-site. We discussed various H&S issues, including the fact that drillers are not wearing tyvek. Paul considers this acceptable as they are only handling drilling equipment with their hands and not getting material on their clothing. Drillers are wearing one set of chemical gloves, but Paul has some question if that is adequate protection. HASP says they will wear nitrile inner glove and chemical resistant outer glove.

[signature] 1/26/10

Location Gasco-Portland Date 1/26/10

Project / Client Oversight of Well Installation

1420 Paul also discussed/requested of Anchor that the AED be brought out to the drill site, not kept in trailer as this would be too far a distance in case AED is needed - would take ~5 min. to run to trailer to retrieve. Anchor stated AED does not operate well if it gets cold, but will try to figure out a way to bring to drilling.

1422 Anchor John Renda stated drillers got out of fill material at 22'. Now into silty sand layer. Anchor Matt Wilson and Doug Laffoon logging ~~sample~~ cores. [signature] 1/26/10

1425 Took photo #1 showing drillers working at MW-22. Took photo #2 showing Anchor crew at sample processing/logging table. Took photo #3 showing driller preparing plastic sleeve for next core of sediment.

1430 According to Paul Opem, who was present this morning, hydraulic leaks occurred on plastic and were cleaned up appropriately.

[signature] 1/26/10

Location Gasco - Portland Date 1/26/10

Project / Client Oversight of Well Installation

1439 Took photo #4 showing Anchor crew disposing of soil cuttings in IDW drum.

1444 Took photo #5 showing Anchor crew using PID monitor in driller's breathing zone. Took photo #6 showing drillers collecting sample in plastic bag. Sample is very liquidy - have encountered product perhaps. Took photo #7 showing Anchor crew using PID meter on sample. Matt Wilson, Anchor geologist, determined the last sample was slough (not a good sample) as it contained gravel, etc. No free product, just excess water. Drillers will collect sample again.

1454 Discussion with Matt Wilson. Native material encountered at 23'. Lamp black has been observed throughout fill material.

1505 Drillers having trouble recovery next sample. May be a problem with flapper bit.

1506 Discussed need for tyvek with Paul Opem. Took photo #8 showing driller getting material on his clothing

1/26/10

Location Gasco - Portland Date 1/26/10

Project / Client Oversight of Well Installation

1507 Paul agrees Tyveks are appropriate.

1510 Drillers unable to recover 32-40' sample core. Just fell out of core.

1512 Drillers will attempt 5 foot sample now. May need to get a flapper bit (don't have one here) to recover. Material is so soft, can't pull it up.

1520 Anchor is conveying to drillers the need to wear tyvek or rain gear.

1535 No recovery again so stopping drilling. Will get flapper bit for tomorrow.

1545 Escorted off site

1/26/10

Location Gasco - Portland Date 1/27/10

Project / Client Oversight of Monitoring well MW-22 Installation

1025 Arrived at Gasco site. 45° F, partly cloudy. Drillers collecting sample at MW-22, 75-80 feet below ground surface. Matt Wilson, Anchor geologist, stated they reached the medium-grained sand layer at 69' bgs. This is the layer they want for screening the well. Went to 80' to get 10' of this material to be sure they are in it. Doug Laffoon, Anchor, has been taking PID readings of samples - highest was 1.2 ppm.

1030 Took photo #1 showing drillers wearing tyvek, to the left is the Anchor crew waiting for next sample.

1050 Paul Upton, CDM HES, stated Anchor brought AED to work area. It is stored in Anchor's van.

1055 Return water is being released from hole onto visqueen. John Renda and Matt Wilson discussing with drillers the need to contain this water because it is a fair amount and will start running off plastic soon.

Jerry Jones 1/27/10

Location Gasco - Portland Date 1/27/10

Project / Client Oversight of Monitoring well MW-22 Installation

1110 Took photo #2 of driller bringing 75-80' sample to processing table, in plastic bag. ~~Took photos 3 of Anchor crew bagging sample for PID reading~~. Material is medium sand, which is what they are looking for to complete the well. Took photo #3 of sandy material.

1125 Took photo #4 showing Anchor crew taking PID readings of sample.

1126 John Renda stated drillers do not have 1' sump materials - need screws to hold sump and don't have them. So drillers are going to get screws so well can be constructed. Will break for lunch also. Also drillers will get something to hold the return water instead of letting it release to buckets and spill to plastic.

1130 Departed site.

1245 Returned to site. Drillers have not yet returned.

1300 Drillers return and begin to prepare for well construction.

Jerry Jones 1/27/10

Location Gasco - Portland Date 1/27/10

Project / Client Oversight of monitoring well MW-22 Installation.

1310 Took photo #~~6~~ 5 JJ 1/27/10 showing driller using decontamination fluid at entry to work area/exclusion zone.

1315 Drillers assembling well construction materials. Took photo #~~7~~ 6 JJ 1/27/10 of slotted PVC screen sitting on sampling table. Took photo #~~8~~ 7 JJ 1/27/10 showing close-up view of slotted well screen.

1339 Drillers beginning well construction. Before they can construct well, they will clean out bottom of hole, as 2-3 feet of soil has fallen to bottom.

10 1345 Drillers installed tub under (around) borehole to catch ~~over~~ return water. Took photo #~~9~~ 8 JJ 1/27/10 showing tub. JJ 1/27/10

10 1400 took photos #~~10~~ 9 JJ 1/27/10 and #~~11~~ 10 JJ 1/27/10 of drillers assembling PVC casings and screen to put into hole. Photo #~~12~~ 11 JJ 1/27/10 shows driller

10 installing centralizer at top of screen. A centralizer was also placed at bottom of screen to keep screen in center of hole. Additional centralizers are installed every ~25 feet throughout well construction. Casing + screen = 2" PVC.

Jennifer Jones 1/27/10

Location Gasco - Portland Date 1/27/10

Project / Client Oversight of MW-22 Installation

1410 Drillers have been wearing tyvek and nitrile gloves all day. Proper PPE.

1411 Took photo #~~13~~ 12 JJ 1/27/10 of drillers pouring sand into outside of PVC casing. This is the sand filter pack. Using 10-20 gradation filter pack. Photo #~~14~~ 13 JJ 1/27/10 shows a closer view of driller pouring sand in. Drillers are pulling up casing as they go. Took photo #~~15~~ 14 JJ 1/27/10 showing this.

JJ 1/27/10

1453 ~~1553~~ Drillers surging well. While lead driller is surging well, other drillers are loading casing and drill rods onto support truck to transport to decon area, which is an on-site treatment pond, where water is put through water treatment system.

1500 Driller completed surging and measured sand pack again. Sand pack did not move, so will proceed with sealing up well.

1515 Departed site. Plan for tomorrow is to move on to MW-24 once decon and cleanup complete at MW-22.

Jennifer Jones 1/27/10

Location Gasco-Portland Date 1/28/10

Project / Client Oversight of Monitoring Well MW-24 Installation

1350 Arrived at the Gasco site. Temp ~ 53°F, mostly cloudy. Matt Wilson, Anchor geologist, explained that drillers had just completed grouting up MW-22. Drillers moved rig and support truck to location of MW-24. Took photo #1 showing Anchor geologist Matt Wilson discussing access and space issues around MW-24 with drillers. MW-24 is next to a road and next to an active dock/catwalk. Drillers will lay out plastic sheeting, position rig and truck, and set up decon station. They have not yet decontaminated drill rods + casing from work at MW-22.

1425 Took Photo #2 of drill rig on visqueen, driller lowering platform, leveling rig.

1430 Matt states Steve with Cascade came to site this morning to advise on grouting.

Gerald Dunn 1/28/10

Location Gasco-Portland Date 1/28/10

Project / Client Oversight of MW-24 Installation

1430 Drillers were having trouble grouting MW-22 as they were inexperienced using this type of grout required here, which is less dense but more viscous than Portland Cement. Steve was able to get the formulation right so that ~~grout~~ pump was able to work to grout up the hole. GD 1/28/10

1450 Went with Matt Wilson and Tim Stone to view the water treatment "pond". This is a lined above-ground enclosure used to store water from decon of equipment temporarily and then put into water treatment system. Took photo #3 showing the pond. Cascade will use a trailer with built in tank to decon, then water will be dumped into pond. Took photo #4 of trailer, not yet set up for decon.

1520 Drillers setting up decon station. Took photos #5 + 6.

1545 Drillers having trouble with crane, which they need to move the drill equip. to decon it.

Gerald Dunn 1/28/10.

Location Gasco - Portland Date 1/28/10

Project / Client Oversight of MW-24 Installation

1602 Drillers mechanic able to fix crane. Drillers loaded drill equipment and transporting it to decon station. Took photo #7 of completed MW-22 after cleanup.

1620 Begin decon. Water is captured in trailer tank, then put into drums or transported directly to pond.

1630 Drillers using crane to offload IDW drums to storage area. Took photo #8 showing this.

1635 Drillers using crane to offload drill rods and casings for decon on trailer. Took photo #9 of driller using power washer on drill equipment.

Photo #10 shows drill casing being offloaded onto decon trailer. Photo #11 shows driller using power washer on drill casings.

1645 Took photo #12 of onsite water treatment system.

1654 Departed site.

1/28/10

Location Gasco - Portland Date 1/29/10

Project / Client Oversight of Monitoring Well MW-24 Installation

1315 Arrived at Gasco Site. Temperature ~52°F, mostly cloudy

1325 Drilling being conducted at MW-24. NAPL found in boring and very liquidy material is causing recovery to be very low. Discussion with Matt Wilson, Anchor geologist, will use his log to describe lithology. Drillers preparing to decontaminate equipment used to encounter NAPL before drilling further.

1330 Achor boring log data:

0-6': Dark brown wet silty gravel. (FILL)

6-14.1': Dark brown moist silty gravel (FILL)

14.1-25.0: mixed dark gray and black dry silty sandy gravel.

@ 18.2 - color change to black, wet oily strong HC odor, sheen at 19-20 feet - spotty sheen.

20-21: Silty sandy gravel

@ 21': heavy sheen, oily, strong HC odor

@ 22.2-22.4: tar

@ 23.0 - lampblack + charcoal-like material.

@ 24' - wood chips

24.2-24.6 gravelly sand heavily saturated w/oil

1/29/10

Location Gasco-Portland Date 1/29/10

Project / Client Oversight of MW-24 Installation

1340 From Matt Wilson's boring log, con't:
24.6-25: dark olive gray silt with gravel, heavy sheen (fill).
25-25.8: sandy silt, spotty sheen with HC odor
@ 25.8: increased sand content
@ 29.4 - sand layer, heavy sheen, trace oil
30-40 No recovery
40': Dark brown, loose, wet poorly graded fine sand, trace gravel, no sheen, slight HC odor.
40-45 No recovery
45-46 Dark brownish gray loose wet SAND w/silt. No sheen, slight HC odor.
Casing installed to 47 feet. This is past NAPL zone. Equipment decontaminated before drilling deeper. Casing is 8". One bag of bentonite chips placed in hole ~~around~~ inside 8" casing to keep any NAPL from going deeper. 6" casing will be used to drill through bentonite seal.
1/29/10

Location Gasco-Portland Date 1/29/10

Project / Client Oversight of MW-24 Installation

1400 From Matt Wilson's boring log:
drill rig is ROTOSONIC Speedstar 15K.
1400 Took photo #1 showing driller pouring liquid material (NAPL, etc) from buckets into IDW drum.
Took photo #2 of set-up at MW-24.
Drillers took lunch @ 1345 (photos taken @ 1330).
1410 Matt Wilson stated were using 6" casing in the beginning of the drilling at MW-24. When encountered NAPL, used 8" casing - drove to 47'. This helps to contain NAPL and then can use bentonite to "seal" this and use smaller 6" casing for deeper drilling. Went to 47" to get material to confirm out of NAPL zone, but NAPL likely ended @ 30'. So NAPL zone was from 18.2 - ~~25~~ 30'. 1/29/10
1415 From Matt Wilson's log: PID readings mainly <1.0 (1.1 @ 15') until ~~18~~ 18-20': 14.1 ppm. 1/29/10
20-22': 10.9 ppm; 22-25: 16.1 ppm; ~~26~~ 25-28': 27.6 ppm; 1/29/10
28-30': 4.2 ppm.
1/29/10

Location Gasco - Portland Date 1/29/10

Project / Client Oversight of MW-24 Installation

1440 Drillers returned from lunch and are preparing to resume drilling. Took photo #3 showing liquid with sheen visible in flow drum.

1500 Drillers ~~using~~ installing 6" casing inside 8". Took photo #4 showing this.

1501 Took photo #5 showing Doug, Anchor crew member, taking PID reading in drillers' breathing zone. No elevated PID readings today so far in breathing zone.

1510 Drilled pushed 6" casing 1 ft deeper than 8", to 48'. Now will switch to core barrel sampler for drilling. Took photo #6 of sealed core barrel sampler. Took photo #7 of driller connecting flapper bit to end of sampler.

1530 As sample was being pulled up drill rods are full of water and started spraying water out a vent hole between 2 10' rods. Water sprayed onto drillers. Drillers trying to catch it in buckets. Took photos #8-12.

[illegible] 1/29/10

Location Gasco - Portland Date 1/29/10

Project / Client Oversight of MW-24 Installation

1531 Photo 8 shows driller excavating material caught in drill rod. Photos 9-12 show water pouring from vent hole.

1535 Took photo #13 of drillers putting plastic sampling bag on end of core sample. Photo #14 shows drillers collecting sample in bag.

1545 Lots of slough in 47-50' sample. Photo #15. Only recovered ~1 foot from 49-50'.

1546 Took photo #16 of Anchor crew using PID meter in sampler's breathing zone. Slight HC odor associated with slough material, also spotty sheen noted in slough, not in 49-50' sand. Fine sand, slight HC odor, no sheen from 49-50'.

1550 Drillers put duct tape over vent hole so water doesn't spray out upon collection of next sample. Next sample will be 10' from 50-60'. 47-50' sample was to ~~clear~~ get through bentonite seal ~5' of bentonite and get to round number for next sample, starting at 50'.

[illegible] 1/29/10

Location Gasco-Portland Date 1/29/10

Project / Client Oversight of MW-24 Installation

1600 Drillers advance 6" casing prior to collecting next sample.

1616 Drillers bagging 50-60' sample. Recovery 8.3' out of 10'. Took photo # ~~16~~ 17 of 1/29/10 60 from of sample ~57-60'. Appears to be a fine sand, as above. No sheen evident, may be a slight HC odor or that might be coming from the IDW drums.

1625 Upon further observation, Matt Wilson noted a lot of slough on top of sample ~4' of slough containing bentonite chips and a spotty sheen.

1635 Departed site.

Jeff Jones 1/29/10

Location Gas-Co Portland Date 2/1/10

Project / Client Oversight of Monitoring Well Installation

1300 Arrived at Gasco site. Raining, 44°F.

1310 Discussion with Matt Wilson, Anchor Geologist. One of the three drillers, Mark, is licensed in OK. The lead driller, Jason, and assistant Jeff are not, they are up from CA. Drilling completed to 130.8 feet at MW-24. Sump from 129.8-130.8'. Used a 10' slotted PVC screen and are now adding filter pack. Centralizers at 30, 60, 90, 120 + 130'. Drillers are currently repairing rig. From Matt's boring log:

@ 57.6': grain size change to fine-medium sand. PID's: 49-50': 1.2 ppm; 50-55': 0.2 ppm; 55-60': 0.7 ppm

60-65': sand, as above

@ 65.5-68.6 silt

@ 66.7-67.1 poorly graded fine-grained sand

68.6-70 silty sand, dirty gym sock odor

~~70~~ 71.5-72.3 silty sand

72.0-78.6 sand

78.6-80 silty sand

Ended at 80' on 1/29/10

2/1/10

Location Gasco Portland Date 2/1/10

Project / Client Oversight of MW Installation

1320 Matt Wilson's boring log, con't:

80.3-80.8 silt layer

80-90: medium-grained sand, dirty gym sock odor

90-92.7 sand w/ occasional silt blebs

92.7-94.2 silt layer

100-110 Medium-grained sand, as above

114.8-117 trace silt

117 wood fragments

117.3 occasional silt blebs

120-130 medium grained sand, as above

123.1-124 very wet + soft, soupy sandy silt layer

128.1-129.4 trace silt

End boring at 130'.

HCN detections increased at depth: from 0-1 until 110': 5 ppm HCN 110-113' HCN @ 113-115': 8 ppm; 115-117: 7 ppm; 117-120': 1 ppm. 120-122': 4 ppm; 122-125: 3 ppm 125-127: 2 ppm; 127-130': 1 ppm.

PID readings < 1.0 ppm except: ~~#8~~ 28-30': 4.2 ppm; 29-50': 1.2 ppm; 98-100': 1.2 ppm; 100-103: 13.1 ppm; 103-105: 6.3 ppm; 105-108: 10.4 ppm; 108-110: 1.4 ppm;

Gerry Jones 2/1/10

Location Gasco-Portland Date 2/1/10

Project / Client Oversight of MW Installation

1330 PID readings, con't:

110-113': 3.1 ppm; 113-115': 3.1 ppm; 115-117': 2.6 ppm; 117-120': 1.2 ppm; Rest 1.0 ppm or lower.

1335 Took photo #1 of drillers measuring filter pack with measuring tape.

1340 Driller stated hydraulic piston cap had come off, some hydraulic fluid leaked out but was contained. Cap is now replaced and rig is operating well. Took photo #2 of centralizer used to keep PVC casing in center of hole.

1341 Driller beginning well surging.

1342 Took photo #3 of CRZ as exit exclusion zone with decon + rinse for boots.

1343 Took photo #4 showing driller surging well. Glove is tied onto cable to tell driller when 10 foot surge is done.

1344 Took photo #5 showing table outside CRZ with first aid kit, fire extinguisher.

1346 Driller stopped well surging. 5 min total.

1347 Took photo #6 of surging tool. Took photo #7 of driller pouring filter pack seal into boring.

Gerry Jones 2/1/10

Location Gasco-Portland Date 2/1/10

Project / Client Oversight of MW Installation

1348 Took photo #8 of drillers using decon station upon exiting exclusion zone.

1350 Drillers break for lunch.

1400 Discussion with Matt Wilson, the surging just completed was not for well development, that will occur at a later time (must be at least 24 hours after well construction). The 5 min of surging now helps to get rid of any bridges that would enable fine material to enter screen and would need to be cleaned out later during surging in well development.

1430 Drillers return from lunch.

1450 Drillers carrying grout over and preparing to grout up well.

1456 Took photo #9 + 10 of drillers assembling grout piping + tremie piping. Matt Wilson will measure density of grout to ensure minimum of 9.5 lbs/gallon. Took Photo #11 of grout pipe attached to hose.

1500 Took photo #12 of driller pouring grout into drum to mix with water.

1501 Took photo #13 of scale used to measure density.

Jenifer Jones 2/1/10

Location Gasco-Portland Date 2/1/10

Project / Client Oversight of MW-24 Installation.

1501 Took photo #14 of Matt Wilson putting grout sample into scale + photo #15 of Matt using scale to measure grout density of 9.9 lbs/gal.

1502 Drillers pumping grout into well.

1510 Drillers added 45 gallons of grout. Stopped to take some tremie pipe out to finish adding grout.

1515 Correction: Matt Wilson stated drillers were unable to pump grout - too thick for pump. This is the same problem they had at MW-22.

1530 Drillers added more water. Matt Wilson measured grout density again = 9.5 ok. Drillers will try again to add grout after unclogging tremie pipes.

1535 Departed site.

Jenifer Jones 2/1/10

Location Gasco-Portland Date 2/2/10

Project / Client Oversight of Monitoring Well Installation - 2nd well at MW-24.

1010 Arrived at Gasco site. Mostly sunny, 45°F.

1011 Drillers completing decon from first well at MW-24 and preparing to begin drilling at second (shallow) well. Just completed grouting up deeper well this morning.

1030 Took Photo #1 of new borehole location, which is just north of deeper well at MW-24. Secondary contamination is shown in photo.

1040 Discussion with Matt Wilson, Anchor geologist: changed the target depth of this well from 70-80' to 60-70'. This is because 70-80' was found to be silt in deeper borehole, whereas there was sand from 60-70. Want well screened in fine to medium ~~fine~~ grained sand. Deeper well is screened in medium-grained sand, a different layer than the target for this shallow well - fine to medium grained sand. Driller will first advance casing (8") to 30 feet here, then seal it off. This is to avoid spreading the NAPL that is known to occur.

[signature] 2/2/10

Location Gasco-Portland Date 2/2/10

Project / Client Oversight of MW Installation

1040 Sample will then be collected from 30-40'. Did not get recovery in this zone in deeper well. Before sample from 30-40' is brought up, driller will install 6" casing to 40' so there will not be any open hole to allow NAPL to be transported.

1045 According to Matt Wilson, wells at this location will be approx. 4 feet apart.

1057 Drillers continuing to install 8" casing to 30' and capping out soil cuttings into IDW drum as they go. Took Photo #2 of Matt Wilson applying label to IDW drum.

1105 Matt stated that organoclay was added to bentonite grout in 0-47' zone of deeper well. This is due to presence of NAPL in that zone, which may cause breakdown of bentonite grout alone.

1110 Matt's calculation for grout volume:
47' of 8" casing: 2.375 g/ft = 111.6 gal
115-47 of 6" casing: 1.235 g/ft = 84.2 g total predicted = 195.8 gal. Actual used: 255 gal.

[signature] 2/2/10

Location Gasco - Portland Date 2/2/10

Project / Client Oversight of MW-24 Installation

1115 Drillers completed installation of 8" casing to 30' and are now preparing to collect sample from 30-40'. Took photo #3 of driller vacuuming water and material from plastic sheeting to put into IDW.

1120 Took photo #4 of Matt taking PID reading in driller's breathing zone. Reading = 0.0 ppm (background) for both VOCs and HCN.

1125 Took Photo #5 showing darkly stained material with NAPL being disposed into IDW drum. Matt took PID reading - max 0.2 ppm - not very volatile.

1135 Correction - drillers still installing casing to 30'. They were cleaning out the hole earlier, not sampling yet.

1150 Completed casing installation. Added one bag of bentonite to seal.

1205 Drillers taking lunch. Departed site.

2/2/10

Location Gasco - Portland Date 2/3/10

Project / Client Oversight of Groundwater well Installation

1430 Arrived at the Gasco site. Weather partly cloudy, 47 °F.

1435 Matt Wilson, Anchor Geologist, stated the drillers completed shallow well at MW-24 earlier today. Unlike planned, drillers cannot begin at PW-7 because they need to retool the rig to use the 12" casing for the extraction well drilling. Currently waiting for mini-sonic rig to arrive (was supposed to be here at 1400) to begin at MW-23. This will be a cluster of 3 wells. A different crew that has been working here for the last 7 days installing MW-22 and MW-24; however, this crew that will operate the compact rig is familiar with the site and worked on the piezometer installation.

2/3/10

Location Gasco - Portland Date 2/3/10

Project / Client Oversight of Well Installation

1452 Discussion with Matt Wilson on theoretical vs. actual grout volumes. Matt stated the formation is very soft, so likely the grout is pushing into the formation and filling voids there, accounting for the extra actual volume over what was calculated. Matt is calculating expected volume for filter pack also, and they measure the filter pack's depth after surging to ensure it is of proper length.

1507 Drillers arrive with mini-sonic rig.

1508 From Matt Wilson's notes:

Sand filter pack:

13.4 ft x 1.238 gal/ft x 1 bag/3.75 gal = 4.42 bags

→ Added 6 bags

Grout:

6" (54.8-40) ft x 1.238 gal/ft = 18.32 gal

8" 40 ft x 2.375 gal/ft = 95.0 gal

113.3 gal

Added 165 gallons of grout and had to also add 3 ft of bentonite chips.

[signature] 2/3/10

Location Gasco - Portland Date 2/3/10

Project / Client Oversight of Well Installation

1518 Moving compact rig to MW-23 location.

1520 Took Photo #1 of compact decon trailer.

1522 Took Photo #2 of compact drill rig.

1530 Health + Safety Meeting.

New Cascade Drilling crew is Steve, Jeff, and Caleb. Steve is lead driller and led safety meeting. Items discussed: emergency evacuation route, meet at guard shack. Cascade has its own Site Safety Plan. Safety First, be proactive to prevent problems. Mark Bonman will replace Jeff tomorrow. Slips trips + falls - uneven ground. Be aware of vehicles onsite, especially blue truck drives fast. Minimal overhead hazards but tight access at drilling location. PPE, First Aid, eyewash is on rig. No heat stress issues. Tasks for today - set up drilling station, no drilling today. Have directions to hospital. Everyone has stop work authority. PPE: tyvek, hard hat, glasses, boots.

[signature] 2/3/10

Location Gasco - Portland Date 2/3/10

Project / Client Oversight of MW Installation

1535 Matt: no NAPL expected at MW-23 but in GW (top 20') may encounter lampblack - less toxic.

1540 End H&S Meet.

1545 Took photo #3 of MW-23 location. Will be 3 wells, approx. 5 ft apart, depths of 130', 80', and 30'.

1600 Departed site.

2/3/10

Location Gasco - Portland Date 2/4/10

Project / Client Oversight of MW-23 Installation

0830 Arrived at the Gasco site. Weather Overcast ~46°F.

0840 Drillers working at MW-23 with Compact Sonic rig. First sample just being processed/logged by Matt Wilson. Sample is 0-3 ft. Took photo #1 of Matt Wilson examining sample. Took photo #2 of rig set-up. Took photo #3 showing drillers collecting sample in plastic sleeve. Must hammer on core barrel to get material to come out. Drilling team is Steve (lead), Mark, who worked on previous drilling at MW-24 and MW-22, and Caleb, assistant.

0847 3-7' sample placed on table. Drillers using all 5' casings and sampler with compact rig.

0850 0-3' is silt with cobble.

0855 2.2 to 7 gravelly silt. Concrete pieces at 3.8-4 feet.

0905 7-9' sample - low recovery. Rig hit a rock and material fell out of barrel. Only ~8" of material.

2/4/10

Location Gasco - Portland Date 2/4/10

Project / Client Oversight of MW-23 Installation.

0915 9-14' sample. Appears very wet inside plastic sleeve, and very black, likely from lampblack. Took photos #4 and 5 of material.

0917 Took photo #6 of Anchor crew taking PID measurement in sampler's breathing zone. Reading = 0.0 ppm.

0920 Matt's log: 9-14 silty gravel with cobble. @ 10' wet black sticky concrete + lampblack (fine grained soot like material). ~~2/4/10~~

0935 14-18' sample. Strong ~~HC~~ naphthalene odor. PID reading above sample in breathing zone ~0.1 ppm. Took photo #7 of sample and photo #8 of bagged where headspace PID reading will be measured.

0940 14-18 gravelly silt. Pieces of concrete 0-17 feet. Strong odor of naphthalene + HC.

0951 Took photo #9 of Anchor crew taking PID reading in driller's breathing zone. Reading = 0.0 ppm.

0953 18-21' sample on table.

Gary Dorner 2/4/10

Location Gasco Portland Date 2/4/10

Project / Client Oversight of MW-23 Installation

0955 21-26' sample on table.

0956 John Renda here to replace Matt Wilson as sample logger/geologist. Matt has to leave to attend to sick kid.

1010 Took photo #10 of 23-26' sample. More sandy material here.

1021 26-30' sample on table.

1030 From John Renda's boring log:
21-25 sandy silt with fine gravel.
22.5-24' gravelly silt
24-24.5 Sand
24.5-25' sandy silt
25-26' sand

1035 30-36' sample on table

1040 Took photo #11 of Doug Anchor collecting sample in baggy for PID reading.

1045 Native material begins ~26'.
26-27.5': silty sand, mottled.
Silt unit from ~~26'~~ 27.5 - ~~36'~~ 33' 2/4/10, with sand lenses.
31-31.5 Fine sand
32-36 sand, fine sand, trace organics - roots + decomposed leaves
35': .2' silt lens, same at 34'.

~~1100~~ 2/4/10

Gary Dorner 2/4/10

Location Gasco Portland Date 2/4/10

Project / Client Oversight of MW-23 Installation

1100 36-41' Sample on table. Material looks very similar to that above.

1103 Took photo #12 of MW-23 work area showing exclusion zone. Took photo #13 of tight space of entry - requiring compact rig.

1105 Departed site.

2/4/10

Location Gasco-Portland Date 2/5/10

Project / Client Oversight of MW-23 Installation

1243 Arrived at the Gasco site. Mostly clear ~55°F.

1250 Matt Wilson stated drillers got to 131.5' but since material here was silty backfilled to 124.2 to install screen in sandy material. Used a special kind of coated bentonite chips to backfill. Took photo #1 showing drillers installing PVC casing in well. Photos #2 and 3 show bentonite chips and bucket container with label.

1304 Took photo #4 showing Anchor measuring casing to determine where bottom of screen is. Photo #5 shows Steve, lead driller, measuring to top of filter pack inside metal casing.

1305 Matt wasn't sure where groundwater was encountered here, as John Renda did not note that in the log. He thinks it would occur around 20-25' based on cross section figure.

1310 Driller added water to well. Matt stated this is not necessary but Steve typically does this to help sand settle.

2/5/10

Location Gasco-Portland Date 2/5/10

Project / Client Oversight of MW-23 Installation

1319 Matt Wilson's log:

32-59' sand: fine sand

@ 34' · 0.2' silt lens

@ 35': 0.2' silt lens

@ 36' · 0.3' silt lens

@ 37.5': 0.2' silt lens

@ 38.5-39.5': silt lens

@ 40.5-41' silt lens

@ 42': 0.2' silt lens

@ 46.5-47' silt lens

@ 49.5 0.3' silt lens

@ 50.3-50.8': silt lens.

@ 51': 0.3' silt lens

@ 52: 0.5' silt lens

@ 53-54 silt w/organic laminants

@ 58.5-59' silt lens w/trace organics

59. to 91 sand, medium-grained

91-97' silty sand fine-med sand

96-97': no recovery, driller over-drilled casing.

1325 Took Photo #6 of Matt Wilson taking PID readings of sample headspace.

1326 There were no elevated PID readings in breathing zones, All = 0.0.

Jenifer Jones 2/5/10

Location Gasco-Portland Date 2/5/10

Project / Client Oversight of MW-23 Installation

1330 Took Photo #7 of driller vacuuming liquid from plastic sheeting.

1331 Took Photo #8 of Matt Wilson's Well Construction Notes.

1332 From Matt's log:

97': medium-grained sand

97-123' medium-grained sand

@ 123 - grain size change to fine-grained

123.5-124 silt layer

124.2-124.5 silt layer

125.4-125.5 silt layer

125.7-126.6 silt layer

126.5-126.9 silt layer

@ 129.3 color change, med. grained sand

128.1-128.5 silt layer

130.7-131 sandy silt layer

131.5 total depth

PID readings (greater than 1.0 ppm):

0-3': 1.1 ppm

7-9': 1.8 ppm

12-14': 1.1 ppm

14-16': 10.2 ppm

16-18': 25.9 ppm

18-20': 9.0 ppm

Jenifer Jones 2/5/10

Location Gasco - Portland Date 2/5/10

Project / Client Oversight of MW-23 Installation

1336 PID readings, con't:

21-23': 5.4 ppm
23-26': 4.7
26-27: 3.9
33-36: 1.1
41-43: 1.2
43-46: 1.2
46-47 1.6
47-51 1.3
51-53: 1.0
53-56: 1.3
61-63: 1.5
63-66: 1.8
103-106: 1.4
106-109: 1.4
109-111: 1.1
111-113: 1.4
113-116: 1.5
116-119: 1.8
121-123: 2.8
123-126 1.4
126-129: 2.0
129-131: 1.4

HCN readings >1.0:

26-27: 2
81-83: 3
86-88: 3
88-91: 9
91-93: 8
93-96: 12
111-113: 2
113-116: 7
116-119: 8
121-123: 8
123-126: 2
126-129: 2
129-131: 4

2/5/10

2/5/10

Location Gasco - Portland Date 2/5/10

Project / Client Oversight of MW-23 Installation

1337 Drillers beginning to grout up borehole. Assembling tremie pipes while driller checks depth of sand pack with weighted measuring tape. Steven Z started adding grout get. Driller checks depth each time he pull's up casing in increments.

1350 Drillers adding another bag of sand.

1400 Drillers add another bag of sand.

1410 Discussion with Matt about where groundwater was encountered - first noted at 10' to 14', then again at 21'-22.5'.

1411 Took photo #9 of drillers installing tremie piping.

1415 Matt called John Rendon to discuss observation wells and criteria for screening them in fill. Response from John: don't know yet.

1440 Matt's calculations for sand pack:

12.8' x 1.238 gal/ft x 1 bag/3.75 gal = 4.2 bags

added 5 bags of sand.

Grout calc:

108.7 ft x 1.238 gal/ft = 134.6 gallons

Filter pack seal thickness = 2.7'

2/5/10

Location Gasco - Portland Date 2/5/10

Project / Client Oversight of MW-23 Installation.

1. 1445 Took photo #10 of drillers mixing grout.
Took photo #11 of grouting tool on well casing. Took photo #12 of Matt's well construction sheet, with calcs.
1445 Matt measured grout density
1446 Drillers grouting up well.
1512 Pulling up casing.
1550 All casing removed.
1551 Driller adding grout to top of well. Took photo #13 showing this.
Used 188 gallons of grout total.
1553 Departed site.

[signature] 2/5/10

Location Gasco - Portland Date 2-8-10

Project / Client Oversight of PW-8 Installation

1300 Arrived at Gasco site. Mostly clear, ~46°F. Drillers just returning from lunch. Work at PW-8 progressed to total depth of 70', which is target depth for PW-8. Matt Wilson stated they will now use a technique to expand the hole to 12 inch diameter. Drillers did not know if this rig could drill 12" casing to 70' so used 6" casing and sampled with 4" barrel, as before. Now will use technique adding water to well while using an 8" casing with expanders to expand to final diameter of 12" all way down.
1305 Matt stated will likely continue using this drill rig to complete all wells and then do MW-23 wells with compact rig last - likely not starting with compact rig until next week.
1310 Matt stated well inspector from the state was here earlier but not far enough along to do inspection.

[signature] 2/8/10

Location Gasco- Portland Date 2/8/10

Project / Client Oversight of PW-8 Installation

1320 Took photo #1 of drillers putting tags on MW-24 wellheads.

1340 Drillers still working on wellhead ballards - attaching tags. Also will weld to modify a steel tub for expanding borehole - used to contain cuttings and drilling mud - recirculated water.

1345 Walked down to location of PW-8, at end of roadway that begins at MW-24. Took photos #2 and #3 of setup at PW-8 showing exclusion zone, etc.

1348 From Matt Wilson's boring log at PW-8:

0-2.5': moist gravel with silt (fill)

2.5-7': gravel with silt, dry (fill)

@5': brick + concrete rubble

7-10.5': mottled sticky moist well-graded gravel with silt (fill)

10.5-12': moist to wet silty sand, fine-med sand, trace brick pieces (fill)

12-13' wet firm sandy silt with fine sand.

13-14': very loose, wet sand with silt, medium-grained.

Jenna Jones 2/8/10

Location Gasco - Portland Date 2/8/10

Project / Client Oversight of PW-8 Installation

1348 Matt's log, con't:

14-20' very loose, wet sand, fine-med grained. Slight HC odor

15.8-16.3': silt layer

@ 15': moderate HC odor, trace oil, sheen present, smells like oil, not DNAPL

20-27.5' very soft wet sandy silt, fine sand, no sheen.

@ 26-27.5' increasing sand content with depth

27.5-30' loose wet fine-med grained sand with silt, no sheen

30-46.0': very loose very wet fine-med grained poorly graded sand, no sheen

35.1-35.6': sheen, moderate HC odor silt layers to 39'

40-46': moderate HC odor, no sheen, sand as above

46-46.9 silt with organic debris

46.9-55 very loose wet med-grained sand with silt layers to 60'

60-70 med-grained sand, as above.

1350 Matt: native starts ~12'. Groundwater encountered 10.5-12' here.

Jenna Jones 2/8/10

Location Gasco - Portland Date 2/8/10

Project / Client Oversight of PW-8 Installation.

1400 Took photo #4 showing bit that will be used to expand borehole to 12". Goes down with 6" casing but flares to 12". Took photo #5 of other equipment, tub to be used during expansion drilling.

1408 Matt doing PID readings of samples. Matt is only Anchor personnel present right now. All breathing zone readings 0.0 ppm so far today.

1413 Took photo #6 showing driller using bentonite and water to create seal around top of 6" casing. Took photo #7 showing drillers adding more bentonite and preparing to put tub around casing. Took photo #8 showing tub added and adding more bentonite.

1430 Sample PID readings > 1.0 ppm:
13-15': 2.0 ppm
15-20': 5.9 ppm
HCN readings > 1.0 ppm:
60-62': 2 ppm ; 62-65': 3 ppm
All others 1.0 ppm or lower.

[signature] 2/8/10

Location Gasco - Portland Date 2/8/10

Project / Client Oversight of PW-8 Installation

1445 Photo #9 of drillers putting 12" drill bit onto 8" casing.

1450 Drillers beginning to drill with 12" drill bit. Matt stated they would normally be using a ~~some kind of~~ shaker sieve to capture fines, but don't have one today, so trying it without that. Seems to be working fine so far. Matt stated he called John Kenda and John is calling John Edwards to discuss this method. No material is being pulled out of borehole - unlike if drilling mud with a shaker were being used to recirculate mud/water and remove cuttings. John Kenda wasn't sure he wanted to use mud, as it can reduce yield by plugging up fine voids. Rig may not have enough power to push 12" casing all way down, according to Matt, which is why this is necessary.

1506 Driller stated to Matt, up on Matt's asking, he will add water to circulate, but not recirculate. So cuttings will come up and be shovelled out of tub. Even when they set 8" casing.

[signature] 2/8/10

Location Gasco - Portland Date 2/8/10

Project / Client Oversight of PW-8 Installation

1510 Water should be dense enough to push up sand and other soil cuttings without using mud.

1511 Took Photo #10 of driller adding water as he drills with 12" bit. Took Photo #11 showing tub filling up with water and material from ~~well~~ bore. SS 2/8/10

1516 Driller assembling sump pump to put into trough and pump out water. Will continue this tomorrow, using shaker. Hope to complete drilling tomorrow (expanding well to 12", rather) and may begin well construction tomorrow.

1533 Left site.

Scott Jones 2-8-10

Location Gasco - Portland Date 2/9/10

Project / Client Oversight of PW-8 Installation

1420 SS 2/9/10

~~1430~~ Arrived at Gasco site. Weather mostly clear, 50°F.

1430 Drillers installing 12" casing in PW-8. Have installed to ~40' so far. Delays earlier in the day due to discussion regarding what depth the well should be. In the end, decided to leave it at 70'. Took photo #1 showing drillers preparing to add another length of 12" casing onto drill rig. Matt stated in the end drillers did not use a shaker after all to overdrill borehole to 12". Debate about depth of well was since pump goes on top of screen, would there be enough water above it to create enough head during dry times of year. Based on calculations, they determined at the driest there would still be ~20' of water above the pump with total well depth of 70', so this would be sufficient. Sequence of overdrilling: 12" bit to 70', then remove 6" casing + 8" casing (w/bit), now installing 12" casing.

Scott Jones 2/9/10

Location Gasco-Portland Date 2/9/10

Project / Client Oversight of PW-8 Installation

1445 After install 12" casing to 70', will have to clean out borehole. Took photo #2 of driller using measuring tape to gauge depth of casing. Took photo #3 of tank holding water from overdrilling. Will be disposed into on-site treatment system, after holding in temporary "pond". Took photo #4 of drillers working with 12" casing. Very large heavy and cumbersome - takes 3 drillers to handle 12" casing lengths.

1524 Drillers continue to install 12" casing. I stated to Matt that Scott Coffey and Lance Peterson would like to know the amount of material pulled from borehole to ensure not too much or too little.

1551 Still installing 12" casing. They are @ 65'. Matt stated he was concerned about this method also because there should be 300 gallons of material between the 6" and 12" annular space, and so far only a couple of shovelfulls have been removed.

[signature] 2/9/10

Location Gasco-Portland Date 2/9/10

Project / Client Oversight of PW-8 Installation

1552 Matt's concern is that since very little material has come out, it is being forced into the formation, and this could compact the material where well is screened, reducing yield. He stated when they clean out well after installing 12" casing, they can determine how much material comes out. Used 2 x 55 gallon drums for the 6" drilling/installation.

1605 Total material removed from borehole should be 411 gallons: 6": actual 110 gallons removed. 19' of material in 12" casing after installation x 5.874 gal/ft = 107 gallons ≈ 220 gallons actual removed. Note: this calculation is correct, not the 300 gallons on previous page.

1620 Shaker arrived. This is a large piece of equipment on its own trailer. It has a series of sieves to separate material from recirculating water. Took photos # 5 + 6. Will assemble and prepare for cleaning out 12" casing tomorrow morning. Departed site at 1635.

[signature] 2/9/10

Location Gasco-Portland Date 2/10/10

Project / Client Oversight of PW-8 Installation

0800 Arrived at Gasco site. Overcast, 41°F.

0810 Drillers setting up shaker with hose connections to drill rig, etc. Drillers having difficulty separating a large piece of piping needed for the shaker.

0902 Drillers completed assembly shaker equipment and are adding drill rods to rig to begin cleaning out borehole. Took photo #1 of assembly and exclusion zone area. Took photo #2 of bit on end of rods.

0905 ~~Al~~ N_2 2/10/10 another staff present in work area at the moment.

0907 Took photo #3 showing closer view of bit – from side.

0914 Matt returned to work area.

0915 Drillers adding bentonite to reseal contact between outside of top of 12" casing and hole to catch water during clean-out.

0915 Beginning to ream.

0916 Took photo #4 of pump [illegible]

Sandra Jones 2/10/10

Location Gasco-Portland Date 2/10/10

Project / Client Oversight of PW-8 Installation

0920 Took photos #5 + 6 of shaker separating out soil that falls into drums

1010 A heavy sheen was noted on circulated water returns. A strong hydrocarbon odor also noted for a bit. Matt stated this is more sheen than he would expect given that he only saw a slight sheen during sampling in 2 places in the borehole. Took photo #7 of water at top of casing during recirculation. Sheen not easily visible.

1020 HC odor not apparent now.

1030 Took photo #8 of Matt's calculations of sand + grout.

1039 Not much soil cuttings have been removed from the borehole (12" casing) so far. Only a small amount has been generated from the shaker into the drums. Photo #9.

1041 Matt's calcs on sand for filter pack:

24 ft × 5.645 gal/ft × bag/3.75 gal = 36 bags

grout:

46 ft × 5.645 gal/ft = 259.7 gal / 52 = 5.2 drums.

Sandra Jones 2/10/10

Location Gasco - Portland Date 2/10/10

Project / Client Oversight of PW & Installation

1050 Drillers continuing to circulate bit very slowly inside casing, allowing water to slowly fall over top. Trying to get larger (coarser) material out of casing.

1055 Matt Wilson stated they will not likely complete construction of this well today, given the slow rate that cleanout is progressing. He thinks they may be able to install the screen and filter pack.

1100 Left site.

Jennifer Jones 2/10/10

Location Gasco - Portland Date 2/11/10

Project / Client Oversight of PW & Installation

0845 Arrived at Gasco site. Weather overcast, 48°F.

0855 Matt Wilson explained that yesterday drillers added polymer to ~~borehole~~ 38 2/11/10 recirculating water. This worked to bring up material (sand) in casing. Used very little polymer (< 1 gallon) and flushed casing with 1,000 gallons of water, which is now in drums. Matt: Impossible to determine how much material pulled out as there is soil material in each of the drums of water. Took photo #1 of centralizers that will be installed in well. Took photo #2 of drums with water containing polymer. The drums under the shaker are only ~< 1/10 full, same amount as when I left site yesterday.

0900 Drillers adding sand to well as they pull up 12" casing. Yesterday the screen and ~~PVC~~ steel 22 gauge casing was installed.

Jennifer Jones 2/11/10

Location Gasco-Portland Date 2/11/10

Project / Client Oversight of PW-8 Installation

0902 Took photo #3 of drillers using measuring tape to measure sand pack in well.

0905 One drum is full of water containing the most polymer. This will be stored, not put through on-site water treatment system. The rest of the water will go to the treatment system. Polymer is liquid, called "EZmud."

0920 Took photo #4 of drillers unscrewing 12" casing lengths by hand. Matt stated this rig is not equipped with jaws for 12" casing, so all of this equipment was custom fitted so that this small rig could use 12" casing.

0935 Matt stated drillers are pulling up casing at about 3' intervals measuring sand pack and adding sand. Gets difficult when casing (10') is pulled up high and drillers have to climb up to add sand in the top.

0936 Took photo #5 of Matt Wilson taking PID reading in drillers breathing zone. All readings = 0.0 ppm so far.

Quin Jones 2/11/10

Location Gasco-Portland Date 2/11/10

Project / Client Oversight of PW-8 Installation

0940 Matt stated his calculations for sand + grout yesterday were incorrect (he was thinking 2" well casing, not 8"). New calcs:

24' of sand in 12 inch / 8 5/8 annulus

$V_{12} = 5.875$ gal/ft

$- V_{8\,5/8} = 3.035$ gal/ft

2.84 gal/ft

24' x 2.84 gal/ft x bag/3750 = 18.18 bags of sand

1006 Took photo #6 of driller measuring sand pack. Have added 18 bags of sand. Bottom of 12" casing now at 47.9'. Preparing to surge well. Well is steel casing, with stainless steel screen. Stronger than PVC and won't corrode.

1032 Beginning well surging.

1032 Driller Mark removing drums of water from work area with forklift. Transporting them to storage area for disposal in on-site water treatment system.

1033 Took photo #7 of driller surging well.

1043 Driller stopped surging and measured depth to sand pack. Driller forgot to measure at start of surging.

Quin Jones 2/11/10

Location Gasco-Portland Date 2/11/10

Project / Client Oversight of PW-8 Installation

0 1045 Since driller did not measure sand pack before surging, does not know how much sand went down
09 as a result of 10 minutes of surging. So has measured now - 46.3' and will surge for another 5 minutes. Matt has not calculated grout needed yet. Will do so after completion of surging.

0 1050 Stopped surging and measuring sand pack. Result = 46.5' Went down .2'. Took photo #5 of top of surge cable connection. Driller adding another ½ bag of sand = 18.5 bags total. Will surge another 5 minutes. After
09 adding sand, depth to filter pack = 45.6'.
1110 Final depth to top of sand = 45.7' (went down 0.1'). Now will add 3 bags to top of filter pack and begin grouting.
Total bags for filter pack = 18.5.

09 1112 Took photo #6 of surge tool. Solid rubber wheel that fits inside 8" casing.
1120 Left site.
Jennifer Flow 2/11/10

Location Gasco-Portland Date 2/12/10

Project / Client Oversight of OW-8

0822 Arrived at Gasco site. Raining, 46°F.
0830 Drillers preparing to begin drilling OW-8 ~5' from PW-8 (north of PW-8). Target depth is 15.5'. Want to screen in fill, not native material. Took photo #1 showing 6" casing with drill bit being lowered to spot. PW-8 is visible on left portion of photo. Rock marks OW-8.
0839 Took photo #2 of drillers collecting first sample, 0-5'. Took photo #3 of Matt Wilson taking PID reading of 0-5' sample. Result = 0.0 ppm. Matt is visually observing sample and comparing to PW-8 log. Next sample 5-7'. It's soft material.
0845 Next sample 7-9'. Matt noted sloughing in sample. Want to switch to 4" core barrel.
0910 Drillers changing to 4" sampler. Took photo #4 of 4" core barrel bit. Need to be careful and slow to ensure well is screened in right units.
Jennifer Flow 2/12/10

Location Gasco - Portland Date 2/12/10

Project / Client Oversight of OW-8 Installation

0915 Took photo #5 of Matt Watson taking PID reading in drillers breathing zone.

0925 Obtained sample from 10-15.5'. Material is sand. Matt stated there is gunk he doesn't observe in the sample. The sandy silt layer observed from 12-13' observed in PW-8. Also no oil or sheen at 15' as observed in PW-8. Matt is calling John Benda to discuss what to do. Determination made to go ahead and set well with total depth 15.5'. Since fill material is variable, they can't know for sure what was placed here, so assume this is same fill unit as seen in PW-8. Water depth encountered ~12.5'. Although sand appears dry, is saturated.

0950 Drillers had a leak in drilling during installation of 6" casing. Using absorbent pads and bentonite sand to absorb hydraulic fluid. All contained on plastic. Photo #6.

Derek Jones 2/12/10

Location Gasco - Portland Date 2/12/10

Project / Client Oversight of OW-8 Installation

1015 Drillers still installing 6" casing to 15.5' and cleaning it out. Matt stated that at PW-8 yesterday, they grouted up to 8' from surface. They added bentonite chips then to top of grout. Matt's calculation was for 122 gallons of grout, used ~145 gallons, but still not to surface ~8' down.

1025 Drillers still assembling materials. This well will have a 5' PVC slotted screen.

1030 The plan for the rest of today is to complete well construction of OW-8, decon + cleanup site and demob. Will set up rig at PW-7 to begin drilling there monday 2/15/10 AM.

1035 Left site.

Derek Jones 2/12/10

Location Gasco-Portland Date 2/15/10

Project / Client Oversight of MW-23-74 Installation

1248 Arrive at Gasco site. Weather partly cloudy, ~54°F.

1255 Took photo #1 showing set-up at MW-23 location. Compact sonic rig being used here due to tight space for entry. Currently have drilled to 30 feet. Not sampling continuously - Matt has log from adjacent MW-23.

1300 Discussion with Matt Wilson regarding OW-8. He was not aware of the request to drill holes in endcap - this was not done. Also hard for him to state whether OW-8 was screened in fill or native material. He stated the silt encountered at 15.8 feet is the layer upon which the shallow groundwater in the fill is perched, so want to screen above that, which is what they did, from 10.5-15.5'.

1307 Drillers stated there is a fracture in a connection piece they need to run drill rig (to drill) so they are looking for fix.

Jerry Jones 2/15/10

Location Gasco-Portland Date 2/15/10

Project / Client Oversight of MW-23 Installation

1308 Drillers do not have the replacement part they need to continue drilling. Lead driller, Steve, is calling Cascade maintenance for help.

1309 Discussion with Matt regarding grout used at PW-8. Theoretical: 43 feet => 122 gallons needed. Actual: 145 gallons to 8' of surface. Matt does not know how many bags of bentonite chips were added to top of grout to seal to surface.

1310 Matt requested drillers keep busy digging holes for bollards (well monuments) while waiting for replacement part to be delivered.

1325 Matt took PID readings of samples collected today. Only sampled the following depths with PID readings for VOCs and HCN as follows: 21-23': VOCs = ~~13~~ 3.5 ppm, HCN = 13 ppm 2/15/10
23-26': VOCs = 3.3 ppm, HCN = 36 ppm.
~~26~~ 27-30: VOCs = 152 ppm, HCN = 84 ppm. 2/15/10
Matt stated chunks of wood found in sample. Took photo #3 showing wood.

Jerry Jones

Location Gasco - Portland Date 2/15/10

Project / Client Oversight of MW-23 Installation

1330 Matt collected samples for PID readings at these depths since elevated PID readings and napthalene odor noted in deep well at MW-23. These readings in the shallow well are much higher. Matt stated wood chunks may have been coated with creosote which could cause these elevated PID readings.

1335 Took photo #2 earlier showing further back view of MW-23 drilling site. Tight access is apparent.

1347 Left site.

[signature] 2/15/10

Location GASCO PORTLAND Date 2/17/10

Project / Client OVERSIGHT of PW-7 INSTALLATION

0820 ARRIVE ON SITE

STEVE ZIMMERMAN - ~~DRILLER~~ ASST

Doug Laffoon - QEA

RICK HERNANDEZ - DRILLER

MATT WILSON - QEA

0830 Fueling Rig, According to Rick Hernandez, Beginning DRILLING IN 15 minutes.

0840 According to MATT WILSON, CASCADE WILL change DRILLING METHOD for PW-7, SAME DRILLING / SAMPLING then ALTERNATING 8"-12" for COMPLETION.

0903 STARTED DRILLING, DRILLER & 2 ASSISTANTS IN TYVEK, gloves.

0915 FIRST SOIL SAMPLE 3' RECOVERY from 0-5', NO VOC'S. QUEST. FILL WITH ORGANIC MATERIAL

0917 5-10' SAMPLE. FILL NO VOC'S or HCN.

0925 10-15' SAMPLE, BOTTOM half ALL "WATERY". WILL MAKE DIFFICULT to CLASSIFY. NO PID or HCN READINGS. NO APPARENT ODORS

[signature] 2/17/10

Location GASCO Date 2/17/10

Project / Client Over Sight of PW-7 Installation

Sheen on water, oil spots on plastic soil sample collection bag. According to Matt Wilson's log, wet @ 11.2 feet, very wet at 11.8. Plastic liner covering table being cleaned up prior to next sample. BFS

0940 15-20' sample, no VOC's or HCN. No odors 16.5-17' sand layer, olive gray silt below from 17-20'.

Driller changed from 4" core barrel to 8" drill head with 6" sleeve. Will drill core (4") then ream out with 8" with 6" inside. BFS 2/17/10

1010 left 8" casing with 12" cutting head inside hole to 20', setting 6" casing inside of 8" casing, 4" core barrel through to collect samples. BFS 2/17/10

1035 pulled sample from 20-30, material appears consistent with 17-20' sample, dark gray. No odor, VOC's, HCN or visable sand lenses. ~~Has some~~ sample all moist. BFS 2/17/10

1047 Matt spilled some of the 20-30 sample onto ground. Scooped up promptly & discarded in spoils barrel. BFS 2/17/10.

Location GASCO Date 2/17/10

Project / Client Oversight of PW-7 Installation

Weather started mid 30's and overcast now 1100 warming and sunny. No precip. expected today.

1100 30-40' sample. Released very well from core barrel. Silt layers (According to Matt) 28-28.2', where grain size changed to fine. 33.2-33.3; 36-36.3; 37.9-38.2; 38.6-39.4. Silt layer @ 33.2-33.3, sheen observed, moderate HC like odor. 23' also noted HC like odor. According to Matt- anticipated well depth is 90' or 20' into the coarser sand, according to cross sections. BFS 2/17/10

1122 40-50' section being pulled. Again core released well. Substantial liquid in core barrel behind sample; driller used tape to measure liquid depth at 12-15', when core barrel was removed. No VOC or HCN readings.

1129 Drillers break for lunch

1135 Leave site

BFS 2/17/10

Location GASCO Date 2/19/10

Project / Client Oversight of PW-7 Installation

0923 - Called Matt Wilson, Rig/Drill string issues, will not be ready for well completion till afternoon. He will call me in office when he has better idea of time for activities. Currently at 85' going to 95' with 12" casing, then still need to use tri-cone bit through casing to clean interior.

1038 Does not look like the well will be installed today as they are unable to advance the 12" casing to 95'. Left as voice mail message. Called to confirm and will call again after 1pm today for a status.

1325 - Spoke with Matt Wilson. Drillers were not yet to total depth (at 90'), then needed to change out equipment and clean out hole. Optimistically this would be 1530.

BSS 2-19-10

Location Gasco-Portland Date 2/22/10

Project / Client Oversight of PW-7 Installation

0902 Arrived at Gasco Site. Weather clear, 43°F.

0908 Drillers setting up to complete well construction at PW-7. Took photos #1 and 2 of wide view of PW-7 area, showing exclusion zone.

0915 Matt Wilson stated that drillers were able to clean out well this morning and are ready to begin construction. They had to remove the 8" casing and go back in with tri-cone bit to remove cuttings. By 0830, hole was open to 95 feet total depth.

0920 Drillers assembling materials. Took photo #3 of stainless steel screen. Took photo #4 close-up of screen.

0925 Took photo #5 of drillers installing 2 foot sump to end of screen.

0937 Matt stated the method of surging will be the same: surge in 5 minute increments the entire length of 20 foot screen until no fines are coming out (sand pack settles).

0938 Drillers installing screen with centralizer.

Simon Dunn 2/22/10

Location Gasco-Portland Date 2/22/10

Project / Client Oversight of PW-7 Installation

0940 Took photo #6 of driller adding centralizer to bottom of well screen.

0951 Drillers installing 2nd length of 10' screen for total of 20 feet. Took photo #7 showing this. Added another centralizer at junction of 2 10' screen lengths.

1010 Drillers adding first length of steel casing to top of screen. Photo #8. All sections must be screwed in by hand. Photo #9 and 10 show this.

1015 Adding centralizer at top of 20's screen.

1020 Matt stated they will add organoclay to the grout for PW-7 due to presence of LNAPL at around 50'. This is not noted in Matt's boring log.

1026 Drillers adding 2nd length of 20' steel casing. Now 40' + 2' sump in hole.

1040 Received request from Scott Coffey via email to ask Matt about surging: whether or not he checks to see what type and how much material comes into screen. He stated he does not and didn't see the point since wouldn't do anything about it anyway.

Jennifer Jones 2/22/10

Location Gasco-Portland Date 2/22/10

Project / Client Oversight of PW-7 Installation

1041 Drillers adding 3rd length of 20' steel casing. Now 60' in well, plus 20' of screen = 80', plus 2' sump = 82'.

1055 Adding 10' steel casing. Now 92'. Adding centralizer with each length of casing.

1115 Added last (5') of steel casing. This is a total of 97', so a couple of feet will stick up out of ground surface.

1120 Matt's sand pack calcs:

$V_{12-8\,5/8''} = (5.875 - 3.035)$ gallons $= 2.84$ gal/ft

$V_{12} = 0.7854\ ft^3 = 5.875$ gal/ft

$V_{8\,5/8} = 0.40594\ ft^3 = 3.035$ gal/ft

$V_{12''} = \pi r^2 \times h = \pi (0.5\ ft)^2 \times 1\ ft = 0.7854\ ft^3$

$V_{8\,5/8''} = \pi r^2 \times h = \pi (0.03594\ ft)^2 \times 1\ ft = 0.40529\ ft^3$ 2/22/10

1121 Drillers adding sand for filter pack.

1129 Matt Wilson stated there is an extra 1.5' at bottom of hole that washed out and needs to be filled with sand. Driller holding casing up 1.5' so that screen will be set at correct depth. Also likely that this 1.5' is wider than 12".

Jennifer Jones 2/22/10

Location Gasco - Portland Date 2/22/10

Project / Client Oversight of PW-7 Installation

1130 As a result of extra 1.5' and wider area of wash-out at bottom of hole, more sand will be needed than calculated.

1130 Sand calculation ~ 0.75 (3/4) of a bag of sand per foot, need 24' of sand (20' screen, 2' sump, 2' on top of screen). So approx 19 bags of sand needed, but will add more likely since needs to fill up bottom of hole (1.5'). Added 4 bags of sand.

1145 Drillers have to change the rig tooling so that they can pull up 12" casing as they add filter pack.

1146 Took photo #11 of surge tool.

1150 Took photo #12 of driller disassembly jaws.

1152 Matt stated that after retooling the rig, drillers will likely take lunch break.

Matt hopes to complete grouting up PW-7 today.

1155 Left site.

2/22/10

Location Gasco - Portland Date 2/24/10

Project / Client Oversight of PW-9 Installation

0829 Arrived at Gasco site. Weather Partly cloudy, 48°F.

0832 Drillers working at PW-9. Currently Matt Wilson is logging the 20-25' sample. Took photo #1 of long view of PW-9 location. Photo #2 shows closer view of drilling area. Photo #3 shows Matt logging sample. Photo #4 shows closer view of sample. Material is sand with color change from brown to gray. Photo #5 shows how close drill rig is to slope down to river bank. Access is very limited here.

0842 Matt stated drilling at PW-9 began around 4:45 pm last night. They were able to drill to 15 feet last night. From Matt's log:

0-2' wet silty gravel

2-15.8': moist sticky gravelly silt, HC-like odor. Fine to cobble sized gravel.

15.8-20': moist gravelly sand with silt abundant. Lampblack, no sheen, HC-like odor.

20-21.4': brownish-red wet loose fine-med sand.

2/24/10

Location Gasco - Portland Date 2/24/10

Project / Client Installation of PW-9

0850 Matt's log, con't:
21.4 to 26.3' dark gray wet loose fine-med sand @ 22.2-22.3': silt layers
Matt stated he thinks the dark gray sand is the first native material encountered. Have not seen silt confining layer yet.

0855 Matt stated from 15-20' there was poor recovery, so didn't see clear zone where encountered groundwater. At nearby well it was at 18.6'.

0900 Matt stated electrical line is ~4' away from where drillers hand dug to begin PW-9 borehole. 2/24/10

0905 Drillers collecting 25-30' sample. Took photo #6 of sample.

0915 Matt's log:
21.3-27.6 dark olive gray soft wet fine sand with intermittent silt layers.
27.6 to 29.1 dark olive gray soft wet silt, trace fine sand w/ trace organic debris
28.7-29.1 sand layer

0925 Took photo #7 of Matt taking PID reading in driller's breathing zone.
2/24/10

Location Gasco - Portland Date 2/24/10

Project / Client Oversight of PW-9 Installation

0925 All breathing zone readings = 0.0 ppm thus far.

0930 From Matt: grout calcs at PW-7:
$(69.5 - 1.5')\ 2.84\ gal/ft = 193.1\ gal$
Used 165 gallons of grout, added 13 bags of granular bentonite to fill up top 6' to surface. 13 bags = 38 gal.
So 214 gallons total used. 2/24/10
10% organoclay was added to grout ~~used~~ in grout 1 gal.

0940 Drillers collecting 30-40' sample.
Matt's log:
29.1-37.7' Dark olive gray soft wet silty sand interbedded with fine sand and silt layers
37.7 to 40' Dark olive gray very wet silty sand, fine sand.

1025 Took photos #8 + 9 of drillers collecting 40-50' sample. 2/24/10 Material is very liquidy.
Matt's log:
40-46.3': dark grayish brown very soft very wet silt with sand, fine sand
46.3 to 50: dark greyish brown dense wet silty sand
2/24/10

Location Gasco - Portland Date 2/24/10

Project / Client Oversight of PW-9 Installation

1045 Matt stated total depth at PW-9 will likely be ~90', as not expecting to hit medium-grained sand until ~69' as in MW-22, and need to go 22' into this for 20' screen and 2' sump. Plan for rest of today is to continue drilling and sampling PW-9, hopefully to target depth. Tomorrow will likely be driving 12" casing all day.

1050 Left site.

2/24/10.

Location GASCO - PORTLAND Date 3/1/10

Project / Client Oversight of PW-9 INSTALLATION

50's & OVERCAST

0930 ARRIVE @ GATE, ESCORTED IN

0940 MET WITH MATT WILSON, DRILLERS HAD PROBLEMS this MORNING, began well CIRCULATION when he ARRIVED SITE HAS been SLOPPY ABOVE AND below GROUND.

0946 - WATER (PHOTO'S TAKEN) RUNNING ON SITE, NOTED BY Matt WILSON AS being from hose bib that WAS INADVERTENTLY turned ON AT the MAIN. Shut off AND RESIDUAL WATER SLOWING.

0950 CIRCULATION CEASE. PHOTO of SAND REMOVAL.

0955 MEASURED DEPTH at 95' NOW tripping 4" pipe out of hole used for CIRCULATION.

1010 Done tripping pipe out of hole with rower core bit @ bottom

1015 DRILLER used tape to reverify depth. MATT WILSON/he DISCUSSED something & MATT STATED they were still @ 95'

3/1/10

1030 - STAINLESS STEEL schedule 40 SCREEN & CARBON STEEL, schedule 40 RISER

3/1/10

Location GASCO - PORTLAND Date 3/1/10

Project / Client Oversight of PW-9 INSTALLATION

Screen Length 19.3', 8" Diameter
Continuous wire wrapped, 0.035" slot
Sump-end cap length 2.2'
1038 Cascade Rapke Senitative here
ready to start well development
Matt Wilson sending them to PW 7 & 8
for development.
John from QEA on site
taking photos and performing
general oversight.
1048 Estimating 19 bags of
sand. 24' of sand, 2.84 gallons
per foot of annulus, 2.68 gallons of
3.75 gallons per bag of sand.
18.1 bags of sand.
1055 John-Matt went off to
have "private" conversation. No details
provided upon return.
1109 called Lance to update. Crew
that was supposed to start "air
lifting" solids from PW-7 & 8
have not started.
1140 - starting into hole with screen
are using stainless risers as well
BJS

Location GASCO - PORTLAND Date 3/1/10

Project / Client Oversight of PW-9 INSTALLATION

As they failed to bring enough carbon
steel riser.
Screen connected and
starting into hole @
1145.
1150 Left site

BJS 3/1/10

Location Gasco - Portland Date 3/2/10

Project / Client

MPH 3/2/10

Location Gasco - Portland Date 3/2/10

Project / Client Oversight of PW-7 Purge

930 arrived at site.

940 Begin ~~Purge~~ MPH 3/2 surge with no Air.

20 mL/L conc solids. For the first 1000 gal for the PW-8 surge yesterday

MPH 3/2/10

955 confirmed surge with Air since the begining of the day

MPH 3/2/10

1000 - Doug took core test sample to determine solids content.

- Plan to perform surge until 10x volume of well is removed or water becomes clear. MPH 3/2/10
- Well volume measured at 210 l/gal

DTW = 16.25 @ 930

DTW = 17.23 @ 1005

1005 Drillers began Bollard instalation. Matt stated that PW-9 was completed this morning.

- Air pressure goes from 40-120 PSI
- Flow rate is measured using tank

MPH 3/2/10

Location Gasco - Portland Date 3/2/10

Project / Client oversight of PW-7 surge

Level and stopwatch

1020 Section of flex hose was removed in an effort to increase flowrate.

1025 DTW = 21.52

1025 1.5 FT depth in tank, equating to ~ 500 gal of surge water.

1035 - Added another section of pipe to surge apperatus to get air further down to bottom of well @ 96'

- Observed PW-9 Matt stated that a total of 286 gal of bentonite was used, 225 gal grout & 11 gal granular. Up to ~ 1 FT below ground surface.

1040 resumed surge, Took another sample for cone test, much higher solids content than previous. Also observed slight oil sheen and smell.

- Measurements from cone test samples

1000 volume removed 200, Temp = 15.89 EC = 166, pH = 8.10 DTW = 17.53

1040 Vol = 400, Temp = 15.06, EC = 227, pH = 7.56, chalk brown & milky.

1000 description was Dark brown & cloudy.

MPH 3/2/10

Location Gasco Portland Date 3/2/10

Project / Client oversight of PW-7 surge

1051 - DTW = 22.97

Cone test from 950 = 4 mL / 1000 mL

1051 sample measurements: Temp = 15.12 EC = 371, pH = 7.44 Description = light brown & cloudy. Vol = 700 gal (Total)

1100 Tim Stone with Anchor came on sight.

- Surge apperatus is ~ 1½ of the bottom but there is a 2' sump so its below the screen.

- 1110 DTW = 22.2', Air was off so not accurate

- avg 30 gpm @ approx 2' draw down.

at 1100 surging stopped to transfer surge water to above ground pond.

- Driller plans on surging an additional ~ 1000 gal then using the Grundfos pump for an additional ~ 1000 gal.

1150 resumed surging.

MPH 3/2/10

1000 sample Sand/silt = 900

1050 sample Sand/silt = 9

1200 left site

MPH 3/3/10

Location Gasco - Portland Date 3/4/10

Project / Client Oversight of PW-9 Development

0900 Arrived at Gasco site. 49°F, partly Cloudy.

0905 Discussion with Doug Luffson. DD 3/4/10

He stated Grundfus pump was ~~to~~ set-up DD 3/4/10 ~~operation~~ at 84' in well, approximately 1/2 way depth of screen. Air lifting and surging used 7 volumes of water. Grundfus pump will likely do at least 10 volumes additional. Grundfus pump runs at 50 gpm and will run 1800 gallons of water. This will take around 6h hours. Running full pump at 50 gpm until get drawdown to intake at 84'. Will then stop at that to recover for ~20 minutes to level started at. Then will start again to drawdown to top of screen, throttle flow rate to maintain to top of screen.

From Doug's notes of yesterday: 1400 gallons of water used for development until almost clear

0915 Took photo #1 + 2 of air lift mechanism

Doug Luffson 3/4/10

Location Gasco - Portland Date 3/4/10

Project / Client Oversight of PW-9 Development

0916 Took photo #3 of long view of pumping operation. A large crane is used to handle pump. Took photo #4 of well with Grundfus pump installed and preparing to begin pumping. Took photo #5 of muddy ground next to slope to river bank. berm was formed to prevent water going over bank. Took photo #6 of ~~pump~~ generator and well DD 3/4/10

0925 Water level at start is ~~between~~ at DD 3/4/10 26' within 10 minutes of pumping, has drawn down to 42'. This well, accordy to Tim Stone, has significant drawdown (low efficiency) compared to PW-7 and especially PW-8. Tim stated PW-8 is a very efficient linear well, no matter how fast you pump it, drawdown is consistently linear, whereas with PW-7 it increases as gpm increases. But PW-7 is still very efficient compared to PW-9 so far.

0926 Took photo #7 of Archon measuring well water level during pumping DD 3/4/10

Location Gasco - Portland Date 3/4/10

Project / Client Oversight of PW-9 Development

0934 Doug Laffoon stated they changed plans. Will not drawdown to screen as do not want to expose screen incase material gets in. So instead will just do the second part - throttle to ~70' and maintain flow rate such that no additional drawdown occurs. Top of screen ≈ 74'.

Doug's notes, con't from yesterday:

1415 Start airlift along w/surging. DTW=26.4'

1420 Gal removed = 100; sand/silt (ml/1000 ml) = 16/900.

0940 Took photo #8 of Doug's notes.

0941 Took photo #9 of Imhoff cones with water samples settling. Took photo #10 of pH meter with sample.

1005 Continuing to pump at 50 gpm. Drawdown is much slower than at start. At start, was drawing down ~1.5' in 5 minutes, now drawdown is ~.09' in 5 minutes. Depth to water now is 64.5' (started at 26.4'). Doug Laffoon stated that today's pumping will be used to calculate specific yield of well.

Justin Jones 3/4/10

Location Gasco - Portland Date 3/4/10

Project / Client Oversight of PW-9 Development

1030 Continuing to pump at 50 gpm. Drawdown increased slightly @ 1015 to 0.37' in 5 minutes. So will keep pumping to ensure at equilibrium.

1047 Took photo #11 of Doug's log. Only 0.01' of drawdown on last measure: DTW 65.42' to 65.43'.

1051 Next measure: 0.05' of drawdown.

1057 Next measure dropped from 65.48' to 65.77'. Doug is unsure why these bigger drops, larger drawdowns are occurring periodically. Wants to see it stabilize before stopping pumping. He is wondering if river tide has any influence on well water levels.

1103 DTW = 65.71'. Came back up 0.06'. Doug stated he thinks the pump is fluctuating slightly and we are at equilibrium.

1105 DTW = 65.87'

1107 DTW = 65.76'

1109 DTW = 65.94'

1111 DTW = 65.96'

1113 DTW = 66.04'. Vol water removed = 6800 gal.

Justin Jones 3/4/10

Location Gasco-Portland Date 3/4/10

Project / Client Oversight of PW-9 Development

1115 DTW=66.04'. No change. Doug stated that in 5 minutes he will increasing pumping rate to full power - 60 gpm to see what drawdown occurs.

1117 DTW=66.06'

1119 DTW=66.08'. 7100 gallons of water removed.

1121 Turned pump all way open. DTW=66.1'.

1122 DTW=69.40'

1123 DTW=72.60'

1124 DTW=74.00'. Turned pump off to observe recovery.

1125 DTW=58.55'.

1126 DTW=45.70'

1128 DTW=33.20'.

1133 DTW=27.82'. Restarted pump. Tim Stone is at water holding pond measuring gpm. using a bucket. Set flow rate at 30 gpm.

1136 DTW=37.92. total water=7,290 gal.

1140 DTW=34.78'.

1142 DTW=34.98' beginning to reach equilibrium again.

1145 DTW=35.09' @1147 DTW=35.12' @1150 DTW=35.15'

1152 DTW=35.16'.

[signature] 3/4/10

Location Gasco-Portland Date 3/4/10

Project / Client Oversight of PW-9 Development

1155 DTW=35.20'. Total water removed=7860 gallons.

1157 DTW=35.22'.

1200 DTW=35.24'. Total water=8010 gal

1205 DTW=35.30'. Total water=8160 gal.

1210 DTW=35.34'. Stopped pump. Total water removed=8310 gal.

1211 Will remove pump after lunch.

1215 Left site.

[signature] 3/4/10

Location Gasco-Portland Date 3/8/10

Project / Client Oversight of OW-9 Installation

0905 Arrived at the Gasco site. Weather mostly cloudy, 46°F.

0910 Discussion with Matt Wilson, Anchor geologist overseeing drilling at OW-9. Drilling began at 0840. When I arrived 15-21' sample was on table for Matt to observe. Matt stated he does not think 3/8/10 sample is actually to 21', as still observing large chunks of gravel, no sand. Will drill deeper now, to 23' or so. Napthalene odor apparent in 15-21' sample.

0911 Took photo #1 of wide view of OW-9 work area. Photo #2 shows closer view of drillers working compact drill rig. Photo #3 shows straw waddle to keep silt from flowing over bank. Photo #4 shows 15-21' sample on table, #5 shows close view of gravel pieces and debris at bottom of sample ~21'.

0915 Matt stated he does not know if/when the gravel berm will be constructed here.

Gerry Jones 3/8/10

Location Gasco-Portland Date 3/8/10

Project / Client Oversight of OW-9 Installation.

0924 Took photo #6 of Matt Wilson taking PID reading in ~~samp~~ 3/8/10 drillers' breathing zone. Result = 0.0 ppm.

0925 Drillers collected sample from 20-21'. Strong napthalene odor, still gravel. Material is wet. Matt discussed this with John Renda and it was decided to drill to 25'.

0940 Drillers collected 21-25' sample. Sand was encountered, and black sand in shoe ~25'. Want to screen in reddish brown sand. Took photo #7 of brown + black sand at 24-25'.

0958 Took photo #8 of driller measuring depth of boring. Bucket is sitting on top of OW-9 well.

1002 Beginning well construction. 5' PVC slotted screen and PVC casing. Bottom of well will be at 25'. PVC = 2".

1010 Took photo #9 of drillers installing PVC screen and casing.

1011 Drillers adding sand and pulling up 6" casing.

Gerry Jones 3/8/10

Location Gasco-Portland Date 3/8/10

Project / Client Oversight of OW-9 Installation

1025 Drillers doing manual surging using 1" PVC pipe pulling up and down to get 3' of water inside well to be ~~sucked~~ pushed up and down. Surge-tool is installed on PVC to move water up and down inside well casing to push through screen and settle sand pack. Took photos #10 and 11 showing driller surging well.

1030 Took photo #12 of surge tool. Surged for ~5 minutes.

1035 Took photo #13 of driller decontaminating PVC pipes used for surging - at decon station with power wash.

1042 Completed installation and settling of sand pack at Gasco. All wells need to be sealed with bentonite-granular not chips - and grout mixed with organoclay. Cascade just delivered the granular bentonite needed so will now begin to seal up well. Organoclay absorbs oil (NAPL) so it doesn't reach screen.

[illegible] 3/8/10

Location Gasco-Portland Date 3/8/10

Project / Client Oversight of OW-9 Installation

1040 Matt's calcs for sand at OW-9:

$7.6' \left(\frac{1.238\ gal}{ft}\right)\left(\frac{1\ bag}{3.75\ g}\right) = 2.5$ bags theoretical.

Added 3 and 1/10 bag actual.

1045 Drillers added one bag of granular bentonite and now pulling up more casing.

1046 Adding second bag of bentonite. Will not use grout here, will fill up to surface with bentonite.

1050 Took photo #14 of driller using power washer on casings.

1051 Matt's calcs for granular bentonite:

$15.7' \left(\frac{1.238\ gal}{ft}\right) = 19.44\ gal \left(\frac{1\ bag}{3.75\ gal}\right) = 5.2$ bags

They used 3.2 bags. The difference may be due to a difference in volume between granular and chips. Matt knows volume of chips is 3.75 gal per bag but is not sure if granular is more or less per bag.

1108 Left site.

[illegible] 3/8/10

Location Gasco - Portland Date 3/18/10

Project / Client Site Visit

0855 Arrived at Gasco site. Weather Sunny and clear, 43°F

0900 Met John Rendia and walked to location of MW-22 cluster to view transducer. Then to PW-9 and OW-9 location, PW-8 and OW-8 location, PW-7 and OW-7, MW-24 cluster. MW-23. All wells have same transducer, "Level Troll", 30 psi.

0905 Took photo #1 of transducer, showing dessicant At MW-22. Photo #2 and #3 show metal clamp that fits on top of casing to keep transducer in place. Photo #4 taken looking inside of well with transducer in place. John said transducer measures every 15 minutes. Use PDA to download data - connect to transducer end - between dessicant + transducer head. If manual reading + electronic are off by 7.1, both reset electronic to manual reading

JD 3/18/10

Location Gasco - Portland Date 3/18/10

Project / Client Site Visit

0912 Took photo #5 of PW-9 wellhead. Not yet completed bollards and well monument, here took photo ~~#6~~ JD 3/18/10 showing grand berm.

0916 Took photo #7 of PW-8 and OW-8 location

0920 Photo #8 shows PW-7 and OW-7.

0922 Photo #9 shows MW-24 cluster - 2 wells here.

0925 Took photo #10 of MW-16? location. These are old (previous) monitoring wells. NAPL present here and can be seen dripping down sides of well head. Photo #11 shows other wells here.

0930 Photo #12 of water holding pond.

0930 Photo #13 shows plastic pipe that will convey water from wells.

0933 Met Lance with Advanced Remediation Technologies. Took photo #14 and 15 of vise that holds pipe for fusion. Photo #16 and #17 shows hot plate that is inserted between 2 ends of pipe to heat for fusing

JD 3/18/10

Location Gasco-Portland Date 3/18/10

Project / Client Site Visit.

0940 Took photo #18-20 of MW-23 cluster of 3 monitoring wells. New gravel driveway was installed as this location was very muddy. New gravel and grading conducted by Anchor at all drilling locations.

0942 John Renda stated pumps will be installed next Tuesday in all 3 pumping wells.

0945 left site.

3/18/10

Location Gasco-Portland Date 3/23/10

Project / Client Oversight of Pump Installations

0830 Arrived at Gasco site. Weather overcast, foggy, 41°F.

0840 Escorted by Tim Stow, Anchor, to PW-7 where crew is setting up to install pump. Took photo #1 showing truck with crane and pump materials. Took photo #2 of 3 plastic pipes running from 3 pumping wells across driveway (to on-site water holding pond).

0845 Doug Laffoon measured DTW in PW-7. Took photo #3 of Doug wiping off measuring tape. Rust oxide on tape (not NAPL) and only at shallow top of tape.

0846 Crew assembling and installing pump is R. Stadell and Sons. Took photo #4 and #5 showing pump. This is a 5 horsepower pump with 9 stages, 53" total length, 23" motor length. The total depth of this well is 96.1', total depth to top of screen = 74.1'. Pump inlet will be ~2' above top of screen.

3/23/10

Location Gasco-Portland Date 3/23/10

Project / Client Oversight of Pump Installation

0852 Took photo #6 of metal steel piping riser attached to top of pump. Welded flaps are for a centralizer and to attach to CO_2 injection system. High pressure CO_2 will be injected into screen if it becomes clogged during pumping. JG 3/23/10 Tim Stone stated iron fouling is a problem here. They took a video of all 3 pumps showing inside of screen. All look very clear and clean at this point. He has video on DVD. Can use CO_2 injection to clear out iron fouling if it clogs screen.

0905 Took photo #7 of crew preparing to install pump into well. Photo #8 shows crew attaching top of ~~well~~ JG 3/23/10 pump to bottom.

0910 Installing electrical with JG 3/23/10 + attaching to pump. Tim stated instrumentation panel has been built. Hope to install this week, along with HDPE piping assembly and electrical conduit.

Jordan Jones 3/23/10

Location Gasco-Portland Date 3/23/10

Project / Client Oversight of Pump Installation

0915 Pump instrumentation will JG 3/23/10 ~~include~~ be tied into river elevation transducer and other control wells on site.

0920 Discussion with Tim Stone about sustainability efforts mentioned in work plan (recycling, reuse, etc.) Tim wasn't sure exactly what was referred to. He stated the system was sustainable and built to last in the long term. He also mentioned some efforts to use green power to run the system, including tidal power, but this has not yet been decided. There were some ideas about making the on-site water treatment system a more "green" system with flow through treatment, but this was not ultimately selected.

0930 Took photos #9 and 10 of electrical wire coatings being heated up to provide a water tight seal, first the clear plastic + then the black = double coated seal. J. Jones 3/23/10

Location Gasco - Portland Date 3/23/10

Project / Client Oversight of Pump Installation

0935 Took photo of well assembly (photo #11 materials. The blue disks are for size to cap of wells. Holes for ~~pump~~ water extraction electrical, CO_2 injection, transducer, water level readings. Large hole in middle is water outlet.

0940 Doug Laffoon stated transducer was removed from well this morning for pump installation.

0945 Installing stainless steel pipe for CO_2 injection. Took photo #12 showing this. Photo #13 + #14 shows how steel tube fits in welded piece on main pump pipe. (O_2 injection will be near bottom of screen.

0950 Took close up photo #15 of pump inlet.

0952 Next will install PVC tubing for transducer. Bottom will be at top of pump. Photo #16 and #17.

0955 Contractor is building gravel ~~berm~~ trench for ~~around~~ 3 HDPE water pipes across driveway. Photo #18.

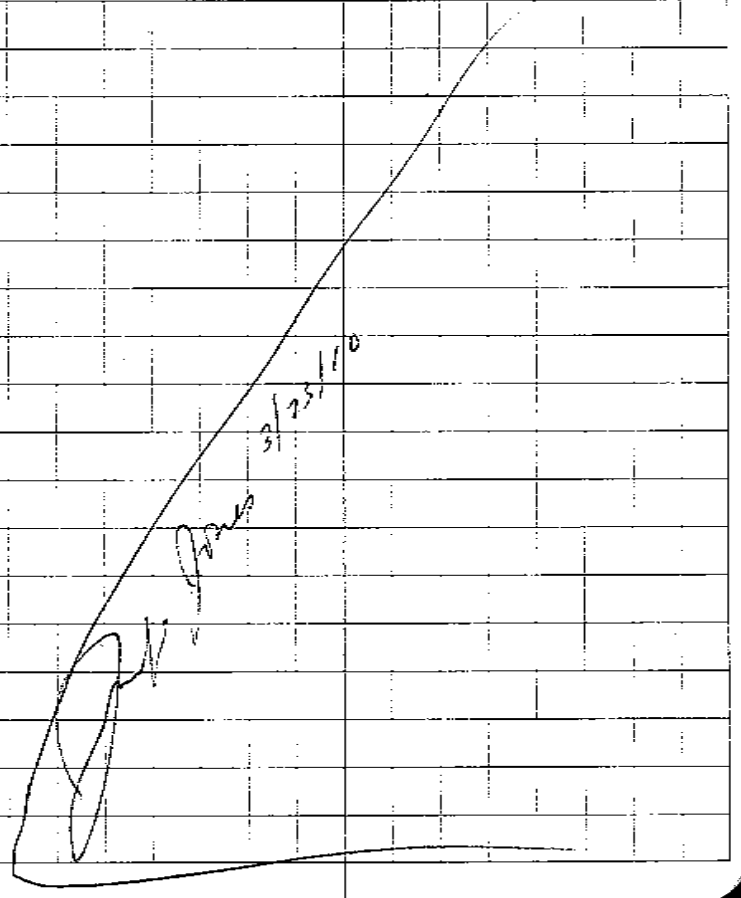
[signature] 3/23/10

Location Gasco - Portland Date 3/23/10

Project / Client Oversight of Pump Installation

1010 Tim Stone stated control panel may be installed starting Thursday (3/25).

1015 Left site.



Location Gasco Portland Date 3/30/10

Project / Client Site visit - transducers

0835 Arrived at the Gasco site. Rainy, 40°F.

0845 Met John Renda, Tim Stone, and Doug Laffoon at on-site Anchor trailer. Discussed schedule for completion of construction of system - electrical remains. One control panel has been installed (at PW-8). All plumbing has been completed. Discussed operation of system, Ambient monitoring has begun. Pump test may begin mid next week.

0910 Accompanied Doug Laffoon and John Renda on rounds to download transducer data from all wells including piezometers. Donned PFD to walk on pier.

0905 Took photo 1 and 2 of In-situ Data reader.

0918 Walked onto catwalk with Doug and John. Photo #3

0920 Took photo #4 and #5 of control panel at PW-8 (taken from catwalk, showing plumbing - photo #5

[signature] 3/30/10

Location Gasco-Portland Date 3/30/10

Project / Client Oversight of Transducer Data Download

0925 Doug Laffoon measuring DTW at PZ1-50. Photo #6 + 7. 26.79' on transducer; manual = 26.84'

2nd reading = 26.84'; auto read = 26.80] Δ = 0.04 less than 0.05 so ok.

0930 At PZ1-20 (right next to PZ1-50). 25.60' manual and 25.55' auto. 0.05 difference, so ok. (< 0.05 difference between auto + manual) Photo #8 at PZ1-20. Photo #9 shows dessicant for transducer at PZ1-20. Starting to turn pink at end.

0935 PZ1-5 (next to PZ1-20) 25.28' on transducer; 25.30' manual reading. OK.

0940 Doug wipes end of water level meter as decon. before moving to next station. Photo #10.

0944 At PZ2-43. Transducer reading = 27.24', manual = 27.24'. Also records time difference between reading on transducer + reading on handheld. [signature] 3/30/10

Location Gasco - Portland Date 3/30/10

Project / Client Oversight of Transducer Data Download

0946 PZ2-77. Manual reading = 27.56'; transducer = 27.83'.

0948 PZ2-20. Manual reading = 27.15 ~~22~~ 3/30/10; transducer = 27.14'

0952 PZ2-5 (right next to PZ2-20) manual = 27.19'; transducer = 27.16'.

1000 PZ4-41 (Further upstream on network parallel to shore. Manual 22.35'; transducer = 22.37'

1002 PZ4-12 (right next to PZ4-41) Manual = 24.19; Transducer = 24.19'.

1005 Walked to PW-8 location. Took photos # 11-13.

1015 Departed site.

J. M. Stone 3/30/10

Location Gasco-Portland Date 4/19/10

Project / Client Oversight of 1st short-term pumping test

0825 Arrived at Gasco Site. Weather overcast, 56°F.

0830 Met Anchor's Tim Stone, John Renda, and Matt Wilson at trailer and then walked to all 3 pumping wells.

0846 Started test. Tim Stone at PW-9, John Renda at PW-8 and Matt Wilson at PW-7. Tim Stone radioed the others to start test at same time. Pumps ramp up to 15 GPM. Flow control alarm if flow or water in pipe is not full - will shut off system. This doesn't start until 5 minutes after pump start.

0849 Matt radioed from PW-7 - flow ramped up to 16 GPM and now down to 11 GPM - still dropping. Tim stated system will stabilize soon. Currently PW-9 is at 14.87 GPM. Drawdown so far 10.7 ft in PW-9

Tim Stone 4/19/10

Location Gasco-Portland Date 4/19/10

Project / Client Oversight of 7 SR Short-term Pumping Test

0853 At PW-9, control well is MW-22-88'. Not much influence in control well yet. ≈0.1' only so far.

0859 PW-7 well flow now at 14.59. Same with PW-8 & PW-9.

0903 Totalizer at PW-9 = 17209.1 Flow 14.98 GPM. Hahn maintains water treatment system being used for pumped water. Replaced carbon last week. After treatment goes to sewer ~~discharge to municipal~~ eventually will be ~~reused in site~~ when full treatment system gets completed.

0906 DTW at PW-9 = 27.190', 14.97 = GPM, 14358 totalizer.

0907 At PW-8 DTW = 19.668' 14.48 GPM, totalizer = 1166.1 gal. This is too high — 20 minutes of pumping at 15 GPM should be 300 gallons.

0910 John Rendra stated seeing no influence in OW wells - shallow wells.

Jane Jones 4/19/10

Location Gasco-Portland Date 4/19/10

Project / Client Oversight of 7 SR short-term Pumping Test.

0915 John discovered PW-8 is reading in liters, not gallons, so totalizer is OK. On other panel, totalizer is 420 gallons.

0917 DTW at PW-8 = 19.737'. Totalizer = 451.4 gallons. Control well has dropped 0.1', PW-8 has dropped from 18.012' to 19.745' at 0919.

0925 Tom Stone - ultimately before long-term test, hope to have one button to push to start all 3 pumps. Long term test may start next week, depending on how long it takes modellers to determine if pump rates are good for long term test.

0932 DTW at PW-7 is 20.544', 14.93 GPM, totalizer = 8172 gal. "B" well = 14.294' = control well.

0940 Left site. See photo log from today's visit on next page.

Jane Jones 4/19/10

Location Portland Gasco Date 4/19/10

Project / Client Oversight of 1st Short-term Pumping Test

4/19/10 Photo log:

0842 Photo #1: Tim Stone showing Matt Wilson how to start PW-7.

0842 Photo #2: Control Panel at PW-7 showing set to 15 GPM.

0843 Photo #3: Another reading on PW-7 control panel

0843 Photo #4: Real-time DTW reading at PW-7. Before test start: DTW in PW-7 ("A") = 17.601 ft. DTW in "B" well (control well nearby = MW-21) = 14.159 ft.

0845 Photo #5: At start of testing totalizer at PW-7 = 7474 Gal. Photo is of Siemens flow meter.

0845 Photo #6: Wide view of PW-7 controls.

0846 Photo #7: PW-8 controls.

0847 Photo #8: DTW at start of test at PW-8: 18.012' in "A". DTW at "B" (MW-23) = 26.014 ft.

0847 Photo #9 Totalizer at PW-8 before start = 0.1 (this is liters).

0848 Photo #10 DTW at PW-9: 27.137 ft. "B" (MW-22) = 26.666'.

Jeff Jones 4/19/10

Location Gasco-Portland Date 4/19/10

Project / Client Oversight of 1st Short-Term Pump Test

4/19/10 Photo log, Con't:

0850 Photo #11: Totalizer at PW-9 at start: 13298. liters

0900 Photo #12: During test, at PW-9. Pump rate = 14.93 GPM, totalizer 13769.1.

0900 Photo #13: Tim Stone at PW-9, showing set-up.

0901 Photo #14: Well control reading at PW-9

0901 Photo #15 Another meter at PW-9.

0901 Photo #16 Control panel at PW-9.

0902 Photo #17 Wide view of PW-9 showing MW-22 in distance with conduit carrying electrical, controls to PW-9.

0911 Photo #18, PW-8 (close) and PW-7 in distance.

0940 Photo #19 Control box at MW-24.

0940 Photo #20 Controls at MW-24 Close view of DTW readings.

0940 Photo #21 Control readings at MW-24 A= ~~MW-22~~ River; B= MW-24-70'.

Jeff Jones 4/19/10

Location Gasco-Portland Date 4/21/10

Project / Client Oversight of Short-term Pump test #3

1020 Arrived at Gasco site. Weather overcast, 54°F.

1025 Met Tim Stone, Matt Wilson and John Renda at trailer

1035 walked to PW-7. Matt at PW-7, Tim at PW-8, John at PW-9. I went with John to PW-9.

1044 Start test. Pumps ramping up to 35 GPM.

1039 (Prior to test start)

Initial readings at 3 pumping wells:

PW-7 A = PW-7 = 17.896' DTW

B = MW-21-75 = 14.475' DTW

Totalizer = 12,265 gal

PW-8 A = PW-8 = 18.321' DTW

B = MW-23-95 = 26.312' DTW

Totalizer = 18,030 liters

PW-9 A = MW-22-88 = 27.463' DTW

B = ~~MW~~ PW-9 = 26.994' DTW

Totalizer = 31,445 l.

1045 Within 1 minute of starting test PW-9 at 34.22 GPM. Starting continuing to increase.

[signature] 4/21/10

Location Gasco-Portland Date 4/21/10

Project / Client Oversight of Short-term pump test #3

1046 Took photo #1 of flow meter and totalizer ready at PW-9.

1047 Took photo #2 of John Renda at PW-9

1049 PW-9 at 34.80 GPM,

A = 27.582' (MW-22)

B = 44.543' (PW-9)

Totalizer = 32,108 l

1055 PW-9 at 35.04 GPM

PW-9 = 45.403'; MW-22 = 27.649'

Totalizer = 32,858 l.

1056 John Renda stated that drawdown is now ~18' and probably won't go much higher.

1100 PW-8 = 34.94 GPM

A (PW-8) = 22.452'

B (MW-23) = 26.575

Totalizer = 20,095 l

Only ~4' of drawdown here. John + Matt discussed that maybe there is more sand and less silt here so pump drawing from larger pool of groundwater?

[signature] 4/21/10

Location Gasco-Portland Date 4/21/10

Project / Client Oversight of Short-Term Pumping test #3

1101 Took photo #3 of flow meter at PW-8.

1104 PW-7 = 35.01 GPM
A (PW-7) = 25.465'
B (MW-21) = 14.804'
Totalizer = 12,960 gal

1107 Took photo #4 of flow meter at PW-7.

1114 PW-9 = 35.00 GPM
A (MW-22) = 27.724'
B (PW-9) = 45.713'
Totalizer = 35,347 l

1117 PW-8 = 35.02 GPM
A (PW-8) = 22.566'
B (MW-23) = 26.636'
Totalizer = 22,397 l

1119 PW-7 = 35.01 GPM
A (PW-7) = 25.573'
B (MW-21) = 14.839'
Totalizer = 13,477 gal

1120 Took photo #5 at PW-7 looking toward PW-8 during test.

1122 Left site.

[signature] 4/21/10

Location Gasco-Portland Date 4/30/10

Project / Client End of 1st Long-term Pump Test - 25 GPM

0800 Arrive at Gasco site. Weather mostly cloudy, 50°F, windy

0805 Met Doug Lafoon at trailer. Waiting for Matt Wilson and Tim Stone to arrive. Doug stated he had downloaded transducer data a few times during test and also took manual readings. Pumps holding steady at 25 GPM. Pumping wells checked several times, all wells downloaded once during pump test. Primary wells are: MW-21, MW-23, PZ-1, PZ-5, OW - these were checked every day (along with pumping wells), others checked once during test.

0815 Walked to on-site water treatment carbon system with Doug Lafoon. He is checking pressure on tanks. He stated they changed carbon prior to short-term tests and will change again after. Took photos #1, #2, and #3 of Doug checking pressure.

[signature] 4/30/10

Location Gasco - Portland Date 4/30/10

Project / Client Oversight of end of long-term Pumping Test at 25 GPM

0830 Walked with Tim Stone, Matt Wilson, and Doug Laffoon to pumping wells to stop test.

0834 At control well + river DTW reading: A(river) = 21.294'; B(MW-24-70) = 23.983'

0835 PW-7 at 25.04 GPM.
A(PW-7) = 22.796'
B(MW-21-75) = 13.296'
Totalizer = ~~13315~~ 13366 US Gallons

Totalizers were all set to 0 at start of test at all 3 pumping wells.

0838 PW-8 at 25.02 GPM; Totalizer = 131190.
A(PW-8) = 26.270'
B(MW-23-75) = 25.121'

0839 PW-9 at 25.06 GPM; Totalizer = 131532.
A(MW-22-88) = 26.270'
B(PW-9) = 38.382'

0840 Stopped test. Watched DTW real-time readings at PW-9 with Matt Wilson. Tim Stone was at PW-8; Doug Laffoon at PW-7. Matt had radioed to Tim and Doug and all shut off pumps at 0840.

Jerry Jones 4/30/10

Location Gasco - Portland Date 4/30/10

Project / Client Oversight of END of Long-term Pumping test at 25 GPM

0840 Within 30 seconds of shutting off pump, well is quickly recovering. Totalizer at stop = 131,551 gal
30 sec: A = 26.279'
B = 34.333' (PW-9)

0841 A = 26.250'
B = 29.208' (PW-9)

0842 A = 26.233'
B = 27.059' (PW-9)

0843 A = 26.214'
B = 26.102' (PW-9)

0844 A = 26.198'
B = 25.745' (PW-9)

0855 A = 26.183'
B = 25.664' (PW-9)

0856 A = 26.177'
B = 25.656' (PW-9)

So in 16 minutes after stopping test, PW-9 has recovered from 38.382' to 25.656' = 13 feet. This is likely the total drawdown that occurred. Don't have start DTW - John Renda will send after processing data from downloads later today.

Jerry Jones 4/30/10

Location Gasco-Portland Date 4/30/10

Project / Client Oversight of END of Long-term Pump Test at 25 GPM

0910 Tim Stone and I walked to PW-7 and PW-8 to get recovery info:

PW-7 DTW:

at 0839 22.832'

0840 20.499' Totalizer = 131,520 gal.

0841 17.128'

0842 16.737'

0843 16.643'

0844 16.621'

0849 16.569' Stabilizing

So total recovery of ~ 6' in 9 minutes.

PW-8 DTW: ~~20.164~~ ~~DD~~ 4/30/10

at 0839 ~~20.172~~

0840 18.124'; totalizer = 131,258 gal

0841 17.147'

0842 17.104'

0843 17.083

0844 17.067

0845 17.055

This is ~ 3' of recovery in 5 min.

0920 Tim Stone stated modelers will evaluate data to determine next pump test - GPM and duration

Jeffrey Jones 4/30/10

Location Gasco-Portland Date 4/30/10

Project / Client Oversight of End of Long-Term Pump Test at 25 GPM

Photo log from 4/30/10:

#1-3 Doug Laffoon at treatment system (see page 117 of this log).

#4: Doug Laffoon showing me line of water to sewer after carbon treatment taken at 0824.

0841: Photo #5: PW-7 DTW

0841: Photo #6 DD 4/30/10 Tim Stone and Doug Laffoon at PW-7

0841 Photo #7 and #8 Off-shore piezometers along catwalk

0842 Photo #9 PW-8 DTW

0842 Photo #10 PW-9 DTW

0842 Photo #11 PW-9 just before stopping test. (these times are camera times, not by my watch. Test was stopped at 0840)

0925 Photo #12 and #13 Matt Wilson and Doug Laffoon starting on rounds to download transducer data and take manual readings at all wells.

0925 Left site.

Jeff Jones 4/30/10

Location Gasco-Portland Date 5/7/10

Project / Client Oversight of End of Long-Term (35 GPM) Pump Test 2

1620 Arrived at Gasco Site. Weather 72°F, partly cloudy.

1630 Walked with Matt Watson, Anchor, to PW-7. He can stop all three pumping wells since have been wired together.

PW-7 A = 26.718'; B = 16.233'

totalizer = 301308 US gal

GPM = 35.05

1631 Stopped test totalizer = 301316

1634 Walked to PW-9:

A = 29.015; B = 31.249'

Totalizer = 301,339 USG

1635 PW-9 A = 28.564' B = 29.155'

Matt stated DTW was ~47' during test. 47.499 was highest DTW reading at 1630. At 1631: 43.925'

1632: 34.945'.

1636 Matt stated next test will including sampling: SVOCs, VOCs, BAHc, cyanide.

1639 Back to PW-7:

Totalizer = 301,316 Gal.

A = 19.386'; B = 15.959' Stable.

or nearly stable now.

Steven Quant 5/7/10

Location Gasco-Portland Date 5/7/10

Project / Client Oversight of End of Long-term (35 GPM) Pump Test

1641 PW-7 Data:

1629: 29.036'

1630: 28.769'

1631: 20.769'

1632: 19.745'

1633: 19.526'

1634: 19.466'

1635: 19.448'

1636: 19.421

1637: 19.408

1638: 19.391'

1639: 19.381

1640: 19.363'

1641: 19.355'

1644 At PW-8: totalizer = 300631

B = 27.793'; Data for A:

1629: 24.310

1630: 23.705

1631: 20.076

1632: 19.991

1633: 19.960

1634: 19.925

1635: 19.904

1636: 19.887

Location Gasco-Portland Date 5/7/10

Project / Client Oversight of end of 2nd Long term Pump test.

Data from PW-8, cont

1637	19.859'
1638	19.846'
1639	19.830
1640	19.821'
1641	19.813'
1646	19.765'

1648 At PW-9

1629	47.499
1630	47.499
1631	43.925
1632	34.545
1633	31.355'
1634	29.725
1635	29.024
1636	28.748
1637	28.613
1638	28.533
1639	28.492
1640	28.467
1641	28.453
1642	28.442
1643	28.441

1650 PW-9 A = 28.829' ; B = 28.442'

[signature] 5/7/10

Location Gasco-Portland Date 5/7/10

Project / Client Oversight of end of 2nd long-term pump test.

1700 Return to on-site trailer. Sampling for cyanide, total and dissolved metals, calcium, sodium, etc. cons. At beginning and end of test. One sample from river; 3 samples from each well. At beginning, middle and end of test.

1702 Matt stated this test (current one ended today) ran for 82.3 hours.

1705 Depart site.

[signature] 5/7/10

Location Gasco-Portland Date 7/1/10

Project / Client Oversight of New Pumping Well Installation - PW-8-52

0700 Arrive at Gasco site. Escorted to on-site trailer. Tim Stone, Matt Wilson, and Doug Laffoon present. (Anchor staff.) Weather: overcast 56°F.

0708 Cascade Drillers Jeffrey and Kevin arrive at trailer for Health & Safety Meeting. Caleb also w/ Cascade. Well will be 45-55' deep. Up to 40' of screen. Stainless steel screen. Granular bentonite over the grout, if dry bentonite needed at all. Goal to go to med sand then backfill above that with coated bentonite pellets. Grout w/ organoclay due to potential NAPL. 20/40 fine sand for filter pack.

Evacuation route - meet at guard gate. COCs at site TPH, gasoline and oil products, PAHs, main risk is ingestion. Wash hands before eating. Smoking away from rig and only in designated smoking areas on site. Tim - 1st site H&S officer, then Matt.

Jeffrey Jones 7/1/10

Location Gasco-Portland Date 7/1/10

Project / Client Oversight of New Pumping Well Installation - PW-8-52

0720 H&S Meet, con't.

Some volatile contaminants. PID breathing zone readings during drilling. If above action levels in H&S Plan, will confirm with drager tubes and stop work if levels above action levels. H_2S and HCN monitored for. Drillers and anyone in contact with soil need to wear 2 pairs of gloves, rainwear or tyvek. Screen will be placed in units without too wide layers of silt. Will use HDPE to wrap around segments of screen to block off any silty sections. Concern is for long term plugging of this well could allow silt to be pulled through and leave a void. Matt: first 15' = fill, will do 5' cores. Three 5' runs, then go to 10. 5' to get better recovery. Also will do 5' runs when near target depth so don't punch through med sand into fine.

Jeffrey Jones 7/1/10

Location Gasco-Portland Date 7/1/10

Project / Client Oversight of Pumping Well Installation - PW-8-52.

0740 Screen zone is also filled with fine sands and silts. Advance core barrel, advance casing before pulling out barrel to reduce heave.

0745 Jeffrey, lead driller lead Cascade's H&S briefing. Safety around drill rig, concern around slope. General safety procedures. Decon area. Could power wash directly over the containment pond. Otherwise will set up decon pad on gravel decon area behind trailer - between trailer and river - this is a contained area already for drum storage. Exclusion zone set up to include boot wash. Will set up berm and containment so that no water or soil will go over slope to river.

0800 Drillers left for work zone to complete set-up. Matt and Tim discussing HDPE material and where they will "blind off" screen at silty locations. Haven't used that before.

Justin Jones 7/1/10

Location Gasco-Portland Date 7/1/10

Project / Client Oversight of Pumping Well Installation - PW-8-52.

0815 Walked down to drill site from trailer. Took photo #1 of box with new slotted screen - stainless steel.

0818 Arrive at drill site. Drillers setting up work area. Took photo #2 of drill rig. Took photo #3 of location next to slope.

0830 Anchor and Cascade continue setup. Took photo #4 of Doug Lufkom setting up simple log and processing area. Took photos #5 and #6 of rig on slope slide. Photo #7 shows debris, logs, and vegetation on slope to river. Photo #8 is drill hole - at location of drum. Photos #9 and #10 show Matt Wilson, Anchor, telling drillers where to establish Exclusion Zone and Contamination Reduction Zone (CRZ). Photo #11 of Exclusion zone on north end of work area - yellow tape.

0840 Photo #12 shows Exclusion Zone and CRZ at south end of work area.

Justin Jones 7/1/10

Location Gasco-Portland Date 7/1/10

Project / Client Oversight of Pumping Well PW-8-52 Installation

0900 Drillers begin drilling to collect 0-5' core. Photo #13 shows drillers collecting material in bags. Photo #14 shows drilling hole with drill rod

0905 Photo #15 shows Matt and Doug beginning to process/log 0-5' sample. Photo #16 and #17 shows Doug Laffoon collecting material in baggies from 0-2.5' and 2.5'-5' for PID readings. Matt calibrated PID earlier this morning in trailer.

0910 Drillers collecting 5-10' sample.

0915 Photo #18 of Doug Laffoon disposing soil in drum after logging done. Photo #19 shows 5-7.5' core. Large cobble at 5' was slough that fell into hole from surface after 0-5' pulled out. Photo #20 shows 7.5-10' sample. Fill material w/ debris, brick. Photo #21 shows Doug Laffoon using PID to screen sample for volatiles. No elevated PID readings.

0917 Drillers collected 10-15' sample core.

Jennifer Jones 7/1/10

Location Gasco-Portland Date 7/1/10

Project / Client Oversight of Pumping Well PW-8-52 Installation

0920 Photo #22 = 10-12.5'; Photo #23 = 12.5-15'. Fine-medium sand from 10-12.5'; At ~14' sand is gray.

0925 Drillers switching to 10' core barrel and installing casing.

0930 Photo #24 shows drillers installing casing to 15'.

0950 from Matt Wilson's log:
0-10' dark reddish brown w/ black patches, dry, gravelly silt. Trace concrete pieces, fill. At 5' color change to black with patches of reddish brown. Slightly moist. 10-14.4' dark brownish red, wet, fine-med sand. 14.4-? gray sand. Water table @ 10'.

1000 Photo #25 of Doug Laffoon taking PID reading in drillers' breathing zone.

1024 Photo #26 of drillers collecting ~~15-20'~~ 15-20' sample. 7/1/10 Photo #27 shows sample in bag brought to logging station.

1028 Photo #28 of 15-17.5' part of sample showing sheen. Photo #29 shows ~17.5-20' of sample. Driller collected 5' instead of 10'.

Jennifer Jones 7/1/10

Location Gasco - Portland Date 7/1/10

Project / Client Oversight of Pumping well PW-8-52 Installation

1035 From Matt's log:
14.4 to 16.1': Sand, gray to brown, wet, loose, fine-med. Sheen from 15.7 - 16.1'; slight HC-like petroleum odor
16.1 to ?, silt - dark gray moist trace fine sand, trace spotty sheen from 16.1 to 17.5' trace petroleum-HC like odor. Trace rootlets and black organic material residue and small plant debris
@19.7 - increased sand content - sandy silt.

1046 Photo #30 of Doug taking PID readings of headspace in baggies.

Depth	HCN	PID (ppm)
0-2.5'	1	~~0.2~~ 0.1 ~~00~~ 7/1/10
2.5-5	1	0.2
5-7.5'	1	0.3
7.5-10'	0	0.2
10-12.5'	1	0.4
12.5-15	1	0.5

1051 Took photo #31 of hole showing visqueen sheeting and berm constructed by wrapping plastic around 2x4. Little liquid and soil on top of plastic.
Jerry Jones 7/1/10

Location Gasco - Portland Date 7/1/10

Project / Client Oversight of Pumping well PW-8-52 Installation

1100 Took photo #32 to show PW-8 in foreground with new well PW-8-52 being drilled. Wells are ~19' apart.

1102 More PID results:
~~15-17.5~~ 15-16': HCN = 1; PID = 1.2 ppm
16-17.5: HCN = 2; PID = 1.4 ppm
17.5-20: HCN = 1; PID = 0.8 ppm

1105 Drillers collecting 20-30' sample. Photo #33. Photo #34 of sample.

1110 Drillers installing casing to 30'.
From Matt's log: 19.7 to ? silty sand, dark gray, wet fine sand, moderately plastic silt, soft, trace HC-like odor, trace gravel. Sand and silt layers are interbedded and intermixed.

1140 Later he crossed out "interbedded" and "layers" and wrote "some layers can be discerned, but there appears to be no stratification" (of silt layers).

1158 Drillers collecting 30-40' sample. Will install casing to 40' and then take lunch. Took photos #35 and #36 of sample.

1215 Break for lunch

1300 Return from lunch.
Jerry Jones 7/1/10

Location Gasco-Portland Date 7/1/10

Project / Client Oversight of Pumping well PW-8-52 Installation

1305 Drillers cleaning out casing installed to 40'.

1310 from Matt's log: Silt layer @ 28.8 to 30'. 31.4 to ~~36.0~~ 37.5 SS 7/1/10 silty sand, dark brownish gray, wet, fine sand and high plasticity silt, abundant silt blebs. ~~36~~ 37.5 to 42 SS 7/1/10 sand, dark gray loose, wet, abundant silt blebs, fine-med sand 19.7-31.4 was silty sand and silt.

1315 PID data: 20-22.5': HCN=1, PID=0.4, 22.5-25': HCN=1; PID=0.4, 25-27.5: HCN=1; PID=0.4. 27.5-30=1; ~~0.4~~ 0.2 SS 7/1/10, 30-32.5: 1; 0.5, 32.5-35: 1; 0.4, 35-37.5: 1; 0.6, 37.5-40'=1; 0.6.

1328 Driller informed Matt that sand is heaving in hole will collect 40-50' sample by using 20' core barrel to also get 6-7' of heave out. then will need to use water to control heave going deeper.

1330 took photo #37 of current state of containment around hole. Still looks good - plastic containing water and soil from slope. No drum in photo because drillers just took full one out to replace with an empty one.

Jeff Jones 7/1/10

Location Gasco-Portland Date 7/1/10

Project / Client Oversight of Pumping well PW-8-52 Installation

1351 Drillers collected 40-50' sample. Now will install casing and clean it out to 50'. Took photo #38 of sample. All looks gray medium sand to me.

1420 Received call from Lance Peterson regarding DEQ concern that at this location there is a window where fill where the silt does not occur and fill is directly on top of native sand. Talked with Matt Wilson and Matt stated he did observe a 4' silt layer at bottom of fill. He stated Anchor was going to screen into the fill and I told him DEQ doesn't want that. Also, Matt stated they encountered medium sand more shallow than expected - at ~~45~~ 42 SS 7/1/10. So bottom of well will be at ~~45~~ 42' SS 7/1/10 and they will backfill from 50 to ~~45~~ 42 SS 7/1/10 w/ bentonite.

1435 Matt's log: Sand to 45' (aspirations 22 7/1/10) 45.0-50 Sand dark gray medium grained, wet @ 48-6 large silt bleb @ 49-50' Sand with silt.

1440 Matt waiting for direction from John Rondo

Jeff Jones 7/1/10

Location Gasco-Portland Date 7/1/10

Project / Client Oversight of PW-8-52 Install

1500 Back at trailer. Another concern is that not full recovery on last 10', About 7 out of 10, and some slough on top. So where is medium grained sand depth?

1505 Began raining a little around 1400, now raining a bit harder.

1505 PID readings 40-42.5: 1, 0.4; 42.5-45': 1, 0.0; 45-47.5: 1, 0.2; 47.5-50': 1, 0.2 ppm.

1510 Matt stated med-grained sand did start @ 42' after considering compaction and sloughing. Matt is talking to John Rhuda on phone. Decision is to screen from 7-37'. 37'-42' = sump. Blind out 16-20' silt layer.

1530 Walked back to work site with Matt. Set up canopy from rain. Drillers adding bentonite chips to backfill hole to 42'. 1/2 inch Enviroplug Tablets - coated.

1600 Took photo #39 of HDPE plastic they plan to use to blind part of the screen from 16-20'.

Scott Jones 7/1/10

Location Gasco-Portland Date 7/1/10

Project / Client Oversight of PW-8-52 - Install

1610 Waiting on more bentonite pellets to arrive to backfill hole.

1640 More pellets arrived - brought by Cascade driller. Drillers adding to hole. Used a total of 4.5 buckets.

1640 Took photo #40 of Matt's notes.

1641 Took photo #41 and 42 of drillers assembling sump (5') and screen. Installed centralizer at junction of sump + screen. Photo #43 shows centralizer.

715. Drillers can't get the screen unscrewed from piece used to hang it in place and don't have the right part to use the jaws. Decided to stop for the day. Will start at 6 Am tomorrow.

1725 Depart site.

Scott Jones 7/1/10

Location Gasco - Portland Date 7/2/10

Project / Client Oversight of PW-8-52 Pumping Well Installation

0608 Arrived at Gasco site. Raining, 57°F. Light rain. Waited for Matt Wilson to arrive to be escorted to trailer.

0620 Matt arrived. Drove to trailer. Drillers arrive for H&S meet.

0640 H&S meet ends. Rain is heavier at times. Everything's slippery.

0650 Walk down to PW-8-52 work site. Drillers setting up. Plan is to install well screen + sump, then filter pack. Will not use grout for top seal and annular seal since ~5 ft will use bentonite granular.

0700 Rain is fairly heavy now. Drillers working to detach screen hanging in well hole from piece used to install. Photo #44. Driller using shop vac to vacuum water on tarpaulin sheeting outside well hole.

0715 Drillers still trying to get screen detached. Matt calculated amount of sand needed for filter pack. See next page.

[signature] 7/2/10

Location Gasco - Portland Date 7/2/10

Project / Client Oversight of PW-8-52 Pumping Well Installation

0715 Matt's theoretical volume:

$V_{filter\ pack} = 42 - 5\ ft = 37'$ of filter pack.

$V_{10/6}$ (annular space between 10" borehole and 6" casing)

$= 0.3492\ ft^3/ft$

$$V = \frac{37\ ft}{} \left| \frac{.3492\ ft^3}{ft} \right| \frac{7.48\ gal}{ft^3}$$

$= 96.64\ gal$

$$\frac{96.64\ gal}{} \left| \frac{50\ lb\ bag\ sand}{3.75\ gal} \right. = 25.8\ bags\ of\ sand$$

0723 Drillers adding another length of screen.

0743 Drillers preparing to wrap HDPE around screen from 16-20' BGS. Photos #46 + 47. Screen wrap is at junction of 2 screen lengths. Using centralizer to tighten HDPE around screen. Also will clamp bottom of HDPE. HDPE is woven. Thickness ~28 mil. Photos #48+49 putting clamps on.

0751 Photo #50 shows completed wrap with clamps around screen.

[signature] 7/2/10

Location Gasco-Portland Date 7/2/10

Project / Client Oversight of PW-8-52 Pumping well Installation

0800 Doug Lafferson arrived. Up to this point only Matt Wilson present from Anchor.

0805 Doug Lafferson departed work area to do other site activities.

0806 Drillers adding stainless steel casing to top of screen Photo #51.

0829 Drillers putting temporary pipe casing on top of carbon steel. This will be removed when drillers are able to take out casing and then weld a flange onto the top of the last carbon steel piece for wellhead.

0839 Drillers addy filter pack. Photo #52.

0849 Matt stated name of this well is PW-8-37 (bottom of screen is at 37 feet.

0909 Drillers pulling up 5' lengths of casing as they install filter pack.

1005 Matt Wilson told drillers to stop installing filter pack because he received a call from John Edwards, Anchor, who has been told by DEQ there needs to be 18' of annular seal.

7/2/10

Location Gasco-Portland Date 7/2/10

Project / Client Oversight of Pumping well PW-8-37 (official name now)

1029 work has been stopped and everyone is waiting to here how this will be resolved with DEQ. DEQ is very concerned about a well being screened in the fill unit. They state there needs to be 18' of annular seal above the screen. Anchor is not aware of this requirement. Other pumping wells here are screened ~~deeper~~ deeper so they do have 18+ feet of seal. Currently this well has been constructed and sand filter pack installed to ~10' bgs. So cannot undo the screen at this point without destroying well.

1230 Matt Wilson received word that they are to complete the well as planned. DEQ is still concerned but is allowing them to complete the well.

1245 Back at work area. Drillers have added a total of 26 bags of sand. Drillers surging filter pack now. Currently sand is to 3' bgs (should be five) but expected to settle.

7/2/10

Location Gasco-Portland Date 7/2/10

Project / Client Oversight of PW-S-37 Pumping Well installation

1253 Drillers assembling surge tool. Took photo #53.

1331 Drillers still surging well. Have been surging for 30 minutes. They are trying to get sand level to go down - want sand to 5' bgs. Sand went down 0.5 feet. Matt thinks it will be fine when they pull up the casing.

1336 Drillers removing casing.

1400 Added 3.5 more bags of sand as casing pulled up. Drillers now adding granular bentonite. 29.5 total bags of sand. Top of sand at 4.8' bgs.

1408 Drillers removed rest of casing.

~~1410~~ 1411 7/2/10 Took photo #54 of well. PVC is temporary and will be replaced with carbon steel riser welded to flange for pumping well head.

1420 Driller pushing sand and bentonite down by well casing. Adding more bentonite to seal up well.

1428 Departed site.

J. Jones 7/2/10

Location Date

Project / Client

8/16 1.0

Location _____ Date _____

Project / Client _____

8/6/10

Location _____ Date _____

Project / Client _____

8/6/10

Location _____ Date _____

Project / Client _____

The manufacturers of "Rite in the Rain" all-weather writing products are grateful to the numerous environmental experts who have contributed to the development of this book. Should you have any additions, improvements or corrections for future publications of this field book or have suggestions for other environmental field book formats, we welcome your input.

Although much effort has been taken to ensure the accuracy of the following reference pages, the J. L. Darling Corp. cannot guarantee the accuracy of the data.

To provide input or solicit pricing on these or custom printed field books, contact your "Rite in the Rain" dealer or J. L. Darling Corp., 253-922-5000 or fax 253-922-5300.

www.RiteintheRain.com / sales@riteintherain.com

Common Field Data Error Codes

Error codes are used to explain common mistakes and are written above or close to the mistake. Commonly used error codes include:

RE	Recording Error
CE	Calculation Error
TE	Transcription Error
SE	Spelling Error
CL	Changed for Clarity
DC	Original Sample Description Changed After Further Evaluation
WO	Write Over
NI	Not Initialed and Dated at Time of Entry
OB	Not Recorded at the Time of Initial Observation

Note: Error code should be circled, dated, and initialed when recorded.

Hazard Classifications

Class 1 Explosives
Class 2 Gas
Class 3 Flammable Liquid
Class 4 Flammable Solids (Potential spontaneous combustion, or emission of flammable gases when in contact with water)
Class 5 Oxidizing Substances and Organic Peroxides
Class 6 Toxic (poisonous) and infectious substances
Class 7 Radioactive material
Class 8 Corrosives
Class 9 Miscellaneous dangerous goods

Container type abbreviations (for sampling guidelines)

BR - Boston Round • ABR - Amber Boston Round • AJ - Amber Jug • AWM - Amber Wide Mouth • Poly - Polyethylene Bottles • BOD - Bottle • CWM - Clear Wide Mouth

CDM

"Rite in the Rain"®
ALL-WEATHER
ENVIRONMENTAL
No. 550F

GASCO
Portland Harbor

"Rite in the Rain"®
ALL-WEATHER WRITING PAPER

ALL-WEATHER
ENVIRONMENTAL FIELD BOOK

Name CDM

Address 14432 SE Eastgate Way, Ste 100
Bellevue, WA 98007

Phone (425) 519-8300

Project GASCO
Portland Harbor
Portland, OR

This book is printed on "Rite in the Rain" All-Weather Writing Paper - A unique paper created to shed water and enhance the written image. It is widely used throughout the world for recording critical field data in all kinds of weather. For best results, use a pencil or an all-weather pen.

Specifications for this book:

Page Pattern		Cover Options	
Left Page	Right Page	Polydura Cover	Fabrikoid Cover
Columnar	1/4" Grid	Item No. 550	Item No. 550F

© 1996 J. L. DARLING CORP.

CONTENTS

PAGE	REFERENCE	DATE
1-4	Table of Contents	—
5-9	7/16/10 oversight Notes	7/16/10
10-17	Abandonment of PW-8-37	8/12/10
18-21 18-20	Install PW-8-39	8/13/10
22-28	Development of PW-8-39	8/19/10
29-33	Oversight of PW-8-39 Testing	9/2/10
34-37	Start of PW-8-39 72H Pump Test	9/9/10

Reference Page Index

147 Error codes, Hazardous classifications, Container types
148 Sampling guidelines (Liquids)
149 Sampling guidelines (Solids)
150 Approximate Volume of Water in Casing or Hole, Ground Water Monitoring Well
151 PVC Pipe casing tables
152 Soil Classification
153 Soil Classification
154 Conversions (Length, Weight, Volume, Temp, etc...)
155 Conversions (Concentrations, Volume/Flow or Time, Velocity, Acceleration)
156 Maximum Concentration of Contaminants for the Toxicity Characteristic

CONTENTS

PAGE	REFERENCE	DATE

Location _____ Date _____

Project / Client _____

_____

Location _____ Date _____

Project / Client _____

Location Gasco – Portland Date 7/16/10

Project / Client Oversight of Pumping well Installation

0945 – Lance Peterson (LEP) on site, call Doug Laffoon (Anchor QEA) and show guard TWIC card. Proceed with Doug to Anchor QEA job trailer, get into Level D gear, and proceed to PW-8-37 location.

Weather: mostly sunny ~65°F

1000 – Arrive at PW-8-37. Matt Wilson and Tim Stone (Anchor QEA) and 3 man crew from Cascade driving on site. All personel in Level D protection. Cascade is in process of surging 6" well w/ 5½" diameter surge tool. ~2' of sediment was in bottom of sump at beginning of development.

Lance Peterson 7/16/10

Location Gasco - Portland Date 7/16/10

Project / Client Oversight of pumping well installation

Photo #1: Cascade surging well with surge tool

Pre development DTW = 14.5' TOC (2.8' stickup)

Development record

0829 - Start surging

09:08 - Pump (~8 gpm), Dk Brown cloudy

09:22 - well dry

09:31 - Pump again after recharging, clear at 0938 hrs

09:42 - well dry, surge after water recovers

10:23 - Pump again after surging/recharge (~~5 gpm~~ 2 gpm)

10:28 - Pull pump after driller reports odd feeling while surging w/pump - pump looks ok 4.28 gpm

10:30 - DTW 17' TOC

10:32 - Start pumping

10:48 - Shut pump off momentarily

10:50 - Restart pump

~~30 bucket test~~ using tape, wide tank

Jance Reber 7/16/10

Location Gasco - Portland Date 7/16/10

Project / Client Oversight of pumping well installation

Photo #2: 5½" diameter surge tool

Photo #3: Imhoff cones

A - empty, B - 0931 hrs, C - 1036 hrs

Matt Wilson reports first Imhoff cone was ½ full of sediment (10% fine sand, 90% < fine sand)

10:43 - collect Imhoff cone - looks cloudy, no sediment accumulation after 2 minutes

Note: Tim Stone mentioned there was a flood event in June 2010 that brought river level up to ~14' elev.

10:52 - Shut pump off - Tim Stone thinks pump is sucking itself against side of well sump

Surge w/ pump

10:54 - Start pump

10:56 - Stop pump, 9/10 foot sediment measured in bottom of sump

Jance Reber 7/16/10

Location Gesco Portland Date 7/16/10

Project / Client Oversight of pumping well installation

1108: Set pump w/ chain wrapped around to attempt — no change — valve opened 100% — well no longer getting sucked to edge of casing
Plan per Tim Stone is to surge w/ pump @ 28gpm until dry — after lunch will break up sediment with 1" steel rod & pump sediment out
Photo #4: pump photo w/ chain around intake area
Photo #5: Surging well w/ pump (pump at bottom within sump)
Photo #6: 1" rod to be used to break up sediment in well sump
1120: temp 16.43°C, EC: 608, pH: 6.59
1127: temp 16.35, EC: 600, pH: 6.64
1130: water level is 1' above intake, pump turned off
Tim Stone off site
Jamie Peters 7/16/10

Location Gesco Portland Date 7/16/10

Project / Client Oversight of pumping well Installation

1131: driller reports ~450 gallons in storage tank, tank contents to be placed in treatment system pond
Photo #7, water storage tank on site
Photo #8: overview of PW8 location
11:34: water level comes up 12' still ~9/10 foot sediment in the bottom
Photo #9: Willamette River showing PZ5 cluster
11:40: depart PW8 site for Anchor QEA job trailer with Doug Laffoon and Matt Wilson, drillers proceed to empty water storage tank and break for lunch
1200 — Doug Laffoon escorts LEP to guard shack — LEP off site for day

Jamie Peters 7/16/10

Location Gasco - Portland Date 8/12/10

Project / Client Oversight of Abandonment of PW-8-37 and Install PW-8-37b

0845 Arrived at Gasco site. Weather overcast ~ 59 °F.

0855 Escorted by Matt Wilson, Anchor to PW-8-37 work area. Tim Stone, Anchor, present at PW-37 along with 3 personnel from Cascade Drilling. Drillers working to remove bollards using a forklift. Matt stated drillers arrived on site at 0740. Health and safety meeting was held and drillers then began work to loosen bollards and remove them. Took photo #1 showing this. No exclusion zone has been set up around the work area other than a row of cones with wood connectors lined up on north side of work area to keep people out from that side. A very large container ship is docked at site, visible in photo #1. Exclusion zone will be established when drilling begins.

[signature] 8/12/10

Location Gasco - Portland Date 8/12/10

Project / Client Oversight of Abandonment of PW-8-37 and Install PW-8-37b.

0920 Bollards removed and now drillers brought the air knife over to PW-8-37. Vacuum truck will work to pull out bentonite as cutting proceeds. Took photo #2 showing drillers using jackhammer to cut through top. Photos #3 and #4 show air knife being used to cut bentonite and vacuum to remove it.

0930 Tim Stone stated this well will be called PW-8-39, as bottom of screen will be at 39'. This is consistent with many of other wells but different than PW-8-37b discussed in memo. Only the name (last number) is different than in memo - construction is the same.

1000 Drillers still using air knife to cut through bentonite.

1005 Asked Matt Wilson about location of AED. He confirmed it is back in the trailer, not at work site. I conveyed EPA's request that it be kept at work site.

[signature] 8/12/10

Location Gasco - Portland Date 8/12/10

Project / Client Oversight of Abandonment of PW-8-37 and Install PW-8-39.

1020 Drillers have removed top 4 feet of bentonite seal from well.

1021 Matt Wilson stated that the State well inspector had arrived on-site and Tim Stone went to meet him. Not sure if inspector is here to watch abandonment of this well or to inspect other site wells.

1035 Drillers removed to 5' bgs. Discussion with Matt Wilson about depth as workplan states air knife will be used to remove bentonite to 7' bgs. Matt stated bentonite only went to 5' bgs, then 2' of sand on top of screen at 7'.

1038 Matt used tape measure to confirm bentonite removed to 5'. Took photo #5 of inside of borehole.

1040 Asked Matt about how he will keep track of volume of material removed from well during overdrilling. He stated he will know by the number of drums used. A hollow stem auger or drill rig will be used.

Denise Jones 8/12/10

Location Gasco - Portland Date 8/12/10

Project / Client Oversight of Abandonment of PW-8-37 and Install PW-8-39.

1048 Drillers bringing drums to work site. Also bring hollow auger stems.

1104 Drillers laying out visqueen sheeting. Photo #6.

1111 Matt stated state inspector was here to observe installation of the piezometer so he will come back tomorrow.

1115 I requested to drillers that they berm up visqueen so that no materials can go over the slope. They placed wood pallets on slope against vegetation and pulled sheeting up to ensure nothing can go past. Photo #7. Will need to improve this before starting but still setting up rig.

1118 Matt Wilson establishing exclusion zone on north end of work area using cones and caution tape.

1135 Drillers beginning to attach rig to top of well casing to pull it up. Photo #8. Chain keeps slipping off when pressure is applied. Now trying a different assembly.

8/12/10

Location Gasco-Portland Date 8/12/10

Project / Client Oversight of Abandonment of PW-8-37 and Install PW-8-39

1145 Drillers attaching chain to rig stem itself instead of to wench. Photo #9. Now driller is very slowly pulling up casing. Photo #10 shows casing after pulling out 3-4 feet. Unsuccessfully to use wench again with chain attached to top of casing. Drillers inspecting and wiping off casing as it is being pulled up. Photo #11. Drillers locating seam in casing to prepare to disassemble it. Photo #12.

1206 Drillers successfully removed top portion of casing ~4 feet long. Top section of screen is now visible after more has been pulled up. Seen in Photo #13.

1210 Matt Wilson using PID meter to measure for VOCs in drillers' breathing zone. Nothing detected - VOCs or HCN.

1212 Drillers unscrewing casing from top of screen.

1220 Drillers stated to Matt that they do not have a cap to secure to top of screen to pull it up.

[illegible] 8/12/10

Location Gasco-Portland Date 8/12/10

Project / Client Oversight of Abandonment of PW-8-37 and Install PW-8-39

1221 Drillers will break for lunch + to get the cap to attach to screen.

1230. Departed site.

1310 Returned to site. Drillers still on break. Piece has not yet been delivered.

1410 Cascade personnel arrived with piece needed to pull out screen. Also brought 3" sump (to replace 5' sump). This we were told, however, they have not yet delivered the equipment to the work area.

1420 Matt Wilson left to go see what the delay is - Cascade personnel all at front gate. I am now the only one at the work site.

1430 Drillers and Matt Wilson returned to work site with sump + screen cap. Resumed pulling up screen. Portion from 12-14' that was wrapped in HDPE now visible. (Photo #14). Matt noticed that upper portion of screen is slightly bent (Photo #15).

[illegible] Jones 8/12/10

Location Gasco - Portland Date 8/12/10

Project / Client Oversight of Abandonment of PW-8-37 and Installation of PW-8-39

1436 Drillers removing HDPE wrap from screen.

1442 Next length of screen pulled up and looks in good condition. Only need one length of screen for PW-8-39 (15' of screen needed).

1445 Drillers are wearing nitrile gloves with work gloves on top. Lead driller is wearing raingear pants, other 2 are wearing cotton pants. I discussed with Matt that if drilling is such that they are getting soil cuttings on them, need to wear rain gear or tyvek. Matt stated drilling soil cuttings should be fairly dry and won't splatter. We will see how it goes when they begin hollow stem auger drilling.

1453 Drillers pulled up last screen length and sump. Both in good condition. This 5' sump will be replaced with new 3' sump.

1505 Drillers setting up to begin overdrilling with hollow step auger

Dwight Jones 8/12/10

Location Gasco - Portland Date 8/12/10

Project / Client Oversight of Abandonment of PW-8-37 and Install PW-8-39

1505 Photo #16 shows leading edge of drill with wooden plug in center. Cuttings are pulled up on the outside of the auger as it goes down.

1510 Driller positioned drums for collecting soil cuttings. Matt placed labels on the drums. Photo #17.

1528 Drilling proceeding slowly. Took photo #18 showing borehole. Visqueen up on pallets as berm. Matt stated he didn't know how long they would work tonight — depends on how much they get done. I will call him later to check in.

1530 Departed site.

8/12/10

Location GASCO - Portland Date 8/13/10

Project / Client Oversite abandonment of PW-8-37 and install PW-8-39

700 Arived on-site and met Matt with Anchor
710 Drillers arrived on site. Cascade drilling, 4 members
720 Held health and safety Meeting
AED Kept in job trailer.
730 The status of the well is that the overdrill has been completed and the well casing has been installed. They are now in the process of removing the auger sections and back filling with sand. 15' of Auger have been removed with 25' remaining in the hole. Sand is 10-20 sieve size silica sand, 39 bags were used yesterday, each bag is 50lb bottom of well is ~42.1, bottom of screen is ~38.1, top of screen is ~24.6 all from ground surface.
750 Re measured surface of sand, ~~24'-5~~ MPH 8/13/10 24'-7". Matt stated that theoretical quantity of sand calculated was 39 bags, (1950 lbs) to reach 23' or 15' of screen.
830 Surging filter pack sand around casing
845 Waiting on driller to bring Bentonite continuing to surge well casing MPH 8/13/10

Location GASCO - Portland Date 8/13/10

Project / Client Oversite Abandonment of PW-8-37 and install of PW-8-39

850 Matt calculated that 324 gal of waste material will need to be removed, so far ~ 2 1/2 55 gal drums have been filled or ~240 gal. Drill crew must scrape of waste from auger flights when pulling up auger.
900 All drilling personnel are wearing gloves, hard hats, glasses.
930 Surging complete. Added 4 more bag of sand (43 total) MPH 8/13/10 and began removing auger equalling 110% of calculated sand. (43/39). Final sand level = 23'
945 Bentonite added (3/8" chips)
1000 Total of 5 auger sections removed, filled 3rd 55 gal drum of waste, continuing to add bentonite
1010 - VOC/Hydrogen cyanide air test done non-detect.
1020 - Removed last auger section added Bentonite to 2' below surface, filled 4th 55 gal drum and ~ 1/5 of 5th. 34 bags of bentonite used
Calculated volume = 160 gal, 31.3 bags
This equates to 108% of estimate.
MPH 8/13/10

Location GASCO-Portland Date 8/13/10

Project / Client Oversite of abandonment of PW-8-37 and install of PW-8-39

1030 Moved drill rig ~20' South for instal of peziometer OW-8-## , 6' South of PW-8-37
With inclusion of waste plastic and dirt 7 55gal drums were used. Max 355gal.
1040 Decontamination started on 10" Auger Sections.
Doug with Anchor came on site around 930
1125 began drilling peziometer and collecting soil samples. Matt ~~1130~~ estimated screening at ~23-28' 1130 left side.
After consult with lance peterson, before piezometer drilling began location was changed to 10' South of PW-8-39 in order to meet criteria in Abandonment/ installation memo.

MPH 8/13/10

Location Gasco-Portland Date 8/17/10

Project / Client Oversight of Abandonment of PW-8-37 and Install of PW-8-39

The following photo log for photos taken on 8/13/10 at the Gasco site by Matt Hewitt, CDM, was written by Jennifer Jones, CDM, based on Matt's notes:

Photo #	Description
1	Close view of top of well showing cap
2	View of top of well showing casing w/cap
3	3 sections of auger pulled out of boring
4	General view of work area
5.	Drums next to boring - soil cuttings inside
6	Close-up of label on bag of sand
7	Wide view of driller surging filter pack
8	Driller using surge tool down center of auger stem
9	Driller adding bentonite to well down auger stem
10	Another view of driller adding bentonite
11	Driller pulling cuttings of auger and into drum
12	View of soil cuttings at top of boring as auger removed
13	Driller shoveling soil cuttings into drum
14	Drillers adding more bentonite
15	Auger close-up showing soil cuttings

8/17/10

Location Gasco - Portland Date 8/19/10

Project / Client Oversight of Development of PW-8-39 and Piezometer

0755 Arrived at Gasco site. Weather drizzling and overcast, 58°F.

0805 Attended Health and Safety Meeting. Discussed emergency procedures, plan for day is to develop ~~AA~~ 8/19/10 PW-8-39 and then adjacent piezometer if time allows. Will be 3 stages of 15 min surges, followed by getting everything out of well. Expecting ~3 GPM of well recharge following drawdown. H&S meet was lead by driller personnel (Cascade). Doug Laffoon is only Anchor QEA personnel present. Water from well will be dumped into on-site holding pond and then will go into treatment system. Doug will develop piezometer with a water a pump either this afternoon or tomorrow (Doug can do this by himself).

0820 Walked to PW-8-39 with Doug Laffoon

[signature] 8/19/10

Location Gasco - Portland Date 8/19/10

Project / Client Oversight of Development of PW-8-39.

0822 Took Photo #1 of PW-8-39 and adjacent Piezometer - OW-8-28.

0825 Doug Laffoon measured depth of well - 37.1 feet. Since total depth of well is 44 feet (including stick up of casing above ground surface) this would indicate there is 7' of silt in bottom of well. Depth to water is 19.30', including stick up which is 2.3 ft.

0850 Cascade drillers (2 persons) setting up at PW-8-39. Drillers are wearing rain gear and two layers of gloves - nitrile and overgloves.

0851 Took Photo #2 of surge tool.

0900 Drillers lowering surge tool into well.

0901 Doug stated there was no silt in well on Friday after they surged for 1 hour. He thinks over the course of the last week, tidal influences from the river have brought in a lot of material through the 15' screen.

[signature] 8/19/10

Location Oasco-Portland Date 8/19/10

Project / Client Oversight of PW-8-39 well development

0905 Begin well surging.

0910 Drillers having a problem getting surge tool to go all way down. Worried about packing the sediment down so have pulled surge tool out. Drillers have to try and get sediment out of well either by lowering a pump and putting water in and pulling everything out of by airlifting it out.

0920 Drillers lowering a steel bailer down well. Photo #3. Pulling it up and down to stir up sediment and pull it out. Photo #4.

0921 Doug Lafferson is measuring depth in adjacent piezometer OW-8-28. Photo #5. Doug measured 6" of sediment in OW-8-28.

0925 Driller collecting material-water and sediment pulled out of PW-8-39 into buckets and then dumping them into holding tank on truck. Photo #6.

Justin Jones 8/19/10

Location Oasco-Portland Date 8/19/10

Project / Client Oversight of PW-8-29 Well Development.

0927 Doug Lafferson collected material in Imhoff cone. Photo #7.

0930 Drillers stated sediment is now at 40'. So 3' has been removed using this bailing method. Photo #7 shows driller releasing material from bailer into bucket.

0944 Drillers have removed 35 gallons of water and sediment from well. Depth to top of sediment is now 42.4'. Still ~2' of sediment in well. Doug's measurements of water from Imhoff cone: Temp = 16.37; EC = 834; pH = 7.29. Dark gray silty sand.

0950 Doug collected a second Imhoff cone from well water pulled out. Photo #8.

0955 50 gallons of water and sediment now removed from well.

1008 Drillers lowering pump into well. Photo #9. 65 gallons have been removed from well. Pump is at 5 GPM.

1012 Doug collected sample from pumped water.

Justin Jones 8/19/10

Location Gasco - Portland Date 8/19/10

Project / Client Oversight of Well Development - PW-8-39.

1013 Took photo #10 of drilling filling Imhoff cone with sample of material - water, sediment being pumped out of well.

1016 DTW is 31.55'

1020 Doug's notes on Imhoff cones:

A cumulative volume removed = 30 gal

B " " " = 65 gal

C " " " = 90 gal

1019 Well is dry with 110 gallons total removed. DTW = 42.2'. Stopped pumping.

1023 DTW now ~30'. Drillers pulled out pump and preparing to bail again. Lots of sand still in well ~2'. 41.5' from top of flange to top of sand in well. Since well is 44' w/ flange, still 2.5' of sand in well.

1025 From Doug's notes:

Cone	Temp	EC	pH	DTW
A	16.37	834	7.29	–
B	16.30	846	7.49	–
C	17.02	903	7.46	3.55

[signature] 8/19/10

Location Gasco - Portland Date 8/19/10

Project / Client Oversight of Development - PW-8-39

1032 Drillers have removed another 15 gallons from well using bailer. Doug collected another Imhoff cone and sample for conductivity + pH, etc. Photo #11 [initials] 8/19/10

1042 Another 15 gallons bailed from well. Material coming out now is primarily sand. Doug stated first set of Imhoff cones had 80% silt, rest sand. Now ~50% silt and 50% sand. Photo #12 shows that in the middle cone, primarily sand with cloudy water on top containing some silt.

1052 Depth to sand in well is 42'. Still ~2' remaining. Continue bailing. So far a total of 170 gallons have been removed from well. Depth to sand is now ~~41.5'~~ 42.5' so still 1.5' of sand. [initials] 8/19/10

1112 Depth to sand now 43.2'. Less than a foot of sand in well now. Continue bailing.

1122 About 0.5' of sand left. Continue bailing.

[signature] 8/19/10

Location Gasco-Portland Date 8/19/10

Project / Client Oversight of PW-8-39 Development

1123 Doug's notes on 2nd set of Imhoff cones:

Cone	Temp	EC	pH	DTW	cumulative Vol. removed (gal)
A	16.63	928	7.47	—	125
B	16.52	892	7.36	—	155
C	16.63	885	7.4	—	185

A = 150/100 sand/silt
B = 250/75 sand/silt
C = 240/30 sand/silt.

1125 Doug collected another Imhoff cone. A = Temp = 16.63; 868 EC; 7.49 pH
215 gallons removed so far.

1130 Only a couple of inches of sand in well now. Drillers putting pump into well. 225 total gallons removed before start pumping. "A" cone from 1125 = 300/30 sand/silt.

1136 Pump appears to be clogged with sand. Actually, generator won't start.

1200 Spoke with Lance Peterson, CDM, to provide update on work so far. Will call Doug Laffoon later this afternoon to see what was accomplished.

1208 Departed site.

Jenifer Jones 8/19/10.

Location Gasco-Portland Date 9/2/10

Project / Client Oversight of PW-8-39 Testing

0955 Arrived at Gasco site. Weather mostly clear and sunny, 65°F.

1005 Escorted by Doug Laffoon (Anchor) to on-site trailer and met Tim Stone (Anchor)

1030 Accompanied Doug and Tim to PW-8-39 location. Took photo #1 of work area showing PW-8-39 on right (in back) and adjacent piezometer OW-8-28 on right in front. On left is a large water tank to which water from PW-8-39 will be pumped.

1032 Took photo #2 showing PW-8-39 with Grundfos pump installed. Tim Stone stated that all transducers on-site have been reset.

1035 Doug took manual water level measurement at PW-8-39 = 20.96' DTW. OW-8-28 DTW = 19.68'. Totalizers = 8694 gal for PW-8-39 and 5175 gal. Photo #3.

Jenifer Jones 9/2/10

Location Gasco - Portland Date 9/2/10

Project / Client Oversight of PW-8-39 Testing

1037 Pump test started at 1.04 + 1.06 GPM. There are two totalizers hooked up (and two flow meters) for redundancy. Flow meters were calibrated this morning by Doug using a graduated bucket. Photo #~~3~~ 4/~~22~~ 9/2/10 shows 2 flow meters/totalizers on line.

1042 Doug is readjusting pump rate as it has dropped to 0.9 GPM.

1045 Doug took manual water level measurements in PW-8-39 and OW-8-28. Photo #~~4~~ 5/~~23~~ 9/2/10. Water level in OW-8-28 has not changed yet.

1055 OW-8-28 now showing drawdown.

1110 Pumping well drawdown is slowing, as is OW-8-28.

1140 Doug measuring water levels every 5 minutes. PW-8-39 may be stabilizing now. Tide is coming in slowly.

1147 Doug stated water levels are coming back up. Will increase pumping rate now to 2 GPM.

[illegible signature] 9/2/10

Location Gasco - Portland Date 9/2/10

Project / Client Oversight of PW-8-39 Testing

1148 Doug increased pumping rate to 2.0 GPM.

1300 Drawdown in PW-8-39 is now ~13' from 20' at start to 33' DTW. OW-8-28 has slowed down and is no longer being drawdown. Still pumping at 2 GPM. Will increase to 2.5 GPM soon.

1301 One of the 2 flowmeters/totalizers stopped working. Good there is a backup.

1309 Tim Stone said likely will not increase pumping rate beyond ~2.5 or ~2.7. Do not want to draw well down below 38'.

1320 The following data is from Doug Raffoon's notes:

Time	Total Gal	DTW: PW-8-39 / OW-8-28	
0	8694/5135	20.96/19.68	
1	— —	21.92/Same	all 1.6 GPM
2	— —	22.20/Same	
3	— —	22.76/Same	
4	— —	22.92/Same	
5	— —	23.33/Same	
~~98~~ 6	— —	23.95/19.68	
7	— —	24.39/Same	
~~98~~ 8	— —	24.64/Same	
~~98~~ 9	— —		
~~98~~ 10	— —		
11	8704/5185		

[illegible signature] 9/2/10

Location Gasco-Portland Date 9/2/10

Project / Client Oversight of PW-8-39 Testing

1320 Dong's notes, con't: (10 GPM)

Time	Total Gal	DTW (PW-8-39/OW-8-28)
13	—	24.94/same
15	8709/5190	25.30/19.79
20	8714/5195	25.72/19.88
25	8719/5200	26.13/19.95
30	8724/5205	26.18/19.98
35	8729/5210	26.38/20.05
40	— —	26.52/20.12
45	8738/5220	26.59/20.15
50	— —	26.77/20.19
55	— —	26.82/20.21
60	8752/5235	26.82/20.23
65	— —	26.78/20.21
70	8757/5235	26.77/20.21

2nd test, at 2 GPM:

Time	Total Gal	DTW (PW-8-39/OW-8-28)
0	8752/5235	26.77/20.21
1	— —	27.06/20.22
2	— —	27.44/20.23
3	— —	— —
4	— —	27.79/20.24
5	— —	— —
7	— —	28.20/20.22

Jeff Jones 9/2/10

Location Gasco-Portland Date 9/2/10

Project / Client Oversight of PW-8-39 Testing

1320 Dong's notes, con't (2 GPM)

Time	Total Gal	DTW (PW-8-39/OW-8-28)
9	— —	28.81/20.24
18	— —	29.08/20.24
13	— —	29.50/20.24
15	— —	29.68/20.24
20	8799/5282	30.49/20.25
25	— —	30.94/20.25
30	— —	31.46/20.25
35	— —	— —
40	8841/5322	32.27/20.24
45	— —	— —
50	8862/5343	33.34/20.25
60	8881/5363	33.77/20.25
70	8901/*	34.18/20.25
85	8929/*	34.49/20.24

* Flowmeter stopped working

1325 Plan was to increase to 2.5 GPM and potentially higher until max well out. Pump test to be conducted next week.

1330 Departed site.

Jeff Jones 9/2/10

Location Gasco-Portland Date 9/9/10

Project / Client Oversight of 72h pump test of PW-8-39

0848 Arrive at Gasco site gate. weather overcast, 60°F.

0853 Escorted to on-site trailer by Doug Laffoon, Anchor. John Renda, Anchor, also present at trailer.

0900 walked to PW-8-39 with John Renda while Doug Laffoon drove truck down with equipment.

0902 John suggested Doug get a tote to enclose the pump in case of rain.

0916 Doug Laffoon arrived with waterproof tote and is feeding cords through sides. Photo #1.

0919 John Renda measured DTW in PW-8-39 manually. DTW = 18.32'. Also measured DTW in OW-8-28 photo #2. DTW = 17.94'.

0920 John instructed Doug that test will be 2 GPM. John stated if later this afternoon well is still drawing down, will need to stop, let well recover, and then start again at lower GPM.

Signature Jones 9/9/10

Location Gasco-Portland Date 9/9/10

Project / Client Oversight of 72h pump test (start of) at PW-8-39.

0925 Start pump test at 2 GPM. As last week, there are 2 flow meters/totalizers on line. Flow meters are reading 2.04 GPM and 2.05 GPM.

0930 John Renda taking DTW reading in PW-8-39. Photo #3 shows wide view of work area. DTW = 21.76'. John stated if need to lower GPM rate later Monday, will go to 1.8 GPM. Test will be ended on Sunday morning ~9:30 am to stop test. Data from electronic transducers will continue to record and be downloaded on Monday. This same pump was used at MW-1 for a 72 h test so should be reliable.

0934 DTW = 24.27', in PW-8-39. Flow rates now reading 1.94 GPM. Doug Laffoon adjusting to 2.0 GPM. Flow meters now reading 2.04 and 2.03 GPM.

Signature Jones 9/9/10

Location Gasco-Portland Date 9/9/10

Project / Client Oversight of start of 72h pump test at PW-8-39

0940 Doug Laffoon stated that the wells he will monitor during the test are: PW-8-39, OW-8-28, PZ-5, OW-15, MW-21, ~~of~~ MW-23, and PZ-1 wells.

0941 DTW = 27.55' in PW-8-39

0955 Pump is at 39' (top of sump, bottom of screen). So don't want drawdown past 39' bgs.

1003 DTW at PW-8-39 = 30.09'.

1007 DTW at OW-8-28 = 18.74', this is down almost 1 foot since start of test. DTW = 30.47' in PW-8-39 on electronic transducer. John is using "Rugged Reader" to view electronic transducer data. Photo #4.

1010 From Doug's notes:

Pump test at 20 GPM:

Time	DTW (PW-8-39 / OW-8-28)	Totalizer #1/#2
0918	18.32 / 17.94	10281/6690
0926	21.76 / not measured (NM)	NM
0932	24.27 / NM	NM

Jeffrey Jones 9/9/10

Location Gasco-Portland Date 9/9/10

Project / Client Oversight of Start of 72 H Pump test at PW-8-39

1010 Doug's notes con't:

Time	DTW (PW-8 / OW-8)	Totalizer #1/#2
0933	25.45 / NM	NM
0939	~~25.~~ 27.55 / NM	10309/6719
1000	30.09 / NM	10335/6765
1006	30.47 / 18.74	NM
1013	30.87 / 18.84	NM

1020 Doug will continue to observe pumping and record data throughout today. I will call him later this afternoon to get an update on results of the test.

1025 Departed site.

Jeffrey Jones 9/9/10

Location Gasco - Portland Date 11/8/10

Project / Client Oversight of Pumping Test and Groundwater Sampling.

0950 Arrive at Gasco site. Escorted to on-site trailer. John Renda, Tim Stone, Matt Wilson, and Doug Laffoon, Anchor QEA present and preparing to start pump test. Will run pumping wells at 25 GPM, except PW-8-39 which will be at 2 GPM (this is the shallow well). Will also collect water samples at beginning, middle, and end of 72 h pump test. Water quality parameters will be measured using a YSI meter. Anchor personnel is gathering sampling equipment.

1020 Arrived at PW-7 with Anchor staff. Tim Stone setting well to pump at 25 GPM. Depth to water is 19.012' prior to test. Will run test for 10 min before collecting sample to ensure have purged at least one well volume prior to sampling.

[signature] 11/8/10

Location Gasco - Portland Date 11/8/10

Project / Client Oversight of Pumping Test and Groundwater Sampling.

1025 Tim Stone setting PW-8 and PW-9 at 25 GPM. Will actually purge 3 volumes on wells prior to sampling so this will take ~30 minutes of pumping prior to collecting sample. PW-8-68 is name.

1026 Water samples collected for: cations, anions, cyanide, iron, manganese, total metals. Cations/anions include potassium, nitrate. Field filtering everything except total metals and cyanides. Ammonium sulfate, sodium, carbonate, and bicarbonate also included in cations + anions group.

1030 DTW at PW-8 prior to test is 19.440'. Took photo #1 of Matt Wilson at PW-8. Crew has to replace a part on PW-8 sampling probe as piece was cracked.

1040 Took photo #2 of Doug Laffoon taking DTW at PW-8-39. DTW = 17.47'. Will measure again at start.

[signature] 11/8/10

Location Gasco - Portland Date 11/8/10

Project / Client Oversight of Pump Test and Groundwater Sampling

1043 Took photo #3 of PW-8-68 and PW-8-39 set-up with PW-7 in background. Weather today is mostly cloudy, ~45°F.

1045 Doug Laffoon stated he will monitor DTW manually and check electronic transducers in several primary wells daily during the 72 hour test.

1050 Anchor will collect a river water sample too, from river surface at Gasco dock. This is "background".

1053 DTW at PW-8-39 is 17.51'.

1055 A total of 5 samples will be collected: PW-7, PW-8-68, PW-8-39, PW-9, and river. JJ 11/8/10

1058 DTW at PW-9 is ~~28.853~~ 28.35. DTW at PW-7 is 19.962. PW-8-68 is 19.56'.

1100 Started pump test. John Renda started 3 pumping wells (PW-7, 8, 9) at same time from PW-7. Doug Laffoon started PW-8-39 manually at 2 GPM at same start time. Took Photo #4 of Doug.

Jerry Jones 11/8/10

Location Gasco Portland Date 11/8/10

Project / Client Oversight of Pump Test and Groundwater Sampling

1103 DTW at PW-8-39 is 20.5'. DTW at PW-8-68 is 20.279'. Purge volumes for pumping wells: PW-7: 602 gallons; PW-8-68: 403 gallons; PW-8-39: 108 gallons; PW-9: 530 gallons. Sampling will be in about 25 min.

1105 Anchor crew realized PW-8-68 stopped pumping. Tim Stone is checking controls. Now pumping at 38 GPM, now adjusting to 25 GPM.

1108 Took photo #5 of flow meter/totalizer at PW-8-68. Anchor did not record totalizer readings at start of test. Totalizer at PW-8-68 is 302402 gallons now.

1109 totalizers at PW-8-39: 15271 and 18861. There are 2 flow meters here for redundancy as before.

1111 Tim Stone instructed John Renda to stop pumping test and start over. PW-8-39 stopped also. PW-7 kicked off for some reason, and PW-8 did too so need to start over.

Jerry Jones 11/8/10

Location Gasco-Portland Date 11/8/10

Project / Client Oversight of Pump Test and Groundwater Sampling

1115 John Kinda stated maybe there is a valve along pumping line to pond that got closed and this is causing pumps to stop.

1127 Totalizer readings for next start:
PW-7: 303135 gal
PW-8-68: 302473 gal
PW-8-39: 18868 / 15278 gal
PW-9: 303198 gal

1130 Matt Wilson stated will zero out all totalizers (except can't do the PW-8-39 ones) before next start. Plan to restart test at 1200.

1200 Starting pump test. DTW at PW-7 = 19.455'. At PW-8-68: DTW = 19.848'. PW-9 is 28.65'. PW-8-39 = 17.95'. Drawdown is evident at PW-8-68.

1205 At PW-8-68 totalizer now 124 gallons, flow = 24.57 GPM.

1211 At PW-8-68 totalizer = 273 gallons flow = 25.44 GPM

1216 At PW-8-68 totalizer = 405 gallons flow = 24.80 GPM.

Quinn Jones 11/8/10

Location Gasco-Portland Date 11/8/10

Project / Client Oversight of Pump Test and Groundwater Sampling.

1217 PW-8-68 has purged 3 well volumes so Matt Wilson collecting samples. Took photo #6 showing this. And Photo #7.

1218 Matt putting filter on tubing to collect filtered samples. Took photo #8 of this.

1222 Matt using YSI meter to collect water parameters. Photo #9 shows YSI meter in use. Totalizer now at 580 gallons. Flow = 25.01 GPM.

1225 Took photo #10 of John at PW-7. Totalizer 661 gallons. Flow = 25.06 GPM

1230 Totalizer at PW-9 is at 755 gal, flow = 25.05 GPM. Matt Wilson using YSI meter. Tim Stone already collected water samples. Temp = 15.87 °C, Cond = 718 µS/cm pH = 7.06, DO = 1.01 mg/L. ORP = 74.6!

1240 YSI parameters at PW-8-68 were: Temp = 17.22 °C, DO = 2.33 mg/L, Cond 767. pH = 7.06 ORP = 57.8.

Quinn Jones 11/8/10

Location Gasco - Portland Date 11/8/10

Project / Client Oversight of Pump Test and Groundwater Sampling

1235 YSI parameters at PW-7: Temp=16.29 °C, Cond=802 µS/cm, DO=0.43 mg/L, pH=7.15, ORP=65.9.

1240 Totalizer reading = 993 gallons at PW-7. Flow=25.36 GPM.

1241 Will collect samples from PW-8-39 at around 1300, after 108 gallons purged. Then will collected river water samples.

1248 Left site.

Jake Jones 11/8/10

Location Gasco-Portland Date 11/11/10

Project / Client Oversight of end of Pump Test and Groundwater Sampling

1130 Arrive at Gasco site. Weather partly cloudy, 48°F.

1140 Met Matt Wilson, Anchor QEA, at PW-8. Matt began collecting water samples from PW-8-68. Water level (depth to water) = 23.201 ft. Totalizer = 107547 Gallons; flow = 24.95 GPM. Matt stated he just completed sampling at PW-9. Matt is only Anchor staff present today.

1145 Took Photo #1 of Matt collecting water sample at PW-8-68. Matt stated everything seems to be going fine during this pump test. One well, ~~MW-13~~ MW-21-12 is beginning to drift away from manual readings. In other words, electronic transducer readings are ~0.15 feet different than manual readings. All other wells monitored during pump test were within 0.1 feet, which is the cutoff at where transducer would be re-set. (but not during pump test)

Jake Jones 11/11/10

Location Gasco - Portland Date 11/11/10

Project / Client Oversight of end of 72h Pump test and Groundwater Sampling.

1148 Matt stated mid-test samples were collected early Wednesday (11/10) morning.

1149 Matt using YSI meter to collect water parameter data at PW-8-68. Took Photo #2 showing this. Photo #3 is close-up of YSI meter recording data from PW-8-68.

1155 Based on starting DTW of 19.848, there has been < 4' of drawdown in this well, PW-8-68.

1200 Matt collecting water samples from PW-8-39. Took Photo #4 of this. Matt stated ~~will not collect DTW~~ 11/11/10 ~~here~~ - have an electronic transducer in this well and only collected DTW manually at start of test to determine purge well volume. Matt is filtering samples for everything except total metals + cyanide, as before. Totalizer readings at PW-8-39 are 27391.6 and 23715.2 gallons. During sampling at PW-8-39, pressure leaks out sampling port and pumping rate decreases to ~0.7 GPM.

Geofrogoner 11/11/10

Location Gasco-Portland Date 11/11/10

Project / Client Oversight of end of 72h Pump Test and Groundwater Sampling.

1205 When not sampling, pumping rate at PW-8-39 is at 2.05 GPM.

1207 YSI parameters at PW-8-68: Temp: 17.19°C; Cond. = 710 µS/cm; DO = 0.15 mg/L; pH = 7.33; ORP = 30.6.

1210 Water samples are kept on ice in a cooler in Matt's van.

1214 Matt measuring DTW in PW-8-39. DTW = 34.16 feet. Based on starting DTW of 17.95, drawdown here is ~16 feet. YSI parameters: Temp = 17.24°C, Cond = 826 µS/cm, DO = 0.14 mg/L, pH = 7.33, ORP = 42.8.

1220 Setting up to sample at PW-7. (PW-7-93). DTW at PW-7 = 25.819 feet. Based on starting ~~DTW~~ 11/11/10 DTW of 19.455, approx 6 feet of drawdown here. Totalizer = 108519 gallons, flow = 25.07 GPM.

1237 YSI parameters at PW-7: Temp = 15.74°C, Cond = 859 µS/cm; DO = 0.26 mg/L; pH = 7.36; ORP = 35.2.

1244 All sampling completed (except at river). Test stopped.

Geofrogoner 11/11/10

Location Gasco-Portland Date 11/11/10

Project / Client Oversight of end of 72h Pump Test and Groundwater Sampling

12:45 DTW at PW-7 = 20.257 feet (recharging).

12:46 From Matt's notes: YSI parameters at PW-9: Temp = 15.78 °C, Cond = 703 µS/cm, pH = 7.16; DO = 0.18 mg/L, ORP = 92.4. Samples were collected at 1119. DTW = 40.90 feet. Totalizer = 107167.0

1249 Totalizer at PW-9 = 109109 gal PW-8-68 = 10955, PW-8-39: 23789/27468. PW-7: 109063. These are at test stop so total gallons pumped.

1250 DTW at PW-7 = 19.819 feet

1252 DTW at PW-8-68 = 20.196 feet.

1253 DTW at PW-9 = ~~29.253~~ 28.819 feet. 11/11/10

1256 Return to on-site trailer to get YSI parameters from Matt's notes: On 11/8/10 YSI parameters of Willamette River: Temp = 12.22 °C, Cond = 78 µS/cm, pH = 7.32, DO = 9.98 mg/L, ORP = 130.8. Water sample was collected on FAMM boat house at 1330 ~~on 11/7~~ 11/8/10 11/11/10

11/11/10

Location Gasco-Portland Date 11/11/10

Project / Client Oversight of end of 72h Pump Test and Groundwater Sampling

1300 Matt's notes, don't:

PW-7-93 on 11/10/10 at 0729: YSI parameters: Temp = 15.92 °C, Cond = 848 µS, pH = 7.09, DO = 0.31 mg/L, ORP = -8.4. DTW at 0729 = 24.80. Water samples were collected at 0730.

PW-8-68 on 11/10/10. DTW at 0734 = 22.39'. YSI parameters: Temp = 16.12 °C, Cond = 711 µS, pH = 7.05, DO = 0.51 mg/L, ORP = 2.6. Samples were collected at 0735.

PW-8-39 on 11/10/10 DTW at 0744 = 33.98'. YSI parameters: Temp = 17.06 °C, pH = 7.15, Cond = 844 µS, DO = 0.28 mg/L, ORP = 10.4. Water samples were collected at 0745.

PW-9-92 on 11/10/10 DTW at 0805 = 39.84 feet. 66362 gal purged. YSI: Temp = 15.6 °C, Cond = 702, pH = 7.13, DO = 0.24 mg/L, ORP = 9.1. ~~Willamette River~~ 11/11/10 Water samples collected at 0810.

From PW-7-93 notes: purged 65780 gal at time of sampling. At PW-8-68 purged 65472, at PW-8-39 purged 20455/24088.

11/11/10

Location Gasco-Portland Date 11/11/10

Project / Client Oversight of end of 72 h Pump Test and Groundwater Sampling

1305 Mathis notes, con't:
On 11/10/10 a field blank was collected by pumping lab grade deionized water through new clean section of tubing with peristaltic pump into sample bottles. Done at 0830 on 11/10/10
Willamette River sampling on 11/10/10:
Samples collected at 0900; YSI:
Temp = 11.30 °C, Cond = 80 µS, pH = 7.16, DO = 11.62 mg/L, ORP = 132.6.
1310 Calibration DTW checks were performed on 11/9/10 and 11/11/10 on the following wells: OW-9-25, MW-23-27, MW-23-75, MW-23-123, PZ1-50, PZ1-20, PZ1-5, MW-21-12, MW-21-75, MW-21-115, MW-21-166, PZ5-5, PZ5-20, PZ5-55, PZ5-85, OW-8-28, PZ2-43, PZ2-77, PZ2-20, PZ2-5, PZ4-41, PZ4-12, PW-8-68, PW-7-93, MW-24-70, MW-24-130, MW-3-26, MW-3-56, MW-22-80, PW-9-92, MW-2-32, MW-2-61, MW-2-104, MW-18-180, MW-16-65, MW-18-125. All by Doug Laffin on 11/9, MWilson on 11/11.

Location Gasco-Portland Date 11/11/10

Project / Client Oversight of End of 72 h. Pump Test and Groundwater Sampling

1320 After obtaining info from M. Wilson's notes, departed site.

11/11/10

Location Gasco - Portland Date 3/28/11

Project / Client Oversight of VFD Testing

0955 Arrived at Gasco gate.
Weather 47°F, overcast. Met
Tim Stone Anchor QEA and
Craig Della Coutin on-site trailer.
Craig is with R&W Engineering.
Craig explained the system -
controlled via a computer in
the trailer. Tim's goal is
to achieve "differential" of
0.1 - 0.2 feet in monitoring
wells = [illegible] feet [illegible]
(in other words, sub-depth
to water) [illegible]
[illegible] MW-[illegible]
[illegible] MW-7 and MW-8
[illegible] MW-13-05 [illegible]
[illegible]
Maximum pump speed
[illegible] 80%
[illegible] speed. If pump
[illegible] minimum [illegible]
[illegible] - [illegible]
[illegible] 100 hours [illegible]
[illegible] 3/28/11

Location Gasco - Portland Date 3/28/11

Project / Client Oversight of VFD Testing

[illegible] 3/28/11

Location [illegible] Date [illegible]

Project / Client [illegible]

[illegible]

Location [illegible] Date [illegible]

Project / Client [illegible]

[illegible]

Location [illegible] Date [illegible]

Project / Client [illegible]

Location Gasco-Portland Date 4/5/11

Project / Client Oversight of VFD Testing

0955 Arrive at Gasco front gate. Weather partly cloudy ~48°F.
1000 Drive to on-site Anchor trailer to oversee VFD testing - start of long-term test. Craig Della Count and Lance Dunns, Advanced Remediation Technologies (electrical engineer). Craig preparing to start test. Has reprogrammed for 0.3' differential. Bias will be constant so that pump speed is at max until this differential is achieved. River stage is very high: 16.73'.
1005 Craig further defined bias for me: how quickly the pumps will slow after reaching set point (0.3' differential). Bias is basically the control rate at which the pumps are slowed. Each PW now controlled by a different MW: MW-23-75 (PW-8); MW-22-80 (PW-9), and MW-21-75 (PW-7).

[signature] 4/5/11

Location Gasco-Portland Date 4/5/11

Project / Client Oversight of VFD Testing

10:10 Gary stated they ran a 6h test on March 31 and it went well: took about 7 minutes for MWs to get to 0.3' differential. Has reprogrammed system to read differential as POSITIVE, not negative. Also auto-shutoff changed so it is now controlled by the water elevation in the ~~PWs~~ MWs 50 4/5/11, not the pump rate. When pump rate slows or stops, this would cause a "low level trip" before. Don't want this. Low level trip elevations set to: -43 feet in PW-7, -18 feet in PW-8, and -34 feet in PW-9. This is ~1' above transducers, which are ~1' above pumps.

1012 Tim Stone stated all transducers M-site were calibrated starting last Friday and over the weekend.

1014 Test started. At start:
MW-21-75 = 16.94'; PW-7 = 16.99'
MW-23-75 = 16.86'; PW-8 = 12.5'
MW-22-80 = 16.76'; PW-9 = 16.83'
[signature] 4/5/11

Location Gasco-Portland Date 4/5/11

Project / Client Oversight of VFD Testing

10:15 PW-7 = 5.34, MW-21-75 = 5.33. Something is wrong - they are reading the same. 30% bias. Now jumped to 15.29'. Probe or settings messed up.

10:17 PW-8: 10.16'; MW-23-75: 16.62'. River = 16.75', PW-9 = -8.76', MW-22-80: 16.62', Diff = 0.14' 50 GPM in PW-9, 50% bias

1019 PW-8 = 10.26', MW = 16.58
Diff = 0.19 61.7 GPM
River = 16.77 feet.
PW-7 is not operating. Diff ~ 7'. This is not accurate
PW-9 = -9.28', MW = 16.58'
Diff = 0.21' River 16.80 64 GPM

1020 PW-9 = -9.94' MW = 16.53
River 16.78' Diff = 0.24'.

1021 PW-8 = 9.18', MW = 16.51'
River 16.78' Diff = 0.26'
63.7 GPM, 50% bias

1023 PW-9 = 13.16' MW = 16.49
river = 16.79 Diff = 0.3' reached goal. Also in PW-8.
[signature] 4/5/11

Location Gasco - Portland Date 4/5/11

Project / Client Oversight of VFD Testing.

1025 Test was stopped. Tim Stone Going out to check on PW-7. Lance Downs showed chart of testing on 3/31 showing all wells reached desired 90% and differential and maintained - ~6 h test.

1040 Tim Stone back - will replace transducer in MW-21-75 with one from piezos currently underwater due to high river. Control box blinking. Will restart test maybe by ~1 PM today. Test will likely go 72 h ~ to Friday afternoon.

1050 Lance: no lag due to formation. This high river is good for sizing pumps. Lots of clean water pushing toward upland wells so pumps must work hard to reach differential. When more pumping wells installed upstream may not be same formation. Need pumps to operate well over wide range of flows needed.

1100 Left site

[signature] 4/5/11

Location Gasco - Portland Date 4/8/11

Project / Client Oversight of End of VFD Test

1133 Arrive at Gasco front gate. Weather clear, sunny, 50°F.

1138 Arrive at on-site trailer to meet Tim Stone, Anchor. Tim left trailer to check a few things. I am in trailer alone. Monitoring computer screen and recording levels of MWs, PWs, and river until Tim comes back to end test @ 1230 w/ Darrel-Cascade

1136 Data on screen: MW-22-80 = 14.88'; PW-9 = -2.44' River = 15.16'. Flow = 55.3 GPM, 0.27' diff

1138 PW-7: 15.20; MW-21-75 = 14.82 River = 15.14'; diff = 0.32' 0.6 gpm

1139 PW-8 = 7.77; MW-23-75 = 14.85' River = 15.16'. 6 rm pumping 27 GPM diff = 0.32'

1140 MW-24-80 = 15.21'

1148 MW 22-80 = 14.87; 23-75 = 14.87, 21-75 = 14.80'; 24-80 = 15.21' River = 15.15'. PW-9 = 10.20 to -3.97

(Pumping) PW-8 = 6.81; PW-7 = 9.78

[signature] 4/8/11

Location Gasco-Portland Date 4/8/11

Project / Client Oversight of End of VFD Test

1152 MW-22-80 = 14.83; 23-75 = 14.85;
21-75 = 14.78; 24-80 = 15.20
Rwer = 15.12 PW-9 = -15.2;
PW-8 = 7.49; PW-7 = 15.16
1155 MW-22-80 = 14.82; 23-75 = 14.84;
21-75 = 14.71; 24-80 = 15.20;
" Rwer = 15.15'; PW-9 = 0.05';
PW-8 = 7.09; PW-7 = 2.77
1200 MW-22-80 = 14.84; MW-23-75 = 14.84;
21-75 = 14.75; 24-80 = 15.19
Rwer = 15.11; PW-9 = -11.4; PW-8 = 8.79
PW-7 = 15.11
1205 MW-22-80 = 14.79, 23-75 = 14.84,
" 21-75 = 14.72; 24-80 = 15.24
Rwer = 15.11; PW-9 = 1.18;
PW-8 = 6.63; PW-7 = 13.67
1210 MW-22-80 = 14.81; 23-75 = 14.82
21-75 = 14.73; 24-80 = 15.24
Rwer = 15.09; PW-9 = -14.90
PW-8 = 7.50; PW-7 = 15.10.
1215 MW-22-80 = 14.85; 23-75 = 14.83,
21-75 = 14.52; 24-80 = 15.24
Rwer = 15.10; PW-9 = 10.43;
" PW-8 = 6.62; PW-7 = 13.40
[signature] 4/8/11

Location Gasco-Portland Date 4/8/11

Project / Client Oversight of End of VFD Test

1220 MW-22-80 = 14.75', 23-75 = 14.81'
21-75 = 14.81; 24-80 = 15.33'.
Rwer = 15.10'. PW-9 = 0.56',
PW-8 = 7.41', PW-7 = 9.17'.
1225 MW-22-80 = 14.84', 23-75'
= 14.82, 21-75 = 14.72, 24-80 = 15.23
Rwer = ~~7.19~~ 15.08 [illegible] 4/8/11, PW-9 = 7.19',
PW-8 = 7.73, PW-7 = 15.10'.
1226 Tim returns. He stated PW-9
is operating at max capacity
~60 GPM. Jumps around when
it powers down and back up.
Affects PW-9 more than others -
PW-8 or PW-7, which have
higher capacities ~75 GPM.
MW-24-80 is not a control
well yet but may be in future -
for PW-6 (further upstream),
depends on approved design - based
on what DEQ wants. Currently
they want to try to get capture in
deep zone - below aquatard - this
is around 166 feet below ground
surface.
[signature] 4/8/11

Location Gasco - Portland Date 4/8/11

Project / Client Oversight of End of VFD Test

1231 MW-22-80 = 14.78', 23-75 = 14.76, 21-75 = 14.71, 24-80 = 15.20, River = 15.06, PW-9 = -12.0, PW-8 = 7.23, PW-7 = 10.19.

1232 Tim stated during this 72 hour test, someone from Anchor checked in each day to make sure all pumps running ok.

1237 Stopped test. Readings: MW-22-80 = 14.81', 23-75 = 14.80, 21-75 = 14.72, 24-80 = 15.11, River = 15.02, PW-9 = 8.26, PW-8 = 14.10, PW-7 = 2.78.

1239 Continue to record data from screen during recovery after end of test: MW-22-80 = 14.82, 23-75 = 14.80, 21-75 = 14.76, 24-80 = 15.10. River = 15.01, PW-9 = 11.28, PW-8 = 15.08, PW-7 = 13.19.

1241 MW-22-80 = 14.89, 23-75 = 14.97, 21-75 = 14.88, 24-80 = 15.10. River = 15.03, PW-9 = 14.44, PW-8 = 15.15, PW-7 = 15.09.

1243 22-80 = 14.93, 23-75 = 15.02, 21-75 = 14.96, 24-80 = 15.
River = 15.01 PW-9 = 14.89, PW-8 = 15.19, PW-7 = 15.17

[signature] 4/8/11

Location Gasco Portland Date 4/8/11

Project / Client Oversight of End of VFD Test

1245 22-80 = 14.96, 23-75 = 15.05, 21-75 = 14.99, 24-80 = 15.09, River = 14.99, PW-9 = 14.28, PW-8 = 15.22, PW-7 = 15.21.

1248 22-80 = 14.99, 23-75 = 15.09, 21-75 = 15.03, 24-80 = 15.10. River = 15.01, PW-9 = 15.03, PW-8 = 15.27, PW-7 = 15.24.

1251 22-80 = 15.02, 23-75 = 15.12, 21-75 = 15.06, 24-80 = ~~15.09~~ 15.09, [illegible] 4/8/11 River = 14.99 PW-9 = 15.08. PW-8 = 15.28, PW-7 = 15.27

1258 22-80 = 15.05, 23-75 = 15.15, 21-75 = 15.11, 24-80 = 15.10 River = 15.00, PW-9 = 15.12 PW-8 = 15.31, PW-7 = 15.31

1259 Tim stated they will download these data on Monday and evaluate. May do another test in 1-2 weeks. May try 0.1-0.2 differential again, and when river is at lower stage to see more tidal swings.

1300 Departed site.

[signature] 4/8/11

Location Gasco - Portland Date 11/8/10

Project / Client Oversight of Pumping Test and Groundwater Sampling.

0950 Arrive at Gasco site. Escorted to on-site trailer. John Renda, Tim Stone, Matt Wilson, and Doug Laffoon, Anchor QEA present and preparing to start pump test. Will run pumping wells at 25 GPM, except PW-8-39 which will be at 2 GPM (this is the shallow well). Will also collect water samples at beginning, middle, and end of 72 h pump test. Water quality parameters will be measured using a YSI meter. Anchor personnel is gathering sampling equipment.

1020 Arrived at PW-7 with Anchor staff. Tim Stone setting well to pump at 25 GPM. Depth to water is 19.012' prior to test. Will run test for 10 min before collecting sample to ensure have purged at least one well volume prior to sampling.

[signature] 11/8/10

Location Gasco - Portland Date 11/8/10

Project / Client Oversight of Pumping Test and Groundwater Sampling.

1025 Tim Stone setting PW-8 and PW-9 at 25 GPM. Will actually purge 3 volumes on wells prior to sampling so this will take ~30 minutes of pumping prior to collecting sample. PW-8-68 is name.

1026 Water samples collected for: cations, anions, cyanide, iron, manganese, total metals. Cations/anions include potassium, nitrate. Field filtering everything except total metals and cyanides. Ammonium sulfate, sodium, carbonate, and bicarbonate also included in cations + anions group.

1030 DTW at PW-8 prior to test is 19.440'. Took photo #1 of Matt Wilson at PW-8. Crew has to replace a part on PW-8 sampling probe as piece was cracked.

1040 Took photo #2 of Doug Laffoon taking DTW at PW-8-39. DTW = 17.47'. Will measure again at start.

[signature] 11/8/10

Location Gasco - Portland Date 11/8/10

Project / Client Oversight of Pump Test and Groundwater Sampling

1043 Took photo #3 of PW-8-68 and PW-8-39 set-up with PW-7 in background. Weather today is mostly cloudy, ~45°F.

1045 Doug Laffoon stated he will monitor DTW manually and check electronic transducers in several primary wells daily during the 72 hour test.

1050 Anchor will collect a river water sample too, from river surface at Gasco dock. This is "background".

1053 DTW at PW-8-39 is 17.51'.

1055 A total of 5 samples will be collected: PW-7, PW-8-68, PW-8-39, PW-9, and river. JJ 11/8/10

1058 DTW at PW-9 is ~~28.853~~ 28.35. DTW at PW-7 is 19.962. PW-8-68 is 19.56'.

1100 Started pump test. John Renda started 3 pumping wells (PW-7, 8, 9) at same time from PW-7. Doug Laffoon started PW-8-39 manually at 2 GPM at same start time. Took Photo #4 of Doug.

Jerry Jones 11/8/10

Location Gasco Portland Date 11/8/10

Project / Client Oversight of Pump Test and Groundwater Sampling

1103 DTW at PW-8-39 is 20.5'. DTW at PW-8-68 is 20.279'. Purge volumes for pumping wells: PW-7: 602 gallons; PW-8-68: 403 gallons; PW-8-39: 108 gallons; PW-9: 530 gallons. Sampling will be in about 25 min.

1105 Anchor crew realized PW-8-68 stopped pumping. Tim Stone is checking controls. Now pumping at 38 GPM, now adjusting to 25 GPM.

1108 Took photo #5 of flow meter/totalizer at PW-8-68. Anchor did not record totalizer readings at start of test. Totalizer at PW-8-68 is 302402 gallons now.

1109 totalizers at PW-8-39: 15271 and 18861. There are 2 flow meters here for redundancy as before.

1111 Tim Stone instructed John Renda to stop pumping test and start over. PW-8-39 stopped also. PW-7 kicked off for some reason, and PW-8 did too so need to start over.

Jerry Jones 11/8/10

Location Gasco-Portland Date 11/8/10

Project / Client Oversight of Pump Test and Groundwater Sampling

1115 John Kinda stated maybe there is a valve along pumping line to pond that got closed and this is causing pumps to stop.

1127 Totalizer readings for next start:
PW-7: 303135 gal
PW-8-68: 302473 gal
PW-8-39: 18868 / 15278 gal
PW-9: 303198 gal

1130 Matt Wilson stated will zero out all totalizers (except can't do the PW-8-39 ones) before next start. Plan to restart test at 1200.

1200 Starting pump test. DTW at PW-7 = 19.455'. At PW-8-68: DTW = 19.848'. PW-9 is 28.65'. PW-8-39 = 17.95'. Drawdown is evident at PW-8-68.

1205 At PW-8-68 totalizer now 124 gallons, flow = 24.57 GPM.

1211 At PW-8-68 totalizer = 273 gallons flow = 25.44 GPM

1216 At PW-8-68 totalizer = 405 gallons flow = 24.80 GPM.

Quinn Jones 11/8/10

Location Gasco-Portland Date 11/8/10

Project / Client Oversight of Pump Test and Groundwater Sampling.

1217 PW-8-68 has purged 3 well volumes so Matt Wilson collecting samples. Took photo #6 showing this. And Photo #7.

1218 Matt putting filter on tubing to collect filtered samples. Took photo #8 of this.

1222 Matt using YSI meter to collect water parameters. Photo #9 shows YSI meter in use. Totalizer now at 580 gallons. Flow = 25.01 GPM.

1225 Took photo #10 of John at PW-7. Totalizer 661 gallons. Flow = 25.06 GPM

1230 Totalizer at PW-9 is at 755 gal, flow = 25.05 GPM. Matt Wilson using YSI meter. Tim Stone already collected water samples. Temp = 15.87 °C, Cond = 718 µS/cm pH = 7.06, DO = 1.01 mg/L. ORP = 74.6!

1240 YSI parameters at PW-8-68 were: Temp = 17.22 °C, DO = 2.33 mg/L, Cond 767. pH = 7.06 ORP = 57.8.

Quinn Jones 11/8/10

Location Gasco - Portland Date 11/8/10

Project / Client Oversight of Pump Test and Groundwater Sampling

1235 YSI parameters at PW-7: Temp=16.29 °C, Cond=802 µS/cm, DO=0.43 mg/L, pH=7.15, ORP=65.9.

1240 Totalizer reading = 993 gallons at PW-7. Flow=25.36 GPM.

1241 Will collect samples from PW-8-39 at around 1300, after 108 gallons purged. Then will collected river water samples.

1248 Left site.

Jake Jones 11/8/10

Location Gasco-Portland Date 11/11/10

Project / Client Oversight of end of Pump Test and Groundwater Sampling

1130 Arrive at Gasco site. Weather partly cloudy, 48°F.

1140 Met Matt Wilson, Anchor QEA, at PW-8. Matt began collecting water samples from PW-8-68. Water level (depth to water) = 23.201 ft. Totalizer = 107547 Gallons; flow = 24.95 GPM. Matt stated he just completed sampling at PW-9. Matt is only Anchor staff present today.

1145 Took Photo #1 of Matt collecting water sample at PW-8-68. Matt stated everything seems to be going fine during this pump test. One well, ~~MW-13~~ MW-21-12 is beginning to drift away from manual readings. In other words, electronic transducer readings are ~0.15 feet different than manual readings. All other wells monitored during pump test were within 0.1 feet, which is the cutoff at where transducer would be re-set. (but not during pump test)

Jake Jones 11/11/10

Location Gasco - Portland Date 11/11/10

Project / Client Oversight of end of 72h Pump test and Groundwater Sampling.

1148 Matt stated mid-test samples were collected early Wednesday (11/10) morning.

1149 Matt using YSI meter to collect water parameter data at PW-8-68. Took Photo #2 showing this. Photo #3 is close-up of YSI meter recording data from PW-8-68.

1155 Based on starting DTW of 19.848, there has been < 4' of drawdown in this well, PW-8-68.

1200 Matt collecting water samples from PW-8-39. Took Photo #4 of this. Matt stated ~~will not collect DTW~~ 11/11/10 ~~here~~ - have an electronic transducer in this well and only collected DTW manually at start of test to determine purge well volume. Matt is filtering samples for everything except total metals + cyanide, as before. Totalizer readings at PW-8-39 are 27391.6 and 23715.2 gallons. During sampling at PW-8-39, pressure leaks out sampling port and pumping rate decreases to ~0.7 GPM.

Geofrogoner 11/11/10

Location Gasco-Portland Date 11/11/10

Project / Client Oversight of end of 72h Pump Test and Groundwater Sampling.

1205 When not sampling, pumping rate at PW-8-39 is at 2.05 GPM.

1207 YSI parameters at PW-8-68: Temp: 17.19°C; Cond. = 710 µS/cm; DO = 0.15 mg/L; pH = 7.33; ORP = 30.6.

1210 Water samples are kept on ice in a cooler in Matt's van.

1214 Matt measuring DTW in PW-8-39. DTW = 34.16 feet. Based on starting DTW of 17.95, drawdown here is ~16 feet. YSI parameters: Temp = 17.24°C, Cond = 826 µS/cm, DO = 0.14 mg/L, pH = 7.33, ORP = 42.8.

1220 Setting up to sample at PW-7. (PW-7-93). DTW at PW-7 = 25.819 feet. Based on starting ~~DTW~~ 11/11/10 DTW of 19.455, approx 6 feet of drawdown here. Totalizer = 108519 gallons, flow = 25.07 GPM.

1237 YSI parameters at PW-7: Temp = 15.74°C, Cond = 859 µS/cm; DO = 0.26 mg/L; pH = 7.36; ORP = 35.2.

1244 All sampling completed (except at river). Test stopped.

Geofrogoner 11/11/10

Location Gasco-Portland Date 11/11/10

Project / Client Oversight of end of 72h Pump Test and Groundwater Sampling

12:45 DTW at PW-7 = 20.257 feet (recharging).

12:46 From Matt's notes: YSI parameters at PW-9: Temp = 15.78 °C, Cond = 703 µS/cm, pH = 7.16; DO = 0.18 mg/L, ORP = 92.4. Samples were collected at 1119. DTW = 40.90 feet. Totalizer = 107167.0

1249 Totalizer at PW-9 = 109109 gal PW-8-68 = 10955, PW-8-39: 23789/27468. PW-7: 109063. These are at test stop so total gallons pumped.

1250 DTW at PW-7 = 19.819 feet

1252 DTW at PW-8-68 = 20.196 feet.

1253 DTW at PW-9 = ~~29.253~~ 28.819 feet. 11/11/10

1256 Return to on-site trailer to get YSI parameters from Matt's notes: On 11/8/10 YSI parameters of Willamette River: Temp = 12.22 °C, Cond = 78 µS/cm, pH = 7.32, DO = 9.98 mg/L, ORP = 130.8. Water sample was collected on FAMM boat house at 1330 ~~on 11/7~~ 11/8/10 11/11/10

11/11/10

Location Gasco-Portland Date 11/11/10

Project / Client Oversight of end of 72h Pump Test and Groundwater Sampling

1300 Matt's notes, don't:

PW-7-93 on 11/10/10 at 0729: YSI parameters: Temp = 15.92 °C, Cond = 848 µS, pH = 7.09, DO = 0.31 mg/L, ORP = -8.4. DTW at 0729 = 24.80. Water samples were collected at 0730.

PW-8-68 on 11/10/10. DTW at 0734 = 22.39'. YSI parameters: Temp = 16.12 °C, Cond = 711 µS, pH = 7.05, DO = 0.51 mg/L, ORP = 2.6. Samples were collected at 0735.

PW-8-39 on 11/10/10 DTW at 0744 = 33.98'. YSI parameters: Temp = 17.06 °C, pH = 7.15, Cond = 844 µS, DO = 0.28 mg/L, ORP = 10.4. Water samples were collected at 0745.

PW-9-92 on 11/10/10 DTW at 0805 = 39.84 feet. 66362 gal purged. YSI: Temp = 15.6 °C, Cond = 702, pH = 7.13, DO = 0.24 mg/L, ORP = 9.1. ~~Willamette River~~ 11/11/10 Water samples collected at 0810.

From PW-7-93 notes: purged 65780 gal at time of sampling. At PW-8-68 purged 65472, at PW-8-39 purged 20455/24088.

11/11/10

Location Gasco-Portland Date 11/11/10

Project / Client Oversight of end of 72 h Pump Test and Groundwater Sampling

1305 Mathis notes, con't:
On 11/10/10 a field blank was collected by pumping lab grade deionized water through new clean section of tubing with peristaltic pump into sample bottles. Done at 0830 on 11/10/10
Willamette River sampling on 11/10/10:
Samples collected at 0900; YSI:
Temp = 11.30 °C, Cond = 80 µS, pH = 7.16, DO = 11.62 mg/L, ORP = 132.6.
1310 Calibration DTW checks were performed on 11/9/10 and 11/11/10 on the following wells: OW-9-25, MW-23-27, MW-23-75, MW-23-123, PZ1-50, PZ1-20, PZ1-5, MW-21-12, MW-21-75, MW-21-115, MW-21-166, PZ5-5, PZ5-20, PZ5-55, PZ5-85, OW-8-28, PZ2-43, PZ2-77, PZ2-20, PZ2-5, PZ4-41, PZ4-12, PW-8-68, PW-7-93, MW-24-70, MW-24-130, MW-3-26, MW-3-56, MW-22-80, PW-9-92, MW-2-32, MW-2-61, MW-2-104, MW-18-180, MW-16-65, MW-18-125. All by Doug Laffin on 11/9, MWilson on 11/11.

Location Gasco-Portland Date 11/11/10

Project / Client Oversight of End of 72 h. Pump Test and Groundwater Sampling

1320 After obtaining info from M. Wilson's notes, departed site.

11/11/10

Location Gasco - Portland Date 3/28/11

Project / Client Oversight of VFD Testing

0955 Arrived at Gasco gate.
Weather 47°F, overcast. Met
Tim Stone Anchor QEA and
Craig Della Coutin on-site trailer.
Craig is with R&W Engineering.
Craig explained the system -
controlled via a computer in
the trailer. Tim's goal is
to achieve "differential" of
0.1 - 0.2 feet in monitoring
wells = [illegible] feet [illegible]
(in other words, sub-depth
to water) [illegible]
[illegible] MW-[illegible]
[illegible] MW-7 and MW-8
[illegible] MW-13-05 [illegible]
[illegible]
Maximum pump speed
[illegible] 80%
[illegible] speed. If pump
[illegible] minimum [illegible]
[illegible] - [illegible]
[illegible] 100 hours [illegible]
[illegible] 3/28/11

Location Gasco - Portland Date 3/28/11

Project / Client Oversight of VFD Testing

[illegible] 3/28/11

Location [illegible] Date [illegible]

Project / Client [illegible]

[illegible]

Location [illegible] Date [illegible]

Project / Client [illegible]

[illegible]

Location [illegible] Date [illegible]

Project / Client [illegible]

Location Gasco-Portland Date 4/5/11

Project / Client Oversight of VFD Testing

0955 Arrive at Gasco front gate. Weather partly cloudy ~48°F.
1000 Drive to on-site Anchor trailer to oversee VFD testing - start of long-term test. Craig Della Count and Lance Dunns, Advanced Remediation Technologies (electrical engineer). Craig preparing to start test. Has reprogrammed for 0.3' differential. Bias will be constant so that pump speed is at max until this differential is achieved. River stage is very high: 16.73'.
1005 Craig further defined bias for me: how quickly the pumps will slow after reaching set point (0.3' differential). Bias is basically the control rate at which the pumps are slowed. Each PW now controlled by a different MW: MW-23-75 (PW-8); MW-22-80 (PW-9), and MW-21-75 (PW-7).

[signature] 4/5/11

Location Gasco-Portland Date 4/5/11

Project / Client Oversight of VFD Testing

10:10 Gary stated they ran a 6h test on March 31 and it went well: took about 7 minutes for MWs to get to 0.3' differential. Has reprogrammed system to read differential as POSITIVE, not negative. Also auto-shutoff changed so it is now controlled by the water elevation in the ~~PWs~~ MWs 50 4/5/11, not the pump rate. When pump rate slows or stops, this would cause a "low level trip" before. Don't want this. Low level trip elevations set to: -43 feet in PW-7, -18 feet in PW-8, and -34 feet in PW-9. This is ~1' above transducers, which are ~1' above pumps.

1012 Tim Stone stated all transducers M-site were calibrated starting last Friday and over the weekend.

1014 Test started. At start:
MW-21-75 = 16.94'; PW-7 = 16.99'
MW-23-75 = 16.86'; PW-8 = 12.5'
MW-22-80 = 16.76'; PW-9 = 16.83'
[signature] 4/5/11

Location Gasco-Portland Date 4/5/11

Project / Client Oversight of VFD Testing

10:15 PW-7 = 5.34, MW-21-75 = 5.33. Something is wrong - they are reading the same. 30% bias. Now jumped to 15.29'. Probe or settings messed up.

10:17 PW-8: 10.16'; MW-23-75: 16.62'. River = 16.75', PW-9 = -8.76', MW-22-80: 16.62', Diff = 0.14' 50 GPM in PW-9, 50% bias

1019 PW-8 = 10.26', MW = 16.58
Diff = 0.19 61.7 GPM
River = 16.77 feet.
PW-7 is not operating. Diff ~ 7'. This is not accurate
PW-9 = -9.28', MW = 16.58'
Diff = 0.21' River 16.80 64 GPM

1020 PW-9 = -9.94' MW = 16.53
River 16.78' Diff = 0.24'.

1021 PW-8 = 9.18', MW = 16.51'
River 16.78' Diff = 0.26'
63.7 GPM, 50% bias

1023 PW-9 = 13.16' MW = 16.49
river = 16.79 Diff = 0.3' reached goal. Also in PW-8.
[signature] 4/5/11

Location Gasco - Portland Date 4/5/11

Project / Client Oversight of VFD Testing.

1025 Test was stopped. Tim Stone Going out to check on PW-7. Lance Downs showed chart of testing on 3/31 showing all wells reached desired 90% and differential and maintained - ~6 h test.

1040 Tim Stone back - will replace transducer in MW-21-75 with one from piezos currently underwater due to high river. Control box blinking. Will restart test maybe by ~1 PM today. Test will likely go 72 h ~ to Friday afternoon.

1050 Lance: no lag due to formation. This high river is good for sizing pumps. Lots of clean water pushing toward upland wells so pumps must work hard to reach differential. When more pumping wells installed upstream may not be same formation. Need pumps to operate well over wide range of flows needed.

1100 Left site

[signature] 4/5/11

Location Gasco - Portland Date 4/8/11

Project / Client Oversight of End of VFD Test

1133 Arrive at Gasco front gate. Weather clear, sunny, 50°F.

1138 Arrive at on-site trailer to meet Tim Stone, Anchor. Tim left trailer to check a few things. I am in trailer alone. Monitoring computer screen and recording levels of MWs, PWs, and river until Tim comes back to end test @ 1230 w/ Darrel-Cascade

1136 Data on screen: MW-22-80 = 14.88'; PW-9 = -2.44' River = 15.16'. Flow = 55.3 GPM, 0.27' diff

1138 PW-7: 15.20; MW-21-75 = 14.82 River = 15.14'; diff = 0.32' 0.6 gpm

1139 PW-8 = 7.77; MW-23-75 = 14.85' River = 15.16'. 6 rm pumping 27 GPM diff = 0.32'

1140 MW-24-80 = 15.21'

1148 MW 22-80 = 14.87; 23-75 = 14.87, 21-75 = 14.80'; 24-80 = 15.21' River = 15.15'. PW-9 = 10.20 to -3.97

(Pumping) PW-8 = 6.81; PW-7 = 9.78

[signature] 4/8/11

Location Gasco-Portland Date 4/8/11

Project / Client Oversight of End of VFD Test

1152 MW-22-80 = 14.83; 23-75 = 14.85;
21-75 = 14.78; 24-80 = 15.20
Rwer = 15.12 PW-9 = -15.2;
PW-8 = 7.49; PW-7 = 15.16
1155 MW-22-80 = 14.82; 23-75 = 14.84;
21-75 = 14.71; 24-80 = 15.20;
" Rwer = 15.15'; PW-9 = 0.05';
PW-8 = 7.09; PW-7 = 2.77
1200 MW-22-80 = 14.84; MW-23-75 = 14.84;
21-75 = 14.75; 24-80 = 15.19
Rwer = 15.11; PW-9 = -11.4; PW-8 = 8.79
PW-7 = 15.11
1205 MW-22-80 = 14.79, 23-75 = 14.84,
" 21-75 = 14.72; 24-80 = 15.24
Rwer = 15.11; PW-9 = 1.18;
PW-8 = 6.63; PW-7 = 13.67
1210 MW-22-80 = 14.81; 23-75 = 14.82
21-75 = 14.73; 24-80 = 15.24
Rwer = 15.09; PW-9 = -14.90
PW-8 = 7.50; PW-7 = 15.10.
1215 MW-22-80 = 14.85; 23-75 = 14.83,
21-75 = 14.52; 24-80 = 15.24
Rwer = 15.10; PW-9 = 10.43;
" PW-8 = 6.62; PW-7 = 13.40
[signature] 4/8/11

Location Gasco-Portland Date 4/8/11

Project / Client Oversight of End of VFD Test

1220 MW-22-80 = 14.75', 23-75 = 14.81'
21-75 = 14.81; 24-80 = 15.33'.
Rwer = 15.10'. PW-9 = 0.56',
PW-8 = 7.41', PW-7 = 9.17'.
1225 MW-22-80 = 14.84', 23-75'
= 14.82, 21-75 = 14.72, 24-80 = 15.23
Rwer = ~~7.19~~ 15.08 [illegible] 4/8/11, PW-9 = 7.19',
PW-8 = 7.73, PW-7 = 15.10'.
1226 Tim returns. He stated PW-9
is operating at max capacity
~60 GPM. Jumps around when
it powers down and back up.
Affects PW-9 more than others -
PW-8 or PW-7, which have
higher capacities ~75 GPM.
MW-24-80 is not a control
well yet but may be in future -
for PW-6 (further upstream),
depends on approved design - based
on what DEQ wants. Currently
they want to try to get capture in
deep zone - below aquatard - this
is around 166 feet below ground
surface.
[signature] 4/8/11

Location Gasco - Portland Date 4/8/11

Project / Client Oversight of End of VFD Test

1231 MW-22-80 = 14.78', 23-75 = 14.76, 21-75 = 14.71, 24-80 = 15.20, River = 15.06, PW-9 = -12.0, PW-8 = 7.23, PW-7 = 10.19.

1232 Tim stated during this 72 hour test, someone from Anchor checked in each day to make sure all pumps running ok.

1237 Stopped test. Readings: MW-22-80 = 14.81', 23-75 = 14.80, 21-75 = 14.72, 24-80 = 15.11, River = 15.02, PW-9 = 8.26, PW-8 = 14.10, PW-7 = 2.78.

1239 Continue to record data from screen during recovery after end of test: MW-22-80 = 14.82, 23-75 = 14.80, 21-75 = 14.76, 24-80 = 15.10. River = 15.01, PW-9 = 11.28, PW-8 = 15.08, PW-7 = 13.19.

1241 MW-22-80 = 14.89, 23-75 = 14.97, 21-75 = 14.88, 24-80 = 15.10. River = 15.03, PW-9 = 14.44, PW-8 = 15.15, PW-7 = 15.09.

1243 22-80 = 14.93, 23-75 = 15.02, 21-75 = 14.96, 24-80 = 15.
River = 15.01 PW-9 = 14.89, PW-8 = 15.19, PW-7 = 15.17

[signature] 4/8/11

Location Gasco Portland Date 4/8/11

Project / Client Oversight of End of VFD Test

1245 22-80 = 14.96, 23-75 = 15.05, 21-75 = 14.99, 24-80 = 15.09, River = 14.99, PW-9 = 14.28, PW-8 = 15.22, PW-7 = 15.21.

1248 22-80 = 14.99, 23-75 = 15.09, 21-75 = 15.03, 24-80 = 15.10. River = 15.01, PW-9 = 15.03, PW-8 = 15.27, PW-7 = 15.24.

1251 22-80 = 15.02, 23-75 = 15.12, 21-75 = 15.06, 24-80 = ~~15.09~~ 15.09, [illegible] 4/8/11 River = 14.99 PW-9 = 15.08. PW-8 = 15.28, PW-7 = 15.27

1258 22-80 = 15.05, 23-75 = 15.15, 21-75 = 15.11, 24-80 = 15.10 River = 15.00, PW-9 = 15.12 PW-8 = 15.31, PW-7 = 15.31

1259 Tim stated they will download these data on Monday and evaluate. May do another test in 1-2 weeks. May try 0.1-0.2 differential again, and when river is at lower stage to see more tidal swings.

1300 Departed site.

[signature] 4/8/11

Appendix B
Field Oversight Photographs

Segment 2 Oversight Report
November 17, 2009

Photos 001 and 002

Segment 2 Oversight Report
November 17, 2009

Photos 003 and 004

Segment 2 Oversight Report
November 17, 2009

Photos 005 and 006

Segment 2 Oversight Report
November 17, 2009

Photos 007 and 008

Segment 2 Oversight Report
November 18, 2009

Photos 001 and 002

Segment 2 Oversight Report
November 18, 2009

Photos 003 and 004

Segment 2 Oversight Report
November 18, 2009

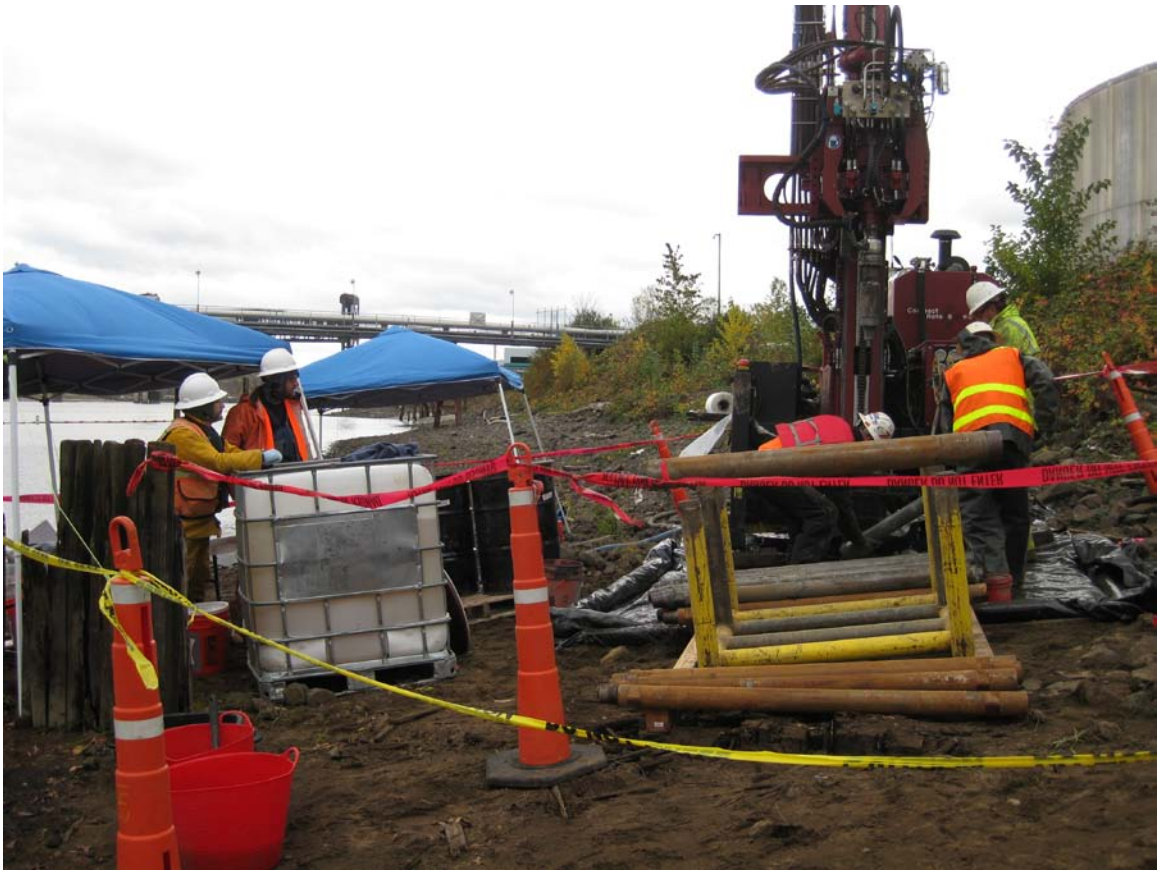
Photos 005 and 006

Segment 2 Oversight Report
November 18, 2009

Photos 007 and 008

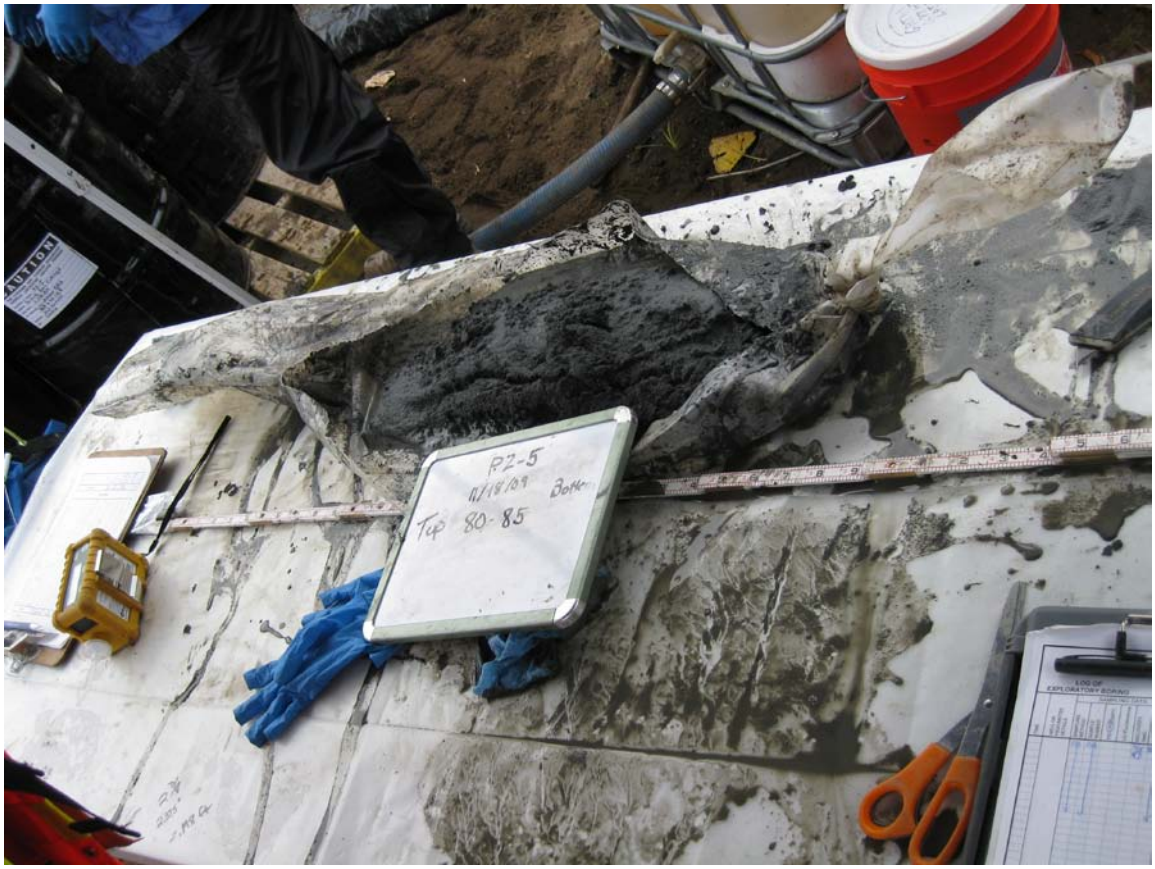
Segment 2 Oversight Report
November 18, 2009

Photos 009 and 010



Segment 2 Oversight Report
November 18, 2009

Photos 011 and 012



Segment 2 Oversight Report
November 18, 2009

Photos 013 and 014

Segment 2 Oversight Report
November 19, 2009

Photos 001 and 002

Segment 2 Oversight Report
November 19, 2009

Photos 003 and 004

Segment 2 Oversight Report
November 19, 2009

Photos 005 and 006

Segment 2 Oversight Report
November 19, 2009

Photos 007 and 008

Segment 2 Oversight Report
November 19, 2009

Photos 009 and 010

Segment 2 Oversight Report
November 19, 2009

Photos 011 and 012

Segment 2 Oversight Report
November 20, 2009

Photos 001 and 002

Segment 2 Oversight Report
November 20, 2009

Photos 003 and 004

Segment 2 Oversight Report
November 20, 2009

Photos 005 and 006

Segment 2 Oversight Report
November 20, 2009

Photos 007 and 008

Segment 2 Oversight Report
November 20, 2009

Photos 009 and 010

Segment 2 Oversight Report
November 20, 2009

Photos 011 and 017

Segment 2 Oversight Report
November 23, 2009

Photos 001 and 002

Segment 2 Oversight Report
November 23, 2009

Photos 003 and 003a

Segment 2 Oversight Report
November 23, 2009

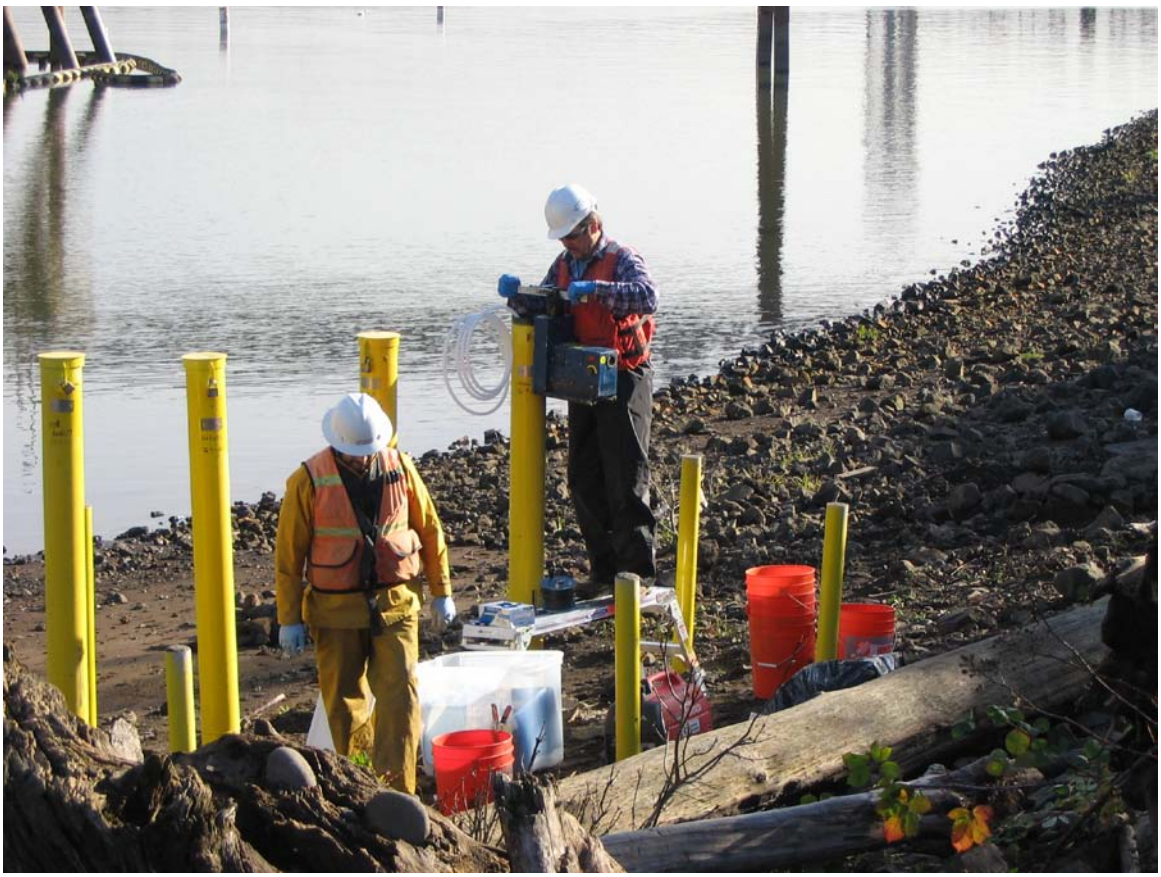
Photos 004 and 005

Segment 2 Oversight Report
November 23, 2009

Photos 006 and 007

Segment 2 Oversight Report
November 23, 2009

Photos 008 and 009



Segment 2 Oversight Report
November 23, 2009

Photos 010 and 011

Segment 2 Oversight Report
November 24, 2009

Photos 001 and 002

Segment 2 Oversight Report
November 24, 2009

Photos 003 and 004

Segment 2 Oversight Report
November 24, 2009

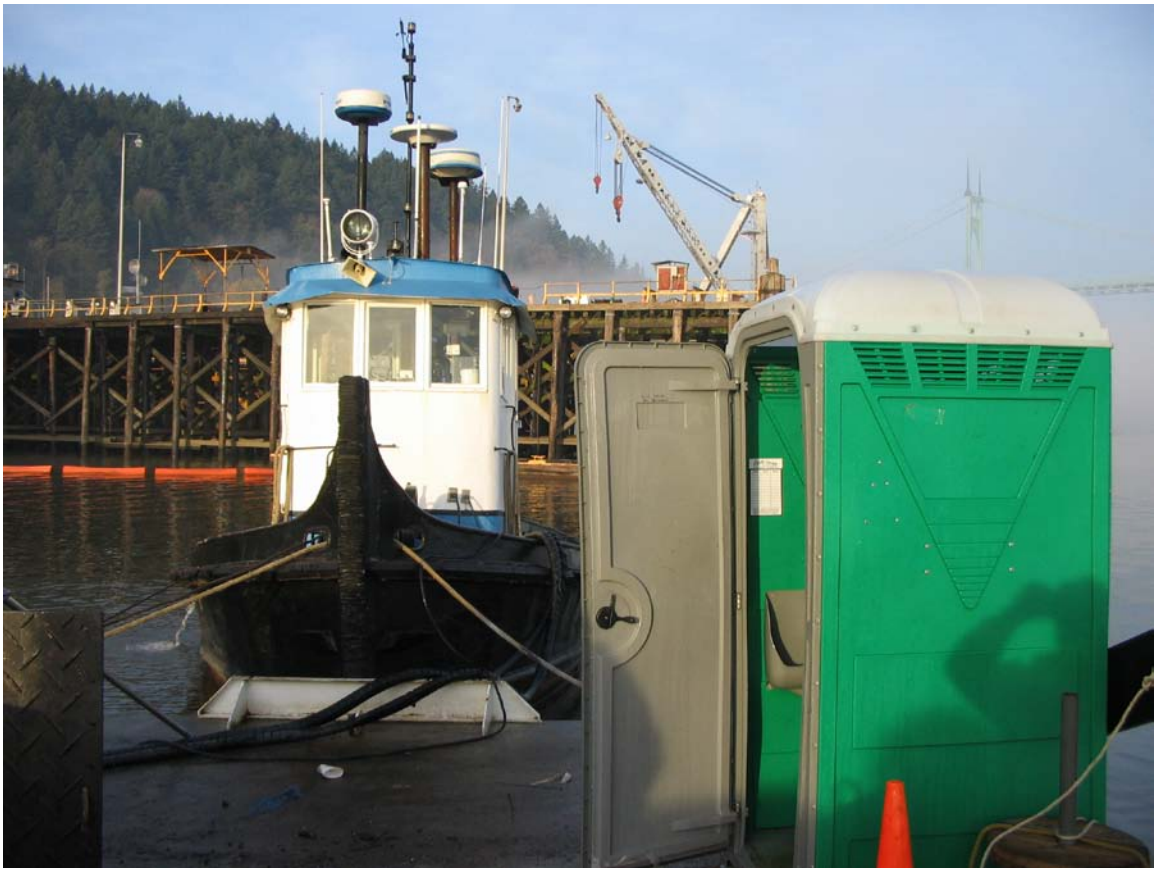
Photos 005 and 006

Segment 2 Oversight Report
November 25, 2009

Photos 001 and 002

Segment 2 Oversight Report
November 25, 2009

Photos 003 and 004



Segment 2 Oversight Report
November 25, 2009

Photos 005 and 006

Segment 2 Oversight Report
November 25, 2009

Photos 007 and 008

Segment 2 Oversight Report
November 25, 2009

Photos 009 and 010

Segment 2 Oversight Report
November 25, 2009

Photos 011 and 012

Segment 2 Oversight Report
November 25, 2009

Photo 013

Segment 2 Oversight Report
November 30, 2009

Photos 001 and 002

Segment 2 Oversight Report
November 30, 2009

Photos 003 and 004

Segment 2 Oversight Report
December 1, 2009

Photos 001 and 002

Segment 2 Oversight Report
December 1, 2009

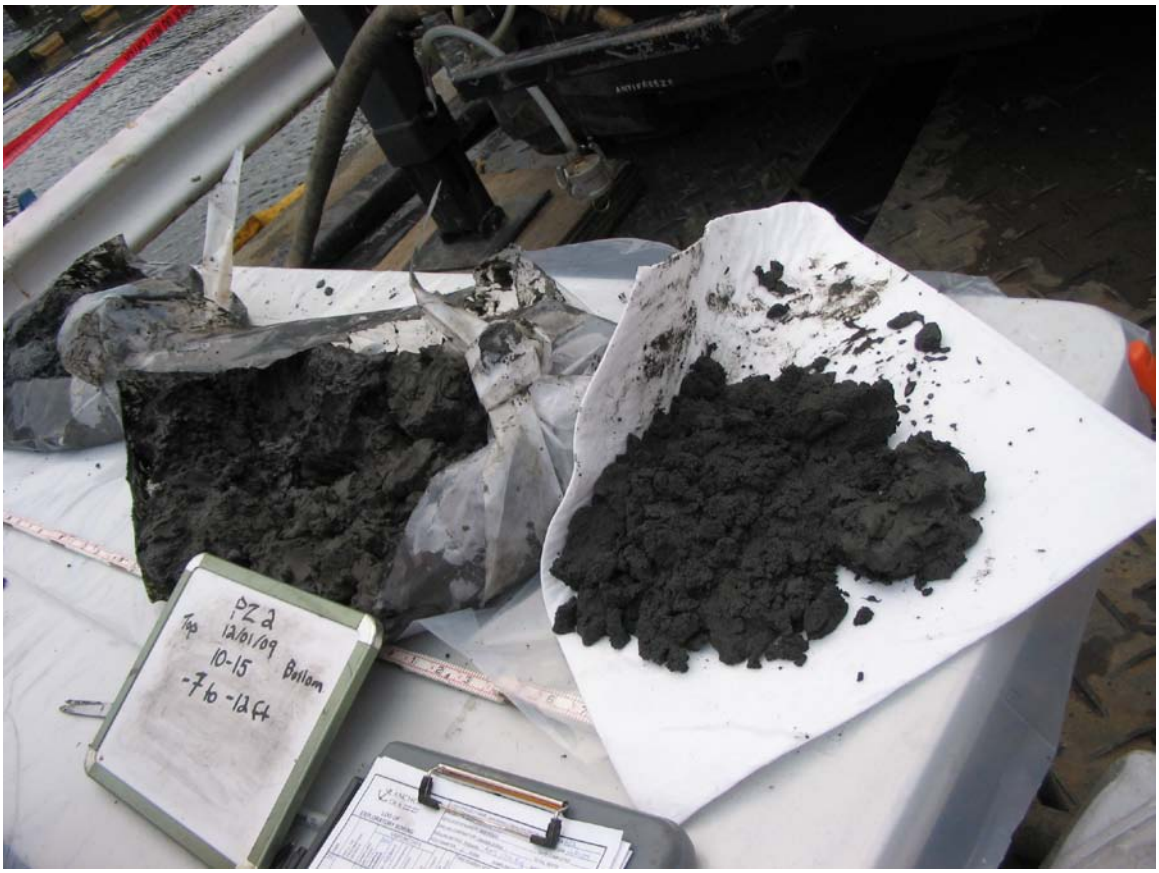
Photos 003 and 004

Segment 2 Oversight Report
December 1, 2009

Photos 005 and 006

Segment 2 Oversight Report
December 1, 2009

Photos 007 and 008



Segment 2 Oversight Report
December 1, 2009

Photo 009

Segment 2 Oversight Report
December 2, 2009

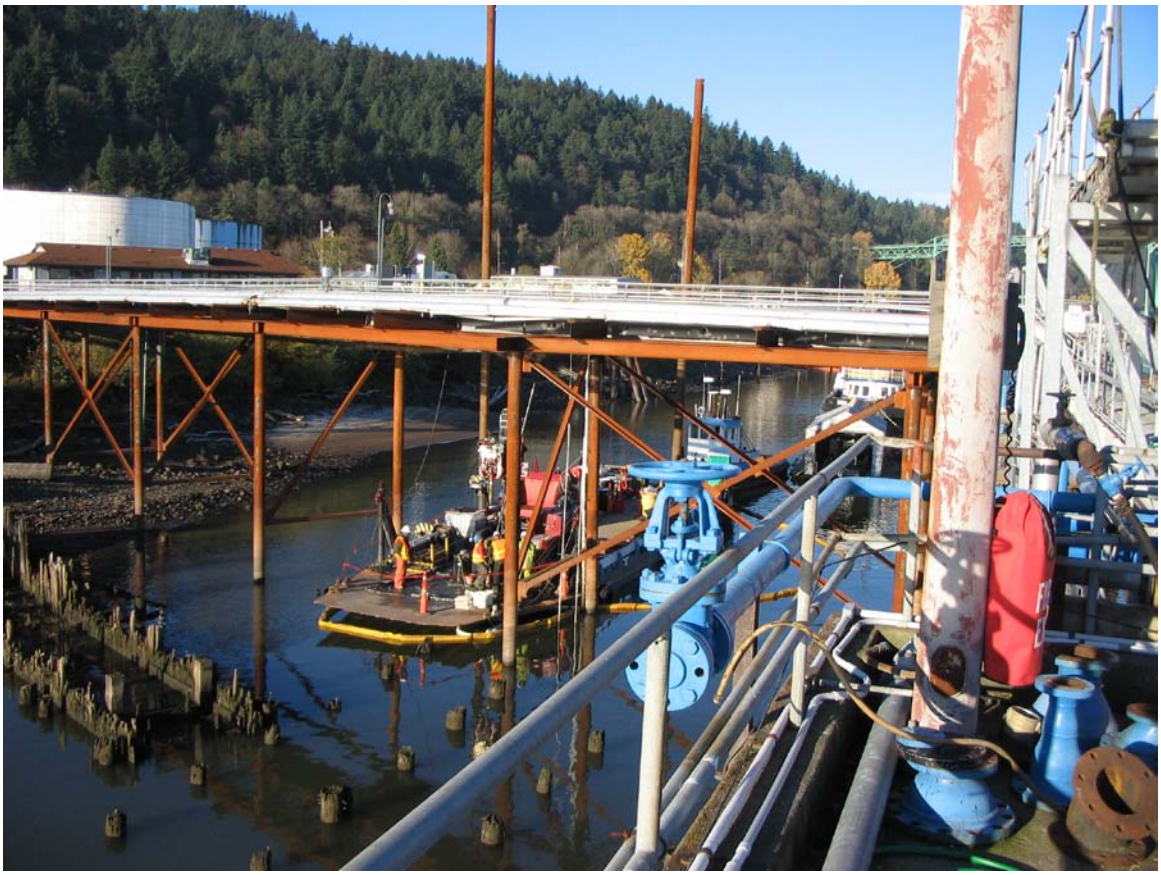
Photos 001 and 002

Segment 2 Oversight Report
December 2, 2009

Photos 003 and 004

Segment 2 Oversight Report
December 2, 2009

Photos 005 and 006



Segment 2 Oversight Report
December 2, 2009

Photos 007 and 008

Segment 2 Oversight Report
December 2, 2009

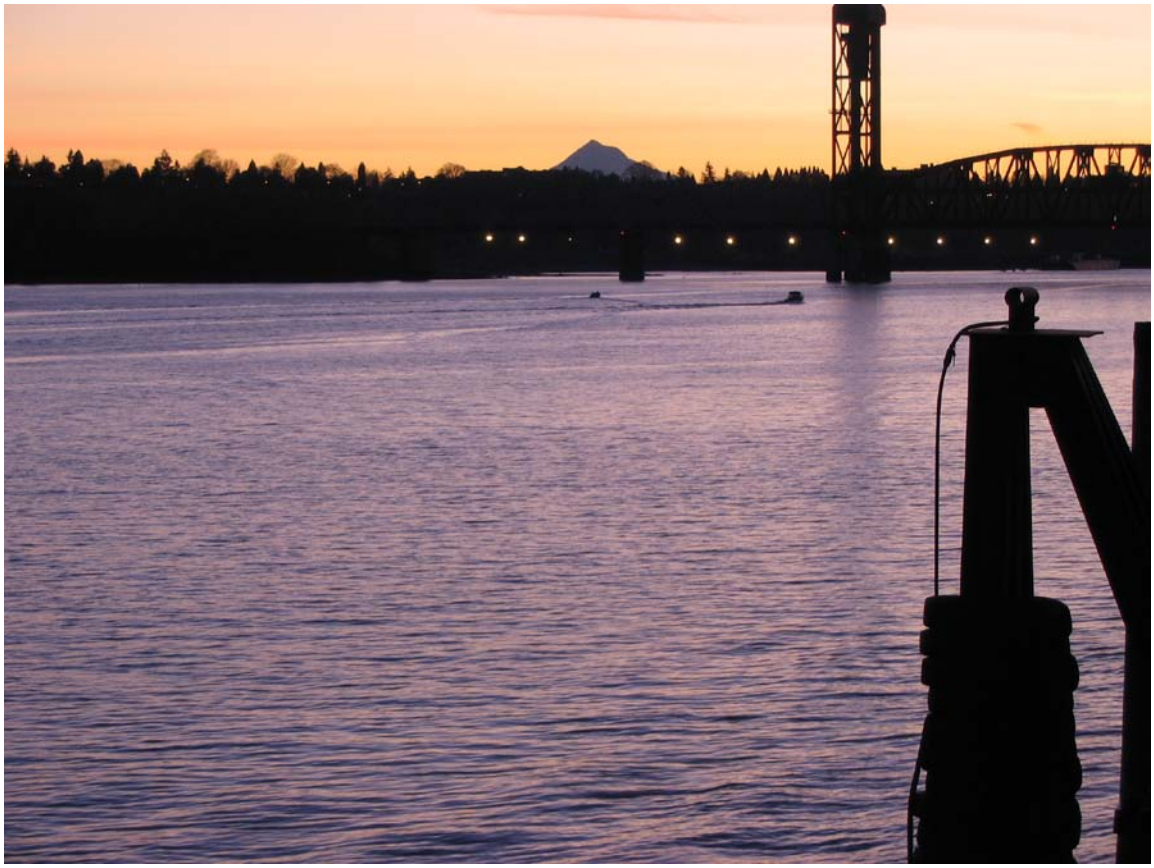
Photos 009 and 010

Segment 2 Oversight Report
December 2, 2009

Photo 011

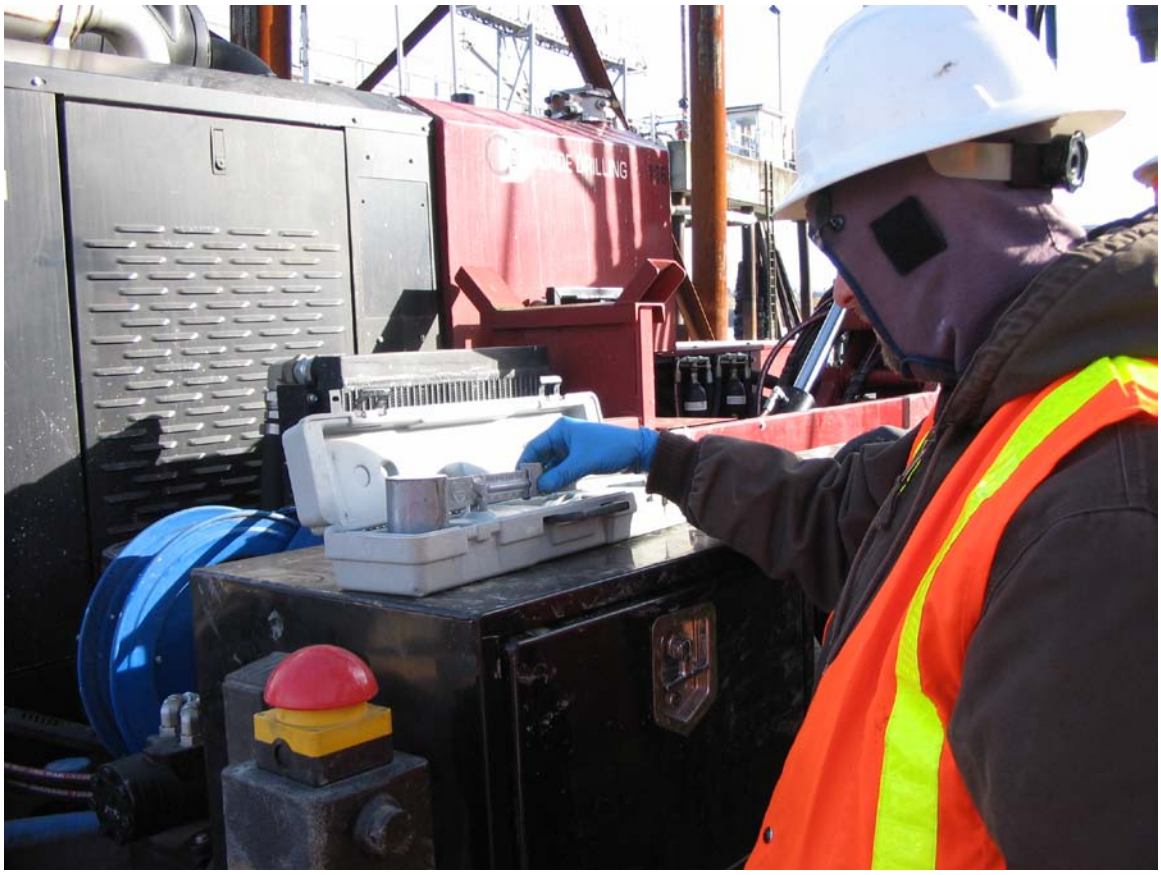
Segment 2 Oversight Report
December 3, 2009

Photos 001 and 002



Segment 2 Oversight Report
December 3, 2009

Photos 003 and 004



Segment 2 Oversight Report
December 3, 2009

Photos 005 and 006

Segment 2 Oversight Report
December 3, 2009

Photos 007 and 008

Segment 2 Oversight Report
December 4, 2009

Photos 001 and 002

Segment 2 Oversight Report
December 4, 2009

Photos 003 and 004

Segment 2 Oversight Report
December 4, 2009

Photos 005 and 006

Segment 2 Oversight Report
December 4, 2009

Photos 007 and 008

Segment 2 Oversight Report
December 4, 2009

Photos 009 and 010

Segment 2 Oversight Report
January 25, 2010

Photos 001 and 002

Segment 2 Oversight Report
February 25, 2010

Photos 003 and 004

Segment 2 Oversight Report
January 26, 2010

Photos 001 and 002

Segment 2 Oversight Report
January 26, 2010

Photos 003 and 004

Segment 2 Oversight Report
January 26, 2010

Photos 005 and 006

Segment 2 Oversight Report
January 26, 2010

Photos 007 and 008

Segment 2 Oversight Report
January 27, 2010

Photos 001 and 002

Segment 2 Oversight Report
January 27, 2010

Photos 003 and 004

Segment 2 Oversight Report
January 27, 2010

Photos 005 and 006

Segment 2 Oversight Report
January 27, 2010

Photos 007 and 008

Segment 2 Oversight Report
January 27, 2010

Photos 009 and 010

Segment 2 Oversight Report
January 27, 2010

Photos 011 and 012

Segment 2 Oversight Report
January 27, 2010

Photos 013 and 014

Segment 2 Oversight Report
January 28, 2010

Photos 001 and 002

Segment 2 Oversight Report
January 28, 2010

Photos 003 and 004

Segment 2 Oversight Report
January 28, 2010

Photos 005 and 006

Segment 2 Oversight Report
January 28, 2010

Photos 007 and 008

Segment 2 Oversight Report
January 28, 2010

Photos 009 and 010

Segment 2 Oversight Report
January 28, 2010

Photos 011 and 012

Segment 2 Oversight Report
January 29, 2010

MW-24 NAPL from Anchor

Photos 001 and 002

Segment 2 Oversight Report
January 29, 2010

MW-24 NAPL from Anchor

Photos 003 and 004

Segment 2 Oversight Report
January 29, 2010

MW-24 NAPL from Anchor

Photos 005 and 006

Segment 2 Oversight Report
January 29, 2010

MW-24 NAPL from Anchor

Photos 007 and 008

Segment 2 Oversight Report
January 29, 2010

MW-24 NAPL from Anchor

Photos 009 and 010

Segment 2 Oversight Report
January 29, 2010

MW-24 NAPL from Anchor

Photo 011

Segment 2 Oversight Report
January 29, 2010

Photos 001 and 002

Segment 2 Oversight Report
January 29, 2010

Photos 003 and 004

Segment 2 Oversight Report
January 29, 2010

Photos 005 and 006

Segment 2 Oversight Report
January 29, 2010

Photos 007 and 008

Segment 2 Oversight Report
January 29, 2010

Photos 009 and 010

Segment 2 Oversight Report
January 29, 2010

Photos 011 and 012

Segment 2 Oversight Report
January 29, 2010

Photos 013 and 014

Segment 2 Oversight Report
January 29, 2010

Photos 015 and 016

Segment 2 Oversight Report
January 29, 2010

Photo 017

Segment 2 Oversight Report
February 1, 2010

Photos 001 and 002

Segment 2 Oversight Report
February 1, 2010

Photos 003 and 004

Segment 2 Oversight Report
February 1, 2010

Photos 005 and 006

Segment 2 Oversight Report
February 1, 2010

Photos 007 and 008

Segment 2 Oversight Report
February 1, 2010

Photos 009 and 010

Segment 2 Oversight Report
February 1, 2010

Photos 011 and 012

Segment 2 Oversight Report
February 1, 2010

Photos 013 and 014

Photo 015

Segment 2 Oversight Report
February 2, 2010

Photos 001 and 002

Segment 2 Oversight Report
February 2, 2010

Photos 003 and 004

Segment 2 Oversight Report
February 2, 2010

Photo 005

Segment 2 Oversight Report
February 3, 2010

Photos 001 and 002

Segment 2 Oversight Report
February 3, 2010

Photo 003

Segment 2 Oversight Report
February 4, 2010

Photos 001 and 002

Segment 2 Oversight Report
February 4, 2010

Photos 003 and 004

Segment 2 Oversight Report
February 4, 2010

Photos 005 and 006

Segment 2 Oversight Report
February 4, 2010

Photos 007 and 008

Segment 2 Oversight Report
February 4, 2010

Photos 009 and 010

Segment 2 Oversight Report
February 4, 2010

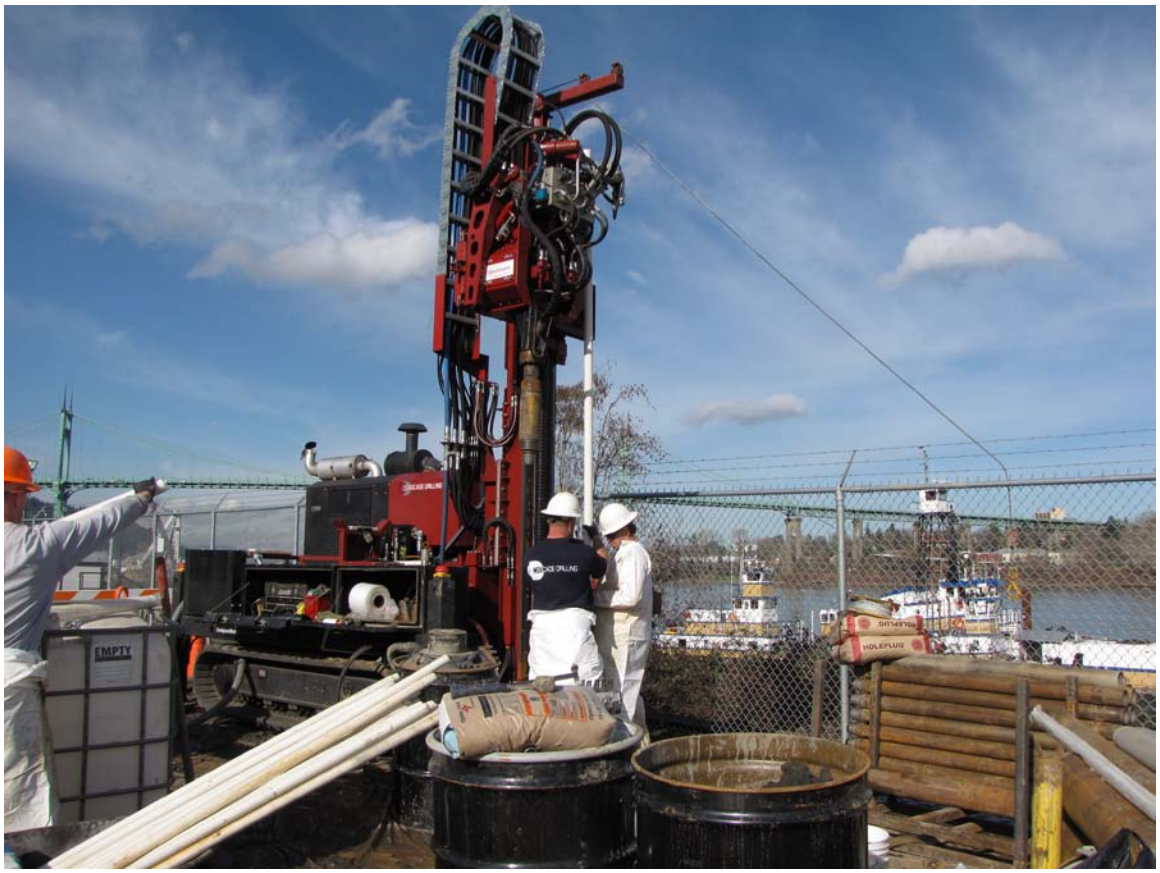
Photos 011 and 012

Segment 2 Oversight Report
February 4, 2010

Photo 013

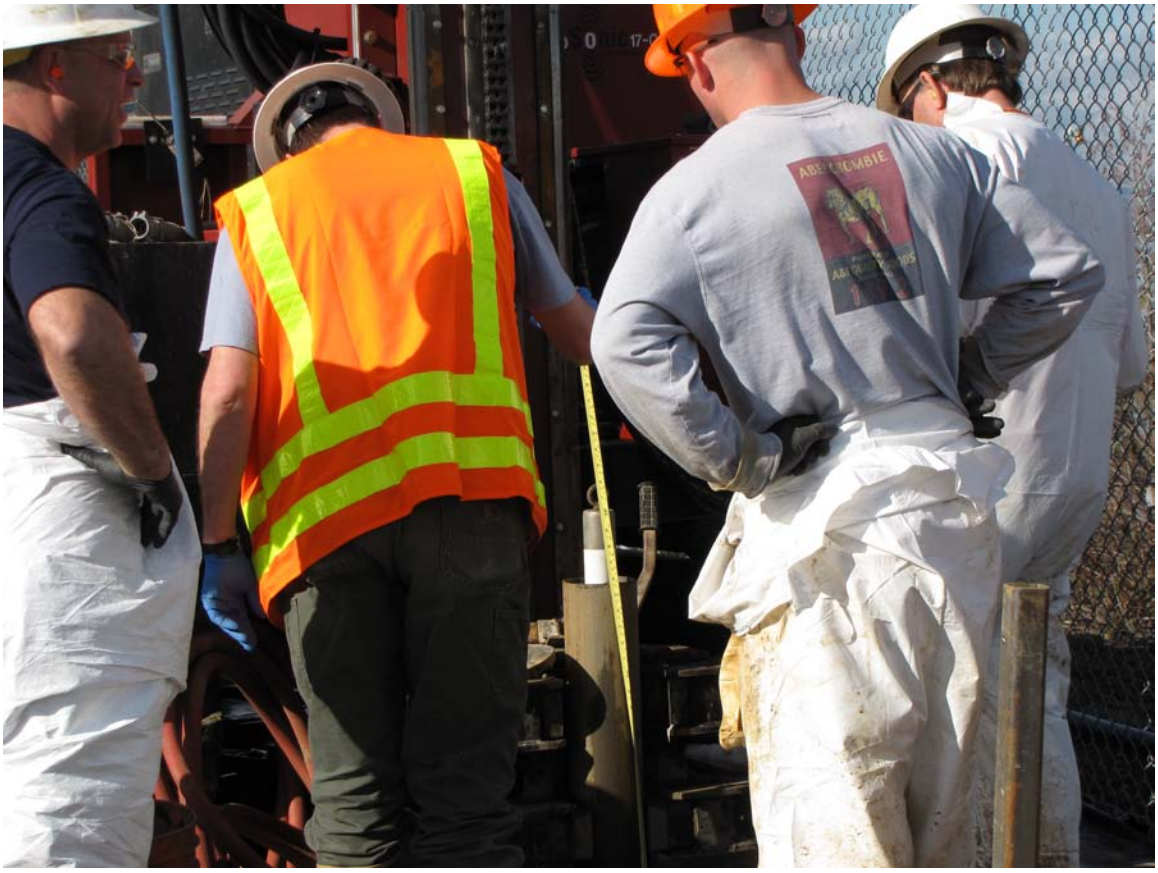
Segment 2 Oversight Report
February 5, 2010

Photos 001 and 002



Segment 2 Oversight Report
February 5, 2010

Photos 003 and 004

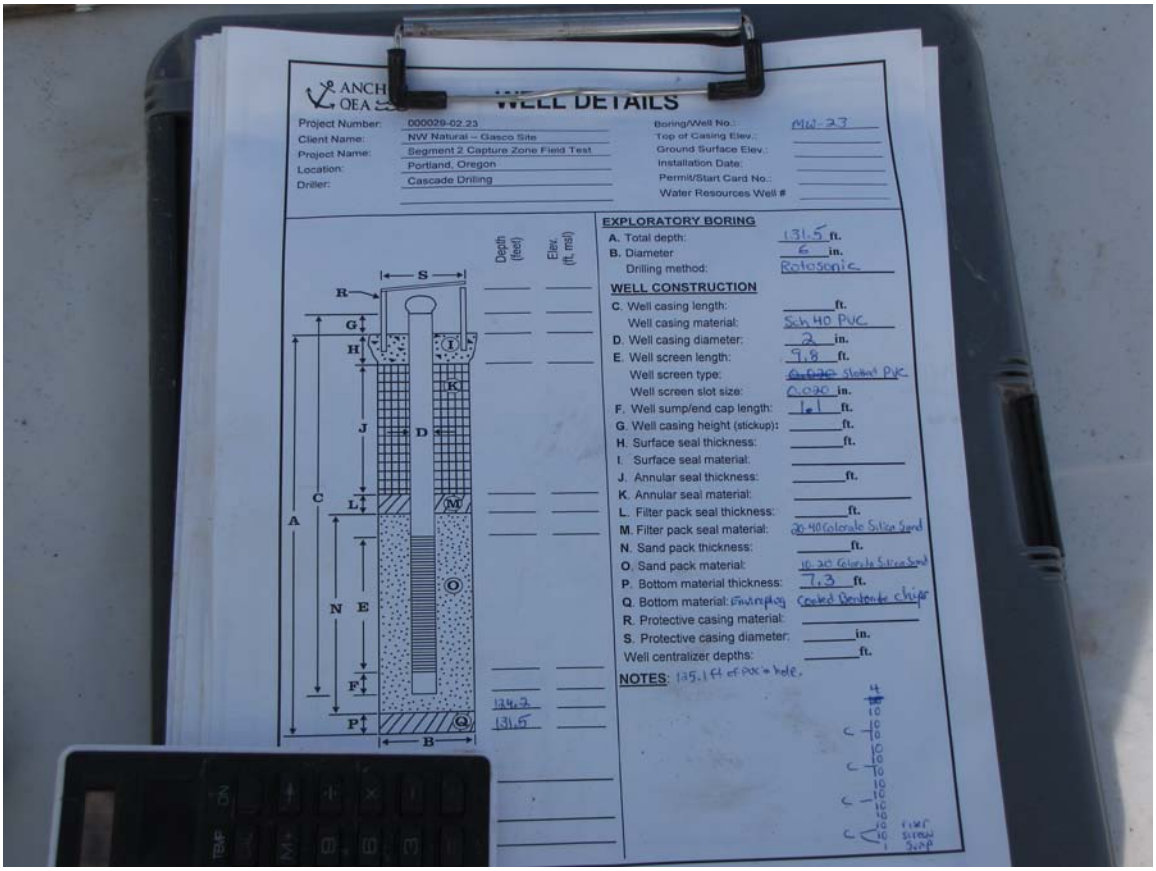


Segment 2 Oversight Report
February 5, 2010

Photos 005 and 006

Segment 2 Oversight Report
February 5, 2010

Photos 007 and 008

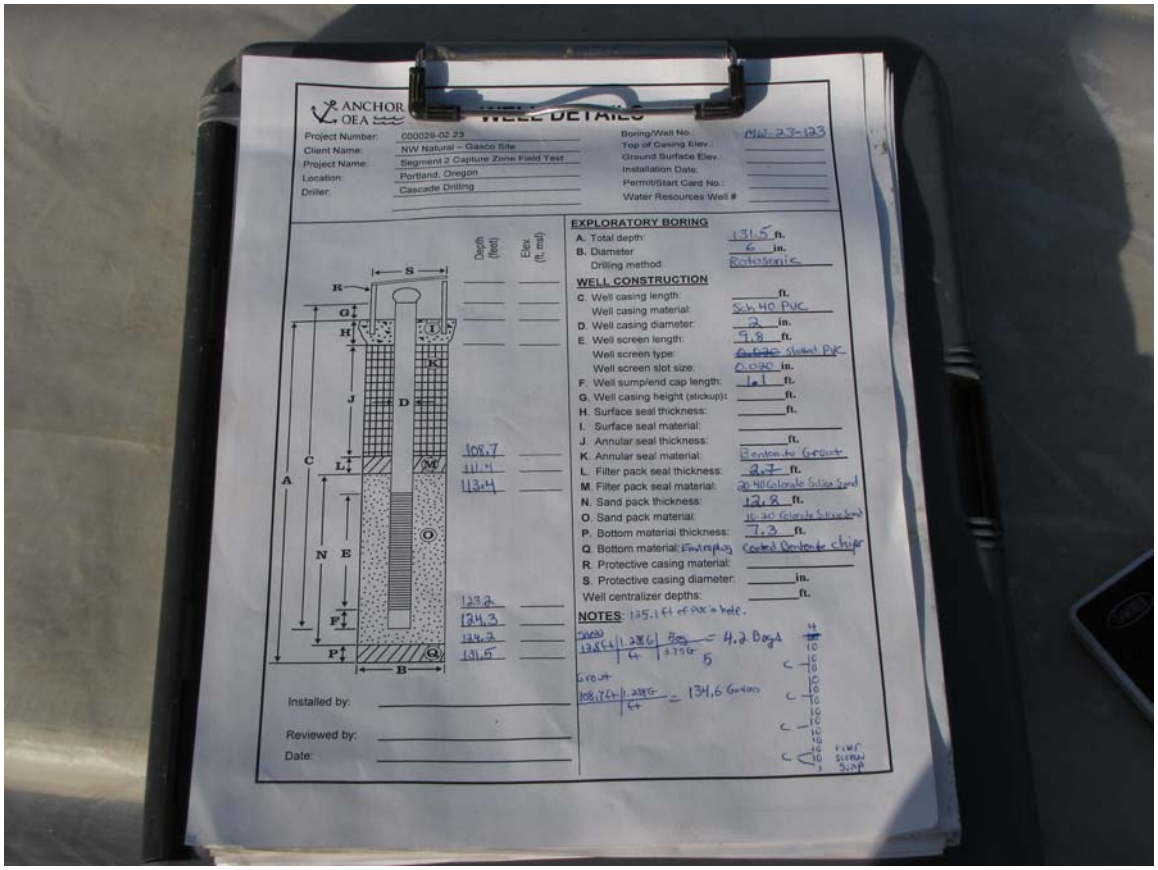


Segment 2 Oversight Report
February 5, 2010

Photos 009 and 010

Segment 2 Oversight Report
February 5, 2010

Photos 011 and 012



Segment 2 Oversight Report
February 5, 2010

Photo 013

Segment 2 Oversight Report
February 8, 2010

Photos 001 and 002

Segment 2 Oversight Report
February 8, 2010

Photos 003 and 004

Segment 2 Oversight Report
February 8, 2010

Photos 005 and 006

Segment 2 Oversight Report
February 8, 2010

Photos 007 and 008

Segment 2 Oversight Report
February 8, 2010

Photos 009 and 010

Segment 2 Oversight Report
February 8, 2010

Photo 011

Segment 2 Oversight Report
February 9, 2010

Photos 001 and 002

Segment 2 Oversight Report
February 9, 2010

Photos 003 and 004

Segment 2 Oversight Report
February 9, 2010

Photos 005 and 006

Segment 2 Oversight Report
February 10, 2010

Photos 001 and 002

Segment 2 Oversight Report
February 10, 2010

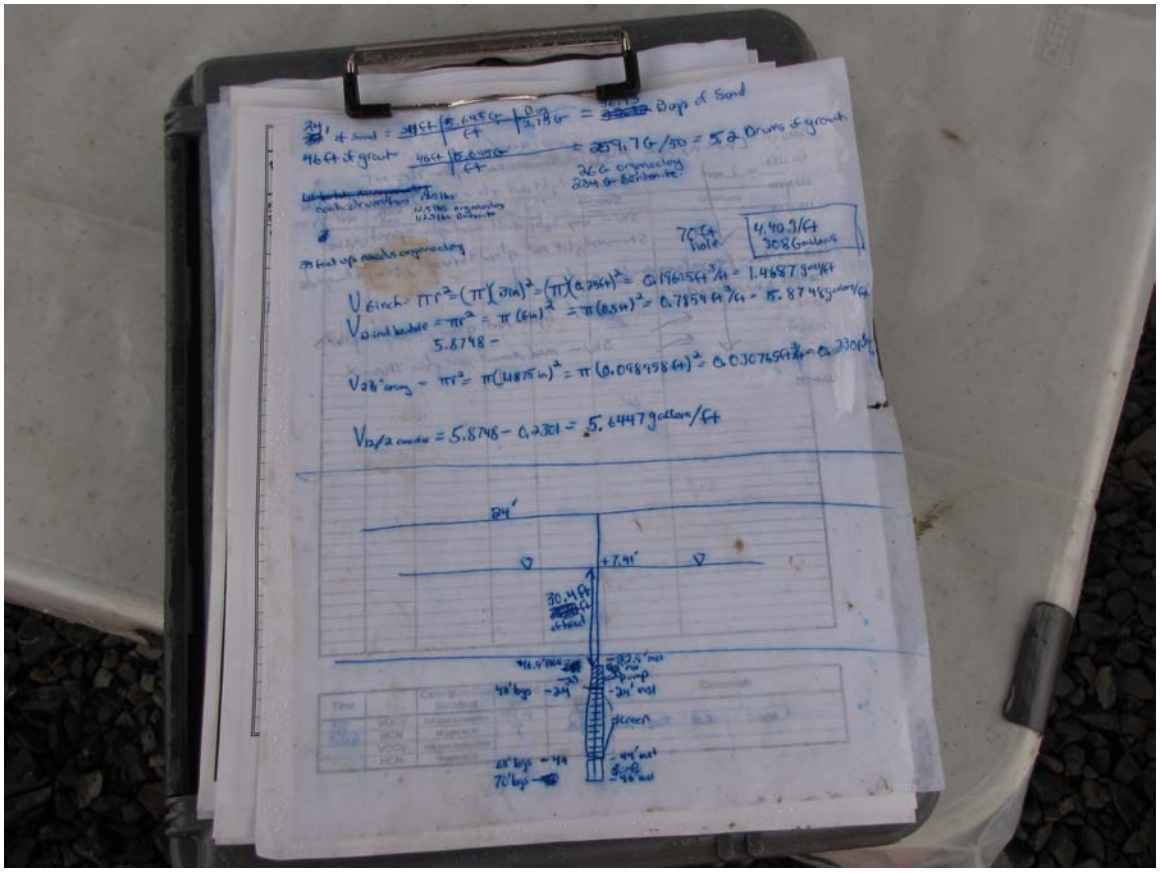
Photos 003 and 004

Segment 2 Oversight Report
February 10, 2010

Photos 005 and 006

Segment 2 Oversight Report
February 10, 2010

Photos 007 and 008



Segment 2 Oversight Report
February 10, 2010

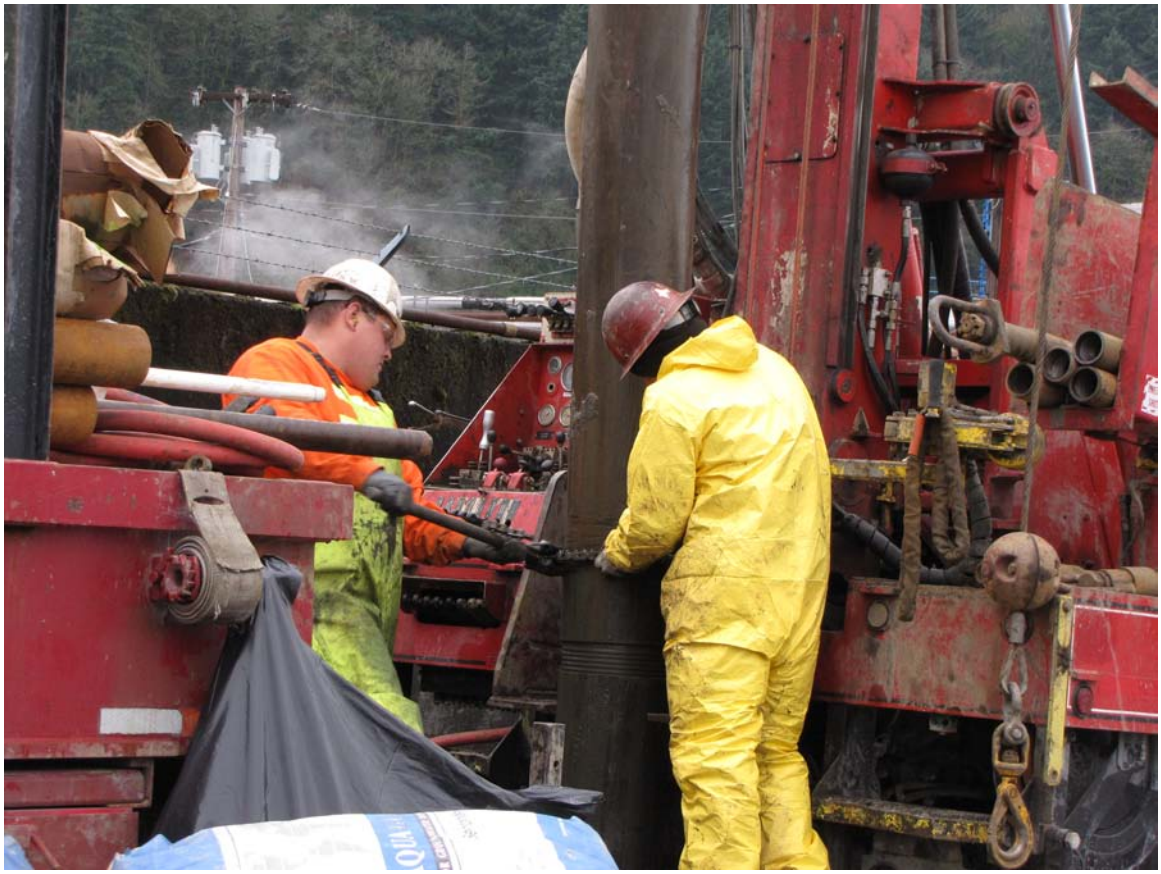
Photo 009

Segment 2 Oversight Report
February 11, 2010

Photos 001 and 002

Segment 2 Oversight Report
February 11, 2010

Photos 003 and 004



Segment 2 Oversight Report
February 11, 2010

Photos 005 and 006

Segment 2 Oversight Report
February 11, 2010

Photos 007 and 008

Segment 2 Oversight Report
February 11, 2010

Photo 009

Segment 2 Oversight Report
February 12, 2010

Photos 001 and 002

Segment 2 Oversight Report
February 12, 2010

Photos 003 and 004

Segment 2 Oversight Report
February 12, 2010

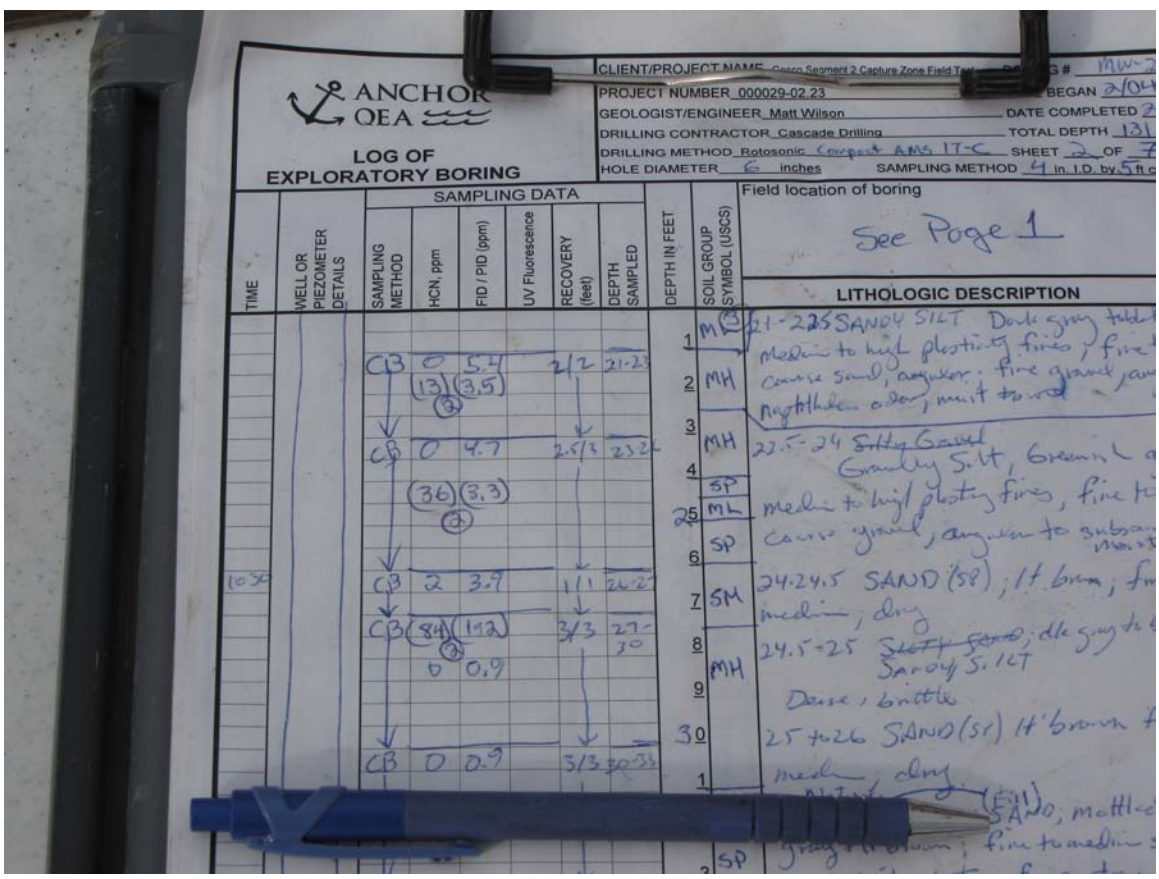
Photos 005 and 006

Segment 2 Oversight Report
February 15, 2010

Photos 001 and 002

Segment 2 Oversight Report
February 15, 2010

Photos 003 and 004



Segment 2 Oversight Report
February 17, 2010

Photos 001 and 002

Segment 2 Oversight Report
February 17, 2010

Photos 003 and 004

Segment 2 Oversight Report
February 17, 2010

Photos 005 and 006

Segment 2 Oversight Report
February 17, 2010

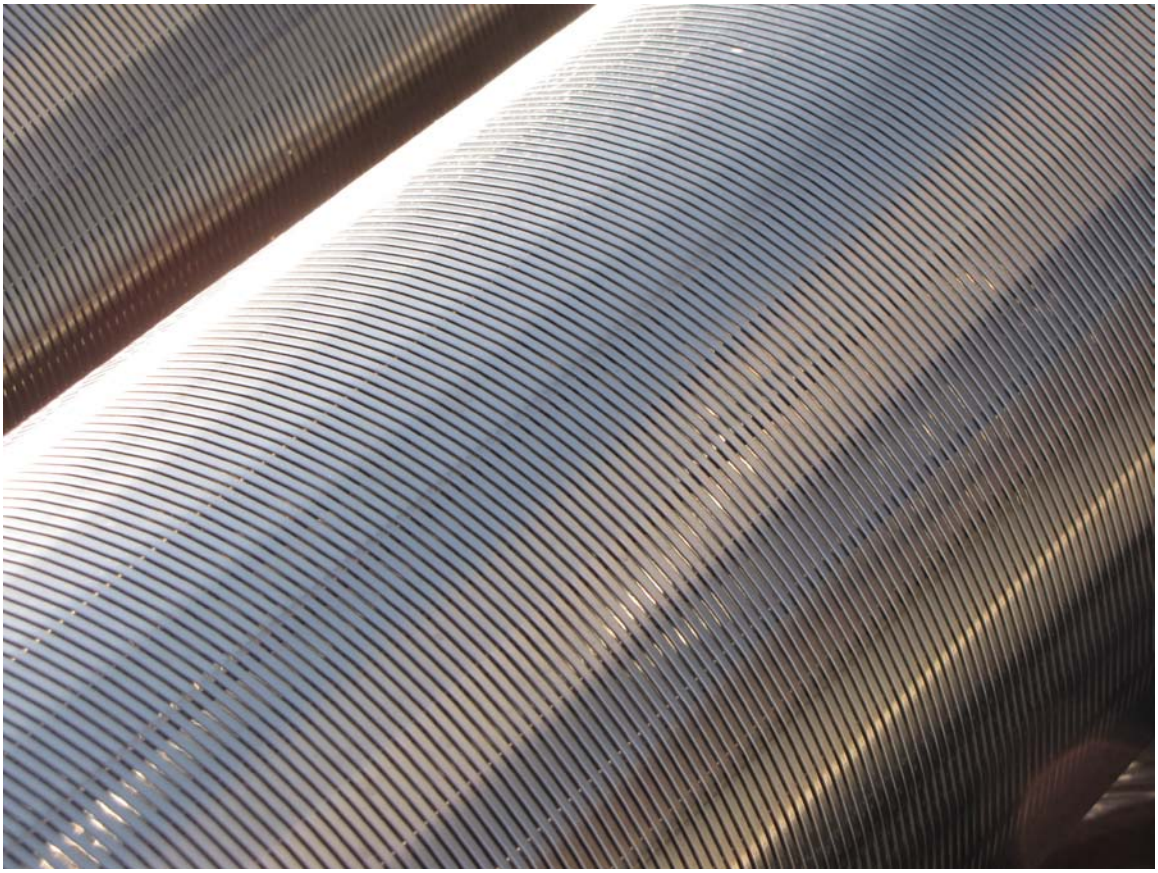
Photos 007 and 008

Segment 2 Oversight Report
February 22, 2010

Photos 001 and 002

Segment 2 Oversight Report
February 22, 2010

Photos 003 and 004



Segment 2 Oversight Report
February 22, 2010

Photos 005 and 006

Segment 2 Oversight Report
February 22, 2010

Photos 007 and 008

Segment 2 Oversight Report
February 22, 2010

Photos 009 and 010

Segment 2 Oversight Report
February 22, 2010

Photos 011 and 012

Segment 2 Oversight Report
February 24, 2010

Photos 001 and 002

Segment 2 Oversight Report
February 24, 2010

Photos 003 and 004

Segment 2 Oversight Report
February 24, 2010

Photos 005 and 006

Segment 2 Oversight Report
February 24, 2010

Photos 007 and 008

Segment 2 Oversight Report
February 24, 2010

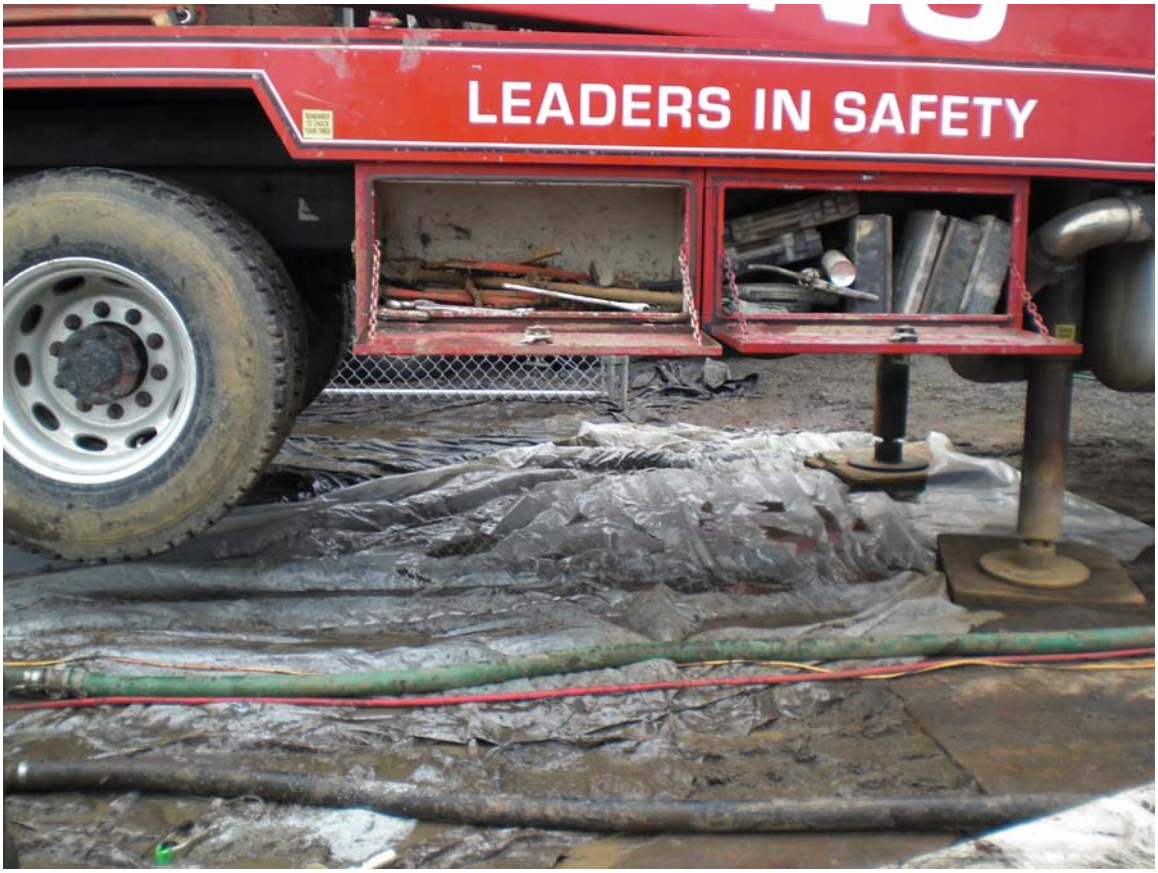
Photo 009

Segment 2 Oversight Report
March 1, 2010

Photos 003 and 004

Segment 2 Oversight Report
March 1, 2010

Photos 005 and 007



Segment 2 Oversight Report
March 1, 2010

Photos 010 and 011

Segment 2 Oversight Report
March 1, 2010

Photos 013 and 014

Segment 2 Oversight Report
March 1, 2010

Photos 016 and 018

Segment 2 Oversight Report
March 1, 2010

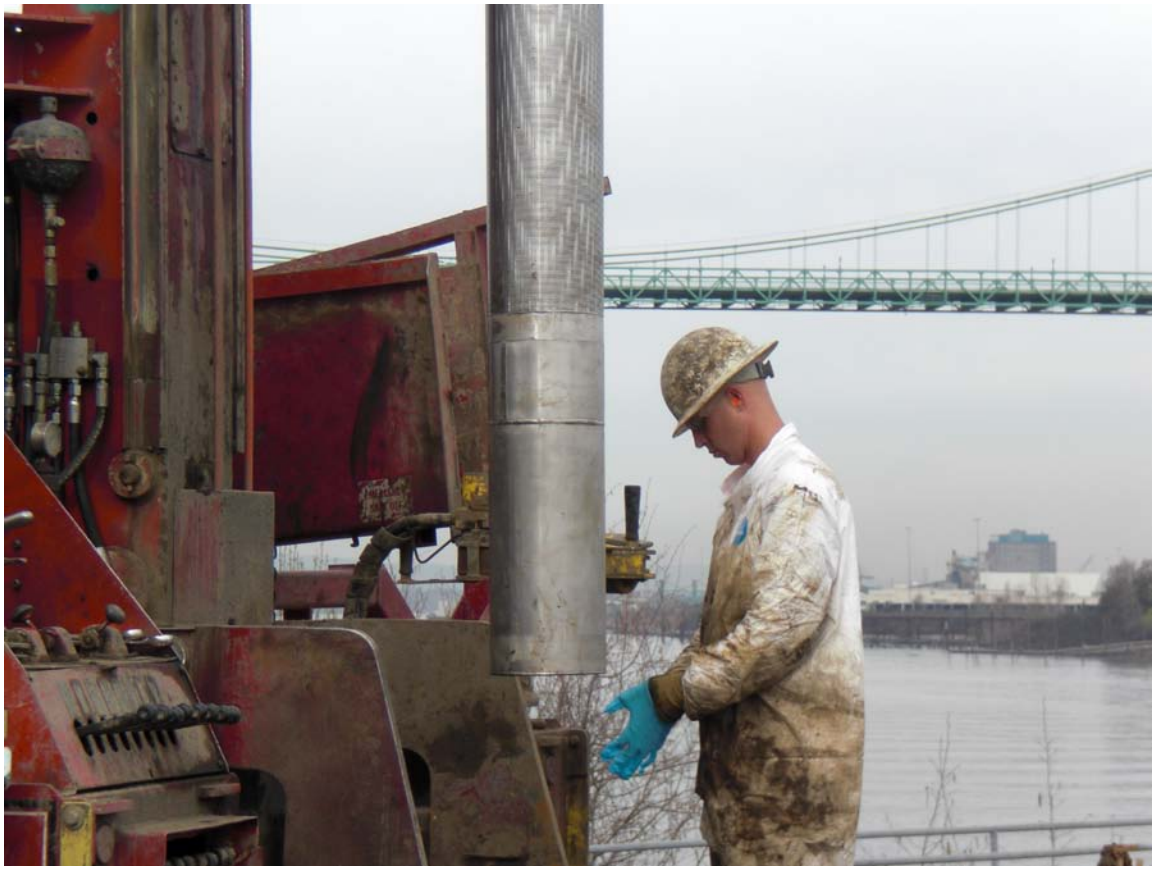
Photos 019 and 021

Segment 2 Oversight Report
March 1, 2010

Photos 023 and 024

Segment 2 Oversight Report
March 1, 2010

Photos 025 and 026



Segment 2 Oversight Report
March 1, 2010

Photo 027

Segment 2 Oversight Report
March 2, 2010

Photos 001 and 002

Segment 2 Oversight Report
March 2, 2010

Photos 003 and 004

Segment 2 Oversight Report
March 2, 2010

Photos 005 and 006

Segment 2 Oversight Report
March 2, 2010

Photos 007 and 008

Segment 2 Oversight Report
March 2, 2010

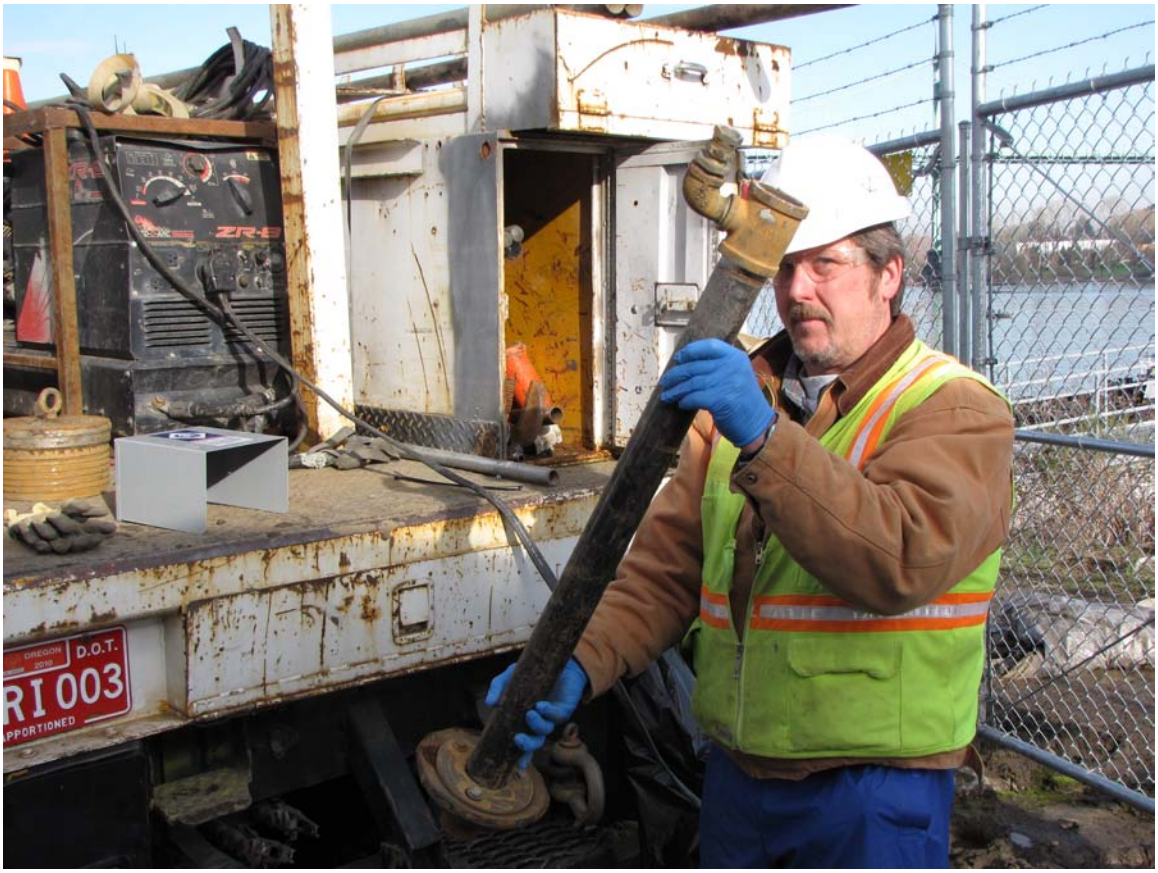
Photos 009 and 010

Segment 2 Oversight Report
March 2, 2010

Photos 011 and 012

Segment 2 Oversight Report
March 4, 2010

Photos 002 and 003



Segment 2 Oversight Report
March 4, 2010

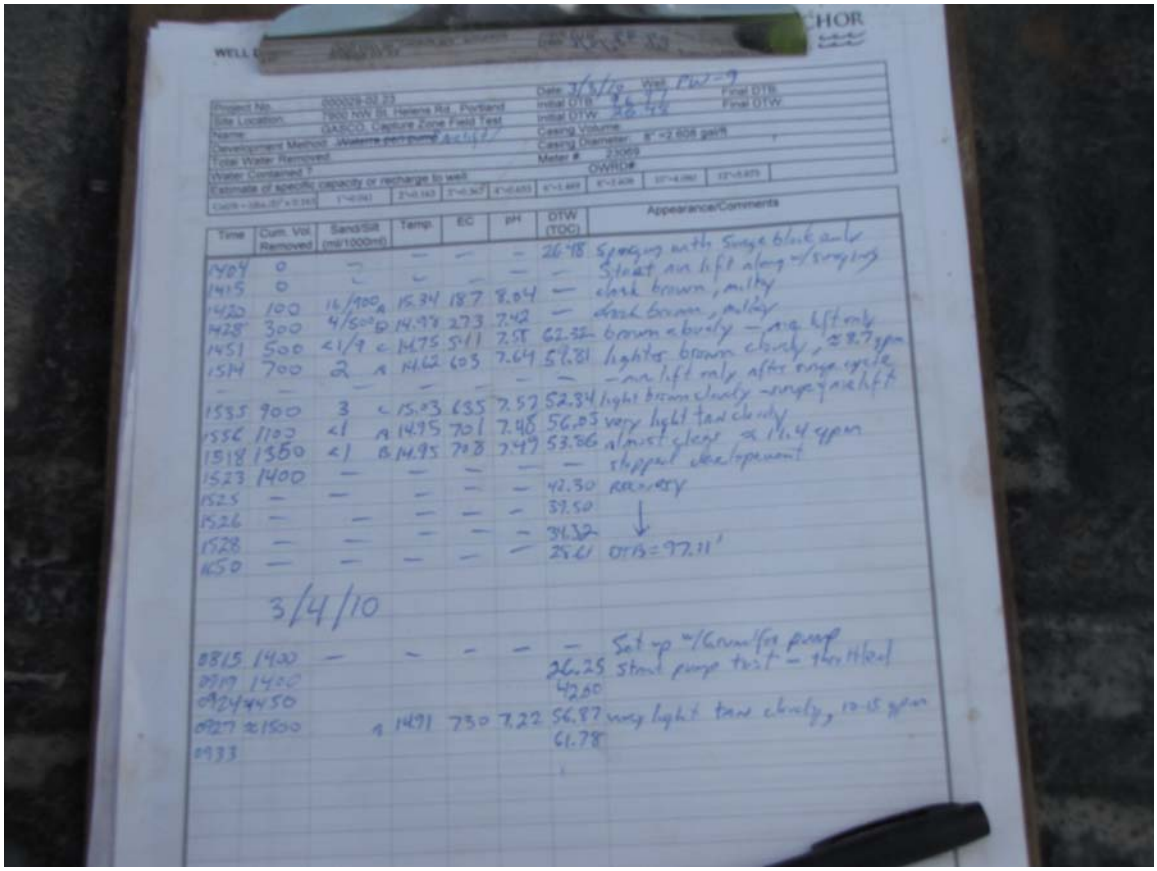
Photos 004 and 005

Segment 2 Oversight Report
March 4, 2010

Photos 006 and 007

Segment 2 Oversight Report
March 4, 2010

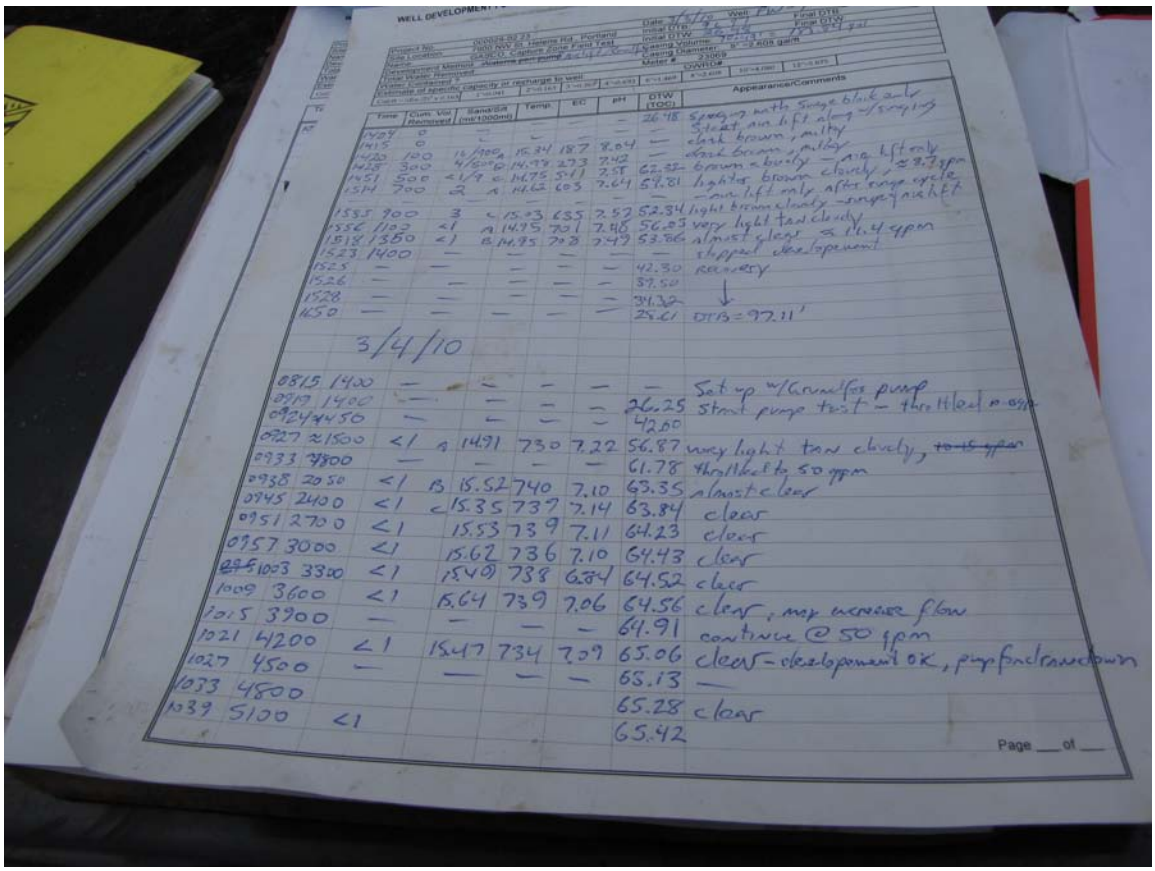
Photos 008 and 009



Time	Cum. Vol. Removed	Sand/Silt (ml/1000ml)	Temp	EC	pH	DTW (TOC)	Appearance/Comments
1404	0	—	—	—	—	26.18	Sponging with Surge block only
1415	0	—	—	—	—	—	Start air lift along w/ sponging
1420	100	16/900 A	15.34	187	8.04	—	dark brown, milky
1428	300	4/500 B	14.98	273	7.42	—	dark brown, milky
1451	500	<1/9 C	14.75	511	7.58	62.32	brown cloudy — air lift only
1514	700	2 A	14.62	603	7.64	56.81	lighter brown cloudy, ≈8.7 gpm
—	—	—	—	—	—	—	— air lift only after surge cycle
1535	900	3 C	15.03	635	7.57	52.34	light brown cloudy — surge + air lift
1556	1100	<1 A	14.95	701	7.48	56.05	very light tan cloudy
1518	1350	<1 B	14.95	708	7.49	53.86	almost clear ≈ 14.4 gpm
1523	1400	—	—	—	—	—	stopped development
1525	—	—	—	—	—	42.30	recovery
1526	—	—	—	—	—	39.50	
1528	—	—	—	—	—	34.32	↓
1550	—	—	—	—	—	25.61	DTB = 97.11'
3/4/10							
0815	1400	—	—	—	—	—	Set up w/ Grundfos pump
0919	1400					26.25	start pump test — throttled
0924	1450					42.50	
0927	≈1500	A	14.91	730	7.22	56.87	very light tan cloudy, 10-15 gpm
0933						61.78	

Segment 2 Oversight Report
March 4, 2010

Photos 010 and 011



WELL DEVELOPMENT

Time	Gal. Vol. Removed	Sand/Silt (ml/1000ml)	Temp.	EC	pH	DTW (TOC)	Appearance/Comments
						26.18	Spraying with Sludge black and
1404	0	—	—	—	—	—	Start air lift along w/ surging
1415	0	—	—	—	—	—	dark brown, milky
1420	100	16/1000	15.34	187	8.04	—	dark brown, milky
1425	300	4/1000	14.98	273	7.42	—	brown cloudy — surg lift only
1451	500	<1/9	14.75	511	7.55	62.22	brown cloudy, ≈ 8.7 gpm
1514	700	2	14.62	605	7.64	59.81	lighter brown cloudy, surge cycle
—	—	—	—	—	—	—	— air lift only after surge cycle
1535	900	3	15.13	655	7.57	52.34	light brown cloudy — surge / air lift
1556	1100	<1	14.75	701	7.46	56.03	very light tan cloudy
1518	1350	<1	14.95	708	7.47	53.86	almost clear & 11.4 gpm
1523	1400	—	—	—	—	—	stopped development
1525	—	—	—	—	—	42.30	recovery
1526	—	—	—	—	—	37.50	
1528	—	—	—	—	—	34.32	↓
1650	—	—	—	—	—	29.61	DTB = 97.11'

3/4/10

Time	Gal. Vol. Removed	Sand/Silt (ml/1000ml)	Temp.	EC	pH	DTW (TOC)	Appearance/Comments
0815	1400	—	—	—	—	—	Set up w/ Grundfos pump
0819	1400	—	—	—	—	26.25	Start pump test — throttled to 0%
0824	4450	—	—	—	—	42.00	
0827	≈1500	<1	14.91	730	7.22	56.87	very light tan cloudy, ~~10.5 gpm~~
0933	4800	—	—	—	—	61.78	throttled to 50 gpm
0938	2050	<1	15.52	740	7.10	63.35	almost clear
0945	2400	<1	15.35	737	7.14	63.84	clear
0951	2700	<1	15.53	739	7.11	64.23	clear
0957	3000	<1	15.62	736	7.10	64.43	clear
~~0955~~ 1003	3300	<1	15.49	738	6.84	64.52	clear
1009	3600	<1	15.64	739	7.06	64.56	clear, may increase flow
1015	3900	—	—	—	—	64.91	continue @ 50 gpm
1021	4200	<1	15.47	734	7.09	65.06	clear — development OK, pump and rawdown
1027	4500	—	—	—	—	65.13	—
1033	4800					65.28	clear
1039	5100	<1				65.42	

Page ___ of ___

Segment 2 Oversight Report
March 8, 2010

Photos 001 and 002

Segment 2 Oversight Report
March 8, 2010

Photos 003 and 004

Segment 2 Oversight Report
March 8, 2010

Photos 005 and 006

Segment 2 Oversight Report
March 8, 2010

Photos 007 and 008

Segment 2 Oversight Report
March 8, 2010

Photos 009 and 010

Segment 2 Oversight Report
March 8, 2010

Photos 011 and 012

Segment 2 Oversight Report
March 8, 2010

Photos 013 and 014

Segment 2 Oversight Report
March 18, 2010

Photos 001 and 002

Segment 2 Oversight Report
March 18, 2010

Photos 003 and 004

Segment 2 Oversight Report
March 18, 2010

Photos 005 and 006

Segment 2 Oversight Report
March 18, 2010

Photos 007 and 008

Segment 2 Oversight Report
March 18, 2010

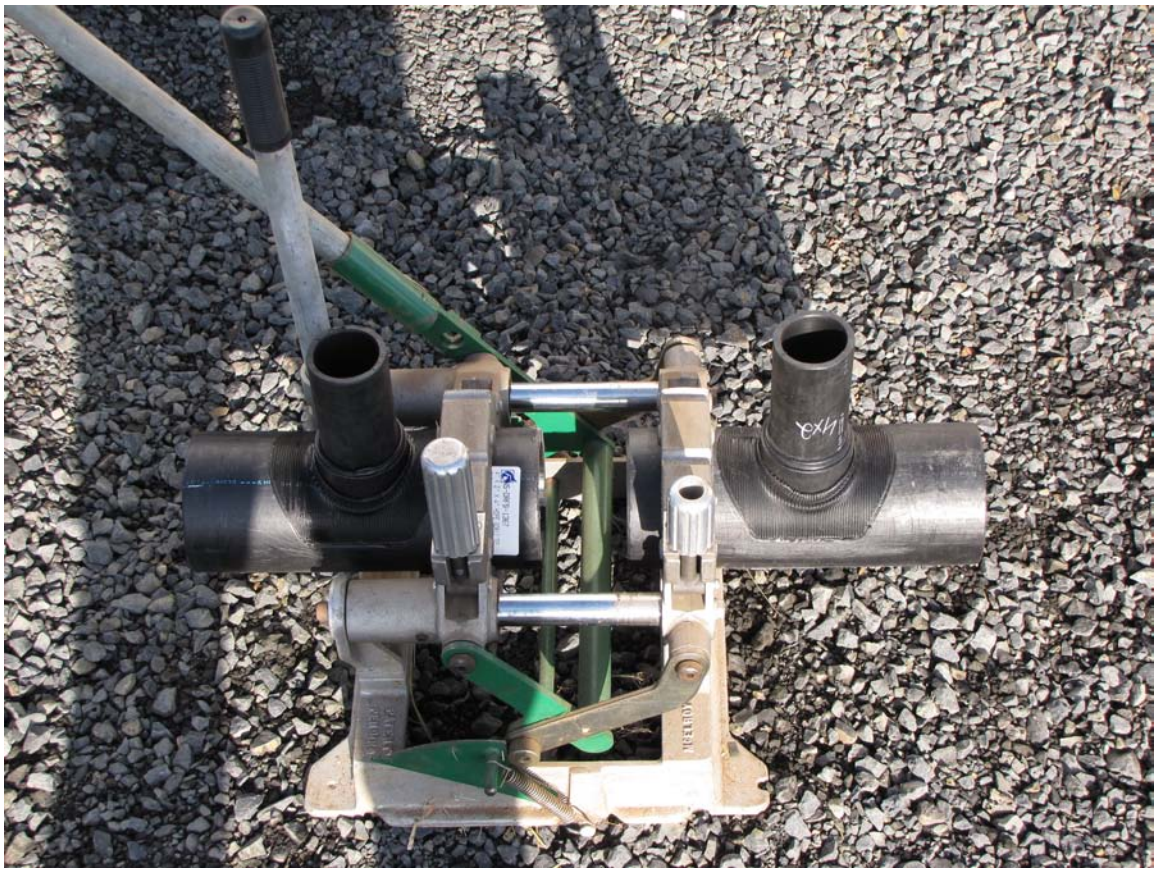
Photos 009 and 010

Segment 2 Oversight Report
March 18, 2010

Photos 011 and 012

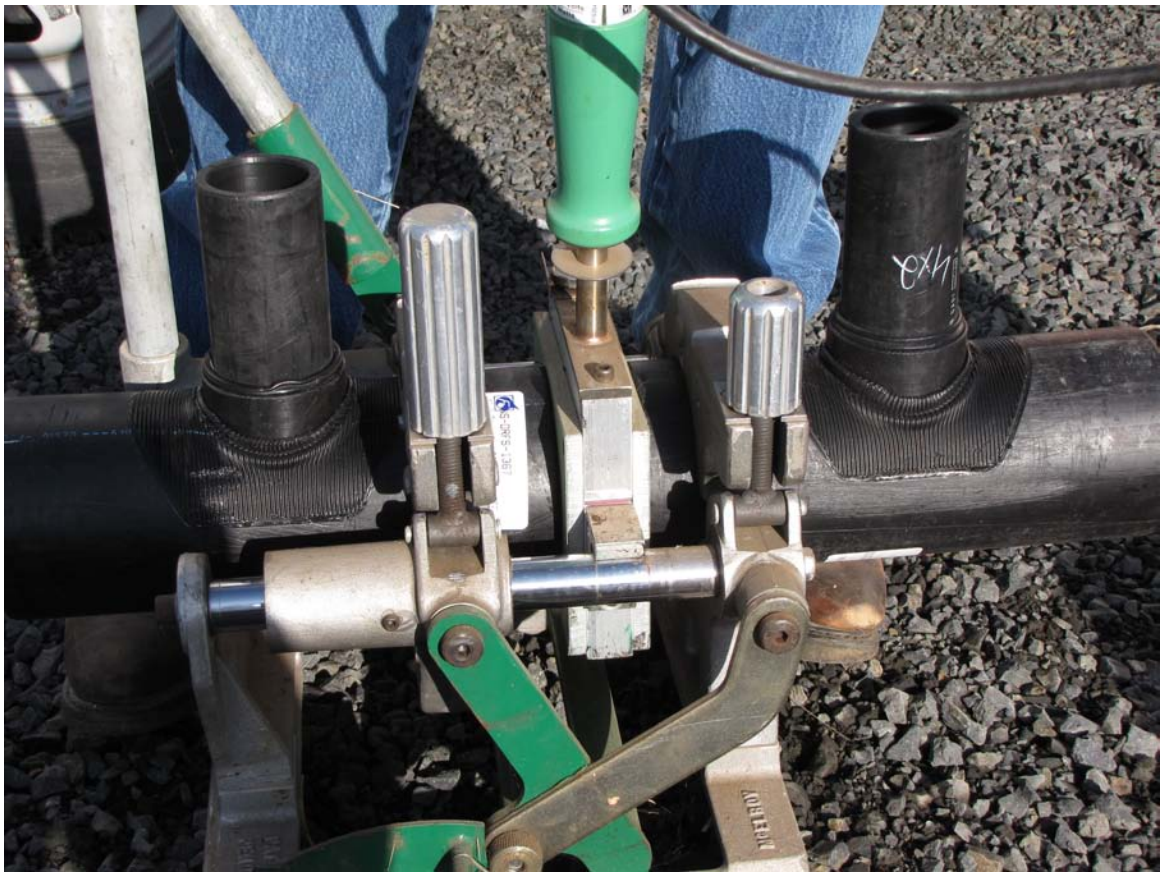
Segment 2 Oversight Report
March 18, 2010

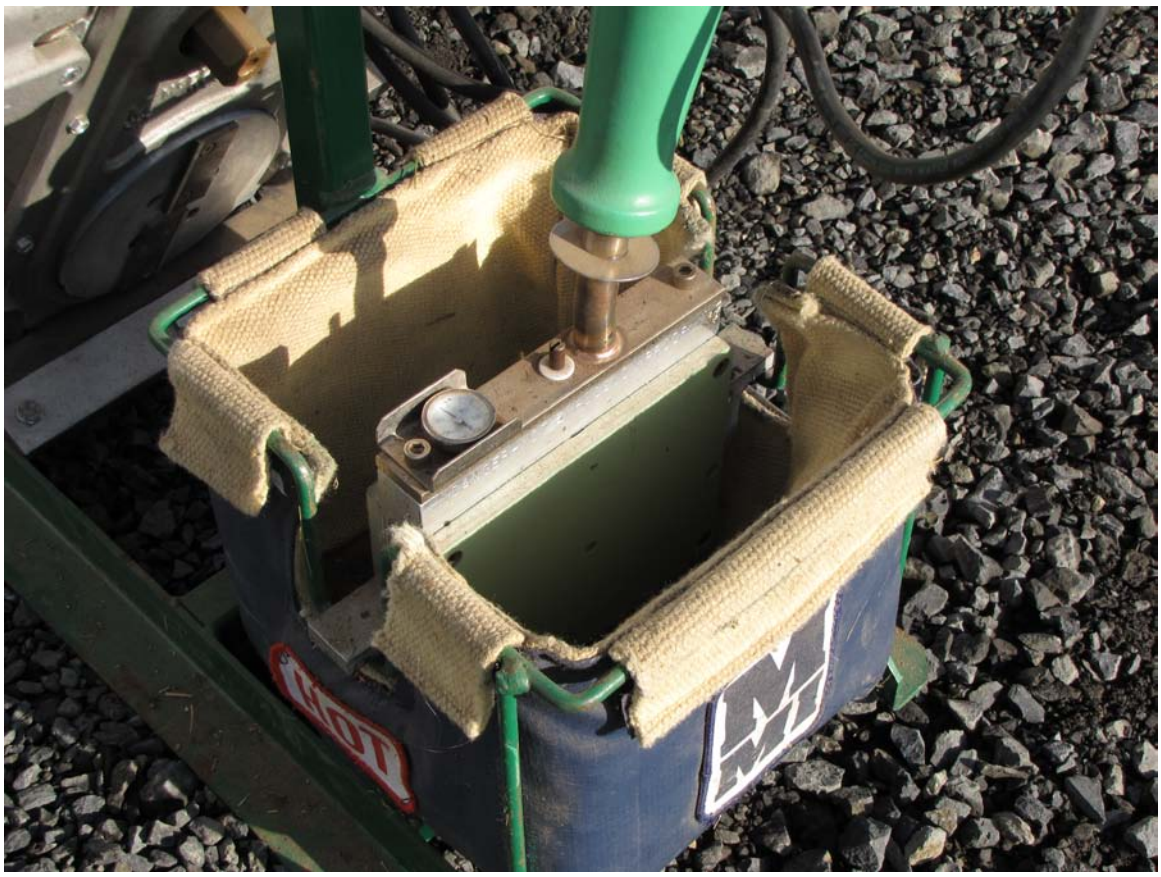
Photos 013 and 014



Segment 2 Oversight Report
March 18, 2010

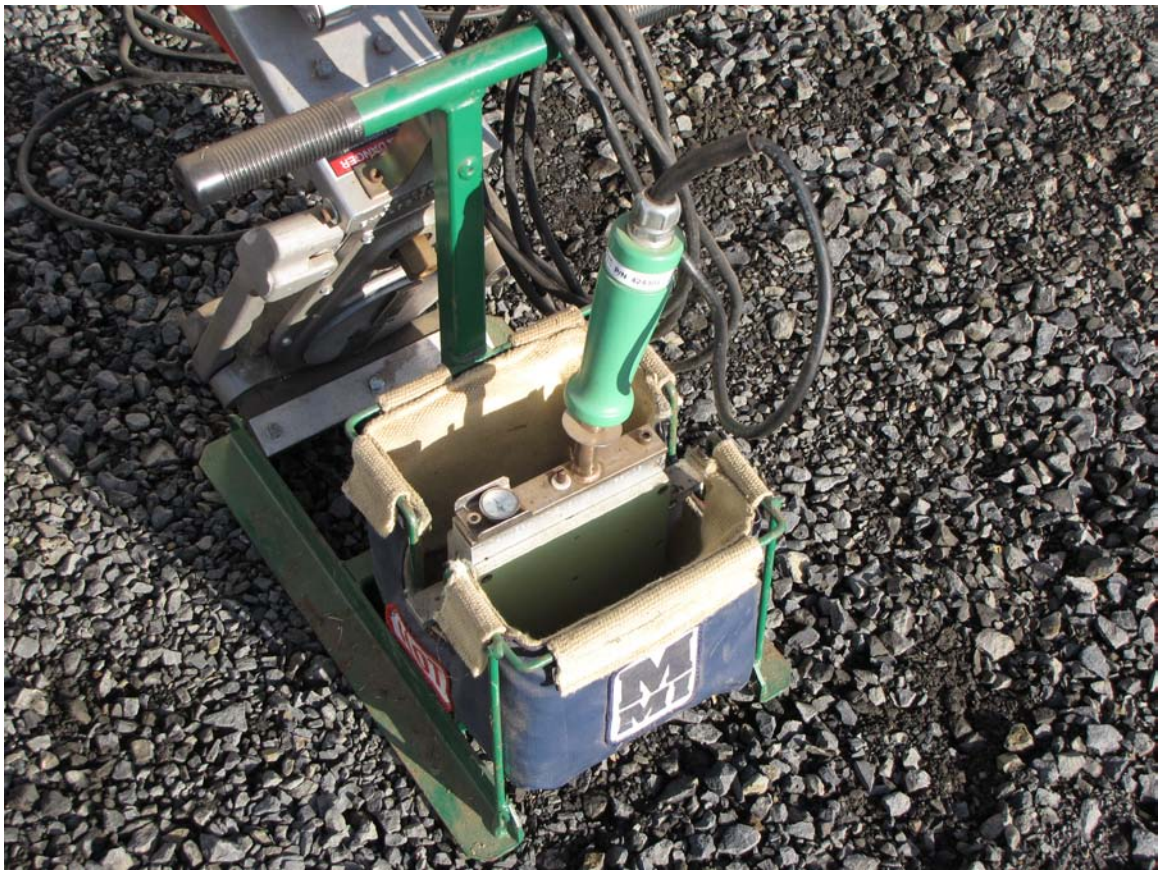
Photos 015 and 016





Segment 2 Oversight Report
March 18, 2010

Photos 017 and 018



Segment 2 Oversight Report
March 18, 2010

Photos 019 and 020

Segment 2 Oversight Report
March 23, 2010

Photos 001 and 002

Segment 2 Oversight Report
March 23, 2010

Photos 003 and 004

Segment 2 Oversight Report
March 23, 2010

Photos 005 and 006

Segment 2 Oversight Report
March 23, 2010

Photos 007 and 008

Segment 2 Oversight Report
March 23, 2010

Photos 009 and 010

Segment 2 Oversight Report
March 23, 2010

Photos 011 and 012

Segment 2 Oversight Report
March 23, 2010

Photos 013 and 014

Segment 2 Oversight Report
March 23, 2010

Photos 015 and 016

Segment 2 Oversight Report
March 23, 2010

Photos 017 and 018

Segment 2 Oversight Report
March 30, 2010

Photos 001 and 002

Segment 2 Oversight Report
March 30, 2010

Photos 003 and 004

Segment 2 Oversight Report
March 30, 2010

Photos 005 and 006

Segment 2 Oversight Report
March 30, 2010

Photos 007 and 008

Segment 2 Oversight Report
March 30, 2010

Photos 009 and 010

Segment 2 Oversight Report
March 30, 2010

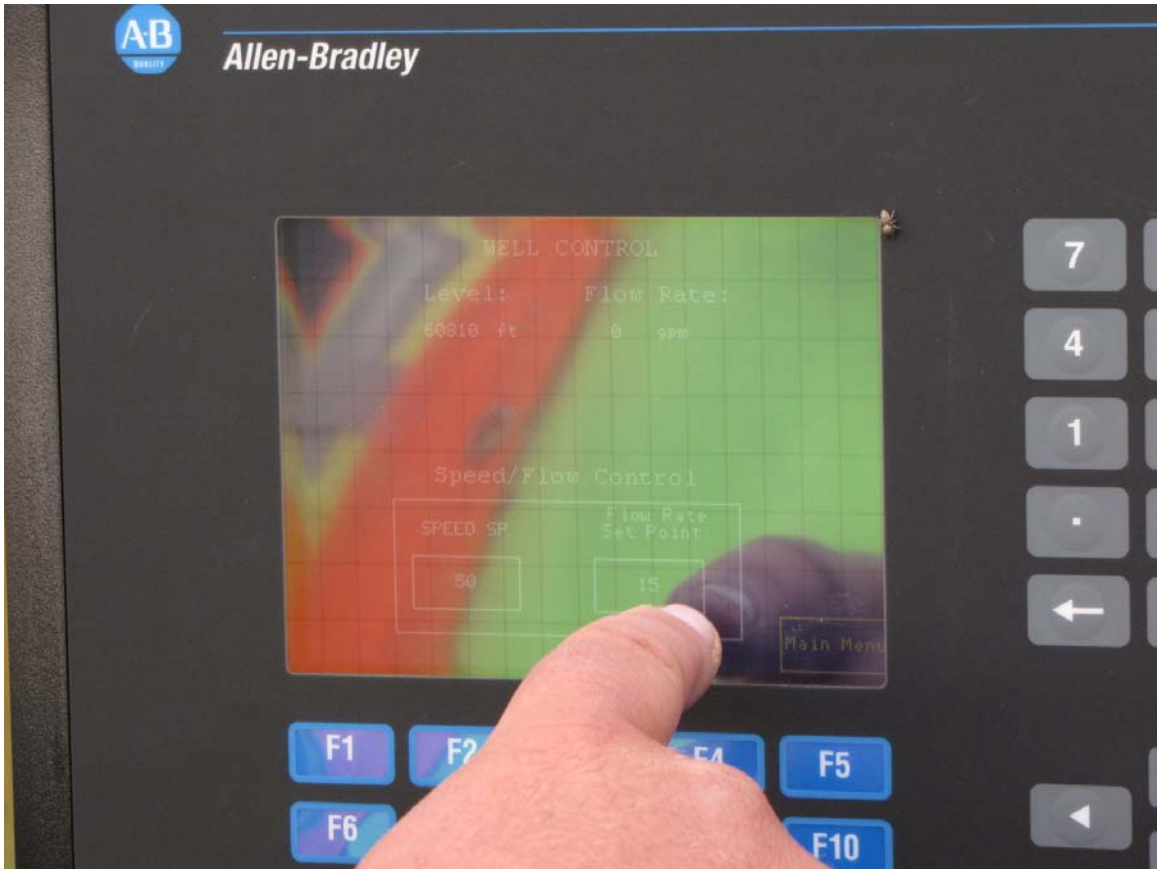
Photos 011 and 012

Segment 2 Oversight Report
March 30, 2010

Photo 013

Segment 2 Oversight Report
April 19, 2010

Photos 001 and 002



Segment 2 Oversight Report
April 19, 2010

Photos 003 and 004

Segment 2 Oversight Report
April 19, 2010

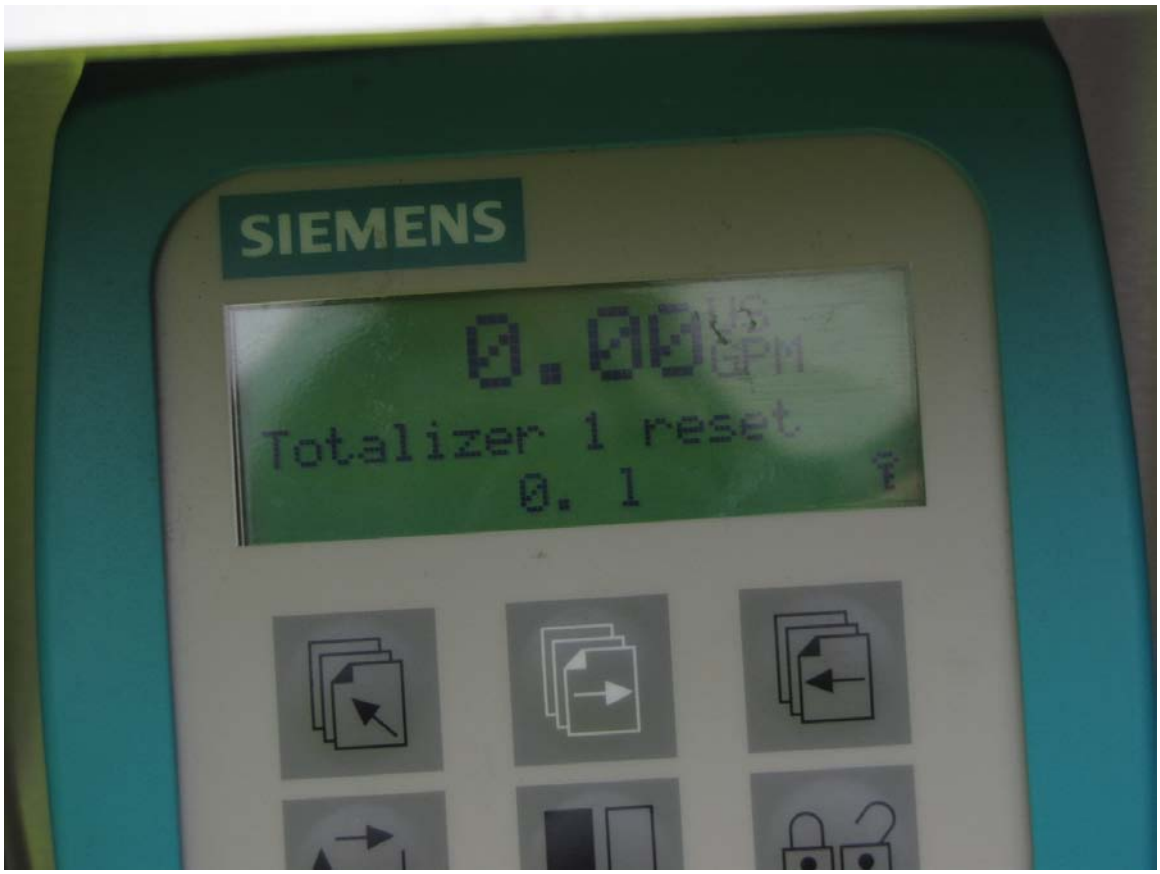
Photos 005 and 006

Segment 2 Oversight Report
April 19, 2010

Photos 007 and 008

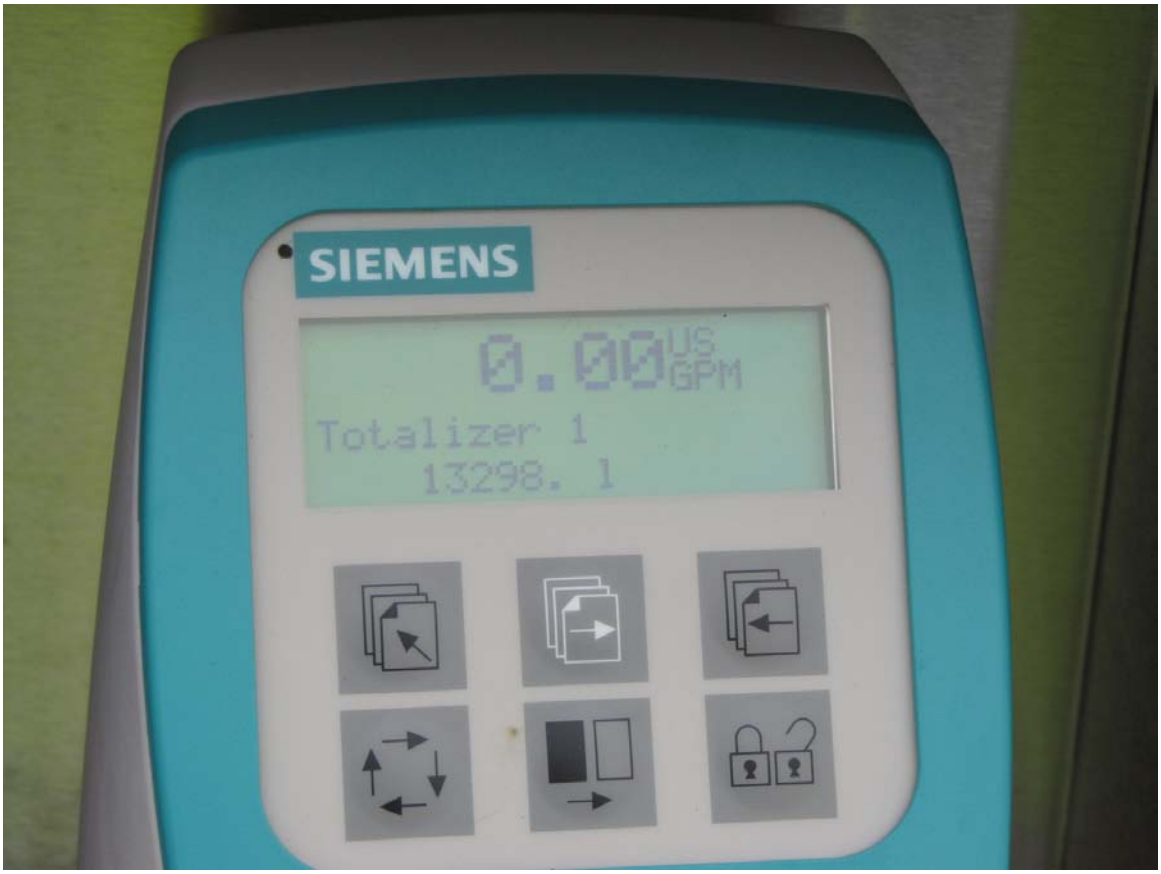
Segment 2 Oversight Report
April 19, 2010

Photos 009 and 010



Segment 2 Oversight Report
April 19, 2010

Photos 011 and 012



Segment 2 Oversight Report
April 19, 2010

Photos 013 and 014

Segment 2 Oversight Report
April 19, 2010

Photos 015 and 016

Segment 2 Oversight Report
April 19, 2010

Photos 017 and 018

Segment 2 Oversight Report
April 19, 2010

Photos 019 and 020

Segment 2 Oversight Report
April 19, 2010

Photo 021

Segment 2 Oversight Report
April 21, 2010

Photos 001 and 002

Segment 2 Oversight Report
April 21, 2010

Photos 003 and 004

Segment 2 Oversight Report
April 21, 2010

Photo 005

Segment 2 Oversight Report
April 30, 2010

Photos 001 and 002

Segment 2 Oversight Report
April 30, 2010

Photos 003 and 004

Segment 2 Oversight Report
April 30, 2010

Photos 005 and 006

Segment 2 Oversight Report
April 30, 2010

Photos 007 and 008

Segment 2 Oversight Report
April 30, 2010

Photos 009 and 010

Segment 2 Oversight Report
April 30, 2010

Photos 011 and 012

Segment 2 Oversight Report
April 30, 2010

Photo 013

Segment 2 Oversight Report
May 7, 2010

Photos 001 and 002

Segment 2 Oversight Report
May 7, 2010

Photos 003 and 004

Segment 2 Oversight Report
May 7, 2010

Photo 005

Segment 2 Oversight Report
July 1, 2010

Photos 001 and 002

Segment 2 Oversight Report
July 1, 2010

Photos 003 and 004

Segment 2 Oversight Report
July 1, 2010

Photos 005 and 006

Segment 2 Oversight Report
July 1, 2010

Photos 007 and 008

Segment 2 Oversight Report
July 1, 2010

Photos 009 and 010

Segment 2 Oversight Report
July 1, 2010

Photos 011 and 012

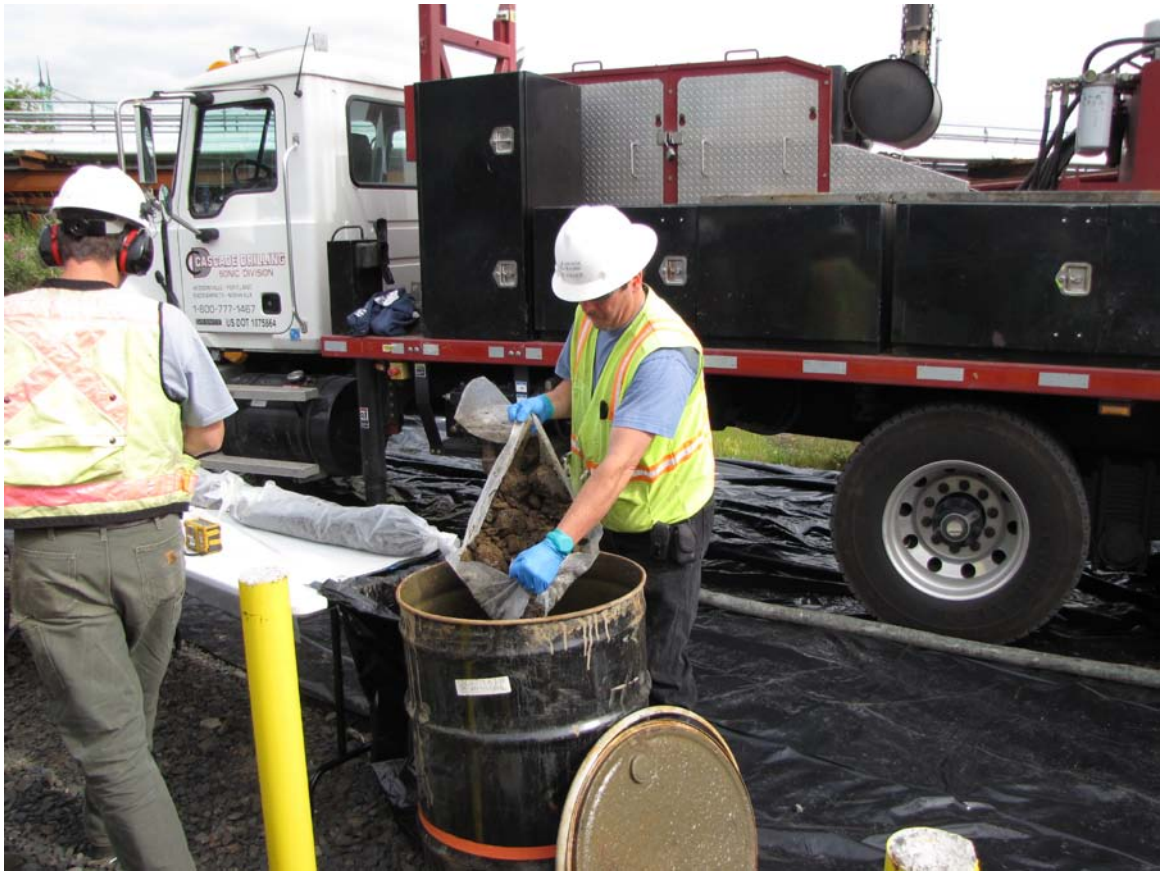
Segment 2 Oversight Report
July 1, 2010

Photos 013 and 014

Photos 015 and 016

Segment 2 Oversight Report
July 1, 2010

Photos 017 and 018



Segment 2 Oversight Report
July 1, 2010

Photos 019 and 020

Segment 2 Oversight Report
July 1, 2010

Photos 021 and 022

Segment 2 Oversight Report
July 1, 2010

Photos 023 and 024

Segment 2 Oversight Report
July 1, 2010

Photos 025 and 026

Segment 2 Oversight Report
July 1, 2010

Photos 027 and 028

Segment 2 Oversight Report
July 1, 2010

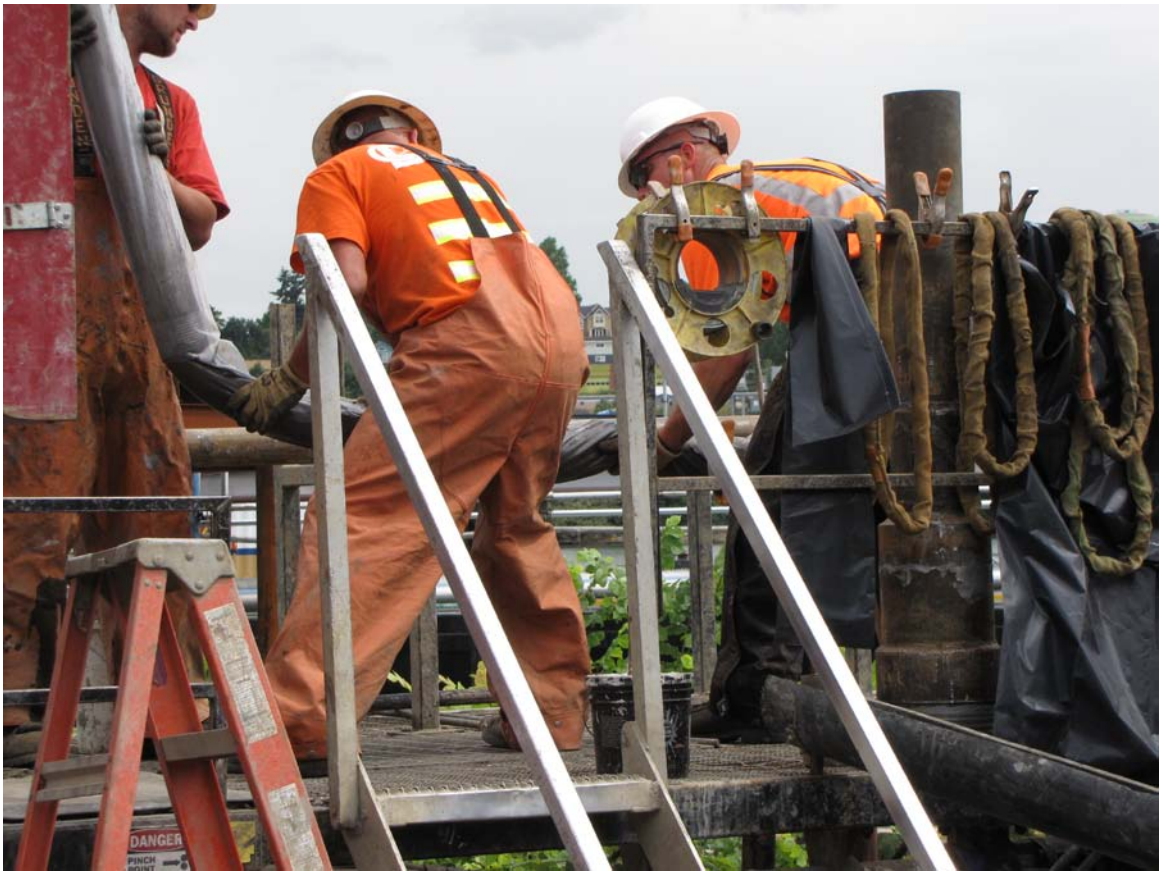
Photos 029 and 030

Segment 2 Oversight Report
July 1, 2010

Photos 031 and 032

Segment 2 Oversight Report
July 1, 2010

Photos 033 and 034



Segment 2 Oversight Report
July 1, 2010

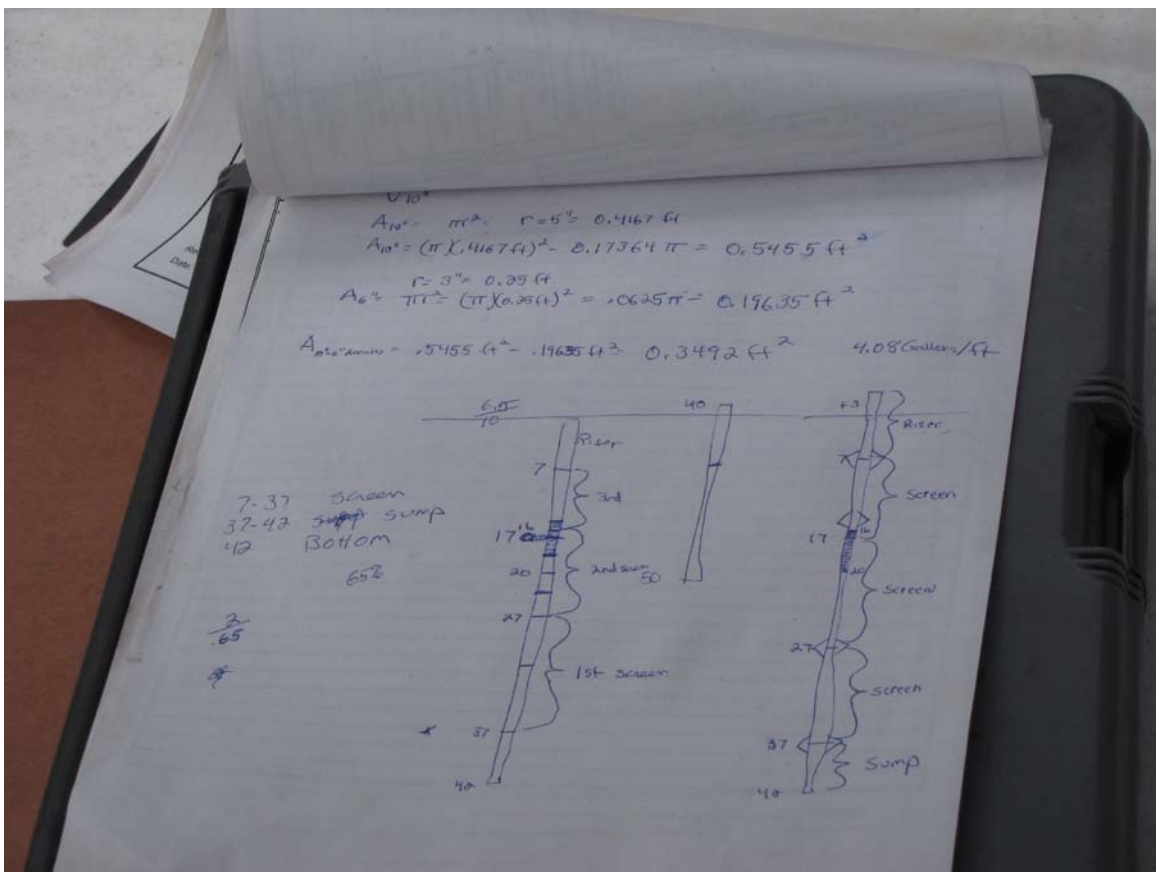
Photos 035 and 036

Segment 2 Oversight Report
July 1, 2010

Photos 037 and 038

Segment 2 Oversight Report
July 1, 2010

Photos 039 and 040



Segment 2 Oversight Report
July 1, 2010

Photos 041 and 042

Photo 043

Segment 2 Oversight Report
July 2, 2010

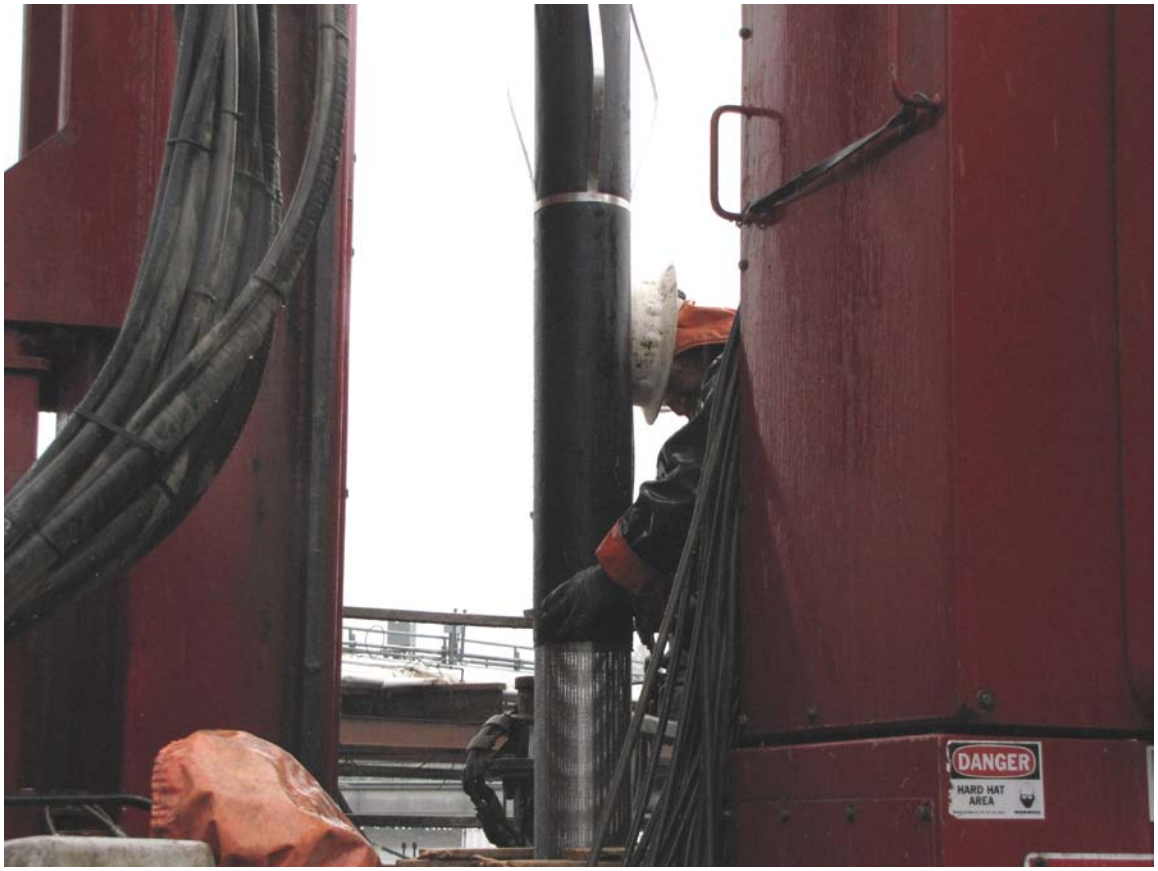
Photos 001 and 002

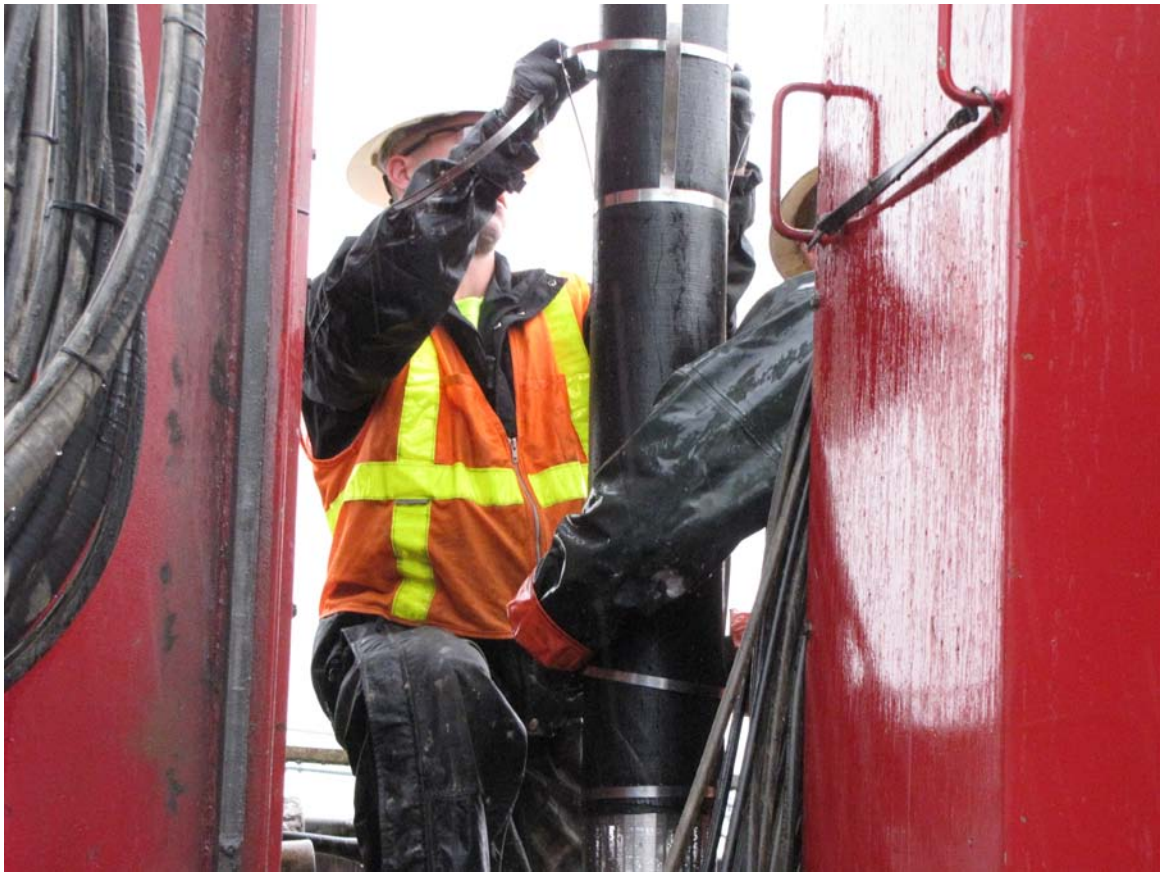
Segment 2 Oversight Report
July 2, 2010

Photos 003 and 004

Segment 2 Oversight Report
July 2, 2010

Photos 005 and 006



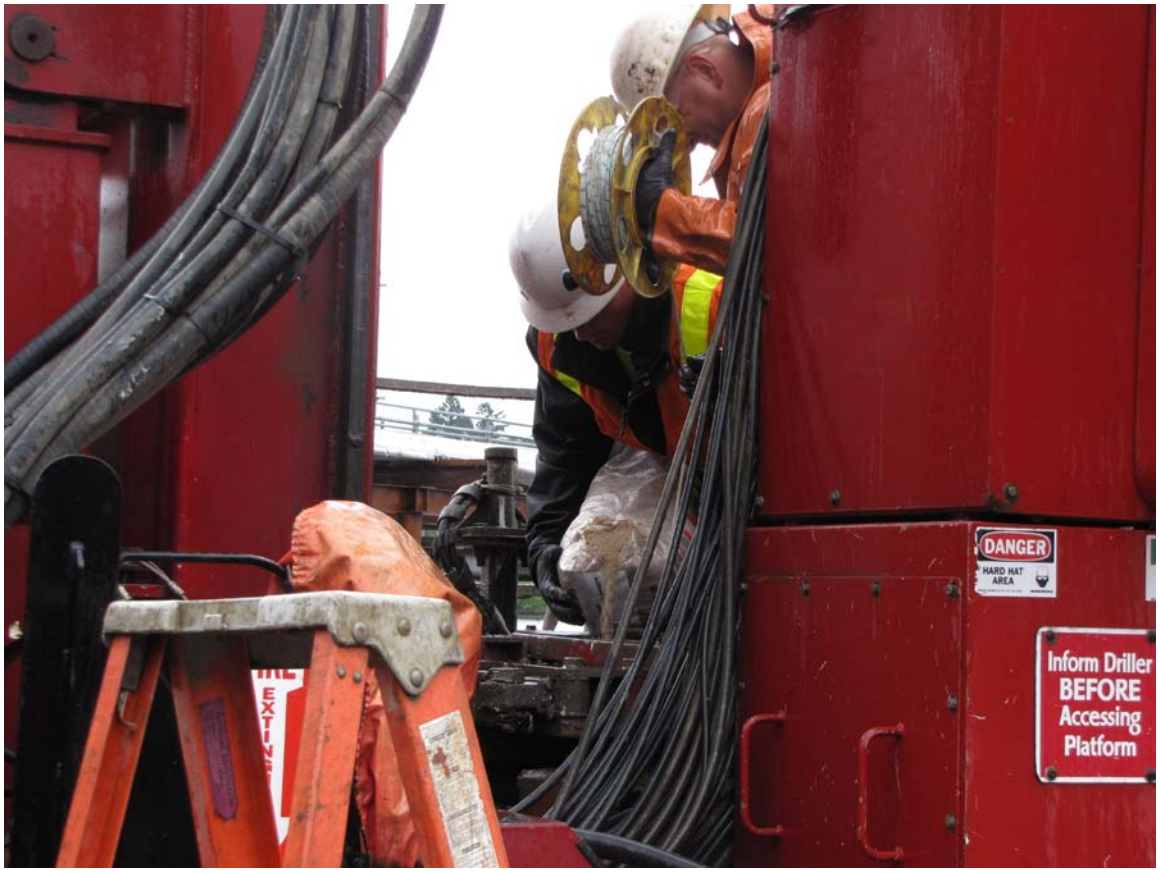


Segment 2 Oversight Report
July 2, 2010

Photos 007 and 008

Segment 2 Oversight Report
July 2, 2010

Photos 009 and 010



Segment 2 Oversight Report
July 2, 2010

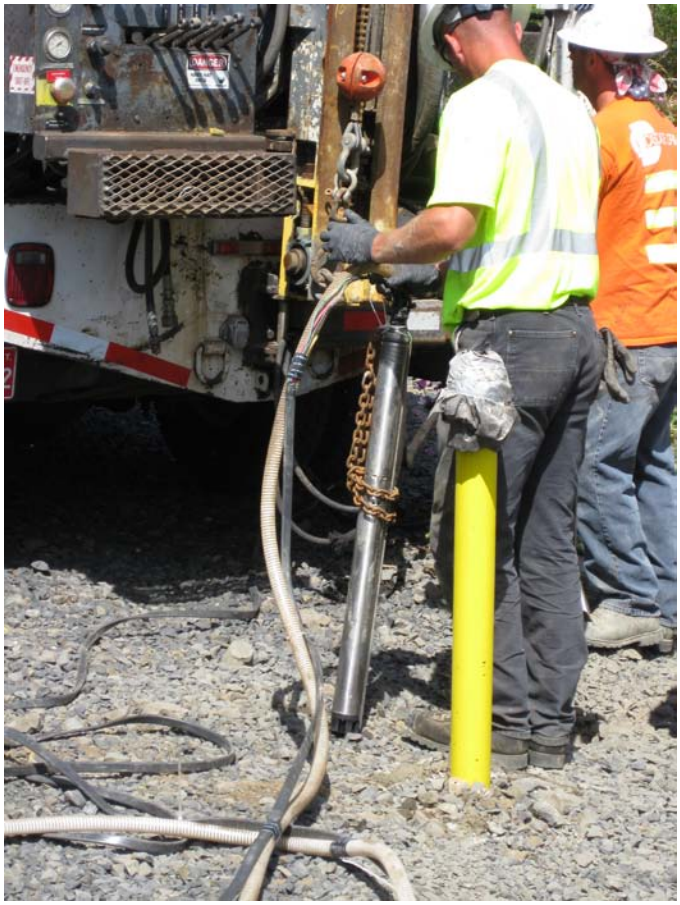
Photo 011

Segment 2 Oversight Report
July 16, 2010

Photos 001 and 002

Segment 2 Oversight Report
July 16, 2010

Photos 003 and 004



Segment 2 Oversight Report
July 16, 2010

Photos 005 and 006

Segment 2 Oversight Report
July 16, 2010

Photos 007 and 008

Segment 2 Oversight Report
July 16, 2010

Photo 009

Segment 2 Oversight Report
August 12, 2010

Photos 001 and 002

Segment 2 Oversight Report
August 12, 2010

Photos 003 and 004

Segment 2 Oversight Report
August 12, 2010

Photos 005 and 006

Segment 2 Oversight Report
August 12, 2010

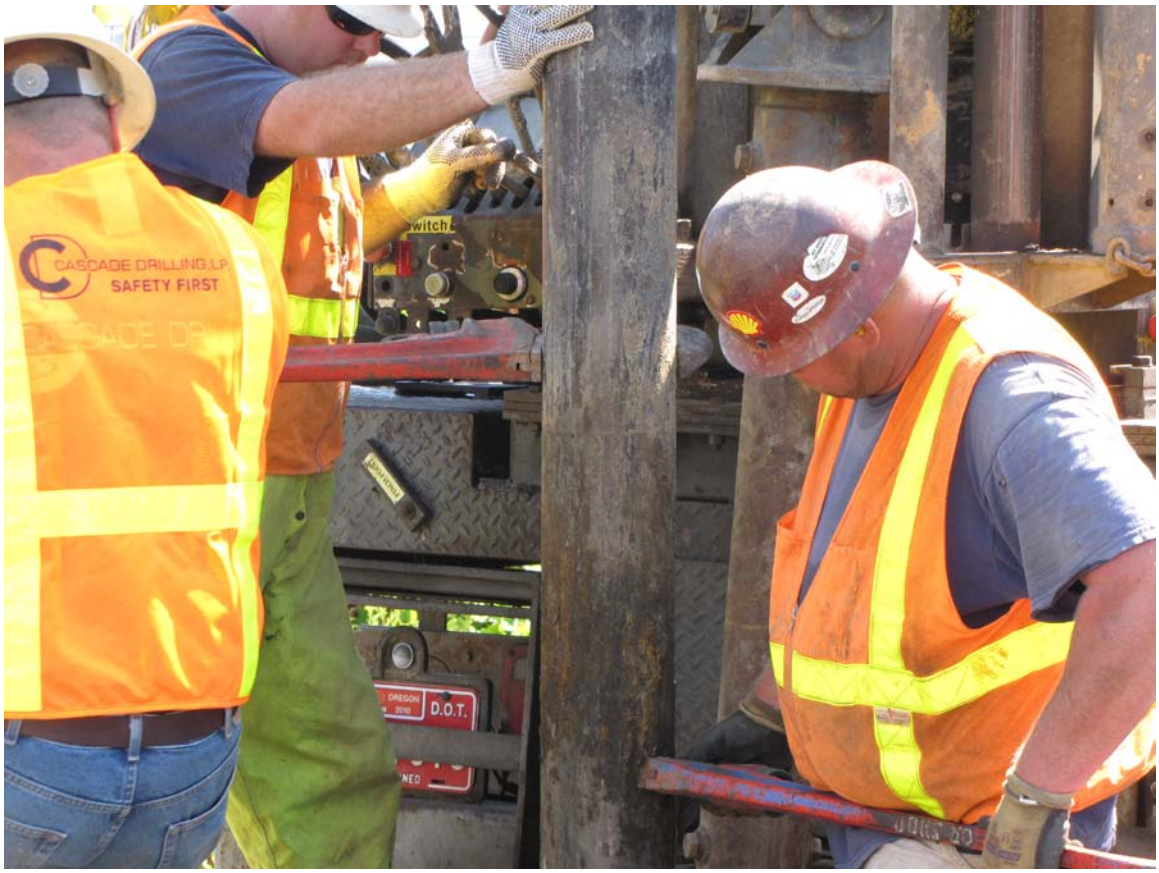
Photos 007 and 008

Segment 2 Oversight Report
August 12, 2010

Photos 009 and 010

Segment 2 Oversight Report
August 12, 2010

Photos 011 and 012

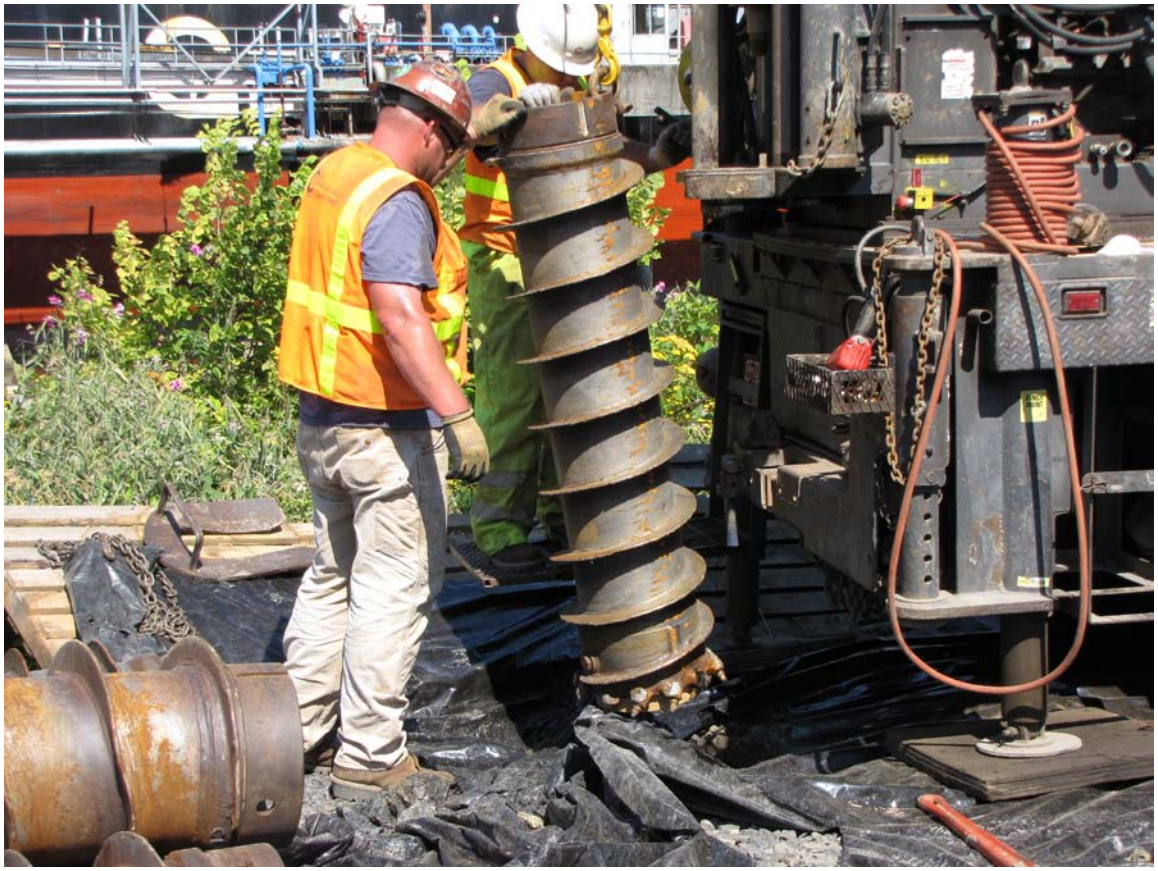


Segment 2 Oversight Report
August 12, 2010

Photos 013 and 014

Segment 2 Oversight Report
August 12, 2010

Photos 015 and 016



Segment 2 Oversight Report
August 12, 2010

Photos 017 and 018

Segment 2 Oversight Report
August 13, 2010

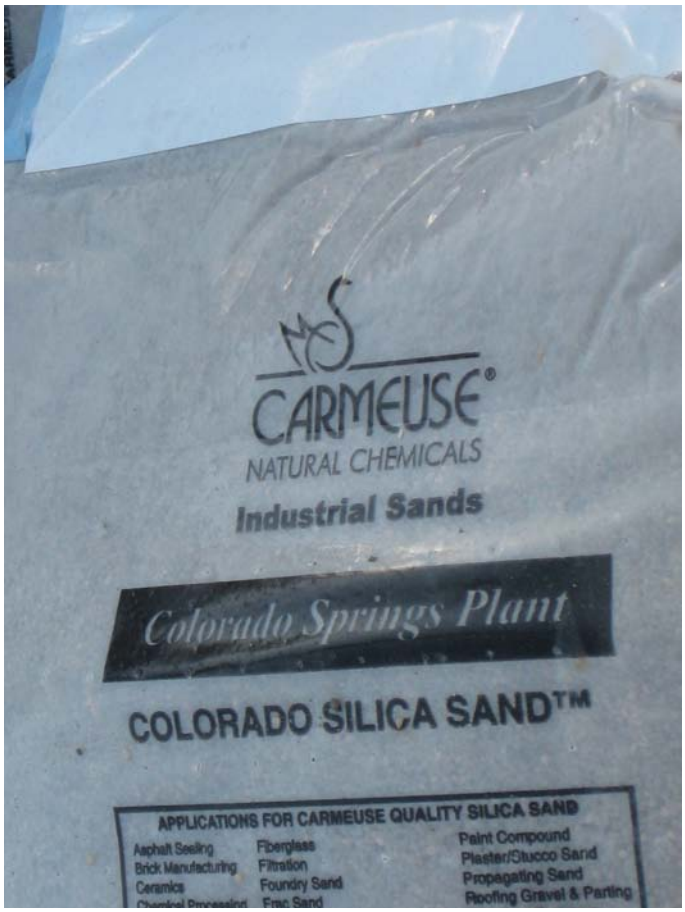
Photos 001 and 002

Segment 2 Oversight Report
August 13, 2010

Photos 003 and 004

Segment 2 Oversight Report
August 13, 2010

Photos 005 and 006



Segment 2 Oversight Report
August 13, 2010

Photos 007 and 008

Segment 2 Oversight Report
August 13, 2010

Photos 009 and 010

Segment 2 Oversight Report
August 13, 2010

Photos 011 and 012

Segment 2 Oversight Report
August 13, 2010

Photos 013 and 014

Segment 2 Oversight Report
August 13, 2010

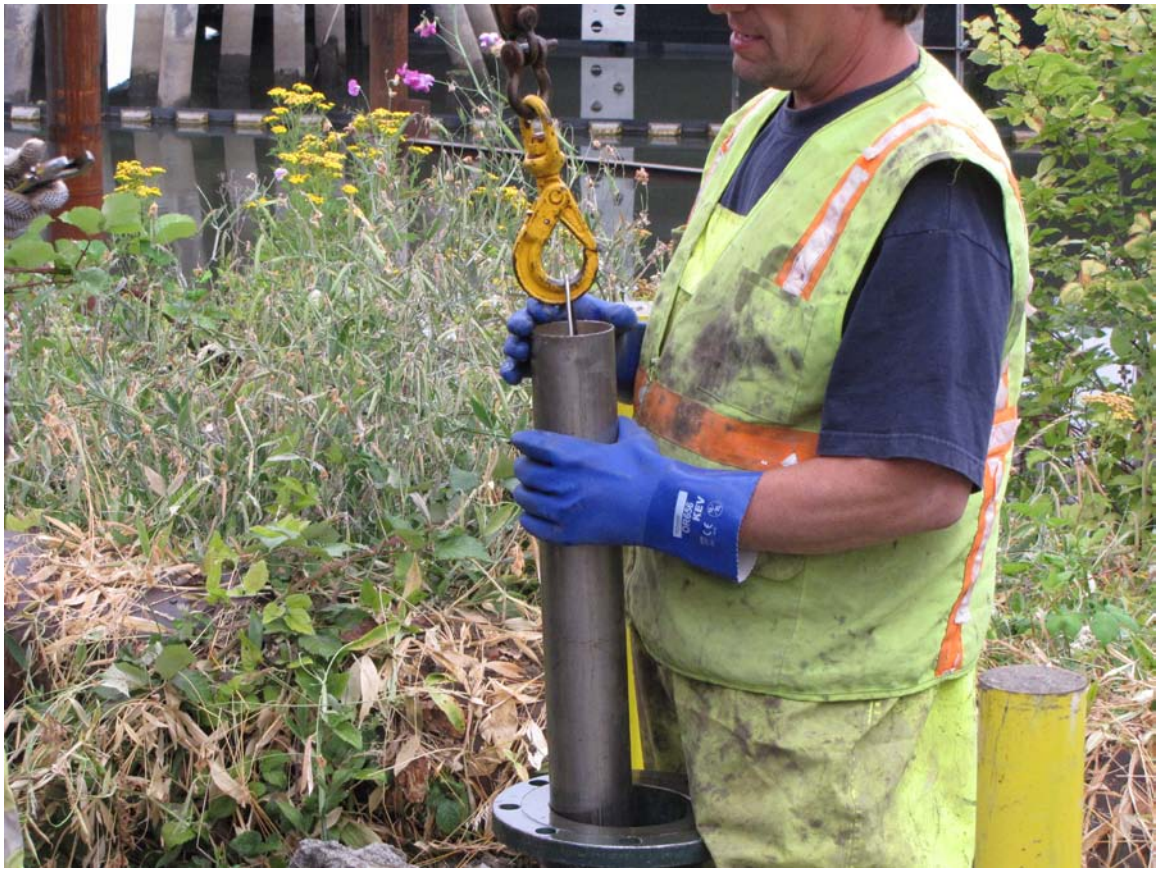
Photo 015

Segment 2 Oversight Report
August 19, 2010

Photos 001 and 002

Segment 2 Oversight Report
August 19, 2010

Photos 003 and 004



Segment 2 Oversight Report
August 19, 2010

Photos 005 and 006

Segment 2 Oversight Report
August 19, 2010

Photos 007 and 008

Segment 2 Oversight Report
August 19, 2010

Photos 009 and 010

Segment 2 Oversight Report
August 19, 2010

Photos 011 and 012

Segment 2 Oversight Report
September 2, 2010

Photos 001 and 002

Segment 2 Oversight Report
September 2, 2010

Photos 003 and 004

Segment 2 Oversight Report
September 2, 2010

Photo 005

Segment 2 Oversight Report
September 9, 2010

Photos 001 and 002

Segment 2 Oversight Report
September 9, 2010

Photos 003 and 004

Segment 2 Oversight Report
November 8, 2010

Photos 001 and 002

Segment 2 Oversight Report
November 8, 2010

Photos 003 and 004

Segment 2 Oversight Report
November 8, 2010

Photos 005 and 006

Segment 2 Oversight Report
November 8, 2010

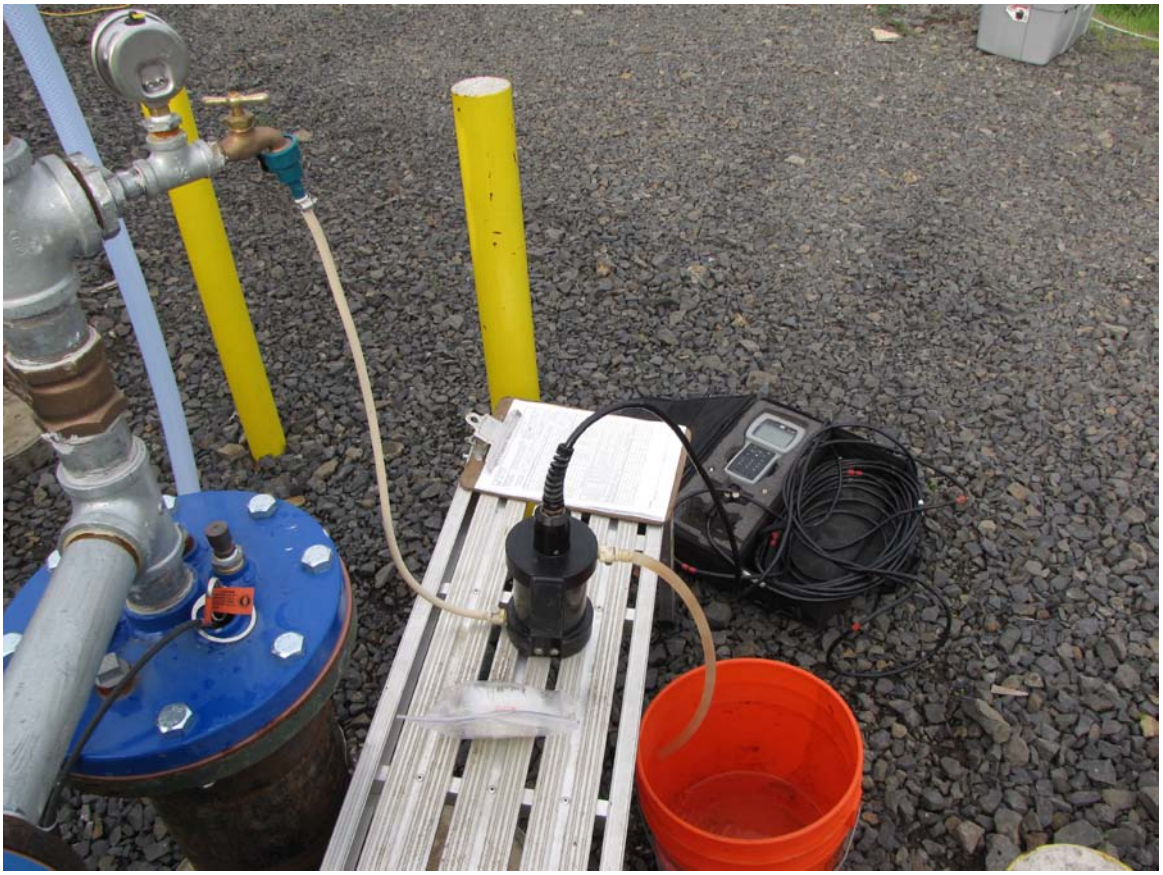
Photos 007 and 008

Segment 2 Oversight Report
November 8, 2010

Photos 009 and 010

Segment 2 Oversight Report
November 11, 2010

Photos 001 and 002



Segment 2 Oversight Report
November 11, 2010

Photos 003 and 004

Appendix C
Health and Safety Inspection Reports

CDM Field Safety Report for the GASCO Piezometer Installation November 17-18, 2009

Health and Safety Summary

11/17/09

At 06:30 hrs Kickoff Health & Safety meeting was held by the project SHSO Tim Stone (Anchor QEA). Tim Stone reviewed the site H&S plan, emergency evacuation plan, proper use of PFD, contamination of concerns, location of first aid kit, AED, eyewash and fire extinguishers. In addition, the team lead for Cascade Drilling (Steve) went over the operating procedures for the sonic drill rig.

Drilling of boring for the first piezometer started at 12:35 hrs. At 13:15 hrs it was observed that one of the helpers set the 4-inch diameter drilling pipe against the pipe rack causing a potential striking hazard. John Renda (Anchor QEA) was made aware of the situation and he spoke with the drilling contractor. The hazard was corrected by the drilling contractor by constructing a low profile table out of 4x4 timbers so that the drilling pipe was not in contact with the ground.

At approximately 13:35 hrs drilling operations were stopped because of the lack of 8-inch diameter conductor casing. During this shut down the drilling operator lifted the drill, leaving the drill head suspended. John Renda (Anchor QEA) was made aware of the situation and he spoke with the drilling operator. He then corrected the action immediately by placing the drill head in a lowered (safe) position. This item is noted as a corrected deficiency on the attached inspection summary.

General observation, Anchor personnel were observed collecting PID readings at select intervals as described in the HASP at all working locations.

11/18/09

At 06:30 hrs attended tailgate safety meeting lead by Cascade Drilling lead.

At 08:45 hrs drilling helpers were observed with gross amount of material being placed on their clothing by the drill pipe while removing it from the drill rig. Discussed this issue with the SSHO Tim Stone (Anchor QEA) and 3 corrective actions were taken by the drilling subcontractor.

1. Placed an inline gasket on the pipe to remove the gross material prior to the removal of the pipe off of the drill rig.

2. Added larger decontamination stations so that out layers can be washed off prior to leaving the EZ

3. Driller helpers donned a washable outer layer.

At 1400 one of two driller helpers was observed standing too close to the drill head while the sonic rig was in operation causing a potential crushing hazard. This was immediately brought to the attention of John Renda (Anchor QEA) and drilling sub contractor. The Cascade Drilling lead had a brief discussion with all Cascade's employees onsite discussing the importance of staying clear of drill head while in operation.

CDM Field Safety Report for the GASCO Piezometer Installation November 17-18, 2009

Overall Safety Summary

Based on a review of the GASCO Piezometer Installation efforts performed by Anchor QEA and their subcontractors all program elements are in place to the degree required by Federal OSHA standards and the site HASP as documented in the daily safety inspections.

Safety Net Inspection Review

The following tables provide a summary of the SafetyNet inspections performed at the GASCO Field Site on November 17 and 18, 2009.

The SafetyNet system employs a user-friendly platform to quickly and efficiently recording observations of field activities. Checklists are stored on a PDA device and are used by H&S personnel to evaluate work progress and compliance with the Site HASP. Observations of activities are objectively treated as either safe or unsafe. Safe observations are uploaded to the server and tracked accordingly. Unsafe observations are treated as on open issues that must be corrected. Information related to the unsafe observations, such as the type and severity of the hazard, recommended corrective action, party responsible for implementing the corrective action, and the timeframe required to complete the corrective action, must be entered. Unsafe observations (i.e., open issues) remain open until a corrective action has been confirmed. The time duration of open issues is also tracked.

The SafetyNet inspections allow for a comprehensive assessment of all program elements required under the Site HASP

Inspection Type	Inspections	Observations	Unsafe Conditions	% Safe
Safety	2	96	5	94.8%

Category	Sub-Category	Observations	Conditions	
			Unsafe Conditions	Safe Conditions
Administration	Summary	6	0	6
	Emergency action plan	1	0	1
	First Aid/CPR trained person	1	0	1
	First aid kit available	1	0	1
	MSDS manual	2	0	2
	Safety meetings	1	0	1

CDM Field Safety Report for the GASCO Piezometer Installation November 17-18, 2009

Category	Sub-Category	Observations	Conditions	
			Unsafe	Safe
Drilling Operations	Summary	20	5	15
	Atmospheric monitoring	1	0	1
	Containers labeled/stored	1	0	1
	Deficiencies corrected	1	1	0
	Empl. trained in oper proc	1	1	0
	Equipment clean	2	0	2
	Exclusion zone for drill rig	2	0	2
	Fluid leaks contained	1	0	1
	Hydraulic hose condition	1	1	0
	Leaks on rig	1	0	1
	MSDS sheet available	1	0	1
	One Call utilized	3	0	3
	Smoking policy observed	1	0	1
	Struck by hazards	2	2	0
	Trip hazards	1	0	1
	Warning labels in place	1	0	1
Environmental	Summary	3	0	3
	Spill containment adequate	1	0	1
	Spill kit available	2	0	2
Fire Protection	Summary	1	0	1
	Ext charged and inspected	1	0	1
Hazard Communications	Summary	2	0	2
	MSDS' (site specific)	1	0	1
	Proper labels on containers	1	0	1
Housekeeping	Summary	1	0	1
	Walkways clear	1	0	1
Medical / Emergency	Summary	4	0	4
	1st aid kit	1	0	1
	Emergency action plan	1	0	1
	Eye wash	1	0	1
	Map to medical facility	1	0	1

CDM Field Safety Report for the GASCO Piezometer Installation November 17-18, 2009

Category	Sub-Category	Observations	Conditions	
			Unsafe	Safe
P.P.E.	Summary	139	0	139
	Glasses / face shields	25	0	25
	Gloves	11	0	10
	Hard Hats	31	0	31
	Hearing protection	11	0	11
	Metatarsal protection	20	0	20
	Proper Clothing	31	0	31
	Work Boots	11	0	11

CDM Field Safety Report: Gasco Well Installation 1/25/10 – 1/27/10

Health and Safety Summary

Provided By: Paul Opem, CSP

01/25/10:

12:40 hrs: Project kickoff meeting, led by Tim Stone and John Renda of Anchor QEA, provided an overview of expected site activities and potential hazards during planned monitoring, observation, and pumping well installation. Discussion of chemical hazards of concern, including primarily TPH, PAHs, VOCs, benzene, cyanide, and NAPL. Air monitoring and physical observations are to be performed regularly for presence of chemical hazards. Action levels and corresponding personnel activities (e.g., halting work activities and evaluating engineering controls) were discussed.

General health and safety (H&S) components were reviewed, including: required PPE; emergency response and evacuation routes; work zone establishment (i.e., support zone, exclusion zone, contamination reduction zone); means of communication; and site layout hazards (e.g., traffic, slip/trip/fall hazards). Location and operation of AED unit was reviewed, which was to remain in the site office trailer due to cold weather conditions. In addition, spill response and notification procedures were reviewed.

The Cascade Drilling site supervisor walked everyone through the firm's H&S philosophy, reviewing drill-rig specific hazards and explained that everyone onsite has stop work authority in the event of observed H&S deficiencies.

15:30 hrs: Sonic drill rig and separate truck-mounted crane were set up at the drilling location for MW-22. CDM H&S requested that the exclusion zone be expanded to include a distance of 1.5 times the height of the drill mast in all directions where feasible. This entailed moving parked vehicles and caution flagging. Additionally, steep embankment and brush locations were pointed out as critical fall hazards for all site personnel to be aware of.

01/26/10:

07:10 hrs: Daily safety meeting was held, led by John Renda and Matt Wilson of Anchor QEA. Issues discussed included the required hearing protection, hand signal communication with operator and crew for all approaching personnel, and site-specific fall hazards.

CDM H&S requests that Anchor bring an air horn to the each drill site in case of emergency.

During the meeting, CDM H&S requested clarification of the following issues:

- Why is the AED unit stored in the office trailer when the extra time spent retrieving the unit could determine the difference between life and death for personnel requiring it?

  Anchor personnel explained that the unit must go through a warm-up cycle when ambient temperatures drop to approximately 32 degrees Fahrenheit. CDM H&S requested that a storage method be devised so that AED is at each drill location and

available, and also asked for another operations review with all present personnel. Anchor provided a run through of the AED's usage and stated they would evaluate how to keep the unit at the drilling locations at all times. This was resolved on January 28th with the AED being stored in the Anchor QEA field van at each drilling site.

- Spill notification procedures: CDM reinforced the need to notify CDM of any site spills, regardless of quantity, and to follow established spill reporting procedures with EPA.
- Were all necessary utility locates throughout the site performed, particularly all of the underground locations?
  John Renda confirmed that Anchor had arranged previously for the utility locates, and all locations were marked appropriately.

07:40 hrs: Attended a drill rig hazard walkthrough with Cascade's site supervisor. Reviewed the equipment's critical hazards, including pinch points and potential moving/struck by hazards. Also discussed were emergency shut-off locations and appropriate personnel access routes when moving around the machinery.

10:45 hrs: CDM H&S inquired as to whether Cascade personnel are wearing the nitrile inner gloves beneath the outer chemical resistance layer, which is required per the Gasco Site Health and Safety Plan (HASP). CDM is informed that only the outer layer of gloves is being worn. CDM H&S requests that Matt Wilson of Anchor QEA notify Cascade personnel to don the additional layer of gloves as soon as they are able. Cascade complies with this request.

A hydraulic line on the Sonic drill rig was pinched and leaked fluid onto the plastic sheeting beneath. CDM H&S observed the leak as small and completely contained on the plastic, with Cascade personnel immediately mopping up the material with absorbent pads from the spill kit. Cascade shut down operations temporarily to arrange for replacement of the hydraulic line.

12:45 hrs: The damage to the hydraulic hose on the sonic rig was caused from use of the 12-inch casing jaws. A second leak occurred before the driller realized the issue and the solution is to stop using the 12-inch jaws as they are not needed until drilling for the pumping wells. The hose configuration will be modified such that the pinching issue will no longer be present. Drilling resumed at approximately 13:25 hrs after the second hydraulic line repair was complete.

14:23 hrs: After resumption of drilling activities CDM H&S observed that potable water is not available in the form of a hand/face wash at the personnel decontamination location. CDM requested that Anchor provide a portable sprayer or equivalent so that employees leaving the exclusion zone may more adequately clean their hands/face upon leaving the zone.

The drilling crew was observed to be showing signs of potential contaminant and debris on their Level D "street" clothing. CDM H&S requests that all Cascade Drilling personnel in the exclusion zone don Tyvek protective clothing over their "street" clothes. The Cascade crew

halted operations briefly and dons Tyvek, stating they would bring a larger quantity of protective suits for utilization in the exclusion zone on a daily basis.

13:45 hrs: The lack of a "flapper" on the drill bit was preventing capture of sample material from the soil core. It was decided that drilling operations would be halted so that repairs could be made, with activities to resume on 01/27/10.

01/27/10:

07:10 hrs: Daily H&S meeting attended, led by Matt Wilson of Anchor QEA. Discuss solution to AED unit location: equipment is to be kept at drill site in the Anchor van, with acknowledgment of this location by all attending personnel. Anchor will store the equipment in the site's office trailer overnight in order to prevent exposure to freezing temperatures.

Proper and HASP-compliant PPE was worn by Cascade personnel throughout the day, including acceptable inner/outer gloves and Tyvek suits. Potable water in a portable sprayer was set up and available at the personnel decontamination station (exit from exclusion zone).

13:44 hrs: CDM H&S observed "return" water spilling from the drill casing and onto the plastic sheeting beneath the drill rig. Cascade placed plastic buckets beneath in order to capture the fluid but means is not sufficient to collect all of the water. CDM H&S requests that the excess material be vacuumed and disposed of as IDW, and that larger capture basins be placed beneath the drill platform to effectively contain any "return" water. Cascade complied with this request and installed a basin to surround the drill casing.

There were no additional spills of any kind observed by CDM H&S throughout the day on 01/27/10.

Overall Safety Summary

Based on a review of the Gasco well installation efforts performed by Anchor QEA and their subcontractors, all program elements are in place to the degree required by Federal OSHA standards and the site HASP as documented in the daily safety review inspections.

SafetyNet Inspection Review

The SafetyNet system employs a user-friendly platform to quickly and efficiently record observations of field activities. Checklists are stored on a PDA device and are used by H&S personnel to evaluate work progress and compliance with the November 2009 Gasco Site HASP, prepared by Anchor QEA, LLC. Observations of activities are objectively treated as either safe or unsafe. Safe observations are uploaded to the server and tracked accordingly. Unsafe observations are treated as an open issue that must be corrected. Information related to the unsafe observation, such as the type and severity of the hazard, recommended corrective action, party responsible for implementing the corrective action, and the timeframe required to complete the corrective action, must be entered. Unsafe observations (i.e., open issues) remain open until a corrective action had been confirmed. The time duration of open issues is also tracked.

The SafetyNet inspections allow for a comprehensive assessment of all program elements required under the HASP.

The following tables provide a summary of the SafetyNet inspections performed by CDM H&S at the Gasco Site from 1/25/10 through 1/27/10.

CDM Field Safety Report: Gasco Well Installation 1/25/10 – 1/27/10

Inspection Type	Inspections	Observations	Unsafe Conditions	% Safe
Safety	8	297	6	98.0%

Category	Sub-Category	Observations	Conditions		% Safe
			Unsafe Conditions	Safe Conditions	
Administration	Summary	7	0	7	100.0%
	First Aid/CPR trained person	1	0	1	100.0%
	First aid kit available	2	0	2	100.0%
	Safety meetings	4	0	4	100.0%
Drilling Operations	Summary	50	1	49	98.0%
	Atmospheric monitoring	4	0	4	100.0%
	Containers labeled/stored	3	0	3	100.0%
	Emp know accident report pro	1	0	1	100.0%
	Equipment clean	2	0	2	100.0%
	Exclusion zone for drill rig	4	0	4	100.0%
	Fluid leaks contained	3	1	2	66.7%
	Hydraulic hose condition	5	0	5	100.0%

CDM Field Safety Report: Gasco Well Installation 1/25/10 – 1/27/10

Category	Sub-Category	Observations	Conditions		% Safe
			Unsafe Conditions	Safe Conditions	
	IDW handling/drum lifting	4	0	4	100.0%
	Knowledge of shut down switch	3	0	3	100.0%
	Leaks on rig	4	0	4	100.0%
	Material handling	2	0	2	100.0%
	Rig set up	2	0	2	100.0%
	Shut down devices	2	0	2	100.0%
	Smoking policy observed	2	0	2	100.0%
	Struck by hazards	2	0	2	100.0%
	Trip hazards	4	0	4	100.0%
	Underground utilities located	1	0	1	100.0%
	Work area organized	2	0	2	100.0%
Environmental	Summary	12	0	12	100.0%
	Containers labeled	1	0	1	100.0%
	Dust Control Adequate	3	0	3	100.0%
	Haz material properly stored	1	0	1	100.0%

CDM Field Safety Report: Gasco Well Installation 1/25/10 – 1/27/10

Category	Sub-Category	Observations	Conditions		% Safe
			Unsafe Conditions	Safe Conditions	
	Spill containment adequate	1	0	1	100.0%
	Spill kit available	4	0	4	100.0%
	Spill response awareness	1	0	1	100.0%
	Vehicle / machinery leaks	1	0	1	100.0%
Fire Protection	Summary	3	0	3	100.0%
	Ext charged and inspected	2	0	2	100.0%
	Fire suppression equip avail	1	0	1	100.0%
Hazard Communications	Summary	1	0	1	100.0%
	Employees trained	1	0	1	100.0%
Housekeeping	Summary	7	0	7	100.0%
	Roadway around proj clear	3	0	3	100.0%
	Slip, trip, fall hazards	3	0	3	100.0%
	Trash in protected cont	1	0	1	100.0%
Medical / Emergency	Summary	12	0	12	100.0%
	1st Aid/CPR on site	2	0	2	100.0%
	1st aid kit	6	0	6	100.0%

CDM Field Safety Report: Gasco Well Installation 1/25/10 – 1/27/10

Category	Sub-Category	Observations	Conditions		% Safe
			Unsafe Conditions	Safe Conditions	
	Eye wash	2	0	2	100.0%
	Map to medical facility	2	0	2	100.0%
Motorized Equipment	Summary	2	0	2	100.0%
	Wheels chocked	2	0	2	100.0%
P.P.E.	Summary	195	2	193	99.0%
	Glasses / face shields	38	1	37	97.4%
	Gloves	19	1	18	94.7%
	Hard Hats	37	0	37	100.0%
	Hearing protection	27	0	27	100.0%
	Proper Clothing	37	0	37	100.0%
	Work Boots	37	0	37	100.0%
Site / Public Protection	Summary	8	3	5	62.5%
	Adequate washing facilities	1	1	0	0.0%
	Barricades installed properly	2	1	1	50.0%
	Perimeter fences	2	1	1	50.0%
	Public protection signage	2	0	2	100.0%

CDM Field Safety Report: Gasco Well Installation 1/25/10 – 1/27/10

Category	Sub-Category	Observations	Conditions		% Safe
			Unsafe Conditions	Safe Conditions	
	Traffic Control plan	1	0	1	100.0%

OSHA Recordables/Lost Time:1/25/10-1/27/10 = 0	**OSHA Recordables/Lost Time To Date = 0**

Appendix D
Field Change Requests

ANCHOR QEA

NW NATURAL
GASCO SITE
FIELD CHANGE REQUEST (FCR) FORM

Project Name: Segment 2 Capture Zone Field Test **Project No.** 000029-02.23
Client: NW Natural **Request No:** FCR 1

To: John Edwards **Date:** August 6, 2010

Field Change Request Title: Abandon and Replace Well PW 8 37

Description This Field Change Order Request responds to EPA's July 24, 2010 e-mail directing NW Natural to abandon well PW-8-37 and construct a replacement pumping well in the upper alluvium. Our understanding is that the basis for this direction from EPA is the Oregon Water Resources Department direction to abandon the well.

Recommended Change: The plan for abandoning well PW 8 37 and constructing replacement well PW 8 37b has been developed through a cooperative effort that has included preparation of three written addendums, concurrent with review of same by EPA and DEQ. Addendum 3 to the plan was submitted to EPA and DEQ on August 6 for approval. The three addendums are attached to this FCR.

Matt Wilson	Matthew Wilson	8/06/10
AQ Field Operations Lead (or designee)	**Signature**	**Date**

Approval:

John E Edwards	John E Edwards	8/6/10
AQ Project Manager	**Signature**	**Date**

Distribution:

Sean Sheldrake, EPA email: Sheldrake.Sean@epamail.epa.gov phone: 206-553-1220
John Edwards, Anchor QEA
Ryan Barth, Anchor QEA
Bob Wyatt, NW Natural

ANCHOR QEA

NW NATURAL
GASCO SITE
FIELD CHANGE REQUEST (FCR) FORM

Project Name: Segment 2 Capture Zone Field Test **Project No.** 000029-02.23
Client: NW Natural **Request No:** FCR-2

To: Sean Sheldrake **Date:** August 27, 2010

Field Change Request Title:
Temporary Pump installation for Testing of well PW-8-39

Description:
Previous plans for this work indicated that the pumping wells would be equipped with automated pumps and controls. Due to the anticipated low yield of well PW-8-39 we need further information on well performance before deciding on how to incorporate the well into the existing well control system.

Recommended Change:
A temporary submersible pump will be installed in PW-8-39 for the purpose of pump testing. This was discussed with Lance Peterson of CDM in a telephone conversation on August 20, 2010 and approved by EPA in an email dated August 24, 2010. Before running the first 72-hour pump test, PW-8-39 will be tested to determine achievable pumping rates for the longer term tests.

JOHN J RENDA		8/27/10
AQ Field Operations Lead (or designee)	**Signature**	**Date**

Approval:

John R Edwards		8/27/2010
AQ Project Manager	**Signature**	**Date**

Distribution:

Sean Sheldrake, EPA email: Sheldrake.Sean@epamail.epa.gov phone: 206-553-1220
Dana Bayuk, DEQ
Henning Larson, DEQ
John Edwards, Anchor QEA
Ryan Barth, Anchor QEA
Bob Wyatt, NW Natural